

Food for Peace

Under Title II of Public Law 480—the Food for Peace Program—the United States contributes food for hungry people in some 90 countries. When PL-480 was enacted in 1954, donations were limited to whole commodities, including wheat, feed grains, rice, wheat flour, corn meal, nonfat dry milk, and edible oil. In 1966, the law was amended to permit the enrichment and fortification of commodities to improve their nutritional quality. To develop these products, the four regional research centers, and the Northern laboratory in particular, made many important contributions. These included high-protein blends of U.S. foods for malnourished infants and children, pregnant women, and lactating mothers.

Foods donated under PL-480 today include whole commodities, processed foods, fortified processed foods, and blended food supplements. The nutritional value of several whole grains has been increased with the addition of vitamin A to help combat the blindness that has afflicted thousands of children in Bangladesh and other countries. The fortified foods routinely combine cereals and soybean meal products to increase the quality and quantity of proteins. Wheat flour, for example, is 11 percent protein; soy flour is 52 percent. In addition, the essential amino acids in cereals and soybeans complement each other; cereals are deficient in lysine, while soybeans have a high lysine content. Soybeans, on the other hand, are deficient in sulfur amino acids; cereal proteins are not. As a result, a substantial portion of U.S. donations of bulgur, sorghum grits, cornmeal, bread flour, rolled oats, and corn masa are fortified with 5 to 15 percent of soy protein.

The supplemental soy may be in the form of flakes, grits, or flour, depending on the physical characteristics of the cereal product to which it is added. In addition, all the fortified processed foods except the rolled oats are enriched with added thiamin, riboflavin, niacin, iron, calcium, and vitamin A. Much of the research on fortified foods was conducted at the NRRC,



A child in the Dominican Republic enjoys food donated by the United States under PL-480. It was prepared locally from high-protein blends developed at the Peoria laboratory.

where a process was developed and patented to convert corn and other whole grains to shelf-stable flours with improved nutritional quality.

One of the more recent fortified foods, which is popular in Mexico and Central America, is an instant corn-soya masa flour. The mixture includes a traditional masa, made by steeping corn in lime water before grinding, and 5 percent defatted soy flour. A versatile product that can be used in any recipe that calls for masa, it was field-tested for more than 1-1/2 years before being included in PL-480 programs. Peoria scientists also improved the digestibility of sorghum proteins by removing all of the grain's outer husk before boosting its protein content with 15 percent soy grits.

Blended food supplements have been used in infant and child feeding programs for more than 20 years. They were originally formulated to meet USDA nutritional guidelines by the Agricultural Research Service; they supply both calories and a substantial proportion of the protein, vitamins, and minerals that children need each day. Most widely used of the blends is CSM, standing for corn-soy-milk, that includes precooked cornmeal, defatted toasted soy flour, nonfat dry milk, soybean oil, and 10 vitamins and 6 minerals. A 3-1/2-ounce package supplies at least half the daily nutritional requirements of a preschool child. CSM can be prepared quickly with little cooking, a necessity in fuel-short countries. Peoria technologists also developed an instant CSM that can be prepared without any cooking at all. Another blend, similar to CSM, contains precooked wheat instead of corn.

Since blended food supplements for children were first exported, NRRC researchers have made several product improvements. The soybean oil content was increased from 2 to 6 percent to raise the number of calories per ounce, and various high-nutrition formulas were worked out, using different surplus grains. Storage life of the products was increased, and storage stability was predicted from time-temperature studies. Better processing was developed to destroy *Salmonella* bacteria without lowering CSM's nutritional quality, and more stable forms of vitamins A and C were found and added to the blends.

Thousands of tons of blends continue to be exported each year to fight starvation and malnutrition among infants and children.

Since wheat and corn are widely grown around the world, ARS scientists hoped that Third World countries would copy the formulas for the blended foods and manufacture their own. This has occurred in several places. In one Middle East country, for instance, the government produces biscuits fortified with CSM as part of an effort to upgrade the diets of its people. In addition, a team of engineers at the Northern lab developed a five-step process that villagers in developing nations can use to make protein-rich soybean flour. Training of foreign personnel on use of the process was financed by the United Nations Children's Fund (UNICEF).

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In the Western laboratory, Food for Peace research focused on bulgur, a wheat product used for making pilaf, a traditional food in the Middle East. Working with a wheat food company in Seattle, WRRC scientists succeeded in developing a continuous process for making bulgur, while reducing the cost of making it by two-thirds. They also invented WURLD wheat, a chemically peeled, creamy white bulgur that looks like rice. Information developed at WRRC led to the use of bulgur in the Food for Peace program and eventually to a sevenfold increase in bulgur consumption worldwide.

Scientists at WRRC also developed Protein-Fortified Wheat Flour, Blend A, obtained by mixing 70-percent ordinary wheat flour with 30-percent wheat protein concentrate extracted from wheat milling byproducts. The result was a flour mixture with

more food value, including higher lysine content, than ordinary wheat flour.

On occasion, it is the process that is exported. A new way to prepare protein concentrates from wheat and rice bran, developed at WRRC, is being used in Honduras. The concentrates, when incorporated into breads, have proved effective in combating malnutrition in children.

The Eastern lab at Wyndmoor developed another dietary supplement for children, using soy flour, soybean oil, corn syrup solids, and sweet cheese whey. The resulting whey-soy drink mix was spray-dried and fortified with vitamins and minerals before packaging for export under the Food for Peace program in the early 1970's, when nonfat dry milk was scarce and priced out of reach for Title II food donation programs. Millions of pounds of the whey-soy mix were shipped overseas at that time.

In New Orleans, the Southern lab developed a cottonseed flour with a bland flavor and a light creamy color. It was designed to be an additive to wheat flour to increase its protein content. While never used for donations in the Food for Peace program, the SRRC cottonseed flour process was introduced to the Third World through a pilot plant in India. Despite India's large production of cotton, none of the cottonseed there had previously been used for human consumption.