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Requirements for Foods Containing Soy Protein in the Food for Peace Program

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ABSTRACT

Under the Food for Peace Program, whole grains, milled wheat flour, milled rice, soybean oil, soybean flour, nonfat dry milk, soya-containing blended food supplements, and soya-fortified processed foods are provided by the U.S. to needy people abroad to alleviate malnutrition. These commodities are used in maternal/child health programs, school feeding, food for work projects and disaster relief. The wide diversity of nutritional requirements and traditional food preferences has led to development of nine soya-containing food types, which are used in the PL-480 Title II donation program as blended food supplements or fortified processed foods. Research studies have led to the development of product specifications. Blended food supplements include the standardized mixtures of corn-soya-milk (CSM), instant CSM, wheat-soy blend and whey-soy drink mix. These foods, developed to fulfill the nutritional requirements of preschool children, contain from 17.5 to 29.7% either toasted-defatted or equivalent full-fat soya flour, along with vitamins and minerals. In addition, 4-19% soya oil is added to improve caloric density. These products contain 19 or 20% minimum protein and 6 or 19% minimum fat content. Fortified processed foods include soya-fortified bulgur (SFB), soya-fortified bread wheat flour (SFWF), soya-fortified cornmeal (SFCM), soya-fortified sorghum grits (SFSG), and soya-fortified rolled oats (SFRO). These foods contain toasted soya flour, grits, or flakes added at 12-15% levels. Fortified foods are generally consumed by people other than infants.

INTRODUCTION

For more than a generation, the U.S. has been a leader in exporting foods to alleviate hunger among the 0.4 to 1.2 billion (estimated) malnourished people in the world (1). Since the inception of Public Law 480 (PL-480), the Agricultural Trade Development and Assistance Act, the U.S. has exported over 265 million tons of food valued above $26 billion (1). The major objective of this program was to relieve world hunger using our surplus commodities. Donations are included under Title II of this act and comprise ca. 20% of total food aid. From 1955 to 1966, the donation program averaged ca. 2 million tons/year. The principal Title II commodities shipped during this period were wheat, feed grains, rice, nonfat dry milk (NFDM), and edible oil. Because these were years of surplus in the U.S., the program served the dual purpose of feeding the hungry and reducing surplus commodities held in U.S. warehouses and grain elevators.

In 1966, the law was amended and PL-480 became known as the Food for Peace Program, which featured a new emphasis on nutrition. Authority was provided for enrichment and fortification of commodities to improve their nutritional values and for international programs to combat malnutrition in children. This legislation removed the requirement that a commodity be in surplus to be eligible for distribution. The Secretary of Agriculture now determines the agricultural commodities to be used.

For several years prior to the change in legislation, there was a growing awareness of the need to provide more nutritious foods through the donation program. In the early 1960s, there was a shortage of nonfat dry milk, which was the only PL-480 high-protein food specifically suited for infant and child feeding. Guidelines for blended food supplements were established in 1965 for the nutrient composition of formulated foods. These guidelines were developed by the U.S. Department of Agriculture (USDA) in cooperation with the Agency for International Development (AID) and the National Institutes of Health (2). The formulated foods were to serve as supplements in diets of young children, pregnant and lactating women, or in emergency feeding of adults.

Guidelines (3,4) included the requirement for corn or wheat to be used as the basic cereal components, whereas soya flour and nonfat dry milk were included as protein supplements. The essential amino acid distributions in soy-

bean and cereal proteins complement each other (5,6). Minimum levels of lysine, methionine, total sulfur amino acids, tryptophan, and threonine were specified. These essential amino acids are frequently low in cereal grains and oilseed meals. Also specified were a minimum apparent net protein utilization of 60% and a protein efficiency ratio (PER) of 2.1 or greater.

Minimum energy requirements of 350 kcal/100 g, 18-22% protein, 2% fat, and 1% linoleic acid were also included in the guidelines. Fat content has been increased to 6% as a result of subsequent research (7). Minimum and maximum levels of calcium, phosphorus, sodium, iron, copper, iodine and zinc, as well as for vitamins A, B_1, B_2, niacin, B_6, pantothenic acid, folic acid, B_{12}, C, D, and E were specified.

