PN-AAZ-550

# COMMODITIES REFERENCE GUIDE

Office of Food for Peace
Bureau for Food for Peace and Voluntary Assistance
U.S. Agency for International Development

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# INTRODUCTION

The Commodities Reference Guide is an annex to Handbook 9 entitled Food for Peace (Public Law 480, Titles I, II, and III). It provides information on commodities authorized for distribution under Title II of Public Law 480, as amended. This program is administered by the Agency for International Development in conjunction with the United States Department of Agriculture.

The Commodities Reference Guide is intended for use by Food for Peace and other program officers, the staff of cooperating sponsors, and recipient governments and agencies. The guide is to assist in decision making for planning, managing, controlling, and evaluating appropriate uses of Title II commodities.

In addition to providing immediate relief from hunger and malnutrition, Title II programs emphasize developmental goals. For example, more Maternal/Child Health programs are strengthening their nutrition education and growth monitoring components; Food for Work projects are increasingly designed for clear-cut positive impacts on the economic and social infrastructures of underdeveloped areas. The criteria used by field missions for selecting commodities reflect this "development" orientation in a number of programs illustrated in this guide.

The Commodities Reference Guide is organized into seven main sections. Section I has a current list of available commodities and a brief description of each. The section includes a listing of nutritional content and examples of how commodities are used.

Section II discusses the ration selection process, and presents a framework on commodity selection including guidelines and a checklist.

Section III describes the data required for commodity selection, methodologies commonly used for collecting data and necessary calculations.

In Section IV guidelines for specific program categories are given; examples are included to illustrate how the guidelines can be applied.

Section V contains the individual commodity fact sheets. Included are detailed descriptions of eligible commodities, including nutritional content, packaging, and recipes for their preparation.

In Section VI commodity packaging and storage concerns are addressed. Section VI contains information on rodent and insect control, and procedures for reporting damages.

The annexes contain a detailed discussion of nutritional considerations (Annex A) and guidelines for strengthening nutrition education (Annex B).

Additional information on commodity specifications and PL 480 Title II can be obtained by writing to:

Office of Food for Peace
Bureau for Food for Peace and Voluntary Assistance
Agency for International Development
Washington, D.C. 20523

## ABBREVIATIONS

| | |
|---|---|
| ADRA | Adventist Development Relief Agency (previously known as SAWS) |
| AER | Annual Estimate of Requirements |
| AID | U.S. Agency for International Development |
| CCC | Commodity Credit Corporation |
| CSM | Corn Soy Milk |
| CWS | Church World Service |
| DCC | Development Coordinatoring Committee |
| FVA | Bureau for Food for Peace and Voluntary Assistance |
| FFW | Food for Work |
| ICSM | Instant Corn-Soy Milk |
| MCH | Maternal and Child Health |
| NFDM | Non-Fat Dry Milk |
| OCF | Other Child Feeding |
| ORT | Oral Rehydration Therapy |
| PER | Protein Efficiency Ratio |
| PL 480 | Public Law 480 |
| RO | Rolled Oats |
| SF | Soy Fortified |
| SFB | Soy-Fortified Bulgur |
| SFCM | Soy-Fortified Cornmeal |
| SFF | Soy-Fortified Flour |
| SFRO | Soy-Fortified Rolled Oats |
| SFSG | Soy-Fortified Sorghum Grits |
| USDA | United States Department of Agriculture |
| WSM | Wheat Soy Milk |

# CONVERSION TABLE

## Cubic Measure

| | |
|---|---|
| 1 cubic inch | = 16.39 cubic centimeters |
| 1 cubic foot | = 0.03 cubic meter |
| 1 cubic yard | = 0.76 cubic meter |
| 1 cubic centimeter | = .06 cubic inch |
| 1 cubic meter | = 35.31 cubic feet |
| 1 cubic meter | = 1.31 cubic yard |

## Liquid Measure

| | |
|---|---|
| 1 pint | = 0.47 liter |
| 1 quart | = 0.95 liter |
| 1 gallon | = 3.79 liter |
| 1 liter | = 1.06 quarts |
| 1 kiloliter | = 264.18 gallons |

## Weights

| | |
|---|---|
| 1 grain | = 0.06 gram |
| 1 ounce | = 28.35 grams |
| 1 pound | = 453.59 grams |
| 1 ton | = 907.18 kilograms |
| 1 gram | = 15.43 grains |
| 10 grams | = 0.35 ounce |
| 1 kilogram | = 2.2 pounds |
| 1 metric ton | = 2,204.6 pounds |



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# COMMODITIES

## Current Eligibility

The eligibility and general characteristics of commodities are discussed in this section. A list of presently eligible commodities and their dollar value is on Table I.1.* The list of available commodities will be updated through cables or replacement pages. Space is provided in Table I.3 for FFP officers in each country to record their own experiences with each commodity for future reference.

The total supply of eligible commodities is determined by the Secretary of the United States Department of Agriculture (USDA). The working group of the Development Coordination Committee (DCC), Subcommittee of Food Aid reviews all PL 480 Title II matters including approval of programs and commodities. New foods are screened by the Committee on Processed Foods whose membership comes from several branches of the USDA and a representative from the AID Food for Peace Office. This committee establishes U.S. standards regarding composition, nutritional value, cost, suitability, and stability for transport and storage. AID's Bureau for Food for Peace and Voluntary Assistance, Office of Food for Peace, coordinates the eligibility, procurement, allocation, and delivery of commodities with the USDA, and it also coordinates the development and implementation of project procedures with the cooperating sponsors, voluntary agencies, and the World Food Programme.

* Note that not all commodities that are eligible under PL 480 are always available.

# Commodity Characteristics

A brief review of commodity characteristics is provided here to facilitate the selection process. Table I.2 contains information on nutritional content of commodities. This information is expanded in Chapter V to include individual commodity fact sheets with information on processing techniques, nutritional content, packaging, and recipes.

Each country or project may have unique experiences with specific commodities. Therefore, space is provided in Table I.3 for each FFP office to add its own comments. Table I.4 contains examples of how various commodites are used throughout the world.

The role that each commodity category or individual commodity can play in various programs is highlighted. Program officers will find it useful to review this background information before starting the process of devising new ration packages or reviewing existing ration packages.

## 1. Processed Foods

Processed foods are converted raw commodities that have been milled or milled and heated so that they can be more easily prepared into food products. All commodities on the eligibility list are processed foods except whole grains and legumes.

### Blended Foods

Blended foods consist of a finely granulated mixture of partially precooked cereal flour, soy flour and NFDM with added vitamins and minerals. They require further cooking one to two minutes, have a low bran content for higher digestibility in young children, and retain storage stability for at least one year at 77°F.

Blended foods are referred to as formulated cereal foods, and were introduced into the program in August 1966. They were intended as a substitute for nonfat dry milk and designed as a high quality protein supplement for weaning age infants, preschool children, and malnourished adults. Even though energy supplementation is now given equal or higher priority than protein in preventing preschool age malnutrition, blended foods continue to play an important role. They are fortified with minerals and vitamins, have a high digestibility, and low bulk. When used as the primary source of food, their energy content should be raised by adding sugar or vegoil before consumption.

Compared with other categories, blended foods have a shorter cooking time, higher nutrient densities, higher digestibility, shorter shelf-life, and higher cost. They also help in targeting as they are more likely to be considered "special foods" for infants, young children, and the malnourished. All blended foods have been fortified with a vitamin-mineral premix.

Corn Soy Milk (CSM). A blend of partially-cooked cornmeal, soy flour, and NFDM supplemented with vitamins and minerals. Was the first formulated food product in the overseas donation program in 1966.

Instant Corn Soy Milk (ICSM). The instant form of CSM is prepared from a finer grind of cornmeal. Without cooking it can be ready for consumption by mixing with water. Much less water is needed to prepare gruels, resulting in higher nutrient density.

Wheat Soy Milk (WSM). A blend of partially precooked wheat or bulgur flour, wheat protein concentrate, with soy flour and NFDM supplemented by vitamins and minerals. Has a taste similar to wheat. At equal concentrations, WSM is more fluid than CSM, making it easier for younger children to consume.

## Soy-Fortified Cereal Foods

Soy-fortified processed commodities are used as staple foods or supplements in all categories of programs. They have been formulated to be virtually indistinguishable from unfortified foods. They have a higher protein density than the unfortified processed commodities.

Soy-Fortified Bulgur. Cracked, debranned, and partially precooked bulgur wheat fortified with 15 percent soy grits. Often accepted as a substitute for rice and is generally used to make porridge.

Soy-Fortified Cornmeal. Degermed cornmeal fortified with 15 percent soy flour and vitamins and minerals. Can be prepared the same way as cornmeal.

Soy-Fortified Sorghum Grits. Degermed and dehulled grain sorghum fortified with 15 percent soy grits. Good replacement for rice in rice-consuming areas. Pounded into coarse meal in some parts of Africa.

Soy-Fortified Wheat Flour. Unbleached straight grade bread wheat flour fortified with 12 percent soy flour, vitamins, and minerals. Is mainly used as a baking ingredient to provide additional protein.

Soy-Fortified Rolled Oats. Partially precooked rolled oats fortified with 15 percent soy flakes. Often acceptable as a substitute for rice.

Instant Corn Soy Masa Flour. Lime treated whole corn fortified with 5% soy flour, vitamins and minerals. Although primarily intended for use in the preparation of tortillas and similar products, it may also be used to make gruels.

Other Processed Foods

These commodities are most likely to be identical to or resemble what recipients already consume, therefore easily fit into most local diets.

Rice. Processed from long, medium, or short grain rough rice. Has high acceptability and market value in many parts of the world. A more expensive way to deliver energy and protein than other grain products.

Bulgur. Cracked, debranned, and partially precooked whole wheat. Often an acceptable substitute for rice and often used for making porridge.

Cornmeal. Degermed ground corn; can be used for porridge and for baking. Is lysine deficient without soy or milk fortification.

Wheat Flour. Milled and processed from hard wheat. Mainly used as an ingredient in cooking and baking.

Rolled Oats. Processed from white oats, partially precooked by passing through heated rolls. Can be used for porridges or baking.

Vegetable Oil (Vegoil). Refined and partially hydrogenated soy or other vegetable oils. A highly desirable component of a ration package because of its high caloric density, ability to increase fluidity of cereal foods (important for feeding young children), palatability, essential fatty acids, and fat-soluble vitamins (A, D, and E) utilization. Most often used as an ingredient in cereal dishes like porridge or rice and as a cooking medium.

## 2. Whole Grains

Whole grains are considered unprocessed. Most often these are used in Food for Work programs and emergency programs. They are recommended for use primarily in regions which are familiar with processing and cooking these types of commodities.

Corn. Whole-grain yellow corn; in some corn-consuming parts of the world less desirable than white corn but can be substituted for it.

Wheat. Whole grain product. Due to its abundance and low price on the world market it is the cereal most likely to be eligible for emergency purposes both by relief agencies and recipient countries' governments.

Sorghum. Unprocessed whole grain; used as a staple in parts of Asia and Africa. Can present problems of digestibility in areas where the population is not familiar with processing it.

## 3. Dairy Products

These commodities consist of foods of high nutritional value. They are generally considered high status foods, with a good market value locally. However, unless stored properly they have limited storage stability. Of these foods, NFDM and cheese are sources of excellent quality protein and are used as ingredients or supplements in all categories. Due to the possibility of lactose intolerance especially in populations not accustomed to consuming milk or milk products, they are best used in combination with local foods such as porridges and bread.

Non-Fat Dried Milk (NFDM). Pasteurized fresh milk from which all fat and water have been removed. NFDM is a highly-concentrated source of excellent quality protein. NFDM is fortified with vitamins A and D. Because the protein to energy ratio is extremely high, this commodity should be combined with sources of energy, such as oil or sugar or mixed with traditional porridges or stews.

Due to the possiblity of lactose deficiency, NFDM should be used with caution in age groups or areas not accustomed to consuming milk.

## 4. Legumes

These are relatively high cost, high protein foods that have a good market value locally. Can be used in all categories of programs. When combined with cereals, provide a better quality of protein than either cereals or legumes separately. Digestibility is improved by removal of the outer seed coat through soaking and local processing, making them usable in MCH and emergency programs. They have a relatively long preparation time, and long shelf-life. Peas, beans, and lentils are eligible.

Table I.1 Commodity Eligibility List

U.S. Fiscal Years 1988 and 1989

| Commodities | Estimated CCC Full Reimbursement value in US dollars per metric ton FY 1988 | FY 1989 |
|---|---|---|
| Wheat | 125 | 129 |
| Wheat Flour | 222 | 228 |
| Soy-Fortified Wheat Flour | 242 | 246 |
| Bulgur | 183 | 195 |
| Soy-Fortified Bulgur | 207 | 213 |
| Wheat Soy Milk | 331 | 342 |
| Corn | 93 | 91 |
| Cornmeal | 150 | 147 |
| Soy-fortified Cornmeal | 195 | 190 |
| Sorghum | 89 | 87 |
| Soy-Fortified Sorghum Grits | 196 | 202 |
| Rolled Oats | 347 | 353 |
| Soy-Fortified Rolled Oats | 375 | 380 |
| Instant Corn Soy Masa Flour | TBA | TBA |
| Corn-Soy Milk | 274 | 269 |
| Instant Corn-Soy Milk | 290 | 284 |
| Non-Fat Dry Milk | 110 | 110 |
| Vegoil | | |
| 55 gallon drums | 644 | 666 |
| 5 gallon drums | 712 | 734 |
| 1 gallon drums | 712 | 734 |
| Rice | 350 | 325 |
| Peas | 275 | 300 |
| Beans | 500 | 252 |
| Lentils | 350 | 400 |
| Prices are as of: | 12/87 | 12/87 |

Note: Price estimates include the cost of commodities FAS, plus 2 percent administrative cost. Section 406.b of the Agricultural Act of 1949, as amended, authorizes that Dairy products under Title II could be charged against the budget at $110 per metric ton. Actual acquistion cost and world market value of dairy commodities are considerably higher.

Table I.2 Commodity Nutritional Content
(per 100 g finished dry commodity)

| COMMODITY | Food Energy Calories | Protein gram | Crude Fat gram | Crude Fiber gram | Carbohydrates gram |
|---|---|---|---|---|---|
| Wheat | 330 | 12.3 | 1.8 | 2.3 | 72 |
| Wheat Flour | 364 | 10.5 | 1.0 | 0.3 | 76 |
| Soy-Fortified Wheat Flour | 357 | 16.0 | 1.3 | 0.6 | 72 |
| Bulgur | 354 | 11.2 | 1.5 | 1.7 | 76 |
| Soy-Fortified Bulgur | 350 | 17.3 | 1.5 | 2.1 | 70 |
| Wheat-Soy Blend | 368 | 20.0 | 6.0 | 2.1 | 59 |
| Wheat-Soy Milk (5% NFDM) | 369 | 20.0 | 6.0 | 1.8 | 58 |
| Wheat-Soy Milk (15% NFDM) | 371 | 20.0 | 6.0 | 1.7 | 59 |
| Corn | 348 | 8.9 | 3.9 | 2.0 | 72 |
| Cornmeal | 364 | 7.9 | 1.2 | 0.6 | 78 |
| Soy-Fortified Cornmeal | 358 | 13.8 | 1.5 | 0.9 | 72 |
| Instant Corn-Soya Masa Flour | 365 | 12.2 | 4.0 | 2.0 | 71 |
| Corn-Soy Milk (5% NFDM) | 378 | 20.0 | 6.0 | 1.2 | 60 |
| Corn-Soy Milk (15% NFDM) | 380 | 20.0 | 6.0 | 1.1 | 60 |
| Instant Corn-Soy Milk (5% NFDM) | 378 | 20.0 | 6.0 | 1.2 | 60 |
| Instant Corn-Soy Milk (15% NFDM) | 380 | 20.0 | 6.0 | 1.1 | 60 |
| Sorghum | 332 | 11.0 | 3.3 | 1.7 | 73 |
| Soy-Fortified Sorghum Grits | 360 | 16.0 | 1.0 | 1.0 | 68 |
| Rolled Oats | 390 | 16.0 | 7.0 | 1.8 | 68 |
| Soy-Fortified Rolled Oats | 375 | 21.0 | 6.0 | 2.0 | 60 |
| Non-Fat Dry Milk (NFDM) | 363 | 35.9 | 0.8 | — | 52 |
| Vegoil | 884 | — | 100.0 | — | — |
| Rice | 363 | 6.7 | 0.4 | 0.3 | 80 |
| Peas | 340 | 24.1 | 1.3 | 4.9 | 60 |

Table I.2 Commodity Nutritional Content
(per 100 g finished dry commodity)

| COMMODITY | Vitamin A IU | Thiamine mg | Riboflavin mg | Niacin mg | Vitamin C mg |
|---|---|---|---|---|---|
| Wheat | —— | 0.57 | 0.12 | 4.3 | — |
| Wheat Flour | 1100 | 0.64 | 0.40 | 5.3 | — |
| Soy-Fortified Wheat Flour | 1100 | 0.64 | 0.40 | 5.3 | — |
| Bulgur | 1100 | 0.55 | 0.33 | 4.4 | — |
| Soy-Fortified Bulgur | 1100 | 0.55 | 0.33 | 4.4 | — |
| Wheat Soy Blend | 1661 | 0.87 | 0.60 | 8.6 | 40 |
| Wheat-Soy Milk (5% NFDM) | 1662 | 0.84 | 0.67 | 8.5 | 40 |
| Wheat-Soy Milk (15% NFDM) | 1664 | 0.81 | 0.83 | 8.2 | 41 |
| Corn | 490 | 0.37 | 0.12 | 2.2 | — |
| Cornmeal | 1100 | 0.55 | 0.33 | 4.4 | — |
| Soy-Fortified Cornmeal | 1100 | 0.55 | 0.33 | 4.4 | — |
| Instant Corn-Soya Masa Flour | 1100 | 0.55 | 0.33 | 4.4 | — |
| Corn-Soy Milk (5% NFDM) | 1942 | 0.65 | 0.58 | 6.2 | 40 |
| Corn-Soy Milk (15% NFDM) | 1926 | 0.60 | 0.75 | 6.1 | 41 |
| Instant Corn-Soy Milk (5% NFDM) | 1926 | 0.60 | 0.75 | 6.1 | 41 |
| Instant Corn-Soy Milk (15% NFDM) | 1942 | 0.65 | 0.58 | 6.2 | 40 |
| Sorghum | —— | 0.38 | 0.15 | 3.9 | — |
| Soy-Fortified Sorghum Grits | 1100 | 0.55 | 0.33 | 4.4 | — |
| Rolled Oats | —— | 0.60 | 0.14 | 1.0 | — |
| Soy-Fortified Rolled Oats | 6 | 0.67 | 0.17 | 1.2 | — |
| Non-Fat Dry Milk | 5000 | 0.35 | 1.80 | 0.9 | 7 |
| Vegoil | —— | —— | —— | — | — |
| Rice | —— | 0.07 | 0.03 | 1.6 | — |
| Peas | 120 | 0.74 | 0.29 | 3.0 | — |

