ANNUAL REPORT
WESTERN REGIONAL RESEARCH CENTER
COMPREHENSIVE RESEARCH ON RICE
January 1, 1990 - December 31, 1990

PROJECT TITLE:	Rice Utilization and Product Development
PROJECT LEADER:	R. N. Sayre Acting Research Leader Food Quality Research Unit Western Regional Research Center USDA Albany, California 94710 (415) 559-5664
WRRC INVESTIGATORS:	A. A. Betschart M. M. Bean R. H. Edwards T. S. Kahlon A. P. Mossman J. Wellwood A. Soria
LEVEL OF 1990 FUNDING:	$25,000
PROPOSAL OBJECTIVES:	To carry out research work on California rices that ultimately will lead to new products for domestic and foreign markets.
RESEARCH OBJECTIVES:	1. Stabilized Rice Bran 2. Extrusion Technology 3. Rice Quality Assessment 4. Rice Flours 5. Standards for Edible-Grade Rice Bran

SUMMARY OF 1990 RESEARCH (MAJOR ACCOMPLISHMENTS) BY OBJECTIVE:

1. Stabilized Rice Bran: WRRC has continued to provide analytical services and technical advice to rice mills and equipment suppliers who are in start-up situations for stabilizing rice bran. Some concern has developed in the industry this past year over some flavor deterioration when stabilized rice bran is reheated during processing into food products. This appears to be due to oxidative deterioration of the oil and related to the severity of the stabilization treatment. Oxidative problems will be minimized by maintaining the mildest possible conditions of stabilization commensurate with inactivation of lipase

enzymes. The use of rice bran in breakfast cereal and baked products is probably in a state of consolidation at present. Some products have been taken off the market while understood by the industry, others are being developed. Once stabilized rice bran characteristics and limitations are understood by the industry, demand will increase on a more sustained basis. Studies have been conducted on hamsters, chickens, and humans during the past year to determine the influence of rice bran and rice bran oil on serum cholesterol status. All have shown beneficial effects and point to the lipid fraction of the bran as the main source of benefit.

2. Extrusion Technology: The Werner and Pfleiderer twin screw, as well as the Brady and Food Extrusion single screw extruders, were operational in 1990. A project to determine the amount of energy transferred from the twin screw extruder to Calrose rice flour as a function of element geometry or configuration, and the extruder operating parameters is nearing completion. This information will enable us to predict the screw geometry necessary to impart a given amount of energy to the product. This work has been done by a U.C. Davis graduate student as part of his Master's thesis in the Department of Food Science and Technology. Most work has focused on the preparation of expanded or puffed products suitable for the snack food industry. Recently, work has begun to produce both white and brown rice pasta on the twin screw using a special multi-hole die. A high protein, high fiber rice residue remaining after the enzymatic removal of the starch phase was tested in the extruder. Additional rice starch was necessary for adequate extrusion behavior of this product.

3. Rice Quality Assessment: Progress was made in developing an equation for predicting amylose by near-infrared reflectance (NIR) technology. This project is ready for involvement of the rice industry and NIR manufacturers. NIR data from Beaumont Uniform Yield Nursery for 1988 and 1989 crops were analyzed at Albany and at Beltsville. NIR spectral regions were found which contain much information associated wth amylose content. These observations were related to differential scanning calorimetry (DSC) and X-ray data obtained on flours and fractions in order to help identify meaningful regions of the NIR spectra for development of prediction equations. The next phase will use rice samples solicited from the industry.

4. Rice Flour: WRRC has continued to cooperate with producers and potential producers of rice flours for various purposes. Tests have been run with the Visco-Amylograph to characterize flour from different types of rice and from different milling procedures, then relate these findings to functional qualities of the flours in food processing. Foreign markets have expanded for waxy rice flour and domestic interest in rice flour seems to be increasing.

5. Standards for Edible-Grade Rice Bran: A set of standards for edible grade rice bran have been adopted by the Rice Millers Association Sub-Committee on By-Products. These non-binding identity standards are a positive influence on the quality of edible rice bran now in the wholesale market.

PUBLICATIONS AND REPORTS:

Saunders, R. M. 1990. The properties of rice bran as a foodstuff. Cereal Foods World. 35(7):632-636.

Sayre, R. N. and Saunders, R. M. 1990. Rice bran and rice bran oil. Lipid Tech. 2(3): 72-76.

Kahlon, T. S., Saunders, R. M., Chow, F. I., Chiu, M. M., and Betschart, A. A. 1990. Influence of rice bran, oat bran and wheat bran on cholesterol and triglycerides in hamsters. Cereal Chem. 67(5):439-443.

Newman, R. K., Betschart, A. A. and Hofer, P. J. 1990. Serum cholesterol in Leghorn chicks fed full-fat or defatted bran. FASEB J. 4:A925 (#3825).

Sayre, R. N. 1990. Rice bran potentials: Oil, pharmaceuticals, chemicals. 23rd Rice Tech. Working Group, Feb 26-28. Biloxi, MS.

Saunders, R. M. 1990. Rice bran: New foods and health benefits. 23rd Rice Tech. Working Group, Feb 26-28. Biloxi, MS.

Betschart, A. A. 1990. Rice bran and rice bran lipids. AACC Short Course on Fiber in Food: Biochemistry, Physiology, and Technology, Oct 11-13, Dallas, TX.

CONCISE GENERAL SUMMARY OF CURRENT YEAR'S RESULTS:

1. The market for stabilized rice bran is now in a state of consolidation as the industry learns how to fully exploit the potential of this food ingredient. Research conducted at and in cooperation with WRRC on both animal and human subjects during the past year have all shown beneficial effects on serum cholesterol status.

2. A detailed study of the effect of screw element configuration and operating parameters of the twin screw extruder on Calrose rice flour is near completion. This information will allow prediction of extruder configuration in order to impart the amount of energy to produce a desired product.

3. Regions in the NIR spectra have been identified which are related to the amylose content of rice starch, and considerable progress has been made in developing a prediction equation for amylose.

4. The Visco-Amylograph has been used to measure the characteristics of different rice flours for use as ingredients in food products.

5. Voluntary standards for edible-grade rice bran are having a positive effect on product quality by encouraging improvement within the industry.