The guidelines provided that 100 g of blended food supplement would supply at least one-sixth of the calories but one-half of the National Academy of Science-National Research Council's (8) recommended dietary allowance (RDA) for protein, vitamins and minerals for the 6- to 8-year-old child, and one-third of the calories but two-thirds of the RDA's for protein, vitamins and minerals for a 1- to 2-year-old child. Vitamin B_{12} was an exception. Because of the probable lack of animal products in the diet of the target group, the full RDA of this vitamin was provided. With this exception, the levels of vitamins and minerals were set comparable to the protein level.

The issuance of guidelines generated cooperative efforts between USDA, trade groups and private industries to investigate prototype blended food supplements. Although the guidelines focused primarily on raw materials and critical nutritional aspects, considerable research was necessary to examine other requirements such as processing, formulation, storage stability, packaging and acceptability. This research led to development of detailed specifications to fulfill the requirements of four blended food supplements (9-12) shown in Tables I and II. In addition, research was done to improve the protein quality of cereals by fortification with soya. Tables III and IV show five fortified processed foods (13-17) that are primarily intended for people other than infants. These nine formulations provide nutritious foods for diet improvement over a wide range of uses such as maternal/child feeding, meals for school children, food for work projects and disaster relief. This paper discusses the research that served as a basis for developing USDA specifications for blended food supplements and fortified processed foods used in the Food for Peace Program.

PROCESSING REQUIREMENTS

In addition to formulation and product requirements for the food mixes shown in Tables I-IV, USDA specifications also include requirements for the individual components. These requirements are directed toward proper selection and processing of raw materials. The processing of cereal and soya components utilized in blended food supplements and fortified processed foods includes dry milling. In cereals, enzymatic activity and oil are higher in the germ fraction. Therefore, separation of the germ is necessary to extend the storage life of milled cereal products if they are not heat-treated. The particle size distribution of the processed commodity is controlled by dry milling, which has a major influence on the functional properties of the final food prepared for consumption. As shown in Table I, corn-soya-milk (CSM) contains soya flour, nonfat dry milk, vitamins and minerals that are finely granulated. Therefore, careful milling of the corn is necessary to achieve the particle size distribution for CSM (Table II). The mouth-feel of the final cooked gruel prepared from CSM is dependent on this granulation. As shown in Table IV, a very fine granulation of soya-fortified bread wheat flour (SFWF) is required for good functional properties in the final baked product. For instant CSM, the particle size range is critical (Table II): a minimum of 97% must pass through a U.S. Standard #40 Screen to provide smoothness to the final cooked product; a maximum of 46% can pass through a U.S. Standard #100 Screen to minimize lumping during water dispersion. Whey-soya drink (WSD) is homogenized

TABLE I

Formulations and Processing Requirements of Blended Food Supplements[a] Used in the Food for Peace Program

Commodity	Cereal meal component (%)	Soya flour (%)	Dairy component[b] (%)	Refined soybean oil[c] (%)	Vitamin premix[d] (%)	Mineral premix (%)
Corn-soya-milk (CSM)	59.2 P[e]	17.5 DT-E	15 N	5.5	0.1	2.7[f]
Instant CSM	63.0 F	23.7 DT-E	5 N	5.5	0.1	2.7[f]
Wheat-soya blend	73.1 F[g]	20.0 DT	–	4.0.	0.1	2.8[h]
Whey-soya drink mix[i]	–	29.7 DT-E	41.3 W	19.0[j]	0.1[k]	0.8[l]

[a]See references 9-12.
[b]N = nonfat dry milk; W = sweet-type whey solids.
[c]Contains (per 100 g final formulated product): 2.5 mg butylated hydroxyanisole and 2.5 mg butylated hydroxytoluene.
[d]Contains vitamins (per 2 lb premix): 15 mil USP units A, 2.5 g B_1, 3.5 g B_2, 1.5 g B_6, 45 g niacin, 25 g Ca D-pantothenate, 1.8 g folic acid, 36 mg B_{12}, 364 g C, 1.8 mil USP units D, and 68,000 IU E.
[e]P = partially cooked, F = fully cooked, DT = defatted toasted, DT-E = defatted, toasted or optional equivalent full-fat.
[f]Contains minerals (per 54 lb premix): 40 lb tricalcium phosphate, 36 g hydrated zinc sulfate, 418 g ferrous fumarate, 13 lb iodized salt.
[g]Contains combination of either 53.1% bulgur flour and 20% wheat protein concentrate (WPC) or 38.1% straight grade flour and 35.0% WPC.
[h]Contains minerals (per 56 lb premix): 40 lb tricalcium phosphate, 36 g hydrated zinc sulfate, 418 g ferrous fumarate, 15 lb iodized salt.
[i]Contains 9.1% corn syrup solids (42 dextrose equivalent).
[j]Partially hydrogenated.
[k]Contains vitamins (per 2.334 lb premix): 17.5 mil USP units A, 2.9 g B_1, 4.1 g B_2, 1.8 g B_6, 52.5 g niacin, 29.2 g Ca D-pantothenate, 2.1 g folic acid, 42 mg B_{12}, 424.8 g C, 2.1 mil USP units D, and 79,356 IU E.
[l]Contains minerals (per 15.17 lb premix): 14 lb calcium carbonate, 42 g hydrated zinc sulfate, 488 g ferrous fumarate, 0.68 g potassium iodide.