Table I.2 Commodity Nutritional Content
(per 100 g finished dry commodity)

| COMMODITY | Calcium mg | Phosphorus mg | Iron mg | Sodium mg | Potassium mg |
|---|---|---|---|---|---|
| Wheat | 46 | 354 | 3.4 | 3.0 | 370 |
| Wheat Flour | 132 | 87 | 4.4 | 2.0 | 95 |
| Soy-Fortified Wheat Flour | 132 | 155 | 4.4 | 1.8 | 302 |
| Bulgur | 132 | 338 | 4.4 | 2.5 | 229 |
| Soy-Fortified Bulgur | 132 | 385 | 4.4 | 2.0 | 467 |
| Wheat-Soy Blend | 859 | 867 | 20.6 | 257.0 | 633 |
| Wheat-Soy Milk (5% NFDM) | 914 | 886 | 20.2 | 283.0 | 650 |
| Wheat-Soy Milk (15% NFDM) | 1037 | 939 | 19.7 | 336.0 | 766 |
| Corn | 22 | 268 | 2.1 | 1.0 | 284 |
| Cornmeal | 132 | 99 | 4.4 | 1.0 | 120 |
| Soy-Fortified Cornmeal | 132 | 182 | 4.4 | 1.0 | 375 |
| Instant Corn-Soya Masa Flour | 132 | 245 | 4.4 | 1.0 | 326 |
| Corn-Soy Milk (5% NFDM) | 907 | 667 | 18.5 | 283.0 | 594 |
| Corn-Soy Milk (15% NFDM) | 1021 | 725 | 17.8 | 336.0 | 651 |
| Instant Corn-Soy Milk (5% NFDM) | 907 | 667 | 18.5 | 283.0 | 594 |
| Instant Corn-Soy Milk (15% NFDM) | 1021 | 725 | 17.8 | 336.0 | 651 |
| Sorghum | 28 | 287 | 4.4 | — | 350 |
| Soy-Fortified Sorghum Grits | 132 | 180 | 4.4 | — | 500 |
| Rolled Oats | 53 | 405 | 4.5 | 2.0 | 352 |
| Soy-Fortified Rolled Oats | 85 | 442 | 5.5 | 1.8 | 572 |
| Non-Fat Dry Milk (NFDM) | 1308 | 1016 | 0.6 | 532.0 | 1745 |
| Vegoil | — | — | — | — | — |
| Rice | 24 | 94 | 0.8 | 5.0 | 92 |
| Peas | 64 | 340 | 5.1 | 35.0 | 1005 |

Table I.3

Local Office's Experience with Commodities*

Commodity _____

Year commodity was used _____

Geographical area(s) commodity was used in:

_____

_____

_____

Description of experience and/or problem:

* Use a separate sheet for each commodity.

Table I.4

Partial List of Title II Commodities and Their Uses in Selected Countries*

| Country | Commodities Distributed | Use and Local Food Equivalent | Other Comments |
|---|---|---|---|
| Bolivia | wheat flour/rice rolled oats | wheat flour/quinua/ potatoes/rice/ maize/cassava | In drought emergency, rice is used to compensate for carbohydrate deficiency caused by poor potato harvests. Rice is not used in regular programs because country is self-sufficient. |
| | vegoil | vegoil | |
| | oats | porridge | |
| | bulgur | rice/soup/porridge | |
| | CSM/WSB | bread | Wheat flour is processed into bread. |
| | NFDM/CSM | weaning food | |
| | | | Cereals are mixed with vegetables to make soups. Bulgur is boiled with milk or used as a soup or fried as rice. CSM and WSB are made into breads. Rolled oats are consumed as cereal with NFDM. Weaning age kids use CSM and are then introduced to other cereals. |
| | | | In emergencies, the preparation does not change but the number of commodities must be reduced. |
| Burundi | NFDM | porridge | NFDM is basically a take-home item and is demonstrated at centers as an additive to porridge or made into a paste shared by the whole family. It is the least favored commodity. All foods except oil are used as weaning food. Emergency commodities were all taken home and processed by community and household mills. |
| | wheat | wheat | |
| | corn | corn | |
| | CSM | porridge | |
| | bulgur | wheat/corn | |

* Results of a cable survey conducted by FVA in 1985.

| Country | Commodities Distributed | Use and Local Food Equivalent | Other Comments |
|---|---|---|---|
| Chad | CSM<br>wheat flour<br>corn/sorghum<br>rice<br>vegoil | porridge<br>"boule"/porridge<br>"boule"<br>rice/"boule"<br>vegoil | Sorghum is used in emergency and ongoing programs. SFSG is used in dry-ration distributions and in preparing feeding mixtures at feeding centers. Vegoil in Food for Work and as an ingredient in supplemental feeding and in meat sauces. Wheat is used to make "boule," a basic Chadian dish, with meat sauce or is boiled whole and served as porridge. Corn is also made into "boule." Rice is used as a grain. The basic preparation of most cereal grains involves mixing flour obtained after cracking and milling with hot water to produce heavy dough-like substance, or "boule." This is eaten with sauce made from greens and/or meat or fish. |
| Dominican Republic | NFDM<br>bulgur<br>NFDM/CSM | porridge<br>porridge/stew<br>weaning food | NFDM is used in cereals, and porridges. Bulgur is used as a cereal or in stews. After the 1979 hurricanes, the Peace Corps made "Pan de Paz" highly nutritious bread for distribution from emergency commodities. |



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| Country | Commodities Distributed | Use and Local Food Equivalent | Other Comments |
|---|---|---|---|
| Egypt | NFDM<br>vegoil<br>wheat flour | cheese/bread<br>vegoil<br>bread | NFDM is used in cereals, in cheese and in bread<br><br>Bulgur is being phased out, but is now mixed at the feeding site with boiling water and served to OCF recipients.<br><br>Soybean oil is a main ingredient in Egyptian cooking, used to fry potatoes and to mix with broad beans. ICSM is mixed with water at the feeding site and used especially as a weaning food, or mixed with sugar to make a pudding. It is cooked with vegetables to make a soup; is used in cakes and breads.<br><br>Flour is mixed with salt and water and cooked on a metal plate to produce a thin unleavened bread. |
| Honduras | NFDM<br>rice | weaning food<br>porridge | Milk is added to sugar and rice, and used primarily for weaning age children. |

| Country | Commodities Distributed | Use and Local Food Equivalent | Other Comments |
|---|---|---|---|
| Morocco | wheat flour | wheat/barley | NFDM is used for making yogurt. |
| | NFDM | yogurt | |
| | vegoil | vegoil | |
| | | | NFDM is used in sweet breads and pastries. |
| | | | Flour is used to make bread, pastries, and as a thickener. |
| | | | Vegoil is used to cook and fry foods and, with flour, to make "nutripan". |
| Niger | NFDM/oil/blended foods | sauces/porridge | Sorghum is pounded into flour. |
| | SF sorghum grits/ wheat flour | teff | Blended food, NFDM, and vegoil used in sauces and porridges. |
| | bulgur | porridge | |
| | sorghum | flour | |
| | CSM/NFDM | weaning food | |
| Sri Lanka | ICSM/NFDM | thriposha | ICSM is combined with local foods to produce thriposha, a weaning food. |
| | | | Flour is made into biscuits for distribution in the schools. |

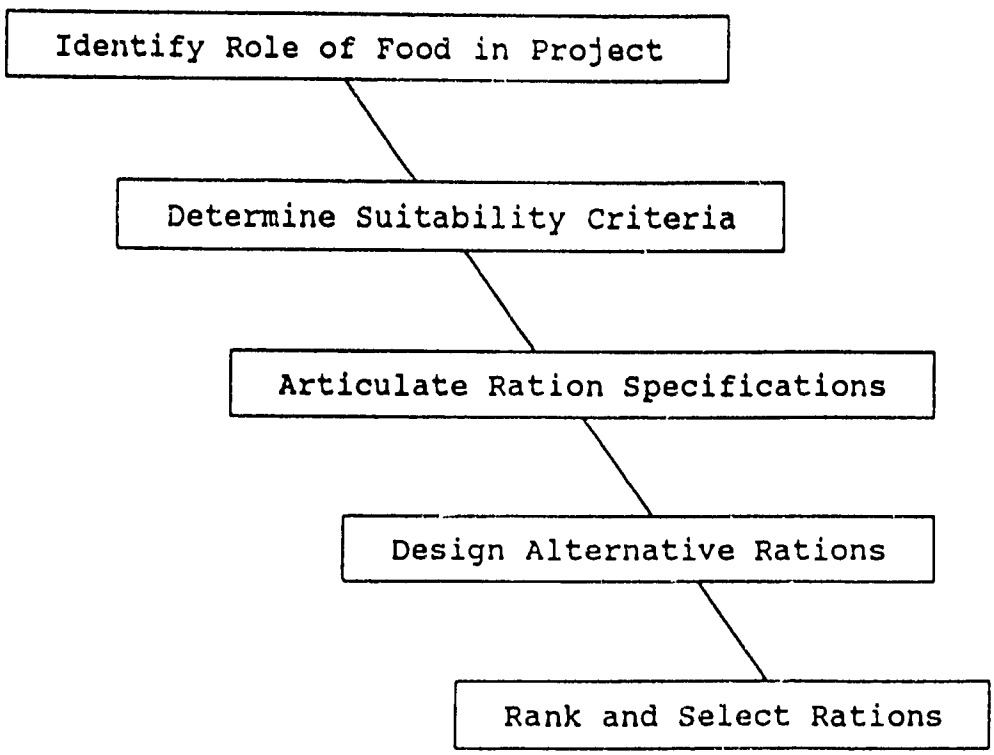
| Country | Commodities Distributed | Use and Local Food Equivalent | Other Comments |
|---|---|---|---|
| Tanzania | bulgur<br>NFDM<br>vegoil | porridge<br>porridge<br>vegoil | Bulgur, NFDM, and vegoil are used to prepare thick and thin porridge.<br><br>Vegoil is used as a cooking medium. |
| Togo | NFDM<br>wheat flour<br>grain<br>ICSM | cheese/<br>bread<br>flour/couscous/bulgur<br>weaning food | NFDM is used in making cheese, and mixed with cereals.<br><br>Grains are not processed. |
| Tunisia | wheat flour<br>grain<br>ICSM | bread<br>flour/couscous/bulgur<br>weaning food | Wheat flour is given to the baker to make into bread.<br><br>NFDM is also added to non-spiced cereals. |

# COMMODITY SELECTION GUIDELINES: A FRAMEWORK

This chapter provides guidelines for selecting the most appropriate, cost-effective commodity ration for reaching project objectives. The guidelines are divided into five steps: (1) consider project objectives and the role of food in the project, (2) determine suitability criteria for commodities, (3) articulate ration specifications, (4) design alternative rations, and (5) rank and select rations. See Figure II.1.

In following these guidelines, data must be collected and analyzed on a variety of project, recipient, community, and commodity characteristics. Chapter III provides a more detailed account of data needs and methodologies for each step. In Chapter IV, guidelines are provided by program category, using the principles described in this chapter.

Figure II.1 Steps for Commodity Selection



# Steps for Commodity Selection

## Step 1: Project Considerations and Role of Food

**Rationale and Definition**

The ration chosen should be appropriate for helping the project reach its objectives. For example, a project to improve the nutritional status of infants should have a ration different from a school feeding program intended to increase attendance and enrollment. Precise project objectives thus need to be identified.

A second project consideration is a clarification of how the food will be used: primarily as a nutritional supplement for achieving nutritional objectives, or as income transfer for increasing resources of the unemployed and for obtaining participation in a development project or training program.

Carefully review the target population, its nutritional needs, age, economic status, and how it will be affected by the project.

The distribution mode is also an extremely important consideration. For an on-site MCH program, consider how much a child in a particular age group typically eats at one sitting and make allowances for substitution (if food will be withheld within the family). In a take-home feeding program, consider food sharing within the family if the food is to be targeted directly to the child, and determine the type of food that the family would most likely give to the child.

Thus, project considerations may be defined as those attributes of project design that go into the selection of appropriate commodities. These include primary project objectives and the role of the food component in achieving project objectives, target population characteristics, distribution mode, and frequency and timing of food distribution. See Table II.1.

**Decisions and Actions**

Decide the primary use of the food, i.e., is it income-in-kind, a source of energy and nutrients, or a combination? This decision is based on project objectives and target population characteristics. For example, if an MCH program's primary purpose is to increase utilization of health services, then the income transfer value of the ration is of primary importance as an incentive to bring families to

Table II.1 Project Considerations in Commodity Selection

| Program | Objectives | Target Population | Distribution Mode | Use of Food* |
|---|---|---|---|---|
| MCH (includes Child Survival) | Improve nutritional status; prevent malnutrition<br>Increase utilization of services | Children under 5 with emphasis on children under 2 and those at serious risk of becoming malnourished; pregnant and lactating women from poor communities | On-site or Take-home | Nutritional Supplement<br>Income Transfer |
| Food for Work | Increase resources of unemployed and underemployed workers and their families | Low income, unemployed adults and their families | On-site or Take home | Income Transfer |
| | Achieve needed agriculture, economic and community improvements through infrastructure creation and econ. development programs<br>Improve self-help capability of individuals | Low income and/or food-deficit communities | | Nutritional Supplement esp. in food deficit areas |
| School Feeding | Increase attendance and enrollment<br>Improve health and nutritional status<br>Improve learning capacity | School age children from poor communities with emphasis on those who are malnourished | On-site | Nutritional Supplement<br>Incentive |
| Other Child Feeding | Improve nutritional status | Undernourished children not reached through MCH or schools (priority on younger children) | Usually On-site | Nutritional Supplement |
| Emergency | Prevent serious malnutrition | All age groups | On-site or Take-home | Nutritional Supplement |

*For MCH, FFW, and School Feeding, food can be used for both its income transfer value and nutritional supplementation, depending on project objectives.

the clinics. However, if the purpose is to provide a nutritional supplement, then the nutritional value of the ration is given priority. A project may have both nutritional and incentive objectives and seek to meet both nutritional value and income transfer goals. In this step establish the relative weight given to income transfer versus nutritional value. Also identify the limitation imposed by the delivery system with respect to frequency and timing of food distribution.

**Key Concepts**

Income transfer. This is the value of the ration in cash terms to the household receiving the food aid. The cash value is determined by the price (market or selling) of the local commodity which is most similar to the food aid commodity in the household diet. Particularly for Food for Work activities, establishing a minimum income transfer value that the ration should provide becomes a very important part of the design of an effective project. If the value to the workers is too low, participation in the project may be doubtful. If the value is too high, commodities may be sold, wasted, or create local market disruptions. Calculating the required income transfer value is based on local wage rates for comparable work or an estimated value that is considered sufficient incentive for achieving desired participation levels.

Nutritional value. This is the energy, protein, vitamin, and mineral content of commodities in the ration. Nutritional value of rations can be calculated by multiplying the amount needed of each commodity by the nutritional values given in Table I.2. The targets for minimum nutritional values that rations should provide are based on estimates of deficits in existing diets of the target group.

## Step 2: Suitability

**Rationale and Definition**

Suitability is defined as those attributes of the individual recipient, target household, or community that will most affect utilization of commodities. Significant attributes include:

(i) physiological appropriateness, which covers nutritional needs and deficits, digestibility and tolerance, and volume or bulk limitations of young children and infants;

(ii) cultural acceptability, including taste, traditional taboos, preference;

(iii) availability of processing, storage and preparation techniques or facilities; and

(iv) characteristics of local food production.

To be suitable, a commodity must be physiologically appropriate for the target population. For example, protein deficient populations have special physiological needs, and therefore the ration should include commodities with a high level of protein. Infants and young children have different physiological needs; in MCH programs the children need highly digestible products having high concentrations of energy and protein, rather than the more bulky and less digestible commodities that can be appropriate for adults and older children. Another physiological concern is tolerance for commodities. This is often a problem if the recipient is not familiar with preparation and consumption of a particular commodity.

In addition to physiological suitability, cultural suitability plays a key role in enabling food to achieve its project objectives. Carefully consider the target population's preferences for shape, color, or texture. For example, the texture of soy-fortified sorghum grits or of bulgur makes it acceptable to those accustomed to a rice staple; red sorghum is not accepted by many populations that would happily consume white sorghum; and to some populations, the yellow color of ICSM makes it appear as spoiled flour.

Commodities also need to be culturally suitable for the particular role they are to play in the project. For example, in a take-home MCH program with a nutritional objective, identify self-targeting food or "baby foods" such as blended or milk-based foods that will be less acceptable to other family members. Unfamiliar foods may be made more acceptable through other project activities such as nutrition education, food processing, and packaging.

Commodity utilization is also affected by processing and storage facilities in the household, feeding center, and/or community. It is preferable, for example, to select milled products rather than whole grains where milling facilities are not available or are expensive. Serious fuel shortages or time constraints will lead to selection of precooked commodities or those needing shorter cooking time; and lack of refrigeration, especially in hot, humid areas, will favor the selection of commodities with a long shelf-life.

Analysis of the community and larger geographical area should also consider local agricultural production and the production cycle particularly when planning a rural food distribution project. This type of review should help ensure that commodities provided will not have a negative effect on local production or prices. Analysis should focus on the production cycle to identify when local foods are available as well as to document seasonal shortages. This is particularly important for planning food projects where significant quantities of food are distributed. If foods produced are consumed by the target population, then the food aid commodities should be carefully chosen not to reduce demand for locally grown foods. In food-deficit areas or in households where income restricts demand, food aid commodities should first and foremost fill nutritional deficits.

**Decisions and Actions**

First, determine the most important physiological characteristics the rations should have which will make them suitable, i,e.:

--protein levels
--energy levels
--low viscosity
--high digestibility

Second, identify the most important taste preferences, practices, and norms of the target population that will affect food use and consumption. Identify major constraints to using particular commodities, such as:

--all household members eat from the same bowl
--yellow cornmeal would be unacceptable
--community prefers wheat to corn

Third, identify the most important processing and storage constraints like:

--no mills available
--limited fuelwood
--no refrigeration

Fourth, determine which local foods are available during the year, and identify periods of shortages when important foods are not available.

