

Practical Feeding Programs Using Soy Protein as Base¹

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ABSTRACT

The U.S. has furnished billions of lb food commodities containing soy protein for use in feeding programs in the less developed countries. As a result of the low cost, excellent nutritional qualities and functional versatility of soy products, they have been used extensively as protein additives in a broad spectrum of foods for practical feeding programs. Soy flours are a major ingredient in blended foods, such as instant corn soy milk, corn soy blend, and wheat soy blend; and soy flours and grits have been used as protein fortificants in wheat, corn, sorghum, and oat products distributed overseas. Most recently, a new whey soy drink mix has been developed for use in preschool feeding programs and now is being introduced around the world. As more attention focuses on the nutritional requirements of feeding program beneficiaries and on the need for low cost sources of protein, it can be expected that uses for soy protein will expand and additional soy based foods will be added to the list of commodities used in practical feeding programs.

INTRODUCTION

The Agricultural Trade Development and Assistance Act of 1954, As Amended, better known as Public Law 480, is one of the principal sources of food commodities used in practical feeding programs. Title I of PL 480 provides for the sale of food commodities to friendly countries on concessional terms, while Title II provides for donation of foods for disaster relief, works projects, and nutrition projects of various kinds. During the years since PL 480 first became operational, feeding programs supplied with Title II foods have benefited literally hundreds of millions of hungry and nutritionally deprived persons in the less developed countries. Soy protein has proven to be a vital ingredient in these commodities, providing a needed source of high quality, low cost protein.

To give some impression of the nature and extent of the Title II program, during 1973, ca. 80 million beneficiaries in over 60 countries were fed using nearly 5 billion lb donated food commodities. Of these beneficiaries, 37 million were school children, 16 million were preschool children and mothers, another 16 million were disaster victims and refugees, and 11 million were involved in work projects where food was used at least in part as payment for public work.

Although food commodities used in Title II programs are procured by USDA, Title II is not just a USDA

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program. It is a program in which USDA, the U.S. Agency for International Development (AID), and numerous other organizations work together with governments and institutions in less developed and disaster stricken countries of the world to solve nutritional and developmental problems. It is a program in which voluntary agencies, such as the Cooperative for American Relief Everywhere (CARE), Catholic Relief Service (CRS), and Church World Services (CWS) help local institutions distribute and manage donated food to the benefit of the needy. It is a program that starts with the American farmer and which ultimately helps feed the hungry and nutritionally deprived people of the world.

NUTRITIOUS PROCESSED FOODS

In the early stages of Title II programing, the food commodities which were distributed were largely food grains and ordinary milled products like wheat flour and corn meal. However, as the program developed, it became apparent that funds for the program could be more efficiently used and the recipients more effectively served if the commodities were fortified nutritionally or otherwise specially processed to accomodate the needs of the less developed countries.

Recognizing the need for nutritionally sound foods in feeding programs, the Secretary of Agriculture issued the following statement related to the establishment of the USDA Committee on Processed Foods (1):

It shall be the function of the Committee on Processed Foods to evaluate proposals for inclusion of specific processed foods in the Department's donation programs with the objective of furnishing the most highly nutritious processed foods consistent with needs, budget limitations, cost/benefit ratios, and policies of the Department.

This policy has resulted in the distribution of a new series of commodities which are more than just whole and milled food grains. They are special processed foods containing beneficially higher levels of proteins, vitamins, and minerals. They are designed as supplementary foods for nutritionally deprived people, particularly for children, and meet the special nutritional requirements of practical feeding programs in the less developed countries. In addition, they contain substantial amounts of low cost soy protein.

USE OF SOY PROTEIN IN TITLE II COMMODITIES

During the period 1954-1973, over 75 billion lb food commodities valued at \$6.3 billion were distributed under PL 480, Title II. As shown in Table I, 2.8 billion lb commodities valued at \$250 million are expected to be distributed during fiscal year 1974. Current estimates of the

TABLE I

Total Commodities Supplied through Title II of PL 480

Agency	Fiscal year 1954-1973		Fiscal year 1974	
	Pounds (millions)	Dollars (millions)	Pounds (millions)	Dollars (millions)
Voluntary agency-international organization	43,077	4,256	1,151	124
Government-to-government	29,209	1,800	1,007	71
World food program	4,674	255	648	55
Total	76,960	6,311	2,806	250

TABLE II
PL 480, Title II Commodities (Fiscal Year 1974)

Commodity	Amount	Amount containing soy flour	Amount soy flour
	Million lb	Million lb	Million lb
Wheat	397		
Rolled wheat	0.4		
Bulgur	247		
Soy fortified bulgur	135	135	20
Bread flour	508		
Soy fortified bread flour	71	71	7
Wheat soy blend	120	120	24
Corn	157		
Corn meal	72		
Soy fortified corn meal	31	31	5
Corn soy blend	121	121	27
Corn soy milk	155	155	44
Sorghum	632		
Soy fortified sorghum	15	15	2
Rolled oats	10		
Soy fortified rolled oats	11	11	2
Whey soy	1.5	1.5	0.5
Soy flour	3	3	3
Soybean oil	118		
Total	2,806 (100%)	664 (23.7%)	135 (4.8%)

for 664 million lb soy containing commodities given in Table II represents nearly one-fourth of the total amount of Title II foods which are expected to be distributed. The 135 million lb soy flour used in the commodities, ca. 5% of the wt of Title II foods, represents one of the major food uses of soy flour in the world.