to achieve a fine particle size distribution, which is required for a smooth texture and good suspension characteristics (Table II). Granulation of the other food mixtures shown in Tables II and IV is controlled to achieve intended properties in final food preparations.

Heat treatment is necessary for cereals and soybeans to inactivate hydrolytic enzymes such as lipase (18) and oxidative enzymes such as lipoxygenase (19-21) and peroxidase (22). Without heat treatment, storage stability may be poor because of the development of objectionable flavors through enzyme action.

Defatted and full-fat soya flours, flakes and grits are specified for various blended food supplements and fortified processed foods (Tables I and III). Soybean products are cooked to inactivate antinutritional substances such as trypsin inhibitors, which reduce biological utilization. The extent of heat treatment is determined by measuring the nitrogen solubility index and urease activity (5). All blended food supplements and all of the fortified processed foods except one specify fully precooked soya flours. For SFWF, a lightly toasted soya flour is specified to yield a brighter crumb color in baked bread. Antinutritional substances are destroyed during the baking process. Preparation of the various partially and fully precooked soybean products involve the use of either desolventizer-toasters or heated conveyers under rigorously controlled conditions to retain maximum nutritional benefits (5).

Corn, wheat and oat components are partially or fully precooked under carefully controlled conditions for use in the various mixtures (Tables I and III). The degree of precooking is measured by consistency test (23). Precooking reduces or even eliminates the need for further cooking during preparation of gruels or beverages. Cereals are precooked in either roll cookers, extruders, or steam-jacketed screw conveyers (22,24-28). The cooked cereal components are ground to required particle size, and moisture is adjusted to 10-12% in the final products.

Production of WSD includes processing an admixture of fluid, sweet cheese whey; either toasted, defatted, or full-fat soya flours; partially hydrogenated soybean oil; and corn syrup solids. The admixture is pasteurized, homogenized, condensed in vacuo to over 40% total solids, and spray-dried to a free-flowing powder (29).

FORMULATION REQUIREMENTS

Blended food supplements such as CSM, instant CSM and WSB (Table I) were formulated to meet USDA nutritional guidelines (3). WSD was formulated to supply all the nutrients of whole milk (29) plus deficient vitamins and essential minerals. Blended food supplements contain up to 73.1% partially or fully cooked cereal; 17.5-29.7% toasted, defatted, or equivalent full-fat soya flour; up to 15% nonfat dry milk or 41.3% sweet-type whey solids; up to 5.5% unhydrogenated or 19.0% partially hydrogenated soybean oil; 0.1% vitamin premix, and 0.8-2.8% mineral premix. Calcium carbonate and calcium phosphate have been used as sources of calcium and phosphorus, but insect infestation can occur after bag damage. Tricalcium phosphate was found to inhibit insect infestation (30) and, therefore, has replaced calcium carbonate and calcium phosphate in CSM, instant CSM and WSB. Instant CSM, WSB and WSD resulted from new process developments (22,26-29). There are also sweetened forms of instant CSM and WSB which contain 7.5 and 15% sucrose, respectively. The formulations are the same as their unsweetened counterparts except for higher levels of soya flour to meet the protein requirements (31,32).