At this point, exclude any commodities from the PL 480 list which clearly could not meet the physiological criteria, would be unacceptable because of cultural preferences, would be difficult to store or process, and would compete with local food production. These decisions will reduce the number of commodities from which to chose.

## Step 3: Ration Specifications

### Rationale and Definition

The final selection of the type and size of the ration should be based on specified nutritional or income transfer value levels, or both, as defined in step 1. First articulate the minimum nutritional or income transfer value that a ration must have to achieve project objectives and impact. Then list suitability criteria and key characteristics that are important to the full utilization and consumption of the ration. For example, if a project is to reduce serious malnutrition in the under-five population and the per capita calorie deficit is approximately 250 calories, a supplement that provides 200 calories per child is unlikely to make a difference, given leakages and additional food needs of malnourished or sick children. On the other hand, in a Food for Work project, it is wasteful to provide a large monthly take-home ration of $30.00, for example, when a $15.00 ration would achieve the desired level of participation.

In a specification statement, always include nutritional value and/or income transfer value. Specify other key characteristics needed to meet suitability requirements and overcome identified utilization problems, i.e., short cooking time, low bulk, self-targeting for take-home.

To achieve nutritional objectives, rations must provide sufficient food to fill gaps in energy (calories) and protein. Additional food may be needed for recuperating the malnourished, for addressing substitution effects when home diets are reduced because the food aid is received, and for food sharing within the family in MCH take-home programs. Similarly, the minimum level or acceptable range of income transfer value must be established for Food for Work and incentive programs to ensure maximum participation. When food is used as wages, the prevailing wage rates in the area for comparable work is most often used to specify the needed income value of the ration. In incentive programs, past program experience, discussion with community leaders, and testing different income transfer value levels may be necessary before agreeing upon a minimum level. Incentive programs generally need to provide sufficient income transfer value to cover the recipients' participation costs such as lost wages and transportation.

A clear articulation of ration specifications can help evaluate substitution of alternate commodities in ration packages. Establishing a minimum level or acceptable range also helps put together rations that use the minimum quantities of commodities needed to meet project requirements. The cost savings thus generated can be used to expand coverage or strengthen other project components.

**Decisions and Actions**

If the project has specific nutritional objectives, specify the minimum number of calories and/or grams of protein to be provided by the ration package.

If the project uses food mainly for its income transfer value, specify the target level and minimum of acceptable income transfer value of the ration package.

Identify other critical characteristics of the ration considered necessary to meet project objectives, such as cooking time, shelf life, and digestibility criteria and add these to the specifications.

## Step 4: Alternative Ration Packages

**Rationale and Definition**

The large number of commodities on the eligibility list makes it possible to design a variety of ration packages. Also, changes in commodity availability, prices, and packaging can alter the relative cost effectiveness of ration packages. It is useful to develop several alternative ration packages so that they can be compared for cost and other trade-offs.

This step involves combining different commodities in varying amounts so that their nutritional and income transfer values meet ration specifications and key suitability criteria as identified in steps 2 and 3.

The income transfer value of commodities (for recipients) will be estimated in this step, based on the market or selling prices of the most similar local commodities. It is helpful to calculate the cost-effectiveness of desired commodities in terms of cost per unit of nutritional value (100 calories or 10 grams of protein) and per unit of income transfer value (in $ to the recipient). This information gives a clear picture of which commodities provide the most nutritional benefits or highest income at the lowest cost to the project.

**Decisions and Actions**

Design rations that meet specifications using no more than three commodities per ration. Use commodities which provide the maximum gain to recipients at lowest cost to the project. Based on the cost per unit of nutritional and/or income transfer value provided to the recipient, use the most cost-effective commodities and design several (generally three or four) rations if a new project is being planned. In existing projects, the nutritional and/or income transfer values of currently used rations are compared with specifications and key suitability criteria. Alter the existing rations to conform to the requirements.

**Key Concepts**

Cost. This refers to costs to the project associated with a commodity (such as CCC values found in Table I.1). In some projects, in-country transportation and storage costs and special handling costs may be critical, however these costs may be similar for most commodities. For each project, first decide which of these cost elements are most relevant.

## Step 5: Ranking and Selection

**Rationale and Definition**

Since all rations meet the ration specifications, they can then be ranked by total cost and other trade-offs. Cost plays a vital role in the size and effectiveness of projects. Cost savings may make possible higher coverage, and strengthening non-food inputs such as nutrition education, storage, or cash incentives. Decisions to change ration packages can be made easily and less arbitrarily when alternative rations and their main attributes have already been worked out.

Budgetary requirements and cost-effectiveness of projects can be affected by the inclusion of certain commodities especially in large amounts. This step allows the project officer to identify those ration packages that are more cost-effective than others.

**Decision and Actions**

Select one ration after comparing costs and other attributes. In addition to cost, list the special advantages and disadvantages of each ration including: excessive losses of any commodity due to packaging, shelf-life, or local transportation; possible disincentive effects; secondary project purposes such as encouraging the use of dairy products or processed weaning foods; and providing vitamin and mineral supplementation.

# Summary for Commodity Selection

## Step 1: Project Considerations and Role of Food

1. What are the primary objectives of the project?

2. What is the age, nutritional status, socio-economic status, etc. of the target population? What is the average energy and protein deficit of the target population? Is the household experiencing a serious overall food deficit? How large? Is this chronic or temporary? Is food available in the market place? How will the target population be affected by the project?

3. What is the distribution mode, i.e., take-home or on-site? What are other project distribution characteristics or constraints?

4. What is the role of food in achieving project objectives, i.e., nutritional supplement, income transfer.

5. Is it more appropriate to calculate the ration based on nutritional or income transfer criteria or both?

## Step 2: Suitability

1. Are there any physiological constraints that should be considered? Is diarrhea a problem in the target population? If it is a very young population, what are the bulk constraints? Is lactose intolerance a problem? Is the community familiar with processing and consuming sorghum using traditional methods of preparation?

2. Are there any commodities that are culturally inappropriate or unacceptable because of taste, color, texture, etc.? Are there any traditional foods or preparations preferred by the target group? What are current consumption practices of the target population and their families?

3. Are there preparation, processing, or storage constraints in the community or households? Are mills available to process whole grain? Are household storage facilities adequate? Can whole sorghum be adequately dehulled and processed? Is cooking fuel a constraint?

4. What are the characteristics of local food production, including seasonal changes in food availability, that will affect commodity selection?

Step 3: Ration Specifications

1. What are the energy and nutritional values (in calories and protein) that the ration should provide to meet project objectives? Calculations should consider current nutrient and energy deficits, including recuperation needs of the malnourished, substitution effect, and family sharing.

2. What should the income transfer value of the ration be for achieving project objectives? What are the characteristics of the labor force and its relationship to the agricultural labor force? Are laborers landless or are they farmers? What are the local wages in off season as well as during planting or harvests for comparable work in the area? What will be the costs to the target population of participation in the project? What is the minimum level of income transfer needed to encourage participation?

3. What are the other critical population, community, and country characteristics that should be considered in selecting commodities?

Step 4: Alternative Rations

1. What is the cost per nutritional unit or income transfer value of each commodity most likely to be used in a ration package?

2. What three or four ration packages meet the specifications?

Step 5: Ranking and Selection

1. What is the cost of the rations to U.S., PVOs, and host governments? Rank rations according to cost.

2. Will any of the commodities be seriously affected by country logistics constraints and weather conditions?

3. Are there secondary project purposes that should be considered?

4. Are certain commodities likely to cause market disruptions?

5. Which is the most cost-effective ration?

# INFORMATION NEEDS AND METHODOLOGIES

To follow the process of ration selection set forth in Section II, data on a variety of project, recipient, community, and commodity characteristics need to be collected. This section describes the data required, methodologies commonly used for collecting it and any calculations that may be needed. Examples of how these are applied to specific program categories are given in Section IV.

Most of the information should be readily available either at USAID (agriculture, economics, nutrition and health divisions), or through national institutions, other donor agencies, or cooperating sponsors. Some projects may require special data collection activities.

## Step 1: Project Considerations

**Information Needs**

In this step the following information should be identified:

(a) Program Category: MCH, FFW, SF, OCF, or emergency.

(b) Project Objectives: State targets and magnitude of expected impact in quantifiable terms, including numbers of people to be affected. The AID logical framework is a useful tool for this.

(c) Food Use: The role of the food component in achieving project goals should be articulated, i.e., nutritional supplement, income transfer.

(d) Target Population: Determine age groups and whether pregnant and lactating mothers should be included. List nutritional and socio-economic status of the intended recipients. Are there serious, chronic, or temporary food shortages in target areas?

(e) Distribution Mode: Determine how distribution will be made (on-site, take-home or other); how often (monthly, weekly, daily, five times a week, seasonally); and in what form (lunch, breakfast, snack, or a combination).

**Methodologies**

Table II.1 lists common objectives of projects which use food aid by program category and distribution mode. Carefully consider the role that the food component is expected to play in achieving program impact because the ration design will be based primarily on this decision.

**Calculations**

None

## Step 2: Suitability

For this step, data is required on individual household and community level needs and constraints that will affect their consumption and use of food, such as physiological appropriateness of food, cultural acceptability, local food production cycle and processing and storage constraints.

A. Physiological Appropriateness

Under physiological appropriateness, energy and nutrient deficits in existing diets are calculated and digestibility, toxicity and bulk characteristics of the commodities are compared with target group needs.

**Information Needs**

Energy and nutrient deficits. Deficits are the difference between recommended nutrient and energy intakes and the actual intake from local diets. Standards of recommended intakes are generally based on the needs of normal well-nourished populations. Therefore, in many communities, an additional allowance is added for the recuperation needs of the already malnourished. The ration should supplement the local diet to fulfill energy (calories) and nutrient deficits such as protein, vitamins and minerals. However, programs where food is used only as wages or as an economic incentive may not need to emphasize this variable in selecting rations.

Bulk, digestibility, and tolerance. Populations vary in their ability to digest and absorb food components. Small children have limited stomach capacities. Therefore, ration specifications for this group should estimate the maximum cooked volume of food allowable per ration (see Table III.2). Commodities vary considerably in their bulk and viscosity properties. Lower volume or higher density foods are preferable for small children. For children under 2 years, low bulk, low viscosity and low fiber commodities are preferred. Also, commodities that are vitamin and

mineral enriched and fully precooked are preferable especially where local cooking facilities are limited. Also review Annex A on nutritional considerations for various population groups.

**Methodologies**

Energy and Nutrient Deficits. In some countries national nutrition authorities have already completed nutritional deficit assessments and have established target nutritional intake levels for supplementary feeding. Where these do not exist, the following sources and methodologies can be used to calculate the equation.

(a) Internationally recommended levels have been set by the FAO/WHO expert committee (1974 and revised in 1983) for use worldwide and are given in Table III.1. The National Academy of Sciences' Nutrition Research Council has set standards for U.S. diets (1981). Many countries use their own recommended levels for planning food and nutrition programs.

(b) Recuperation allowances for the malnourished should be determined after consulting local nutrition authorities. A malnourished child should be consuming approximately 200 calories per kilogram of bodyweight per day, and 4.5 grams of protein per kilogram of body weight per day in order for its growth to catch up with that of its age group. For example, a normal 1 to 3 year old needs 1360 calories and 21 grams of protein per day. An 8 kilogram child who is malnourished will need 1600 calories and 36 grams of protein.

(c) Actual intakes are often the most difficult to assess, yet need to be specified for the intended target population. Methodologies include aggregate household-level food consumption, availability or expenditure surveys; individual food intake assessments; and nutritional status surveys. It may be possible to use results of existing food intake or nutritional status surveys.

Aggregate household level surveys will provide information on whether there is a general food deficit and the severity of the deficit at the household level. FFW programs that attempt to fulfill food needs should make these estimates carefully. SF and MCH program managers may need to provide additional rations or initiate Food for Work activities if there is a severe shortage

of food for entire families. If this is not done, widespread substitution and family food sharing may undermine project impact on the target group. Data in household surveys generally include food expenditures, production and stocks, and food acquired as income in-kind. Information from regional food balance or food gap assessments may be used for interim guidance if no other source of information is available.

Individual food intakes need to be assessed when rations for specific age groups are being planned as in SF and MCH programs. Approaches include food recall, food records, and observation studies. These techniques can be built into sample household surveys.

Nutritional status surveys include assessment of vitamin and mineral deficiency signs and anthropometry (body measurements such as height, weight, arm circumference). These are helpful in confirming the nature and extent of deficits in local diets; in estimating the extent to which recuperation allowances for the malnourished are needed; and as a benchmark for measuring program impact.

Design, data collection, and analysis for all methods should be conducted under the supervision of experienced professionals. Generally, national nutrition institutes or units and departments in ministries of social welfare, health, or agriculture, and medical schools are good sources of existing information and can provide local technical assistance.

Country-by-country compilations of the available nutrition studies since 1975 have recently been completed by the International Nutrition Communications Service (INCS) for about 40 countries.* These reviews include a country map showing the regions where studies have been conducted.

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* Write to the following address for a copy of "Maternal and Infant Nutrition Reviews" for your country: Clearinghouse, Maternal and Infant Nutrition Information, American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005, USA, tel: 202-789-5136.

Technical assistance is also available through AID/W to help design, review, analyze, or interpret food consumption studies for designing or evaluating rations.

Bulk, Digestibility, and Tolerance. PL 480 project officers should review the commodity eligibility list with local nutrition experts and exclude those items that are known to have caused digestibility or intolerance problems in the intended target group.

Programs being planned for target groups who normally do not consume dairy products or sorghum should introduce these commodities cautiously and not without field tests under actual food distribution conditions. Field tests can be conducted to confirm bulk or volume limitation of the target group in on-site feeding programs.

**Calculations**

Energy and Nutrient Deficits. The amount of energy (calories) and nutrients required in a food supplementation program can be calculated as follows:

| | | |
|---|---|---|
| Recommended daily intakes for normal individuals | + | Recuperation allowance for the malnourished |
| Actual or non program intakes | = | Level of food supplementation required |

Generally, calculations for supplementary feeding rations focus only on energy and protein needs. It is assumed that where malnutrition rates are high (for example in food deficit or poor areas, among the under-fives and pregnant and nursing women) that rations should contain vitamin and mineral supplementation. In regions where vitamin A deficiency is widespread, for example, program planners may want to estimate dietary deficits of vitamin A in all their Title II programs. A variety of vitamin A fortified commodities are eligible and can be programmed for all program categories.

## Table III.1 Recommended Daily Intakes for Healthy Individuals

| Program | Energy (Kcalories) a | Energy (Kcalories) b | Protein (g) a | Protein (g) b | Vitamin A (mg RE) a | Vitamin A (mg RE) b | Iron (mg) a | Iron (mg) b |
|---|---|---|---|---|---|---|---|---|
| MCH/Other Child Feeding | | | | | | | | |
| 0-6 months | 700 | 690 | 18 | 13 | 300 | 420 | 5-10 | 10 |
| 6-12 months | 880 | 945 | 18 | 18 | 300 | 400 | 5-10 | 15 |
| 1-3 years | 1250 | 1300 | 21 | 23 | 250 | 400 | 5-10 | 15 |
| 4-6 years | 1750 | 1700 | 26 | 30 | 300 | 500 | 5-10 | 10 |
| Pregnancy (latter half) | 2550 | 2600 | 49 | 74 | 750 | 1000 | 28 | 30-60 |
| Lactation | 2750 | 2800 | 60 | 64 | 1200 | 1200 | 28 | 18 |
| Recuperation/ Malnut. in children under 5 | 250 | 250 | | | | | | |
| School Feeding/Other Child Feeding | | | | | | | | |
| 7-9 years | 2190 | 2400 | 29 | 34 | 400 | 700 | 10 | 10 |
| 10-15 years, girls | 2450 | 2200 | 40 | 45 | 650 | 800 | 17 | 18 |
| 10-15 years, boys | 2800 | 2700 | 46 | 56 | 650 | 1000 | 14 | 10 |
| Food for Work | | | | | | | | |
| Moderately active women | 2200 | 2300 | 39 | 44 | 750 | 800 | 28 | 18 |
| Very active women | 2600 | 2300 | 39 | 44 | 750 | 800 | 28 | 18 |
| Moderately active, men | 3000 | 3000 | 49 | 56 | 750 | 1000 | 9 | 10 |
| Very active men | 3500 | 3000 | 49 | 56 | 750 | 1000 | 9 | 10 |
| Per person weighted ave. for all family | 2350c | | | | | | | |
| Emergency | | | | | | | | |
| Adequate food supplies | 2350c | | | | | | | |
| Scarce food supplies | | | | | | | | |
| -Temporary maintenance | 1800c | | | | | | | |
| -Minimum | 1500c | | | | | | | |
| Partial ration to supplement local staple | 980c | | | | | | | |

[a] For children 0-6 years of age: Adapted from "1983 UN Expert Group Guidelines" (FAO/WHO/UNU). For other groups: "Handbook on Human Nutritional Requirements" (WHO, 1974). Protein allowances considers the predominantly vegetable sources of food in developing countries.

[b] "Recommended Dietary Allowances," National Academy of Sciences, Washington, DC, 1980. Based on diets normally consumed in the United States.

[c] Approximately 10 to 15 percent of calories should come from high quality protein, and 25 to 30 percent of calories should come from fats and oil. If the commodities are only a partial supplement, the ration should contain a higher density of protein, fats and oil, and other nutrients.

Table III.2 Effects of Cooking on the Weights and Volumes of Foods Due to the Absorption or Loss of Water *

| Food | Weights Raw (g) | Weights Cooked (g) | Volumes Raw (ml) | Volumes Cooked (ml) |
|---|---|---|---|---|
| Rice | 100 | 230-250 | 100 | 300 |
| Soy fortified/ plain cornmeal | 100 | 500-600 | 100 | 440-460 |
| CSM | 100 | 500-600 | 100 | 350-400 |
| Rolled Oats | 100 | 600-700 | 100 | 300-350 |
| Soy fortified/ plain bulgur | 100 | 250 | 100 | 300 |
| ICSM | 100 (gruel) | 200-350 | 100 | 300-350 |
| Beans Whole | 100 | 230-250 | 100 | 240-260 |
| Beans Split-no skin | 100 | 250-300 | 100 | 250-300 |

Miscellaneous

1 average chappatti (flat bread 40 g) is equivalent to 25g wheat flour

100g wholemeal or white bread is equivalent to 70g flour

1 average tortilla is made from 60g corn dough

* The amount of water used and the length of cooking time affects the amount of water absorbed or lost from the food.