Table III shows the amount of soy flour added to soy fortified cereals and blended foods used in the Title II program. As listed, 6-15% soy flour added to the cereal products results in a one-fourth to two-thirds increase in protein content. Also because of the well-known complementary effects of soy and cereal protein, the protein quality of all these products is increased substantially, yielding an added nutritional bonus. In the case of wheat soy blend (WSB), corn soy blend (CSB), corn soy milk (CSM), and whey soy drink mix (WSDM), sufficient soy protein, vitamins, and minerals are added to create high protein nutritional supplements for special feeding programs.

Due to the enormous variations in commodity prices which have occurred during the past year or so, it is difficult to comment comprehensively about the cost of fortifying Title II foods with soy protein. However, the prices paid by USDA for fortified and unfortified commodities, as listed in Agricultural Stabilization and Conservation

TABLE III
Soy Protein Containing PL 480, Title II Commodities

Commodity	Soy flour added (%)	Protein content		
		Fortified product (%)	Base product (%)	Increase by fortification
Soy fortified bread flour (6%)	6	14	11	27%
Soy fortified bread flour (12%)	12	16.2	11	47%
Soy fortified bulgur	15	17.3	10.5	65%
Soy fortified sorghum	15	15	9	67%
Soy fortified rolled oats	15	20	15	33%
Soy fortified corn meal	15	13	(8) ^a	(63) ^a
Wheat soy blend	20	20	---	---
Corn soy blend	22	16.7	---	---
Corn soy milk	24.2	19	---	---
Whey soy drink mix	36.5 ^b	19	---	---

^aEstimated, not specified by USDA.

^bFull-fat soy flour.

TABLE IV
Prices Paid for PL 480 Title II Commodities (March 13, 1974)

Commodity	Price (cents/lb)	Increase for soy fortification (%)
Bread wheat flour	12.7-12.9	---
Soy fortified flour (6%)	13.4-13.9	5.5
Soy fortified flour (12%)	13.5-14.4	6.3
Bulgur	11.1-11.8	---
Soy fortified bulgur	11.8-12.0	6.3
Corn meal	8.1- 8.5	---
Soy fortified corn meal	9.0	11.1
Rolled oats	11.0-12.0	---
Soy fortified rolled oats	11.3-12.2	2.7
Corn soy blend	12.3-13.0	---
Instant corn soy milk	16.2-16.4	---
Sweetened instant corn soy milk	19.0-19.2	---
Whey soy blend	13.5-13.7	---
Soy flour (defatted)	12.0	---
Soy flour (full-fat)	17.2	---

types and amounts of commodities used in the program are listed in Table II. Also listed are the types and amounts of commodities containing soy protein and the total amount of soy flour used in the commodities. Soy flour is used in these commodities specifically as a protein fortificant to improve the nutritional value. The estimated requirement

Service, Commodity Office, information releases can be used to illustrate the change in cost due to fortification. As shown in Table IV, the prices cited in one information release (2) show that fortification with soy flour and soy grits generally increases the price of commodities by one-half to one and one-half cents/lb, and this represents only ca. 3-11% increase in price. Since this modest increase in cost results in the substantial improvement in protein shown in Table III, the beneficial results of using low cost soy protein are clear.

WSDM

A new food product based upon soy protein, WSDM, recently has been added to the list of commodities which are available for distribution in overseas feeding programs. WSDM was developed especially because of the shortage of milk powder which drove prices so high that milk could no longer be purchased under PL 480. Since many of the Title II feeding programs require the use of a nutritious beverage product, it was necessary to find a low cost replacement for milk powder. In the summer and fall of 1973, USDA and AID, working closely with industry, developed WSDM as a product which could serve that need. The new product was approved by USDA's Committee on Processed Foods in December 1973, and the first purchase was made in March 1974.

Nearly half of WSDM is sweet whey (41.4%), a by-product of cheese manufacture which traditionally has been a waste product with few strong commercial outlets. Because whey has milk-like flavor notes and a moderate amount of high quality protein, it was chosen as the starting point for formulation of the new beverage product. To supplement the protein in whey and increase the caloric density, full-fat soybean flour (36.5%) and soybean oil (12.1%) were added. Also a small amount of corn sugar (9.5%) was included to extend the product and dilute the mineral salts carried by the whey. Finally, a broad spectrum of vitamins and minerals was added, so that WSDM could provide a complete nutritional supplement in beverage form. The finished product, when mixed with water at 15% solids provides a drink with nearly the same energy and protein content as whole milk and the same vitamins and minerals provided by CSM, WSB, and the other Title II Food supplements.

In acceptability tests carried out in the Dominican Republic, Chile, Vietnam, India, Pakistan, and Sierra Leone, WSDM was found to be acceptable and without apparent defects. Procurement now is moving forward, so that WSDM can be distributed through large scale introduc-

tion programs in the less developed countries.

WSDM, like CSM, WSB, and the fortified cereal products, illustrates the value of soy protein in practical feeding programs. The soy flours and grits used in these products provide a nutritional boost, both in terms of protein quantity and quality, that is not only extremely effective but highly economical. Distribution of literally billions of lb soy containing food commodities has demonstrated the complete acceptability of products containing up to 25% soy flour. WSDM is expected to extend this range up to 35%. Clearly, soy protein has provided a solid base on which to build nutritious foods for practical feeding programs.

REFERENCES

1. Office of the Secretary, USDA, "Secretary's Memorandum No. 1688, Committee on Processed Foods, USDA, Washington, D.C., April 22, 1970.
2. Commodity Office, Agricultural Stabilization and Conservation Service, USDA, Information Release, USDA, Minneapolis, Minn., March 13, 1974.

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