Fortified processed foods (Table III) contain a base cereal to which soya protein is added to increase the protein content and improve the distribution of essential amino acids. Fortified processed foods contain up to 88% uncooked or fully cooked cereal fortified with up to 15% lightly or fully toasted, defatted soya flakes, grits, or flour. To avoid changing physical characteristics, soya flakes, grits and flour are combined with similar physical forms of cereals. The cooking properties, appearance and organoleptic characteristics of the soya-fortified cereals are similar to their nonfortified versions. The formulations were developed through research (22,33-35) of product characteristics as measured by nutritional, color and flavor com-

TABLE II

Product Requirements[a] for Blended Food Supplements[a-d] Used in the Food for Peace Program

Quality measurements (%)	Corn-soya-milk (CSM)	Instant CSM	Wheat-soya blend[e]	Whey-soya drink mix[f]
Moisture (max)	10.0	10.0	11.0	3.25
Protein, N x 6.25 (min)	19.0	19.0	20.0	19.0
Fat (min)	6.0	6.0	6.0	19.0
Crude fiber (max)	2.0	2.0	2.5	1.5
Ash (max)	–	–	6.6	6.5
Granulation (through U.S. Standard Screen)				
#6 (min)	99	–	–	–
#30 (max)	92	–	–	–
#40 (min)	–	97	–	–
#60 (max)	60	–	–	–
#70 (min)	–	–	97	–
#100 (max)	–	46	–	–
Quality measurements (cm)				
Consistency, uncooked	20 (max)	9 (min)	–	–
Consistency, cooked (min)	10	–	–	–
Consistency, cooked (max)	22	–	–	–

[a]See references 9-12.
[b]Analyses expressed on moisture-free basis.
[c]Must conform to provisions of the Federal Food, Drug and Cosmetic Act. Must have characteristic odor, flavor, and color. Must be readily dispersible and essentially lump-free when dispersed in water.
[d]Maximum bacteria count: 50,000/g (salmonella negative).
[e]Lysine, 0.9% minimum.
[f]Minimum pH 6, density of 32-53 g/100 ml, minimum vitamin A level of 1,900 USP units/100 g, negligible settling tendency, minimum protein efficiency ratio of 1.9 (casein = 2.5).

parisons, and by performance tests in typical food applications such as cooked gruels, unleavened bread, yeast-raised bread and chemically leavened bread. The excellent bread baking results of SFWF are due to the inclusion of 0.5% sodium stearoyl-2-lactylate in the formulation. SFWF and soya-fortified cornmeal (SFCM) are enriched according to standard practice (36), except that vitamin A is added. Vitamins and minerals are not added to the other fortified processed foods because of physical separation problems caused by differences in density and particle size among the soya, cereal and enrichment components.

Storage stability characteristics of blended food supplements and fortified processed foods was determined with time-temperature data (37). All combinations have been rigorously tested and the results were reported (7,22,28,33,34,38-43). These food systems are inherently stable because of the presence of either defatted, toasted, or full-fat soya flour (44), particularly in the mixtures which contain precooked cereal. The fat content is kept low in mixtures containing uncooked cereal to minimize the effects of lipase activity (40). Stability is excellent in CSM, instant CSM, and WSB formulations containing added refined, unhydrogenated soybean oil. However, partially hydrogenated soybean oil is required in the WSD preparation to provide adequate stability. A maximum moisture content of 3.25% is required to prevent nonenzymatic browning in the WSD blended food supplement because of the relatively high content of reducing sugar from the whey and corn syrup solids. All vitamins used in blended food supplements and fortified processed foods are stabilized forms to insure maximum storage life (45). Butylated hydroxyanisole and butylated hydroxytoluene are added to provide protection from oxidation. Stability is adequate in the presence of added minerals. Inclusion of ferrous iron might be expected to have a prooxidant effect (45,46). However, blended food supplements and SFCM containing iron complexed as ferrous fumarate were stable with or without added soybean oil (24).

TABLE III

Formulations and Processing Requirements of Fortified Processed Foods[a] Used in the Food for Peace Program

Soya-fortified commodity	Cereal component (%)	Soya component (%)
Bulgur	85 F[b], G[c]	15 DT[b], G
Bread wheat flour[d]	88 U,[e] FL	12 LT[f]
Cornmeal[g]	85 U, M	15 DT, FL
Sorghum grits	85 U, G	15 DT, G
Rolled oats	85 P, FLA	15 DT, FLA

[a]See references 13-17.
[b]See Table I, footnote e.
[c]G = grit, M = meal, FL = flour, FLA = flake.
[d]Contains (per lb final food mixture), vitamins: 5,000 IU A, 2.2 mg B_1, 1.4 mg B_2, and 18 mg niacin; minerals: 14.8 mg iron and 1,050 mg calcium; dough improvers: 22.7 g sodium stearoyl-2-lactylate and 10-40 ppm potassium bromate.
[e]U = uncooked.
[f]LT = lightly toasted flour.
[g]Contains (per lb final food mixture) vitamins and minerals: 5,000 IU A, 2.5 mg B_1, 1.5 mg B_2, 20 mg niacin; and 20 mg iron, 625 mg calcium.