The changes shown in the table are examples only. They should be checked locally.

SOURCE: M. Cameron and Y. Hofvander, Manual on Feeding Infants and Young Children (Oxford: Oxford University Press, 1983).

**Calculations**

Bulk, Digestibility, and Tolerance. None

B. Cultural Acceptability

**Information Needs**

A commodity that is not consumed by the intended target group has zero nutritional value for that group. In ongoing programs actual consumption of the food by the intended recipient should be monitored from time to time.

The nutrition and anthropology literature may provide important guidance on the key questions of acceptability and use of proposed commodities. Types of questions will vary by program and region. For example:

- Will take-home foods aimed at improving preschool nutrition be shared by other family members and to what extent? What would be self-targeting commodities in these households?
- Will school children who receive a school lunch be deprived of a part of their usual home diet?
- Will bulgur or sorghum grits be used as a substitute in rice-consuming areas and therefore have a high income transfer value?
- Will corn and sorghum be considered low status foods and therefore not suitable for incentive or income transfer programs?
- Will blended foods be regarded as spoiled flour and therefore not fit for human consumption?
- Are there any local taboos against any of commodities, especially for pregnant and nursing women or for young children?
- What form, shape, texture, timing, and size of supplementary feeding should be used to enhance the home diet and minimize substitution?
- Are there cultural norms against weaning foods or increasing food intake during pregnancy that can be addressed through changes in commodity types or through activities such as nutrition education?

**Methodologies**

Qualitative techniques that include observation and verification of self-reported behavior by participating households have been invaluable for designing new programs as well as for midcourse corrections of existing programs. Pretesting new and revised rations using these techniques can be highly cost effective. Small sample surveys using test marketing approaches, focus groups, rapid rural appraisal techniques and observations have been used effectively for answering these types of questions.

The focus group is a research method borrowed from commercial marketing. A moderator guides a group interview or meeting to gain insight into some aspect of the project. A focus group is usually formed with six to ten persons from homogenous backgrounds or interests. Under the guidance of a moderator, topics related to the subject matter of the research are discussed. Focus group discussions are conducted as an open-ended conversation, usually one to two hours in length, in which all participants are encouraged to interact with one another, to respond to others' comments. The sessions enable the investigators to hear and observe the groups' reactions toward the topics (e.g., reasons for non-participation in incentive programs) and to gain insight into the participants' knowledge, beliefs, and concerns. The results are qualitative rather than quantitative.

The focus group may be appropriately used to:

- Explore topics prior to more extensive or intensive study and to assist in formulating questions for survey. For example, food consumption and expenditure patterns may be explored prior to a full household survey. Sources of procurement, prices, amounts generally consumed can be discussed. Foods considered high status local weaning foods, taboos for pregnant women, etc. can be explored before deciding whether a larger survey is warranted.

- Elicit reactions and impressions related to new commodities, products, ideas, and/or concepts;

- Cross-validate other individual opinions and claims, e.g., unacceptability of soy-fortified cereals;

- Help develop and test instructional materials, posters, labels or names to ensure understanding and cultural appropriateness, etc.

**Calculations**
None

C. Local Processing and Storage

**Information Needs**
Local processing, preparation, and storage practices and constraints should be identified. Information needs include:

- o availability and type of processing facilities in household and community, i.e., mills, handgrinders. What are the monetary and time costs for using these facilities?
- o How are prepared/unprepared foods stored? Is there access to refrigeration? Is contamination a problem due to cooking and eating schedules?
- o Are there local preparation or processing practices that will affect food use? For example, fermenting of sorghum in Sudan is an ancient practice and enhances its protein availability and digestibility, and culturing NFDM to make yogurt is an important practice.

**Methodologies**
Past program experience, small scale surveys and limited pretests with intended recipients are methodologies for uncovering practices and constraints that may affect appropriate use of commodities by households or feeding centers.

**Calculations**
None

D. Local Food Production

**Information Needs**
Particularly for designing programs in rural areas, it is important to know which foods are available at various periods throughout the year and which of these foods are consumed by the target population. It is also important to know the prices of the major food items consumed during each season, and how that changes according to food availability. This will provide a good understanding of which local foods are readily available and affordable to the target group and in their local diets. It would not be wise to compete with these foods, especially if they are locally grown. On the other hand, be aware of which foods are highly valued and/or are important staples, and which are not available certain times of the year.

**Methodologies**

The USDA publishes crop production schedules for each country. Consultation with Ministry of Agriculture staffs at the national level to document growing seasons, combined with visits to the geographical local areas where you want to locate programs, will usually provide sufficient information on the production cycle. Household budget and expenditure surveys will document food consumption patterns.

**Calculations**

None

## Step 3: Ration Specifications

**Information Needs**

Ration specifications will generally include one or more of the following criteria:

- o Required minimal nutritional value of the ration to meet project objectives
- o Required minimal income transfer value of the ration to meet project objectives
- o Other criteria such as maximum cooked volume, cooking time, vitamin and mineral supplementation, refrigeration needed, etc.

**Methodologies**

Nutritional Value. Under Step 2 above, the energy (calories) and protein deficits in local diets will have already been calculated. Two additional variables are now taken into consideration before nutritional specifications are established. These are:

- -- substitution or cutting back of the home diet when a supplement is provided, and
- -- family food sharing in programs aimed at individual recipients such as in MCH take-home programs.

Allowances for these "leakages" are rough approximations based on household food consumption and availability, and past experience in the target area. Methods for obtaining this information include food intake surveys, field tests and focus groups. These are discussed in the previous step.

When household-level food deficits are large (seasonally or year round), family food sharing and substitution are likely to be high.

Self-targeting foods (foods that are traditionally eaten by the target beneficiary age group only and not shared) may be less prone to family-wide sharing. Snacks between meal times may lead to less substitution. Nutrition education focused on the importance of feeding most vulnerable members of the household may help reduce sharing and substitution. Each program should determine the amount of "leakage" that needs to be covered in order to achieve impact on the intended target group. These estimates can be improved through ongoing monitoring.

If household caloric intakes are below 80 percent of recommended levels, Food for Work or emergency feeding should be initiated rather than attempting to cover these large household food needs through an MCH program.

The nutritional specifications will generally be stated as the minimum number of calories and the number of grams of protein per person, per household per day, or per distribution period. Areas of widespread vitamin A deficiency may include vitamin A levels in their ration specification. Commodities likely to cause digestibility or tolerance problems should already have been excluded from the list under Step 2.

Income Transfer Value. To determine the income transfer value needed for a particular type of program, the following factors should be considered.

(a) for Food for Work programs:

--What is the local cash wage for comparable work? This may change depending on the time of proposed project implementation, and on whether it will be in the off-season or during harvesting or planting.
--What is the degree of labor surplus and food availability in the area?
--What is the availability of cash to supplement food wages?
--What is the worker capability required to carry out the task?

In the urban areas, the required income transfer value of the food may need to be higher than in rural areas if there are competing employment opportunities. In rural areas, there are few employment opportunities, and thus the income transfer value may be less, particularly in the off-seasons.

The income value of the food ration should be at a level adequate to ensure the participation of the target work force.

Maintenance of "cash wage" equivalency will require periodic adjustments to assure the food wage keeps up with inflation.

(b) for incentive-type programs:

--What is the cost to the target population for participation in the program, i.e., transportation, lost wages?
--What other incentives are offered, i.e., training, health services? What is the value of these to the participants?

Incentive values need to be based on past program experience. Local authorities should be able to help decide the minimum level of incentive that is needed for program participation.

## Step 4: Alternative Ration Packages

**Information Needs**

Information needed for completing this step includes:

-- Nutritional value of commodities. This is provided in Table I.2.

-- Income transfer value of the commodities to the recipient. This will be calculated with the help of Table III.3.

-- List of culturally acceptable and physiologically suitable foods. This will have been completed under Step 2.

-- Raw to cooked volume conversions of commodities for MCH and on-site programs. These are provided in Table III.2.

-- Specifications in terms of minimum nutritional value, minimum or range of income transfer value, and other characteristics. These will have been drawn up under Step 3.

-- Cost to the program of commodities and cost effectiveness of commodities.

**Methodologies**

The process of designing rations and selecting individual commodities and their quantities to meet specifications will be based on trial and error. The following procedure should be useful in making the process more systematic.

-- For ease of management, do not use more than three commodities unless strong reasons exist.

-- All rations should exclude those commodites that were identified as causing physiological, acceptability, or logistical problems.

-- Each combination or ration package generally contains a cereal, a protein source (NFDM, soyflour, peas, beans, lentils, or blended food), and oil.

-- Some rations may use a single soy-fortified cereal or blended food in place of a separate cereal and protein source.

-- To limit the sale of commodities by the recipients, the ration should not provide food in excess of food needs for the distribution period.

Nutritional Value. Alternative rations should be designed to meet the calorie and protein specifications. Use Table I.2 for calorie and protein values of commodities.

For a Three Commodity Ration:
Since 25 to 30 percent of the ration's calories should come from fat or oils, multiply the total caloric specifications by 25 to 30 percent. Calculate the quantity of oil which would provide that amount.

Subtract the calories provided by the oils from the overall calorie specifications. The remaining balance of calories will come primarily from the cereal component of the ration. Select a cereal and divide the calorie content of the cereal into the remaining balance. This will give you the number of kilos or grams of cereal needed. Table I.2 gives calories per 100 grams of each commodity. For these calculations, it may be better to use kilos. Therefore multiply the calories by 10 to obtain the number of calories in 1 kg of commodity.

Calculate the protein contribution of the cereal selected. Then calculate the remaining number of grams of protein needed after taking into account the protein contribution of the cereal. Select a quantity of high protein food to make up the difference. Table I.2 shows that NFDM and soyflour (when available) are excellent sources of protein.

Add up the calories and protein from the amounts of cereal, vegetable oil, and protein components. Increase or decrease quantities of commodities until the basic specifications are met. If protein specifications are high, blended foods should be considered as the major cereal of the third component.

For a Two Commodity Ration:
Select the quantity of vegetable oil which will yield 25 to 30 percent of the calorie specifications.

Select a soy-fortified cereal as the cereal component. For groups with high malnutrition rates, and particularly for young children, use vitamin and mineral fortified foods such as WSM, CSM, and ICSM. These blended foods, along with fortified NFDM, should especially be considered in areas with a high prevelence of vitamin A deficiency.

For on-site feeding programs, review the final ration size using Table III.2 and the program implementing agencies' own estimates. Be sure that the cooked volume will not exceed bulk limitations of the target group.

Income Transfer Value. Determination of the income transfer value of a single commodity or total ration is not a precise science but a best estimate. The income transfer value of a commodity should be equivalent to the buying or selling price of the most similar food in the local diet. For example, if a household buys whole grain wheat and processes it in the home, and the commodity under consideration is whole grain wheat, then the value of the food aid commodity will be the market price of the whole grain wheat. If the food aid commodity is wheat flour, the value of the flour is the market price of whole grain wheat, although it may be more highly valued because it does not require processing.

The food aid commodity may both substitute for foods already in the diet, and provide additional foods to households where there is an inadequate supply of food. For many households where Food for Work is the major source of income, the food would all be additional. With families that are purchasing food from other sources of income, be careful not to substitute food aid for locally grown food, particularly in small communities where FFW recipients may affect aggregate demand and therefore potential prices.

The project planners should look at which foods in the current diet are:

--imported foods
--high cost items, i.e., oil, milk
--seasonally unavailable staples
--important foods that cannot be obtained in adequate quantities because of income constraints

Commodities which substitute for highly valued and expensive food items, such as oil and NFDM, may have a substantial income mediating effect, freeing up income typically used for purchasing these expensive items to buy additional local foods or goods.

When consumption of locally grown staples is not adequate, providing additional grains--i.e., either the staple or a complementary grain or legume--would have to be assessed carefully to avoid disincentive effects. Where the target group demand for locally grown foods is too small to affect aggregate demand, disincentive effects are unlikely. If FFW programs have been targeted adequately (to the poorest), the disincentive effects should be negligible since the present demand will be comparatively small.

Methodologies for obtaining this information include sample household consumption and expenditure surveys, market analysis, focused group interviews, and trial distribution of commodities followed by questionnaires and interviews.

For each food aid commodity under consideration, look at which food in the diet is most similar. Then calculate the value of that food to the household based on market or selling prices. Use Table III.3 for these calculations.

Be careful not to provide a particular commodity in excess of a household's need for that food. By using at least two commodities, such as cereal and oil, or cereal and NFDM, this problem can be prevented.

If the ration will be providing a substantial part of an individual's or household's diet, calorie and protein requirements should also be considered. (See "Methodology for Nutrional Value".) Once alternative rations are designed to meet basic income-value specifications, nutritional contributions should be compared.

Table III.3 Income Transfer Value of Commodities

| Commodity on Current Eligibility List | Locally Consumed food Which Approximates Commodity | Price of Locally Consumed Food (US$ equiv. per kilo) | Quantity of Local Food Usually Consumed per Household per Month |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |

Note:

Cost-Effectiveness of Commodities. As you are putting together rations, it may be helpful to know which commodities provide relatively more calories, more protein, and more income value per cost to the program.

Nutritional Value. Table III.6 provides an example of the "Nutritional Cost-Effectiveness" of commodities using FY 85 prices. To update this table, use the most current CCC values in Table I.1 and the nutritional values of commodities in Table I.2.

Calculate the cost in cents per 100 grams of commodity from the most recent price list. Then find the calories and protein in 100 grams of commodity from Table I.2. Use the following equation to determine cost per unit of nutritional value.

for Kcals:

$$\frac{x \text{ cents}}{y \text{ Kcals}} \times 1000 \text{ Kcals}$$

where x is the cost in cents of 100 grams of commodity and y is the Kcals in 100 grams of commodity

for protein:

$$\frac{a \text{ cents}}{b \text{ g protein}} \times 10 \text{ g protein}$$

where a is the cost in cents of 100 grams of commodity and b is the grams of protein in 100 grams of commmodity

Income Value. Cost effectiveness, as discussed here, is the cost of a commodity per $10.00 of income value. For each commodity under consideration, use Table III.3 to calculate the income value of 1 kg of that commodity. Then calculate the amount of the ration required to give $10.00 income value.

Example:

1 kg flour = $2.00 local income value
5 kg flour = $10.00 income value

To determine the costs to the program of 5 kg of flour, calculate the costs of 1 kg and multiply by five.

costs of 1 mt flour = $100.00 (using only CCC costs)

$$\text{costs of 1 kg} = \frac{\$100}{100\text{ kg}} = \$0.10$$

costs of 5 kg = $0.50

cost effectiveness of flour = .50/$10 y value

When these calculations have been made for all commodities, the costs can be compared and commodities can easily be ranked as to the costs per $10 income value.

## Step 5: Ranking and Selection

**Information Needs**

The alternative rations should all meet the minimum standards of nutritional and/or income transfer value as well as other critical specifications. They can be ranked according to cost. A final selection is based on a consideration of costs and other factors including:

- o secondary purposes
- o logistical problems
- o market disruptions

**Methodologies**

Calculating the costs of commodities involves decisions about which cost elements to consider. At a minimum we recommend using CCC value and various in-country transportation and storage costs, if they vary by commodity.

Table III.4 is provided so that cost elements can be calculated for each commodity and for rations. The final row in Table III.4 entitled "total costs" is the figure to be used in all calculations.

Costs of the individual commodities in each ration are totalled to obtain a total ration cost. Nutritional and income transfer values are calculated in step 4 above.

Table III.4 Commodity Costs to the Project

| Commodity | CCC Value | Internal Transport | Internal Storage | Other Costs | Total Costs |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |

Table III.5 Cost Effectiveness of Commodities

| Commodity | Cost per MT (Table III.4) | Cost per 1000 Cal. | Cost per 10g Protien | Cost per $10 worth of approx. local food |
|---|---|---|---|---|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |

Table III.6 Example of Nutritional Cost Effectiveness of Commodities

| Commodities | $CCC Value* MT - FY 1985 | Cost per 1000 Calories (US cents) | Cost per 10 g protein (US cents) |
|---|---|---|---|
| Wheat | 136 | 4.1 | 11.1 |
| Wheat Flour | 187 | 5.1 | 17.8 |
| SF Flour | 263 | 7.4 | 14.0 |
| Bulgur | 188 | 5.3 | 20.2 |
| SF Bulgur | 190 | 5.4 | 11.0 |
| Wheat Soy Milk | 261 | 7.2 | 13.0 |
| Corn | 114 | 3.3 | 12.8 |
| Cornmeal | 184 | 5.0 | 23.3 |
| SF Cornmeal | 222 | 5.7 | 17.1 |
| Sorghum | 110 | 3.3 | 10.0 |
| SF Sorghum Grits | 202 | 5.6 | 7.3 |
| SF Rolled Oats | 294 | 7.8 | 14.7 |
| Rolled Oats | 270 | n.a. | n.a. |
| Inst Corn Soy Masa Flr | n.a. | n.a. | n.a. |
| Corn Soy Milk | 266 | 7.0 | 14.0 |
| Instant Corn Soy Milk | 262 | 6.9 | 13.8 |
| NFDM | 110 | 3.0 | 3.1 |
| Vegoil (55 gal.drums) | 735 | 8.3 | 0 |
| Milled Rice | 280 | 7.7 | 41.8 |
| Peas | 310 | 9.1 | 12.6 |
| Beans | 525 | 15.1 | 23.1 |
| Lentils | 525 | 15.4 | 21.2 |

* These prices were provided by USDA on 12/13/1985 and are illustrative only; for current prices, see Table I.1.

Some additional factors to consider are:

- Many programs have purposes in addition to the primary one stated. Therefore, some commodities or commodity rations may not be as appropriate for fulfilling these purposes as they are for achieving the main objective. For example, in many take-home programs, an important consideration is providing mothers with a complete array of foods necessary to implement recommended child feeding practices. In these cases, it is important to provide participants with a package that will fulfill such a purpose.

  In malnourished populations, vitamin and mineral supplementation may be an important secondary purpose. Here commodities that contain a vitamin and mineral premix will be given priority. Another secondary purpose may be promotion of locally produced crops that are inexpensive. Even though the value of such a food item to the recipient may be too low, it is necessary to include it in the ration if it is to be promoted.

  Food for Work programs designed with food as an economic subsidy or part wages may consider nutritional value a secondary purpose. MCH programs on the other hand, may include income transfer value of a take-home package as a secondary objective. Because either income transfer value or nutritional value is included as specifications their data needs and methodologies are discussed under Step 4 above.

- Food Subsidies and Importation Policies. In those countries where staple foods are subsidized by the government or a high inflation rate exists, commodity selection should take these factors into account. A highly subsidized food item may be inexpensive, and therefore have low income transfer value to the recipient. However, distributing such food in a food aid program may help that country's balance of payment. On the other hand, a subsidized food item in an economy with a high rate of inflation is likely to provide less income transfer value to the recipient over time because subsidized commodities become cheaper in relation to others with inflation.

- Logistics and management. Some commodities may impose undue management or cost burdens due to unusual local conditions (transportation, storage, handling, pilferage, accounting costs, etc.) or unsuitable packaging for the shelf-life of the commodity.

The usual sources of these data are past evaluations of the same or similar programs; interviews with local personnel; ministries of agriculture or finance; and USAID agriculture divisions.

**Calculations**

The information on total ration cost and other attributes should be organized for all rations. Table III.7, is provided to facilitate cost and other comparisons before final selection.

Table III.7 Ration Ranking

| Ration Package | Commodities | Quantity per Beneficiary/ Household per day or month | Cost to Project per Benefic/ Household | Income Transfer Value by Benefic./ Household | Nutritional Value | | Other Considerations | Rank |
|---|---|---|---|---|---|---|---|---|
| | | | | | Calorie | Protein | | |
| a. | 1. | | | | | | | |
| | 2. | | | | | | | |
| | 3. | | | | | | | |
| b. | 1. | | | | | | | |
| | 2. | | | | | | | |
| | 3. | | | | | | | |
| c. | 1. | | | | | | | |
| | 2. | | | | | | | |
| | 3. | | | | | | | |
| d. | 1. | | | | | | | |
| | 2. | | | | | | | |
| | 3. | | | | | | | |

- Food Subsidies and Importation Policies. In those countries where staple foods are subsidized by the government or a high inflation rate exists, commodity selection should take these factors into account. A highly subsidized food item may be inexpensive, and therefore have low income transfer value to the recipient. However, distributing such food in a food aid program may help that country's balance of payment. On the other hand, a subsidized food item in an economy with a high rate of inflation is likely to provide less income transfer value to the recipient over time because subsidized commodities become cheaper in relation to others with inflation.

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The usual sources of these data are past evaluations of the same or similar programs; interviews with local personnel; ministries of agriculture or finance; and USAID agriculture divisions.

**Calculations**

The information on total ration cost and other attributes should be organized for all rations. Table III.7, is provided to facilitate cost and other comparisons before final selection.

# APPLICATION OF COMMODITY SELECTION GUIDELINES BY PROGRAM CATEGORY

This chapter presents specific step-by-step guidelines for selecting the most appropriate commodity ration according to program categories. Program categories include:

MCH On-Site Feeding
MCH Take-Home Distribution
Food for Work
School Feeding
Other Child Feeding

For each program category, general selection guidelines are followed by a project example. The section is summarized by Table IV.2 that lists examples of ration packages.

## MCH On-Site Feeding

**Step 1: Project Considerations**

1.1 What are the major objectives of the project?

To improve nutritional status of weaning age infants and young children, and of pregnant and nursing women. Secondary objectives may be to increase utilization of health services, nutrition education, etc.

1.2 What is the target population?

Children 6 months through 5 years of age and pregnant and nursing mothers are eligible. For Child Survival projects, the emphasis is on the under-two population.

1.3 What is the distribution mode and other characteristics to be considered for on-site feeding?

a) On-site feeding
b) Distributed at rural health centers or mothers clubs, for example.
c) To obtain maximum nutritional improvement, two meals or a meal and a snack are provided; for maximum nutritional supplementation, 350 days per year is used as a basis for calculating commodity needs.

1.4 What is the role of the food component in achieving the project objectives?

The food may be a source of additional energy and nutrients, or an incentive.

1.5 Is it more appropriate to calculate the ration based on nutritional or income transfer criteria or both?

Nutritional criteria are more important.

## Step 2: Suitability

Physiological Appropriateness

2.1 Calculate energy (calories) and nutrient deficits that need to be filled. What are the current caloric and protein intakes of the target groups? Does the target population suffer from other nutritional deficiencies, i.e., Vitamin A or iron? Is there a shortage of food in the households on the whole or is food shortage limited to individuals in the project? Use existing information from nutrition surveys, evaluations, etc., or collect this data by consulting local experts to make estimates for the various age groups. Use local food composition tables wherever available.

2.2 Compare the nutritional value of home diets of children and mothers in the project with recommended daily levels given for normal, healthy children and mothers in Table III.1 to arrive at average estimated calorie and protein deficits. The table below lists some common deficits.

These deficits may range from 300 to 600 calories and 10 to 15 grams of protein. For children and mothers who are already malnourished add 200 to 300 calories and 8 to 12 grams of protein for recuperation.

Table IV.1 Average Energy and Protein Gaps in Developing Countries (per person per day)

| | Calories | Protein (g) |
|---|---|---|
| Pregnancy (latter half) | 500 | 12 |
| Lactation (first six months) | 550 | 14 |
| 6-12 months | 300 | 5 |
| 1-3 years | 350-500 | 1 |
| 3-6 years | 350-425 | 2 |

2.3 Given the ages of children and volume limitations of how much food can be consumed in each meal, estimate the maximum volume of cooked food that can be consumed per meal.

2.4 Consult local nutritionists and medical authorities to determine whether digestibility or intolerance problems are likely to be caused by any commodity on the eligibility list.

Cultural Acceptability

2.5 Are there any commodities on the current eligibility list that are considered unacceptable ingredients in foods of infants, young children, or pregnant and nursing mothers due to taste, color, texture, "hot and cold" attributes, or perceived problems?

2.6 Are there any food preparations that would be particularly desirable given the project context? For example, a porridge may be considered a breakfast food only and not appropriate for a mid-day meal. Prepare a list of acceptable dishes or preparations that are considered "baby foods" and foods appropriate during pregnancy and lactation.

Local Processing and Storage

2.7 Do the feeding center facilities have adequate resources to store, process and prepare the selected commodities into locally acceptable foods for young children and mothers? If preparation resources are limited, eliminate commodities that need a long cooking time (therefore fuel) or several ingredients, or complicated cooking procedures and containers for preparation.

Local Food Production

2.8 What foods are produced locally and consumed by weaning age children, 3-5 year olds, pregnant and lactating women? Generally on-site feeding projects do not compete with local production since the target population is such a small part of aggregate demand. But knowing what protein and calorie sources are available by season is useful in planning a ration.

## Step 3: Ration Specifications

Nutritional Value

3.1 Estimate how much (if any) of the home diet is likely to be cut back when project supplements are provided. This may range from 0 to 300 to 400 calories, and may vary by age groups. Food available to the rest of the household may affect whether and how much substitution occurs (use of snack versus meal preparations and nutrition education may need to be strengthened to reduce substitution). Add the "substitution" allowance to deficits estimated under suitability in step 2.1.

Caloric Deficit

| | | | | |
|---|---|---|---|---|
| Total calories per ration | = | Recommended level & recuperation allowance - actual intake | + | Allowance for substitution |

Protein Deficit

| | | | | |
|---|---|---|---|---|
| Total protein per ration | = | Recommended level & recuperation allowance - actual intake | + | Allowance for substitution |

Income Transfer Value

3.2 Not applicable.

Other Specifications

3.3 Consider factors of critical importance based on suitability under Step 2. For example, a project may specify no sorghum, low NFDM levels, use of snacks instead of meals, maximum volume of cooked food not to exceed 300 ml and short cooking time.

## Step 4: Alternative Rations

4.1 Exclude those commodities from the eligibility list that are physiologically unsuitable or culturally unacceptable or that have serious problems regarding local storage and processing.

4.2 Develop a table of dollar cost per 1000 calories and 10 g of protein. See the preceding chapter on data needs and methodologies to calculate commodity costs and nutritional cost-effectiveness.

4.3 Calculate the minimum amount of vegoil (25-30 percent of calories) that should be in the ration. Subtract the caloric contribution of oil from the total calories. Select a cereal or cereal-based food from the list of commodities based on cost, calories and protein content, raw versus cooked volume, acceptability, ease of storage and processing attributes that are considered key characteristics per specifications listed in Step 4. Calculate the quantity needed to make up the balance of calories in the ration.

Check whether amounts of protein are sufficient. If not, select a high protein commodity to replace a part or all of the cereal. Check the total raw amounts and their cooked volumes and if the volume is above specifications, substitute more calorie and protein dense commodities.

4.4 Review Annex A on the physiological needs of the intended recipient population. For example, for children under three years, preference should be given to blended foods and NFDM in the ration.

4.5 With 3-4 alternative ration packages, conduct any field trials that may be needed to ascertain physiological suitability and cultural acceptability.

## Step 5: Ranking and Selection

5.1 Add up the cost of individual commodities in each ration to calculate costs of the alternative rations. Rank rations by cost.

5.2 Consider trade-offs. If a secondary purpose is education regarding use of locally available but little used foods for MCH groups (like dairy products or green leafy vegetables), will the proposed commodities and preparations promote these objectives? If a secondary purpose is utilization of health services, will the commodities selected place minimal burden (in accounting, storage, distribution) on health facilities so that the health services do not suffer? If a secondary purpose is to enhance use of local resources, will the availability of commodities selected act as a disincentive for local resources?

Will the provision of NDFM encourage bottle feeding? (NFDM will need to be used in a manner that bottlefeeding is not encouraged and discouragement of bottlefeeding may need to be strengthened in the accompanying nutrition education.)

Is there a high level of pilferage in oil and NFDM? Can storage management be improved or should smaller rations be given preference?

5.3 Complete Table III.7 for comparing costs and other considerations. Select the most cost-effective ration(s).

# MCH On-Site Feeding Example

This is an example of a hypothetical MCH on-site feeding project that will illustrate how the guidelines can be applied.

## Step 1: Project Considerations

1.1 What are the primary and secondary objectives of the project?

The primary purpose is to improve nutritional status, through supplementing diets of weaning-age infants and young children, and pregnant and nursing women. A secondary objective is to increase utilization of health services.

1.2 What is the target population?

Children 6 months through 3 years of age and pregnant and nursing mothers who are at high risk of malnutrition.

1.3 What is the distribution mode?

a) On-site feeding
b) One or two meals per day, distributed at rural health centers
c) 300 days per year

1.4 What is the role of the food component in achieving the project objectives?

The ration will provide a nutrient and energy supplement to fill gaps in the home diet of recipients. Target groups will consume the food at feeding sites, and improve and maintain their existing home diets through nutrition education. An extra meal will be provided to children who are already malnourished for their recuperation needs.

1.5 It is more appropriate to calculate the ration based on nutritional or income transfer criteria or both?

Nutrition criteria are more important.

## Step 2: Suitability

### Physiological Appropriateness

2.1 Current estimated caloric and protein intakes are:

| | Calories | Protein (g) |
|---|---|---|
| 6-12 months | 600 | 15 |
| 1-3 years | 900 | 18 |
| 3-6 years | 1100 | 24 |
| Pregnancy | 1700 | 30 |
| Lactation | 1800 | 40 |

2.2 Compared with recommended intakes (Table III.1) deficits are:

| | Calories | Protein (g) |
|---|---|---|
| 6-12 months | 300 | 4 |
| 1-3 years | 350 | 2 |
| 3-6 years | 450 | 2 |
| Pregnancy | 500 | 14 |
| Lactation | 600 | 12 |

An estimated 25 percent of the project children from 1 to 6 years of age are substantially below growth norms and need additional food for recuperation, their nutritional deficits are:

| | Calories | Protein (g) |
|---|---|---|
| 1-3 years | 650 | 10 |
| 3-6 years | 750 | 12 |

2.3 The most vulnerable age group, children under 3 years of age, will be able to consume a meal not exceeding 250 ml.

2.4 Blended foods, other high quality protein foods, and energy dense foods will be given preference in devising rations. None of the ingredients is likely to create digestibility or intolerance problems. The NFDM should be mixed in the porridge and is used in small quantities to avoid lactose intolerance.

### Cultural Acceptability

2.5 Sorghum, rice, and wheat are little known and used in the area. The staple food is corn. Traditional weaning foods consist of a porridge-like preparation made with cornmeal, milk and sugar when available. Ground peanuts are added when milk and sugar are not available.

2.6 Beverages or gruels do not traditionally form a part of mid-day meals.

Local Processing and Storage
2.7 Food preparation facilities are extremely limited therefore pre-cooked foods like ICSM are preferred. There are, however, sufficient resources for preparing a "one-pot" porridge-like food, using milled commodities.

Local Food Production
2.8 Corn is available all year around; however, peanuts are only available from January to August.

## Step 3: Ration Specifications

Nutritional Value
Results of interviews, group discussions, and home observations indicated that approximately 25 percent of the 3 to 6 year olds and mothers' home diets would be substituted. The nutritional value specification covers deficits in the home diets, recuperation needs plus an allowance for substitution.

Therefore, the target level of calories and protein to be provided by the feeding project daily are as follows:

| | Calories | Protein(g) |
|---|---|---|
| Average for children 6 months to 6 years | 375 | 4 |
| Malnourished children | 700 | 11 |
| Pregnant and nursing mothers | 700 | 15 |

NOTE: Malnourished children and mothers will receive two meals while the others receive one meal per day. Each ration should contain a blended food or NFDM for a high protein quality.

Income Transfer Value
No specifications.

Other Specifications
No whole grains to be used.

**Step 4: Alternative Rations**

The following alternatives are devised to fit ration specifications. Mothers and malnourished children will receive double the ration daily of a thick porridge. Each ration provides about 375 calories and 12 grams of protein.

| | | | |
|---|---|---|---|
| (1) | ICSM 80 g<br>Oil 10 g | (2) | CSM 80 g<br>Oil 10 g |
| (3) | Soy Fortified<br>Cornmeal 60 g<br>Oil 10 g<br>NFDM 15 g | (4) | Cornmeal 40 g<br>Oil 10 g<br>ICSM 30 g<br>NFDM 10 g |

## Step 5: Ranking and Selection

The following table is used to compare the cost of rations to the project and other attributes or trade-offs.

| Ration Package | Commodities | Quantity per ben. per day | Cost to Project per ben. | Income Transfer Value | Nutritional Value | Other Considerations | Rank |
|---|---|---|---|---|---|---|---|
| a. | ICSM<br>Vegoil | 80<br>10 | $1.96 | NA | Equal | Small cooked vol. easier to consume.<br>Has vitamin & mineral fortification<br>Minor preparation. | 1 |
| b. | CSM<br>Vegoil | 80<br>10 | $1.76 | NA | Equal | Has vitamin & minerals.<br>Small cooked vol. | 2 |
| c. | SF Cornmeal<br>Vegoil<br>NFDM | 60<br>10<br>15 | $1.52 | NA | Equal | Larger cooked vol. than a. or b. above. | 3 |
| d. | Cornmeal<br>Vegoil<br>ICSM<br>NFDM | 40<br>40<br>30<br>10 | $1.12 | NA | Equal | Highest cooked volume.<br>Low nutrient density.<br>Too many commodities. | 4 |

Ration a, containing ICSM and vegoil, is selected because of convenience in preparation. CSM and vegoil is ranked second. These rations have higher nutritional densities.

# MCH Take-Home Distribution

## Step 1: Project Considerations

1.1 What are the primary and secondary objectives of the project?

The overall objective is to improve nutritional status, through supplementing the diet of weaning-age infants and young children and pregnant and nursing women, as well as through increasing the utilization of (health or social services, etc.) services.

1.2 What is the target population?

Children six months through five years of age, and pregnant and nursing mothers.

1.3 What is the distribution mode and other project characteristics?

Take-home distribution, frequency (monthly, twice monthly, etc.), where distributed (at rural health centers, mothers clubs, etc.)?

1.4 What is the intended role of the food component in achieving the project objectives?

Specify whether an appropriate weaning food must be a part of the ration package or whether the entire package is expected to have an indirect effect. The indirect pathway is where the ration is not necessarily consumed by the MCH group; however, availability of PL 480 commodities in the household frees up money or other foods that are likely to increase household availability of food and increase food supplies for young children.

The project objective may also be accomplished by providing a ration that has sufficient incentive value for households to increase utilization of other services.

1.5 Is it more appropriate to calculate the ration based on nutritional or income value?

Both criteria are important.

## Step 2: Suitability

### Physiological Appropriateness

If the food component is to play only an incentive role and is not expected to be consumed by target groups, skip Steps 2.1, 2.2 and 2.3.

2.1 Estimate energy and nutrient deficits in diets of the intended recipients. What is the current caloric and protein intake of MCH groups? Use existing information, collect this data, or consult local nutrition experts to make estimates. Use local food composition tables if possible.

2.2 Compare current daily intakes with WHO/FAO recommended daily levels for normal, healthy children shown in Table III.1. Locally recommended levels can also be used. Estimate average caloric and protein deficits. For malnourished children add 200 to 300 calories and 8 to 12 grams of protein for recuperation needs.

2.3 Check Annex A for special physiological needs of the target group. Identify those commodities which are particularly suitable or unsuitable.

2.4 Consult local nutrition experts to determine whether any commodities on the eligibility list may cause digestibility or tolerance problems. Draw up a list of physiologically appropriate commodities.

### Cultural Acceptability

2.5 Are there any commodities on the current eligibility list that are considered unacceptable, low status, or otherwise inappropriate for mothers and children?

2.6 If any part of the ration package is to be targeted for direct consumption by MCH beneficiaries, identify those which will be acceptable for weaning-age infants, children, and mothers. In areas where family food sharing needs to be reduced, self-targeting foods or those unacceptable to other members of the family may be given a high priority in the ration. Therefore, list those commodities that are considered "baby foods" or foods good for pregnancy and lactation.

### Local Processing and Storage

2.7 Do the households have adequate facilities knowledge to process, prepare, and store available commodities?

Local Food Production

2.8 What foods are produced locally which are consumed by weaning-age children, 3-5 year olds, and pregnant and lactating women?

## Step 3: Ration Specifications

Nutritional Value

3.1 In MCH take-home projects, where the food is not expected to play a nutritional role by supplementing the local diet, no nutritional value specifications are needed. However, if any part of the ration is for consumption by MCH target groups, estimate how much if any of the home diet is likely to be cut back when intended recipients consume the distributed food. This may range from 0 to 300 or 400 calories and may vary be age groups. Add this to the deficits calculated under Step 2.2 above.