PRODUCT REQUIREMENTS

In the production of Food for Peace commodities, all manufacturing operations must be done under Good Manufacturing Practice regulations (47). Finished products are sampled and tested by USDA laboratories to determine compliance with specifications as shown under "Production Requirements" in Tables II and IV. USDA and other (48-50) methods are used to determine compliance with chemical and physical requirements.

Product specifications were developed through laboratory studies of individual components and prototype formulations. Each commodity shown in Tables II and IV

TABLE IV

Product Requirements for Fortified Processed Foods[a-c] Used in the Food for Peace Program

Quality measurements (%)	Soya-fortified product				
	Bulgur[d,e]	Bread wheat flour[f]	Corn meal	Sorghum grits[d,g]	Rolled oats[d,h]
Moisture (max)	11.5	12.4	13.0	13.5	12.0
Protein, N x 6.25 (min)	17.3	16.2	13.0	15.0	20.0
Fat	2.6 (max)	–	1.5 (max)	2.0 (max)	5.0 (min)
Crude fiber (max)	2.3	–	2.0	2.1	3.0
Ash (max)	2.6	1.61[i]	1.93[i]	2.6	–
Granulation (on U.S. Standard Screen)					
#7 (min)	–	–	–	–	30
#8 (max)	3.5	–	–	–	–
Granulation (through U.S. Standard Screen)					
#8 (min)	81	–	–	90	–
#14 (max)	23	–	–	35	–
#20 (min)	–	–	99	–	–
#25 (min)	–	–	91	–	–
#25 (max)	–	–	–	–	12
#30 (max)	1.2	–	–	5	–
#45 (min)	–	–	40	–	–
#70 (min)	–	98	–	–	–
#80 (max)	–	–	32	–	–

[a]See references 13-17.
[b]Analyses expressed on moisture-free basis.
[c]Must conform to provisions of the Federal Food, Drug and Cosmetic Act. Must have characteristic odor, flavor and color.
[d]Maximum bacteria count: 50,000/g.
[e]Maximum foreign material: 0.2% non-bulgur or wheat, 0.05% hulls, 0.2% scorched particles, 0.9% ungelatinized wheat. Must be distinctly particulate after 15 min gentle boiling of 1-to-2 ratio of product to water.
[f]Minimum loaf volume of 2,550 cc/lb according to standardized baking test. Falling number range of 225-350 units.
[g]Must be distinctly particulate after 15-20 min gentle boiling of 1-to-2 ratio of product to water.
[h]Maximum foreign material: 0.10% hulls, 1.0% total material other than oats and soybeans. Must cook to a smooth homogeneous mixture.
[i]Ash content variable based on calcium level.

must have its normal characteristic odor, flavor and color. Maximum permitted bacteria count is 50,000/g, and blended food supplements must be free of salmonella. Quality measurements such as moisture, protein, fat, crude fiber and ash indicate compliance with formulation requirements. Granulation measurements are used to determine compliance with particle size requirements. Compliance with processing requirements and functionality is determined by physical and performance tests. All blended food supplements must be readily dispersible and essentially lump-free when added to water. Functionality of CSM and instant CSM is indicated in Table II by consistency measurements. A 0.9% minimum lysine content for WSB indicates adequate nutritional quality, which can be achieved by normal processing. Proper selection of raw materials and processing of WSD is indicated by measurements for pH, density, protein efficiency ratio, and settling characteristics. Table IV shows that SFB, SFSG and SFRO must comply with requirements for cooked gruels of these products. A bread-baking test is specified for SFWF which must meet minimum loaf volume requirements to indicate adequate functionality.

PACKAGING REQUIREMENTS

Blended food supplements are packaged in 50-lb pasted, open-mouth, 5-wall paper bags that are polyethylene-lined. The polyethylene liner minimizes moisture transfer during storage (51). All of the fortified processed foods except SFB are also packaged in the standard bag. SFB is packaged in a 50-lb woven polypropylene bag that contains an FDA-approved ultraviolet inhibitor.