Also, add an allowance for family food sharing. MCH beneficiaries may not be the only ones consuming the food that is taken home. An estimate of amounts consumed by other family members will also need to be made. For example, a blended food like CSM intended for weaning-age children may also be consumed by school-age siblings in the home. Commodities which closely resemble local staples are likely to be shared by adults as well. Regions and households facing food shortages will require larger rations to cover the family-wide food deficits and not only deficits in the MCH beneficiaries diets. These estimates will need to be based on data and experience with the target households. In food deficit areas or very low income households, projects have had to provide up to 20 percent of caloric needs of the entire household. According to FVA guidelines, MCH projects should not attempt to fill over 20 percent of household-wide food deficits. Such severe deficits should be filled through FFW or emergency projects.

Thus the nutritional value specifications are calculated as follows:

| | | | | |
|---|---|---|---|---|
| Total calories or protein per ration | = | Recommended level & recuperation allowance - actual intake | + | Allowance for substitution + allowance for family food sharing |

Income Transfer Value

3.2 If the MCH take-home project has an incentive objective and the income transfer value of the ration is important, then complete this step.

What is an acceptable level of renumeration to attract the local population to the clinic?

Complete Table III.3 with the income transfer value of commodities.

MCH take-home projects may establish a minimum acceptable level of income transfer value for rations. This level could be based on factors such as local daily wages, costs to the recipient of food collection (transportation, lost wages, storage, etc.) and some locally acceptable incentive level to ensure participation. If the income transfer value specification is not established, projects can still maximize the incentive value of the ration by preferentially including those commodities in the ration that substitute highly valued foods in the local diet of target households. This exercise of selecting commodities of high income transfer value is undertaken in the next step.

Other Specifications

3.3 List other characteristics of the ration package that are essential for optimal commodity use. These may be inclusion of sufficient amounts of high digestibility, low bulk, self-targeting foods to be consumed by children under three years, pregnant and nursing mothers; no whole grains as milling facilities are limited; or no refrigeration required for storage.

For example, three key specifications in the successful MCH take-home project of Sri Lanka (Thriposha Program) were (a) a high status image food that could be marketed commercially, (b) potential capability to use a variety of indigenous commodities as substitutes for Title II commodities (in case of phase out), without loss of acceptability, incentive value or nutritional value, and (c) a self-targeting highly nutritious food appropriate for young children and pregnant and nursing mothers.

The commodity first selected in 1972 was WSB. In 1974 about 20 percent of the WSB was replaced with indigenous sorghum. In 1975, baking was replaced with extrusion cooking to precook local ingredients. WSB was later replaced by ICSM and sorghum was replaced by indigenous maize and soybeans. At present, the indigenous component is a 70-30 mixture of maize and full fat soy flour. This is blended with 12 percent of NFDM and 2 percent of a vitamin and mineral premix. It is then combined in the ration of 40/60 with donated ICSM. The final product contains maize 59 percent, soy 27 percent, NFDM 12 percent, and vitamins and minerals 2 percent.

The ration is attractively packaged in convenient 750 g packets, labelled "Thriposha" (three foods) to give it an identity, and also distributed through commercial retail outlets to enhance its status and incentive value. Impact evaluations have demonstrated that the project has been successful in improving the nutritional status of children under five through targeted feedings and increased utilization of health services (from where the free distribution is conducted).

## Step 4: Alternative Rations

4.1 Exclude those commodities from the eligibility list that are physiologically unsuitable, culturally unacceptable or that have serious problems regarding local storage and processing.

4.2 If the incentive value of the ration package is important, select high status commodities and those having a high income transfer value for the local population. Determine the income transfer value of food commodities by:

- Identifying the foods currently consumed by target households that are expected to be substituted by commodities on the eligibility list.
- Identifying important foods that are not always available to the target group, i.e., milk or oil.
- Determining the prices of those foods most similar to the ration under consideration.

4.3 Develop a table of cost per 1000 calories and per 10 grams of protein and cost per dollar of income transfer value provided to the recipient. To do this, first complete Table III.4 with cost components of commodities. Then using Table I.3 and Table III.3 (that give nutritional value and income transfer value of the commodities respectively), complete Table III.4 with "cost effectiveness" values of each commodity.

4.4 If nutritional value specifications have been established, start by calculating the amount of vegoil (25-30 percent of calories) that should be in the ration. Subtract the caloric contribution of oil from the total calories. Select a cereal or cereal-based food from the list of commodities based on cost, calories and protein content, raw versus cooked volume, acceptability and ease of storage processing attributes that are considered key characteristics per specifications listed in Step 4. Calculate the quantity needed to make up the balance of calories in the ration. Check whether amounts of protein are sufficient. If not, select a high protein commodity to replace a part or all of the cereal. Check the total raw amounts and their cooked volumes and if the volume is above specifications, substitute more calorie and protein dense commodities.

4.5 If part of the take-home ration is intended for direct consumption by MCH age groups, review Annex A on the physiological needs of the intended recipients. For example, for children under three years, preference should be given to blended foods and use of NFDM in the ration.

4.6 Once 3-4 alternative ration packages have been devised that meet ration specifications, conduct any field trials that may be needed to ascertain physiological suitability, cultural acceptability, or incentive value.

## Step 5: Ranking and Selection

5.1 Add up the cost of individual commodities in each ration to calculate costs of the alternative rations. Rank rations by cost.

5.2 Consider trade-offs. If a secondary purpose is education regarding use of locally available but little used foods for MCH groups (like dairy products or green leafy vegetables) will the proposed commodities and preparation promote these objectives? If a secondary purpose is utilization of health services, will the commodities selected place minimal burden (in accounting, storage, distribution) on health facilities so that the health services do not suffer? If a secondary purpose is to enhance use of local resources, will the availability of commodities selected act as a disincentive for local resources?

Will the provision of NFDM encourage bottle feeding? (NFDM will need to be used in a manner that bottlefeeding is not encouraged and discouragement of bottlefeeding may need to be strengthened in the accompanying nutrition education.)

Is there a high level of pilferage in vegoil and NFDM? Can storage management be improved or should rations with lower amount of these commodities be given preference?

5.3 Complete Table III.7 for comparing costs and other considerations. Select the most cost-effective ration(s).

## MCH Take-Home Distribution Example

This is an example of a hypothetical MCH take-home project that will illustrate how the guidelines can be applied.

**Step 1: Project Considerations**

1.1 What are the primary and secondary objectives of the project?

The primary objectives are to improve nutritional status, through supplementing diets of weaning-age infants and young children, and pregnant and nursing women as well as through increasing the utilization of health services.

1.2 What is the target population?

Children 6 months through 5 years of age and pregnant and nursing mothers.

1.3 What is the distribution mode and other project characteristics?

Take-home distribution, once monthly, distributed at rural health centers. Includes intensive nutrition education on use of commodities to make weaning foods.

1.4 What is the intended role of the food component in achieving the project objectives?

An appropriate self-targeting weaning food will need to be a part of the ration package. This should help supplement home diets with calories and other nutrients. In addition the ration should have sufficient incentive value for low income households to increase utilization of health services, through monthly attendance of health clinics held at food distribution time.

1.5 Is it more appropriate to calculate the ration based on nutritional or income transfer criteria?

Nutritional criteria are more important.

## Step 2: Suitability

### Physiological Appropriateness

2.1 Current intakes and deficits are as follows:

| Calories | Intake | Recommended | Deficit |
|---|---|---|---|
| Children, 6-60 months | 900 | 1300 | 400 |
| Pregnant & nursing mothers | 2250 | 2650 | 400 |
| **Protein(g)** | | | |
| Children, 6-60 months | 13 | 20 | 7 |
| Pregnant & nursing mothers | 30 | 55 | 25 |

Whole grain sorghum is not physiologically well tolerated by the local population and is excluded from the availabilty list. Blended foods and NFDM can provide high quality protein. Blended foods have low bulk, high digestibility; oil will increase energy density and lower the viscosity of weaning foods, therefore these will be given preference.

### Cultural Acceptability

2.2 This is a rice and corn consuming population. Milk is not a part of the traditional diet. Sorghum grits have been used in the past as a rice substitute. Blended foods and NFDM are considered "baby foods" and therefore self-targeting for younger children.

### Local Processing and Storage

2.3 Whole sorghum is not a part of the traditional diet. Milling and cooking facilities in low income households is very limited.

### Local Food Production

2.4 Ground nuts, typically added to weaning foods and porridges, are only available January to August.

## Step 3: Ration Specifications

### Nutritional Value

3.1 The average number of MCH beneficiaries is 2.0 per household. On an average, one of these is malnourished. Households on an average have 4.0 additional members. There is an overall food deficit of 10 percent or 240 calories per person. It is estimated that if this 10 percent household food deficit is provided by the project and if the ration contains sufficient amounts of self-targeting foods,

then substitution will be minimal. Therefore, specifications are:

Calories

| | | | | |
|---|---|---|---|---|
| Deficit of 400 calories x 2 MCH recipients | + | 250 calories for recuperation | + | deficit of 240 calories x 4 household members |

= 800 + 250 + 960
= 2010 per household

Protein

| | | | | |
|---|---|---|---|---|
| Deficit of 32 g for the 2 MCH recipients | + | 12 g for recuperation | + | deficit of 30 g (approx. 12% of calories for other household members) |

= 32 + 12 + 30
= 74 g

NOTE: The concentration of protein would equal about 15 percent of calories provided as protein, which is appropriate for a nutritional supplement in an MCH take-home project.

74 g x 4 calories per gram = 296
296 is 14.7% of 2010, the total calories in the ration.

Income Transfer Value

3.2 Since the ration should have an incentive value to increase participation at health clinics, an attempt will be made to include those commodities that have a high income transfer value. These are as follows:

| Commodities | Local Foods Similar to Commodity | Price($ per kg) of Local Food |
|---|---|---|
| Corn | Corn | 0.40 |
| Cornmeal/SFcornmeal | Cornmeal | 0.40 |
| SF Sorghum grits | Broken Rice | 0.58 |
| CSM, ICSM | Low Grade Cornmeal | 0.36 |
| NFDM | NFDM | 0.80 |
| Vegoil | Vegoil | 1.57 |
| Milled Rice | Milled Rice | 0.67 |

It is estimated that given local transportation costs, lost wages and incentives usually employed for similar projects, the monthly ration should equal at least 50 percent of adult minimum wages for one month in the area

to ensure a high degree of participation at the monthly health clinics. Therefore the income transfer value specification is monthly wage of $6.00 x 0.50 = $3.00.

Other Specifications

3.3 No commodities requiring refrigeration or long cooking times due to severe fuel shortages. No sorghum. Ration must include sufficient amounts of self-targeting foods like CSM, ICSM and NFDM.

## Step 4: Alternative Rations

The following rations are devised to meet specification for each household (2 MCH recipients) enrolled in the project:

a. SFSG 9.0 kg + NFDM 3.0 kg + Vegoil 2.0 kg

b. CSM 12.0 kg + Vegoil 2.0 kg

c. CM 6.0 kg + NFDM 5.0 kg + Vegoil 2.0 kg

d. Rice 6.0 kg + NFDM 5.5 kg + Vegoil 2.0 kg

## Step 5: Ranking and Selection

The following table helps compare rations to make a selection.

NOTE: Each ration is for two eligible MCH recipients per household.

| Ration Package | Commodities | Quantity per ben. per day | Cost to Project per ben. | Income Transfer Value | Nutritional Value | Other Considerations | Rank |
|---|---|---|---|---|---|---|---|
| a. | SFSG<br>NFDM<br>Vegoil | 9.0<br>3.0<br>2.0 | $5.24 | $3.25 | Equal | | |
| b. | CSM<br>Vegoil | 12.0<br>2.0 | $5.54 | $5.32 | Equal | Contains vit. & min. easy to convert to weaning food | 1 |
| c. | CM<br>NFDM<br>Vegoil | 6.0<br>5.0<br>2.0 | $4.58 | $3.16 | Equal | High local acceptability | |
| d. | Rice<br>NFDM<br>Vegoil | 6.0<br>5.5<br>2.0 | $5.19 | $4.00 | Equal | High status of rice; highly acceptable | 2 |

Rations containing CSM and rice are ranked 1 and 2 respectively. The CSM ration has the advantage of having only two commodities being more easily converted to weaning foods, contains vitamins and minerals and has the highest income transfer value for households. The rice ration has a higher income transfer value than the other two rations, and is highly acceptable as a weaning food.

# Food for Work

## Step 1. Project Considerations

1.1 What are the primary and secondary objectives of the project?

To increase resources of the unemployed and underemployed.

To achieve needed economic, agriculture and community development through infrastructure creation and other development projects.

To improve self-help capabilities and income potential of individuals.

To improve nutritional/health status of poor families.

Many projects may have two or three objectives. Therefore it is very important to specify the primary objectives and then specify realistic secondary objectives.

1.2 What is the target population?

The target population is determined by the project objective identified.

Typically, the target populations are (1) poor households with unemployed or underemployed adult men and women, (2) poor communities that need infrastructure and economic development, (3) poor communities where food resources are scarce, or (4) individuals whose skills need to be upgraded to increase their income.

1.3 What is the distribution mode and other characteristics to be considered?

Generally take-home dry distribution provided weekly or monthly. Sometimes food is cooked on-site in connection with a take-home ration.

1.4 What is the role of food in achieving project objectives?

Generally, food is used as a wage to remunerate individuals for work accomplished. The income transfer value of the food, alone or with cash, should be comparable to local wages for similar work. Wage rates may change seasonally. Generally, wages should be paid if the workers will be involved for a significant period of time in the proposed activity, if the

benefits are generalized (shared by a larger group, not just the worker), if development projects require skilled technical inputs, and if performance standards are set.

Sometimes food is used as an incentive--to obtain target group participation in an activity, i.e., training, community organization. FFW activities most appropriate for incentive payments include community activities, projects where the participants are the direct beneficiaries of the activities, and training programs. The income transfer value should be adequate to ensure participation by compensating the target groups for opportunity costs and transportation costs, for example.

If the food is to help fill a nutrient deficit, the nutritional value of the food should be considered based on protein and caloric needs.

1.5 Is it more appropriate to calculate the ration based on nutritional or income transfer criteria or both?

In FFW projects, income transfer criteria are generally more important. However, an awareness of consumption and production of the households in the target group will be required in determining suitability of commodities and ration design.

During periods of serious food shortages, the caloric and protein contribution is critically important.

## Step 2: Suitability

### Physiological Appropriateness

Steps 2.1 needs to be completed in detail when the primary purpose of the ration is to fill nutritional deficits of households. However, in all cases, basic information on the household and community food needs and seasonal changes in food availability should be collected even in situations where food is provided as an incentive or as a wage.

2.1 Estimate energy and nutrient deficits in diets of the target group. What is the current caloric and protein intake of households with low income or unemployed individuals? What impact will project labor have on availabilities? Are there variations in the course of the year? Use existing information, collect this data, or consult local nutrition experts to make estimates.

Compare current daily intakes with WHO/FAO recommended daily levels for individuals shown in Table III.1. An average of 2350 calories per person multiplied by household size can be used to make estimates of target energy intake levels. From this, subtract the actual energy intakes of households. Locally recommended levels can also be used.

2.2 Consult local nutrition experts to determine whether any commodities on the eligibility list may cause digestibility or tolerance problems. List physiologically appropriate commodities.

Cultural Acceptability

2.3 Are there any commodities on the current eligibility list that are considered unacceptable, or otherwise inappropriate for families?

2.4 What commodities on the eligibility list approximate those in the local diet? Are the commodities on the list viewed as equivalent, superior or inferior to the local food?

This information will be required in determining the types of commodities needed to provide either an incentive or a wage. For example, bulgur wheat may be considered as approximate to rice, but it may also be considered inferior to rice. Accordingly, it will be necessary to discount the local price of rice in determining the income transfer value of the bulgur.

Local Processing and Storage

2.5 Do the households have adequate facilities and know-how to process, prepare, and store available commodities? How will they transport the commodities from the distribution point to their home? If the commodities are to be consumed on site, what facilities are available for storing and cooking commodities?

Local Food Production

2.6 What is the agricultural calendar for the area? Will project labor requirements or timing of distributions impact on the agricultural production system? What schedule for project activities is most appropriate? Does this schedule conflict with the agricultural production schedule? If so, can variations be made in the work schedule and/or the distribution schedule to accomodate the needs of the agricultural production system?

The answers to these questions will be important for rural communities where the labor force is drawn from farm households. However, they may also be important in projects where the laborers are landless, but where large distributions of commodities correspond with the harvest. Even where there are conflicts, it may be justified to proceed because of the importance of the activity to development, especially when the activity will contribute to the future of agriculture in the area (e.g., conservation or reforestation activities).

When the facts are known, it is often possible to make adjustments to minimize negative impacts on agriculture. For example, in some locations, construction must await the arrival of the rains as water is needed for cement making. The arrival of the rains is also the period for preparing fields and there is a heavy demand for household labor at that time. However, the construction activity actually consists of two elements: collecting gravel, sand, and rocks, and constructing the building. It is the first activity which generally requires the most labor, and a much smaller number of workers are involved in mixing cement and building the structure. Arrangements can be made to collect the construction materials prior to the start of the rains.

## Step 3: Ration Specifications

### Nutritional Value

In FFW projects where the food is not expected to play a nutritional role by supplementing the local diet, detailed nutritional value specifications are not needed.

If the food is to primarily fill nutritional deficits, establish target number of calories and protein (grams) needed in each ration. This will be the overall daily household deficit divided by the number of FFW workers per household, and multiplied by the number of days the ration is to last. Use the daily deficits estimated in step 2.1.

### Income Transfer Value

The objective of this step is to specify the level of income transfer needed to compensate workers on the project.

3.1 Is an incentive payment or a full-wage payment appropriate for the project?

This depends on the project type, its objectives, its duration, the source of the workers, and the intended beneficiaries of the projects. In general, two types of activities are most appropriate for incentive payments: community activities, and those where the workers are the direct beneficiaries of the activities. Community activities are generally close to the workers' homes thus reducing walking time to the worksite. They are often short term, and when they last for extended periods, any one worker usually participates in only a minor portion of the total effort. Workers should have participated in the decision-making process for the activity, and should view the activity as in their interest or as creating a valuable community asset (e.g., male workers constructing a maternity facility).

An example of a project which directly benefits the workers is where very poor farmers plant rubber trees on their own land. They receive an incentive payment for planting and tending the trees. This incentive payment covers lost production from the land area for the period until the trees begin to bear and thus is essential if poor farmers are to participate in the project.

In some cases, even when workers directly benefit from the project, they may not recognize the benefit and will have to receive wages as incentive, e.g., farmers constructing conservation works to stabilize soil and slow down runoff above their fields. In this case, if the work is urgent it may be necessary to pay wages. However, if the long-term viability of the project depends on minimizing wage costs, a better approach is to sensitize the villagers prior to the start-up of activities and use incentive payments.

Generally, wages should be paid if the workers will be involved for a significant period of time (more than one month for example), if the benefit is generalized, and where a significant construction activity requires high technical and performance standards, e.g., a road between villages which is more than five kilometers long.

3.2 If an incentive payment is appropriate, how much is needed?

This will depend on the costs to the household of participating in the project. If it is a slack time of year, the only costs may be energy costs (walking to the site and working on the site). In these cases, a transfer sufficient to cover energy replacement plus a

small additional amount may be sufficient. However, if the household has to forego other income generating activities, these may need to be considered (in many cases such activities yield far less than a wage rate of return). When data has been collected and preliminary amounts identified, it is best to discuss the proposals with community leaders to ensure that neither too much nor too little is offered.

3.3 If a wage is to be paid, what amount is appropriate and what portion if any should be paid in cash?

Determine the required income value of the food based on the local rate for equivalent work performed. Factors to also consider in setting the income value include:

a. Are workers among the beneficiaries of the activity? If so, then the income value would be less than if they received no benefits.

b. How long will they be employed?

c. Are workers landless or from farms families? Will the wage be the only source of income to the family?

d. What are other employment opportunities in the area? What wages are being paid? Seasonal work schedules should be considered.

e. Are workers from rural or urban areas? Rural wages are generally lower than urban wages.

f. Will workers be taught skills which will enhance their future income or employability?

g. Are there other seasonal factors that should be considered?

If there wil be a cash element, the food/cash mix should be based on experience with similar activities in the designated geographic area. Typically the cash element should make up no more than 50 to 60 percent of the wage.

In determining the income transfer value, discussions should be held with regional and community officials and leaders.

Other Specifications
List other characteristics of the ration package that are essential for optimal commodity use.

Examples of such specifications are: no whole grains as milling facilities are limited; no whole sorghum as communities are not traditionally sorghum consuming; commodities with short cooking time preferred as fuelwood is limited.

## Step 4: Alternative Rations

4.1 Exclude those commodities from the eligibility list that are physiologically unsuitable, are culturally unacceptable, that have serious problems regarding local storage and processing, or that conflict with local food production.

4.2 Utilizing information collected in Step 2, complete Table III.2 for the commodities from the eligibility list which are considered appropriate for the project. This table includes the approximate local food for each commodity on the list, and its price. If the households in the target group produce the local commodity, use selling prices; otherwise use market prices. Discount or increase the prices if necessary, based on local attitudes to the commodities from the eligibility list.

4.3 Develop a table of cost per dollar of income transfer value provided to recipient. To do this, first complete Table III.4 with cost components of commodities. Then complete Table III.5 with "cost effectiveness" values of each commodity. If the ration is to provide sufficient food to supplement nutritional intake, calculate cost per 1000 calories and 10 grams of protein, using Table I.3 for nutritional value of commodities and Table III.4 for commodity costs. Record the results in the appropriate columns of Table III.5.

4.4 Select various combinations of commodities and amounts to meet specifications, i.e., levels of income transfer value and/or nutritional level required. Design rations which minimize impact on local production system. Among actions which can be taken are: Include where possible commodities which approximate to the local foods that are in the shortest supply, and those commodities already in the diet which are imported. Schedule the activities and/or distribution of rations for periods when the approximate local foods are in short supply. Include

more commodities in the ration so the impact on any one food is reduced (there may be a trade-off with management and distribution costs which should be considered). Conduct field trials for acceptability or incentive value if necessary.

## Step 5: Ranking and Selection

5.1 Add up the cost of individual commodities in each ration to calculate costs of the alternative rations. Compare costs and approximate local prices of the rations.

5.2 Consider trade-offs. Do certain commodities come in packaging which has a high value for households thus increasing income transfer? Which rations include commodities with short cooking times thus reducing fuelwood requirements? Which rations are most appreciated by households? Is there a difference in the impact of rations on households? Can the commodities withstand local transportation, storage and handling conditions? Are there any which are prone to excessive losses or pilferage? Do certain rations facilitate distribution and reduce accounting costs?

5.3 Complete Table III.7 to compare costs, approximate local prices and other considerations for rations which remain. Select the most cost effective ration(s) which meet project requirements.

# Food for Work Example

This is an example of a FFW project to illustrate how the guidelines can be applied.

## Step 1: Project Considerations

1.1 What are the primary and secondary objectives of the project?

The primary objective is to construct a feeder road 75 kilometers long through a currently inaccessible food-deficit rural area. The secondary objective is to provide a source of employment and food inputs to poor rural households.

1.2 What is the target population?

The target population are underemployed adult males and females drawn from poor rural households, most of whom are involved in farming.

1.3 What is the distribution mode?

Dry rations to be distributed once a month at the worksite.

1.4 What is the role of food?

Its primary role is to provide an adequate level of income transfer for the work to be accomplished. Its secondary role is to improve the caloric levels in the local diet in a period when local needs are increased by the road building activity.

1.5 Is it more appropriate to calculate the ration based on nutritional or income transfer criteria or both?

It is more appropriate to calculate the ration on the basis of income transfer criteria. However, the ration is to be designed using information on commodity needs and suitability for the area.

## Step 2: Suitability

### Physiological Appropriateness

2.1 What are the energy and nutrient deficits in the diet? Are there differences throughout the year? Will the construction activity impact on availabilities? The primary deficiency in the diet is calories. A supplement of 400 calories per person per household per day would be ideal, particularly during the four-month period from the latter part of the dry season to the harvest of the first crops. At that time consumption in the area is down to one meal per person per day.

2.2 Are there any commodities which present digestibility or tolerance problems?

Local nutritionists indicate that whole sorghum and NFDM may cause digestibility and intolerance problems and should be excluded.

### Cultural Acceptability

2.3 Are there any commodities on the current eligibility list that are considered unacceptable or otherwise unsuitable for families?

Whole sorghum is not considered fit for human consumption.

2.4 What commodities on the eligibility list approximate those in the local diet? Are the commodities on the list viewed as equivalent, superior, or inferior to the local food?

Bulgur wheat and soy-fortified bulgur approximate rice which is the preferred local food. Bulgur is considered inferior to rice and its income value should be discounted by 25 percent. Cornmeal is also consumed, especially by the poor. Local milling facilities are distant and most corn is home ground. Cornmeal has a premium price in the market as a convenience food. No oil is produced in the area but is highly valued. Palm oil is sold which is imported from a neighboring country. Vegoil approximates the palm oil, but should also be discounted by 25 percent due to taste preferences.

### Local Processing and Storage

2.5 Due to fuel shortages, short cooking times are preferred. Milling facilities are limited and at a distance from the area.

Local Food Production

2.6 What is the interrelationship between the agricultural production schedule and the work/ distribution schedule?

There is one production period per year running from February to July. Food is less available in the period January through April. The only periods of labor shortage are during February and July when project activites will shut down. Normally there will be 5 work crews of 100 workers each spread out along the 75 kilometer stretch. There are 10,500 households in the catchment area which can supply labor so at any one time only 5 percent of households will be involved in the activity. The project will organize additional work crews during the period October-January to increase work and food availabilities during the hungry period.

## Step 3: Ration Specifications

Nutritional Value

There is no nutrition value specification although information from Step 2 will be used in the ration design.

Income Transfer Value

3.1 Is an incentive payment or a full-wage payment appropriate for the project?

A full wage payment is indicated due to the nature of the project.

3.2 If a wage is to be paid, what amount is appropriate and what portion if any should be paid in cash?

The accepted wage for similar work is the equivalent of $1.50 per day or $30 per working period of 20 days. It is accepted that a 40 percent cash component is justified and essential to guarantee the quality and speed of work desired. This amount of $12.00 will be paid from the budget of the government's Civil Works Department. The balance is to be supplied by the ration.

## Step 4: Alternative Rations

4.1 Exclude commodities on the eligibility list which are considered unsuitable.

Sorghum and NFDM are excluded because they present digestibility and tolerance problems.

4.2 Complete Table III.3 for the list of commodities considered appropriate for the project.

Table III.3 Income Transfer Value of Commodities

| Commodity on Current Eligibility List | Locally Consumed Food Which Approximates Commodity | Prices of Locally Consumed Food (US$ equiv. per kilo) 1/ | Quantity of Local Food Usually Consumed per Annum 2/ |
|---|---|---|---|
| Bulgur Wheat sf Bulgur | Rice | $0.35 3/ | 250 kilos |
| Cornmeal | Cornmeal | 0.45 | 400 kilos |
| Vegoil | Palm Oil | 2.00 3/ | 12 kilos |

1/ Prices are selling prices for bulgur and cornmeal; market prices for oil.

2/ There is an average of 5 members per household.

3/ Price discounted by 25 percent due to local attitudes to the ration commodity.

4.3 Develop cost effectiveness figures for each commodity.

Table III.5 Cost Effectiveness of Commodities

| Commodity | Cost per MT US$ | Cost per $10 Worth of Approximate Local Food |
|---|---|---|
| Bulgur Wheat | 220 | $6.29 |
| SF Bulgur | 230 | 6.57 |
| Cornmeal | 310 | 6.89 |
| Vegoil | 974 | 14.87 |

Because income transfer is most important, cost effectiveness in terms of calories and protein have not been calculated on the above chart.

4.4 Develop various combinations of commodities which meet the specifications.

The income transfer amount to be supplied in each ration period is approximately $18.00. The following combinations are proposed to meet this specification.

| Commodity | Approximate Local Price |
|---|---|
| a. 20 kilos of bulgur | $7.00 |
| 20 kilos of cornmeal | 9.00 |
| 1 kilo of oil | 2.00 |
| Total | $18.00 |
| b. 45 kilos of bulgur | 15.75 |
| 1 kilo of oil | 2.00 |
| Total | $17.75 |
| c. 36 kilos of cornmeal | 16.20 |
| 1 kilo of oil | 2.00 |
| Total | $18.20 |

These combinations cover the situation where both bulgur and cornmeal are distributed to lessen the local impact on either rice or cornmeal, and also identify the quantities required for bulgur or cornmeal alone to meet the income transfer specification.

The rations are tried on a pilot basis during preparations for project start-up. All combinations are found to be acceptable to workers and households.

The pilot test indicates that any of the three rations will have a similar impact on local markets. Farm households will increase their sales of rice by approximately 20 kilos per month when they are receiving the rations. The households will receive 25 percent more for the rice than the perceived value of the bulgur. However, when their transaction costs are considered, the net income transfer to the households will approximate the desired $18.00. The additional sales are not expected to have a negative impact on local market prices due to (1) the food-deficit situation in the area; (2) the small portion of households receiving rations at any one time; (3) the adjustments in the working schedule which assure distributions will not conflict with the harvest; and (4) the increasing access to the area of traders seeking commodities for urban markets which will result from the road. Despite these expectations, the situation will be monitored during project implementation and remedial action taken if needed.

## Step 5: Ranking and Selection

5.1 Add up the costs of the various ration combinations and compare the costs with the approximate prices of local commodities.

| Ration | Commodity | Monthly Ration per Worker | | |
|---|---|---|---|---|
| | | Quantity (kilos) | Cost (USD) | Approximate Local Price |
| a. | Bulgur | 20 | $4.40 | $7.00 |
| | Cornmeal | 20 | 6.20 | 9.00 |
| | Vegoil | 1 | .97 | 2.00 |
| | Total | 41 | 11.57 | 18.00 |
| b. | Bulgur | 45 | 9.90 | 15.75 |
| | Vegoil | 1 | .97 | 2.00 |
| | Total | 46 | 10.87 | 17.75 |
| c. | Cornmeal | 36 | 11.16 | 16.20 |
| | Vegoil | 1 | .97 | 2.00 |
| | Total | 37 | 12.13 | 18.20 |

The three rations are close in their respective costs and their local price values. However, ration b supplies nearly as much value as ration a at a per ration saving of $0.25. Ration c has the highest local value but is also more expensive than ration b.

5.2 Consider trade-offs. Ration 2 is the easiest to administer as bulgur and cornmeal come in 45 kilo bags. Distribution can be by the bag with each recipient receiving one bag (each empty bag has a minor additional value and the convenience of distribution is appreciated by recipients). The other rations require repackaging on site which creates difficulties in handling and assuring equity. All rations are quick and convenient to cook in local circumstances.

5.3 Complete Table III.7. Select the most cost effective ration(s) which meet project requirements.

Table III.7 Ration Ranking and Selection

| Ration Package | Commodities | Quantity per ben. per day | Cost to Project per ben. | Income Transfer Value | Nutritional Value | Rank |
|---|---|---|---|---|---|---|
| a. | bulgur<br>cornmeal<br>vegoil | 20<br>20<br>1 | $18.00 | $11.57 | N/A | 2 |
| b. | bulgur<br>vegoil | 45<br>1 | $17.75 | $10.87 | N/A | 1 |
| c. | cornmeal<br>vegoil | 36 | $18.20 | $12.13 | N/A | 3 |

Ration b is the most cost-effective ration and it is also the easiest to distribute. Ration b is selected, but the project has experience with the other combinations and may adjust distribution to include cornmeal at a later time should conditions change.

# School Feeding

## Step 1: Project Considerations

1.1 What are the primary and secondary objectives of the project?

Generally to increase school enrollment and attendance and to improve nutritional status through supplementing diets of low income school children.

1.2 What is the target population?

Children 6 years through 14 years of age are eligible.

1.3 What are the distribution mode and other characteristics to be considered for on-site feeding?

a) On-site feeding
b) Number of feedings per day; whether as snack or meals.
c) How many days per year?



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1.4 What is the role of the food component in achieving the project objectives?

The value of the school meal to the households should be sufficient incentive to send children to school, rather than have them stay away to engage in household or farm labor. The nutritional value of the school meal will be sufficient to fill the daily nutrient gaps in the home diet.

## Step 2: Suitability

### Physiological Appropriateness

2.1 Calculate energy (calories) and nutrient deficits that need to be filled in the diets of school age children. What are the current caloric and protein intakes of the target groups? Does the target population suffer from other nutritional deficiencies such as of Vitamin A or iron? Is there a shortage of food in the households on the whole or is food shortage limited to individuals in the project? Use existing information from nutrition surveys, evaluations, etc., or collect this data by consulting local experts to make estimates for the various age groups. Use local food composition tables wherever available.

2.2 Compare the nutritional value of home diets of children in the project with recommended daily levels given for normal, healthy children to arrive at average estimated calorie and protein deficits. These may range from 500 to 1000 calories and 15 to 20 grams of protein. For children who are already malnourished add 200 to 500 calories and 10 to 15 grams of protein for recuperation needs.

2.3 Given the ages of children and volume limitations, estimate the maximum volume of cooked food that can be consumed per meal.

2.4 Consult local nutritionists and medical authorities to determine whether digestibility or tolerance problems are likely to be caused by any commodity on the eligibility list.

2.5 See Annex A for the special physiological needs of this age group and identify those commodities that are particularly suitable.

Cultural Acceptability

2.6 Are there any commodities on the current eligibility list that are considered unacceptable ingredients in foods of children, due to taste, color, texture, "hot and cold" attributes, digestibility or other reasons?

2.7 Are there any food preparations that would be particularly desirable given the project context? For example, a porridge may be considered a breakfast food only and not appropriate for a mid-day meal.

2.8 Identify food preparations, ingredient and feeding times that would help minimize substitution of the home diet when the school meal is consumed.

Local Processing and Storage

2.9 Do the feeding center facilities have adequate resources to process, prepare, and store the selected commodities into locally acceptable foods for children. If preparation resources are limited, eliminate commodities that need a long cooking time (therefore fuel), require several ingredients, or use complicated cooking procedures and containers for preparation.

Local Food Production

2.10 Are there food shortages during particular seasons?

## Step 3: Ration Specifications

### Nutritional Value

3.1 The combination of the school meal with the food consumed at home should equal the nutritional needs of the school children. The ration should provide sufficient calories and protein to fill deficits in the home diet plus any substitution resulting from the children receiving less of usual home diet. Estimate how much if any of the home diet is likely to be cut back when the children consume the distributed food. This may vary by age groups and be higher among the very poor and during hungry seasons. Only a rough estimate of the average substitution will be possible. Add this to the deficits calculated under Step 2.1 above.

Thus the nutritional value specifications are calculated as follows:

| | | | | |
|---|---|---|---|---|
| Total calories or protein per ration | = | Recommended level & recuperation allowance - actual intake | + | Allowance for substitution |

### Income Transfer Value

3.2 If the school project has an incentive objective to increase attendance and enrollment and the income transfer value of the ration is important, then complete this step.

(a) What foods currently consumed by target households are expected to be substituted by commodities on the eligibility list?

(b) What are the prices of the substitutable local foods? If households are food producing households, then what are the selling prices of the substituted foods?

Complete Table III.3 with the income transfer value of commodities.

A school feeding project may establish a minimum acceptable level of income transfer value per child per month for rations. This level could be based on factors such as local daily wages for school age children, costs to the household of sending their child to school (transportation, lost labor) and some locally acceptable incentive level to ensure participation. If

the income transfer value specification is not established, projects can still maximize the incentive value of the ration by preferentially including those commodities in the ration that substitute highly valued foods (of high income transfer value or of high social status). This exercise of selecting commodities of high value is undertaken in the next step.

Other Specifications

3.3 Factors of critical importance based on suitability under Step 2. For example, a project may specify no sorghum, low NFDM levels, use of snacks instead of meals, maximum volume of cooked food not to exceed 500 ml and short cooking time.

## Step 4: Alternative Rations

4.1 Exclude those commodities from the eligibility list that are physiologically unsuitable, culturally unacceptable or that have serious problems regarding local storage and processing.

4.2 Develop a table of dollar cost per 1000 calories and 10 g of protein. See the preceding chapter on data needs and methodologies to calculate commodity costs. Complete Table III.4 with cost components. Use Table III.1 to calculate cost per unit of nutritional value. Complete Table III.5.

4.3 Calculate the minimum amount of vegoil (25-30 percent of calories) that should be in the ration. Subtract the caloric contribution of oil from the total calories. Select a cereal or cereal-based food from the list of commodities based on cost, calories and protein content, raw versus cooked volume, acceptability and ease of storage processing, and any attributes that are considered key characteristics per specifications listed in Step 4. Calculate the quantity needed to make up the balance of calories in the ration. Check whether amounts of protein are sufficient. If not, select a high protein commodity to replace a part of all of the cereal. Check the total raw amounts and their cooked volumes and if the volume is above specifications, substitute more calorie and protein dense commodities.