ACCEPTABILITY REQUIREMENTS

Acceptability of blended food supplements and fortified processed foods depends on a variety of interrelated factors, i.e., type of food preparation, adaptation to various food forms, local tastes, cultural aspects, appearance, temperature served, flavor, texture and mouth-feel, nutritional adequacy, biological response and others. Acceptability of donated foods was carefully monitored in the field during initial introduction to determine feasibility. Prior to commercial production of CSM, acceptability was tested in 21 Latin American, Southeast Asian, Middle Eastern and African countries, and results were excellent (52). In 1970, UNICEF tested the acceptability of sweetened instant CSM in Nigeria and found the low viscosity-high caloric density of this preparation to be advantageous for consumption by children with advanced malnutrition. WSB was tested for acceptability in 59 countries worldwide and results were excellent (53). WSD was found to be acceptable and without defects in tests done in the Dominican Republic, Chile, Vietnam, India, Pakistan and Sierra Leone (54).

Extensive clinical studies with children indicate satisfactory nutritional quality of blended food supplements (3). In tests at the British American Hospital in Peru, CSM maintained nitrogen balance in 1- to 3-year-old children when it was fed as the primary protein source (55). In another child-feeding test using sweetened, instant CSM, nitrogen retention was similar to that of casein, and the product was used successfully in initial dietary management of marasmus and kwashiorkor (56). Human feeding studies indicated satisfactory biological values for soya-wheat and soya-oat foods (57). CSM, WSB and other cereal-soya foods were found to be good protein sources which supported growth in normal infants and "catch up" growth in malnourished infants and children. The methionine deficiency of soya protein was almost completely corrected by the cereal component, making supplementation unnecessary (58).

The U.S. is currently providing ca. 1.6 million tons of Title II commodities to about 85 countries annually through the World Food Program, American voluntary agencies, and recipient governments. In addition to blended food supplements and fortified processed foods, Title II commodities also include nonfat dry milk and processed foods such as rice, bulgur, all-purpose wheat flour, defatted soybean flour and soybean oil. Whole grains such as wheat, corn and sorghum also are used in the program. AID's Food for Peace Office has compiled a PL-480 Title II Commodities Reference Guide (59) that is available to field personnel and others involved in the program. The guide contains technical information about current availability, commodity characteristics and usage, nutrition tables, commodity use by project category, individual commodity fact sheet, and storage and handling information. This type of information facilitates effective usage and acceptability of food commodities made available through PL-480.

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Soybeans and Soy Products in the Feeding of Children

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ABSTRACT

Soya products are used in infant formulas, hypoallergenic foods and vegetable mixtures mainly because of their good protein quality. They have good potential in feeding children from birth to adolescence and seem to satisfy the needs for total nitrogen and essential amino acids when ingested in adequate amounts. Other factors, however, must be considered for their use. The availability of calcium and phosphorous from soy formulas may be inadequate to support for any length of time the rapid bone mineralization of growing premature infants and should thus be fed to such infants only for a few weeks as therapeutic agents rather than as routine feeding formulas. Allergy to soya exists and may be serious, especially among infants with severe allergy to cow's milk. Industrial processing may affect the quality of soya protein and it can produce allergenic substances in some protein foods. Thus, it may be necessary to evaluate the overall nutritional quality of new soya products before recommending their use. The effect of methionine supplementation on soya protein quality is not clear but it may be advisable in infant formulas. Soybean protein has great advantages when it is part of a food or a food system, particularly those based on cereal grains. Finally, the prevention by soya formulas of diarrhea induced by phototherapy is interesting, but its overall metabolic implications need further study.

INTRODUCTION

The increase in soya production in many parts of the world (1) and advances in food technology (e.g., review in ref. 2) have resulted in the appearance of many soybean-based products in the food market and more are certain to become available in future years in industrialized and developing countries of the world. Their use in infants formulas, hypoallergenic foods and vegetable protein mixtures, as well as protein supplements, mainly reflects the good protein quality of soybeans. Although limited in sulfur-amino acids, when soya protein is fed in adequate amounts, it can satisfy in humans of all ages needs for total nitrogen and essential amino acids. This was discussed in more detail elsewhere in this conference (3). This paper presents a brief review of the nutritional implications of the use of soybeans and soya products in the feeding of children.