4.4 Review Annex A on the physiological needs of children 6 to 14 years of age. Identify any commodities that are particularly suitable or unsuitable for this age group.

4.5 Devise ration packages that meet all the specifications. With 3-4 alternative ration packages, conduct any field trials that may be needed to ascertain physiological suitability, cultural acceptability, and incentive value.

## Step 5: Ranking and Selection

5.1 Add up the cost of individual commodities in each ration to calculate costs of the alternative rations. Rank rations by cost.

5.2 Consider trade-offs. For example, if a secondary purpose is education regarding use of locally available but little used foods (like dairy products or green leafy vegetables), will the proposed commodities and preparation promote these objectives? If a secondary purpose is to enhance use of local resources, will the availability of commodities selected act as a disincentive for local resources?

Will the commodities selected place minimal burden on the school teachers and facilities (for storage, accounting, distribution, etc.) so that the educational curriculum is not disrupted?

Will the selection of the rations promote increasing participation and sponsorship of the school feeding project by the local authorities?

Is there a high level of pilferage in vegoil and NFDM? Can storage and management be improved or should rations with lower amounts of these commodites be given preference?

5.3 Complete Table III.7 for comparing costs, and other considerations. Select the most cost-effective rations(s).

# School Feeding Example

This is an example of a school feeding project to illustrate how the guidelines can be applied to developing a ration.

## Step 1: Project Considerations

1.1 What are the primary and secondary objectives of the project?

There are two primary purposes. One is to increase enrollment and attendance in rural primary schools serving low income populations. Another is to prevent malnutrition among primary school age children.

1.2 What is the target population?

Rural children aged 6 years through 14 years from low income populations.

1.3 What is the distribution mode, frequency, etc.?

On-site feeding, 24 days per month on an average, and provided as a mid-day meal.

1.4 What is the role of the food component?

The ration will have sufficient income transfer and incentive value to the household to prevent children from being kept out of school to earn extra wages and do household chores. In addition, the school meal should provide a nutritional supplement to ensure an adequate intake of energy and nutrients to prevent malnutrition.

1.5 Is income transfer value or nutritional value of the ration more important?

Both income transfer value and nutritional value are important criteria.

## Step 2: Suitability

Physiological Appropriateness

2.1 Daily deficits of children in the area average as follows:

Age 6-14 years

| | Intake | Recommended | Deficit |
|---|---|---|---|
| Calories | 1800 | 2400 | 600 |
| Protein (g) | 30 | 45 | 15 |

2.2 In addition, an average recuperation allowance of 150 calories and 10 g of protein will be needed as a majority of children are below growth norms for their age.

2.3 The cooked meal should have a high density of calories and protein since the younger children (6-8 years) will be expected to consume almost 50 percent of their daily needs in one meal. A dry, couscous type of preparation is preferable to a porridge or gruel. Commodities that do not absorb a lot of water should be given preference. The percentage of fat should be around 30-35 percent. Provisions may need to be made to serve an extra snack or meal to the younger children and those who are malnourished.

2.4 Lactose intolerance has been a problem in the past with inappropriate use of NFDM, therefore, if used, quantities of NFDM will need to be kept low and used only in combination with other commodities, not as a beverage. Blended foods and soy-fortified foods will be the chief sources of protein in the ration.

Cultural Acceptability

2.5 A cooked mid-day meal provided on each school day could be an important incentive to send children to school in this food-deficit area. Local staples include sorghum and wheat. A dry couscous type preparation made locally with wheat and oil is well liked.

Local Processing and Storage

2.6 Schools do not have additional staff for administering the school meal project. To conserve time and effort, therefore, simple preparations and quick-cooking commodities will be preferred.

Local Food Production

2.7 Devise ration packages that meet all the specifications. With 3-4 alternative ration packages, conduct any field trials that may be needed to ascertain physiological suitability, cultural acceptability, and incentive value.

## Step 3: Ration Specifications

Nutritional Value

3.1 Children in the target area are generally receiving only two-thirds of their daily requirements. A majority of them are mildly to moderately malnourished.

Calories (average per child per day)

| Deficit of | | | |
|---|---|---|---|
| 600 | + recuperation 150 | + substitution 300 | = 1050 |

Protein (average per child per day in grams)

| Deficit of | | | |
|---|---|---|---|
| 15 | + recuperation 10 | + substitution 10 | = 35 |

Income Transfer Value

3.2 The following are local foods that are similar to the available commodities and their local prices.

| Commodities | Local Foods | Income Transfer Value $ per kg |
|---|---|---|
| Wheat Flour SF Wheat Flour, WSM, | Wheat flour | 0.38 |
| SF Bulgur | Bulgur | 0.36 |
| Vegoil | Vegoil | 1.57 |
| Whole Wheat | Whole wheat | 0.30 |
| SFSG | Sorghum | 0.25 |

Note: NFDM, though not consumed by the target group in the school project, has a local market value of $4.00 per kg. This is an indication that it could be regarded as a high status food and add incentive value to the ration.

The provision of a mid-day meal having an annual income transfer value of at least $10 is considered sufficient incentive for increasing attendance and enrollment.

Other Specifications

3.3 High energy and nutrient density, volume of the cooked meal should not exceed 450-500 ml, short cooking times.

## Step 4: Alternative Rations

The following daily rations meet the specifications (per recipient).

1. WSM 185 g + Vegoil 38 g
2. SF Bulgur 150 g + NFDM 30 g + Vegoil 45 g
3. SFSG 160 g + NFDM 35 g + Vegoil 45 g

The local preparation method of frying cereals in oil and then adding sufficient boiling water to cover and cook is to be used. Ration volumes are expected to increase about two-fold to yield a couscous-like preparation.

## Step 5: Ranking and Selection

The following table is used to compare ration costs and other attributes.

| Ration Package | Commodities | Quantity per ben. per day | Cost to Project per ben. | Income Transfer Value | Nutritional Value | Other Considerations | Rank |
|---|---|---|---|---|---|---|---|
| a. | WSM<br>Vegoil | 185<br>38 | $21.00 | $17.20 | Equal | Contains vitamins & minerals. Shortest cooking time. | 1 |
| b. | SF Bulgur<br>NFDM<br>Vegoil | 150<br>30<br>45 | $20.50 | $16.60 | Equal | High accept-ability | 1 |
| c. | SFSG<br>NFDM<br>Vegoil | 160<br>35<br>45 | $19.70 | $11.50 | Equal | | 2 |

Rations containing WSM and SF bulgur will both be used interchangeably to avoid monotony in the school lunch program. Costs do not apppear to vary significantly across rations, however rations a and b have definite advantages such as providing vitamins and minerals (WSM), having a higher income transfer value (both), and high acceptability (SF bulgur).

# Other Child Feeding

## Step 1: Project Considerations

1.1 What are the primary and secondary objectives of the project?

The primary purpose is to reach children at risk of malnourishment who are not accessible through MCH projects or school feeding projects.

1.2 What is the target population?

Children 6 months through 14 years of age who are at high risk of malnutrition.

1.3 What is the distribution mode and other characteristics to be considered for on-site feeding?

a) On-site feeding
b) Number of meals per day; where distributed, for example at centers, nurseries, hospitals, orphanages, etc.?
c) How many days per year?

1.4 What is the role of the food component in achieving the project objectives?

The ration should provide a nutrient and energy supplement to fill gaps in the institutional diet of recipients.

## Step 2: Suitability

Physiological Appropriateness

2.1 Calculate energy (calories) and nutrient deficits that need to be filled. What are the current caloric and protein intakes of the target groups? Does the target population suffer from other nutritional deficiencies such as of Vitamin A or iron? Use existing information from nutrition surveys, evaluations, etc. or collect this data by consulting local experts to make estimates for the various age groups. Use local food composition tables wherever available.

2.2 Compare the nutritional value of diets of children in the project with recommended daily levels given for normal, healthy children in Table III.1 to arrive at average estimated calorie and protein deficits. These may range from 200 to 1000 calories and 5 to 20 grams of protein. For children who are already malnourished, add 200 to 600 calories and 8 to 20 grams of protein for recuperation needs.

2.3 Given the ages of children and volume limitations of how much food can be consumed in each meal, estimate the maximum volume of cooked food that can be consumed per meal.

2.4 Consult local nutritionists and medical authorities to determine whether digestibility or intolerance problems are likely to be caused by a commodity on the eligibility list.

Cultural Acceptability

2.5 Are there any commodities on the current eligibility list that are considered unacceptable ingredients in foods of young children, due to taste, color, texture, "hot and cold" attributes or digestibility?

2.6 Are there any food preparations that would be particularly undesirable given the project context? For example, a porridge may be considered a breakfast food only and not appropriate for a mid-day meal.

Local Processing and Storage

2.7 Do the feeding center facilities have adequate resources to store, process and prepare the selected commodities into locally acceptable foods for young children? If preparation resources are limited, eliminate commodities that need a long cooking time, (therefore fuel) or several ingredients or complicated cooking procedures and containers for preparation.

Local Food Production

2.8 What foods are produced locally during which seasons? Are those sold or eaten by the target population?

## Step 3: Ration Specifications

Nutritional Value

3.1 Estimate how much (if any) of the institutional diet is likely to be cut back when project supplements are provided. This may range from 0 to 300 to 500 calories, and may vary by age groups. Use of snack versus meal preparations and nutrition education may need to be strengthened to reduce substitution. Add the "substitution" allowance to deficits estimated under suitability in Step 2.

Caloric Deficit

| | | | | |
|---|---|---|---|---|
| Total calories per ration | = | Recommended level & recuperation allowance - actual intake | + | Allowance for substitution |

Protein Deficit

| | | | | |
|---|---|---|---|---|
| Total protein per ration | = | Recommended level & recuperation allowance - actual intake | + | Allowance for substitution |

Income Transfer Value

3.2 If income transfer value is specified, it is usually in terms of value to the institution which would normally provide the food.

Other Specifications

3.3 Factors of critical importance based on suitability under Step 2. For example, a project may specify no sorghum, low NFDM levels due to lactose intolerance, use of snacks instead of meals, maximum volume of cooked food not to exceed 300 ml, and short cooking time.

## Step 4: Alternative Rations

4.1 Exclude those commodities from the eligibility list that are physiologically unsuitable or culturally unacceptable or that have serious problems regarding local storage and processing.

4.2 If the cost of commodities to the project is a critical consideration develop a table of $ cost per 1000 calories and 10 g protein. See the preceding chapter on data needs and methodologies to calculate commodity costs. Complete Table III.4 with cost components. Use Table I.2 on nutritional value of commodities to calculate cost per unit of nutritional value.

4.3 Calculate the minimum amount of vegoil (25-30 percent of calories) that should be in the ration. Subtract the caloric contribution of oil from the total calories. Select a cereal or cereal-based food from the list of commodities based on cost, calories and protein content, raw versus cooked volume, acceptability and ease of storage or processing attributes that are considered key characteristics per specifications listed in Step 4. Calculate the quantity needed to make up the balance of calories in the ration. Check whether amounts of protein are sufficient. If not, select a high protein commodity to replace a part or all of the cereal. Check the total raw amounts and their cooked volumes and if the volume is above specifications, substitute more calorie and protein dense commodities.

4.4 Review Annex A on the physiological needs of the intended recipient population. For example, for children under three years, preference should be given to blended foods and NFDM in the ration.

4.5 Devise alternative combinations of commodities to meet specifications. With 3-4 alternative ration packages conduct any field trials that may be needed to ascertain physiological suitability and cultural acceptability.

## Step 5: Ranking and Selection

5.1 Add up the cost of individual commodities in each ration to calculate costs of the alternative rations. Rank rations by cost.

5.2 Consider trade-offs. If a secondary purpose is education regarding use of locally available but little used foods (like dairy products or green leafy vegetables), will the proposed commodities and preparations promote these objectives? If a secondary purpose is to enhance use of local resources, will the availability of commodities selected act as a disincentive for local resources?

Will the provision of NDFM encourage bottlefeeding? (NFDM will need to be used in a manner that does not encourage bottle feeding. Discouragement of bottlefeeding may need to be strengthened in the accompanying nutrition education.)

Is there a high level of pilferage in oil and NFDM? Can storage, management be improved or should rations with lower amount of these commodities be given preference?

5.3 Complete Table III.7 for comparing costs and other considerations. Select the most cost-effective ration(s).

# Other Child Feeding Example

This is an example of an Other Child Feeding project to illustrate how these guidelines can be applied to developing appropriate rations.

## Step 1: Project Considerations

1.1 What are the primary and secondary objectives of the project?

The primary purpose is to prevent malnutrition among low-income children in day care centers.

1.2 What is the target population?

Rural, low-income children 12 months through 8 years of age.

1.3 What is the distribution mode, frequency, etc.?

On site, daily feeding (360 days), one meal plus one snack.

1.4 What is the role of the food component?

The ration will improve the nutritional intakes of participants, by providing supplements to meet requirements. The local voluntary agencies who sponsor the project will use savings (generated from using donated food rather than locally bought foods) to improve health services, such as immunizations and control of diarrhea.

1.5 Is income transfer value or nutritional value of the ration more important?

Nutritional value is more important. However, the local agencies need sufficient income transfer value in the ration to procure other needed services as well.

## Step 2: Suitability

Physiological Appropriateness

2.1 An estimated 50 percent of daily nutritional needs will be required from the donated ration. This equals 650 calories and 18 grams of protein. (No recuperation allowance is needed as malnourished children are enrolled in government rehabilitation project.)

2.2 No commodities need to be excluded for physiological reasons.

Cultural Acceptability
2.3 Local facilities are available for processing a variety of ingredients into highly acceptable baked products. Corn and wheat are local staples.

Local Processing and Storage
2.4 Whole sorghum and legumes (lentils, peas, beans) cannot be easily processed for consumption by young children.

## Step 3: Ration Specifications

Nutritional Value
3.1 The diet in the institution provides inadequate calories and protein. The deficits are estimated to be the following:

Calories

Deficit of 650 + 0 recuperation + 0 substitution = 650

Protein (g)

Deficit of 18 + 0 recuperation + 0 substitution = 18

Income Transfer Value
3.2 The following are the local ingredients that would be spared by donated commodities and their market price.

| Commodities | Local Ingredients | $ Price per kg |
|---|---|---|
| Wheat Flour<br>SF Wheat Flour,<br>WSM, | Wheat flour | 0.40 |
| Cornmeal,<br>SF Cornmeal | Cornmeal | 0.35 |
| NFDM | NFDM | 3.75 |
| Vegoil | Vegoil | 2.10 |

The rations should provide a income transfer value of $2.50 to $3.50 per person per month to the local agencies.

Other Specifications

2.4 No whole sorghum or legumes can be used.

## Step 4: Alternative Rations

The following daily rations meet the specifications in kg per recipient per month.

a. WSM 4.5 + oil 0.5
b. SF Cornmeal 4.0 + oil 0.6
c. Wheat flour 3.0 + NFDM 0.75 + oil 0.4

## Step 5: Ranking and Selection

The following table is used to compare costs, income transfer value and other attributes.

| Ration Package | Commodities | Quantity per ben. per month | Cost to Project per ben. | Income Transfer Value | Nutritional Value | Other Considerations | Rank |
|---|---|---|---|---|---|---|---|
| a. | WSM<br>vegoil | 4.50<br>0.50 | $1.58 | $1.85 | Equal | Contains vitamins & minerals. | |
| b. | SFCM<br>vegoil | 4.00<br>0.60 | $1.34 | $1.70 | Equal | Contains vitamins & minerals. | |
| c. | Wheat-flour<br>NFDM<br>Vegoil | 0.30<br>0.75<br>0.40 | $0.96 | $4.80 | Equal | Contains vitamins & minerals. | 1 |

Ration c is selected because it has a high income transfer value that will be converted to additional health services and therefore greater impact. It also has the lowest cost and best acceptability.

Table IV.2 Examples of Rations

| Category | Mode | Project Objectives | Primary Use of Food | Calories per day | Protein grams/day | Monetary Value $/month | Other | Alternative Rations |
|---|---|---|---|---|---|---|---|---|
| MCH | On-Site (20 days per month) | To improve nutritional well-being of children under 3 at risk of becoming seriously malnourished | 1. To provide a nutritional supplement to the target group which fills calorie and protein gaps in the diet. | 550 | 23 | NA | No Sorghum, total cooked volume not in excess of 250 ml., milk should be a component | (Staple food is wheat)<br>1. WSM 2.4 + oil 0.3<br>2. SPB 2.0 + NFDM 0.5 + oil 0.4<br>3. Wheat Flour 1.0 + NFDM 1.0 + oil 0.4<br>(Rations are per recipient per month) |
| MCH | Take-Home | To improve nutritional well-being of children under 3 at risk of becoming seriously malnourished | 1. To provide a nutritional supplement to the target group which fills calorie and protein gaps in the diet.<br>2. In addition 10% of household food needs are to be covered | 2010 | 75 | NA | Should contain at least one self - targetting commodity. No whole grain sorghum | (Corn and rice are staples).<br>1. SPSG 9.0 + NFDM 3.0 + oil 2.0<br>2. CSM 12.0 + oil 2.0<br>3. CM 6.0 + NFDM 5.0 + oil 2.0<br>4. Rice 6.0 + NFDM 5.5 + oil 2.0<br>(Amount covers 2 recipients per household per month) |
| MCH | Take - Home | To improve nutritional well-being of children under 3 at risk of becoming seriously malnourished | 1. To provide a nutritional supplement to the target group which fills calorie and protein gaps in the diet.<br>2. The food should also be an incentive for regular participation at the monthly health clinics | 2820 | 70 | $ 4.75 minimum | Should contain at least one self - targetting commodity. No whole grain sorghum | (Corn and rice are staples).<br>1. ICSM 8.0 + CM 8.0 + oil 3.0<br>2. CM 14.0 + NFDM 3.0 + oil 3.0<br>3. Rice 9.0 + oil 3.0 + ICSM 6.0<br>(Amounts cover 3 groups target recipients per household per month) |
| FFW | Take-Home | To provide short-term employment and develop long-term assets in the community | 1. One-half of the wages to be provided as food | N.A. | | $7.0 to $9.0 | No whole grain sorghum | (Corn and rice are staples)<br>1. SPSG 12.0 + oil 3.0<br>2. CM 9.0 + NFDM 2.0 + oil 1.0<br>3. Rice 9.0 + oil 2.0 + NFDM 3.0<br>(Rations are per worker per month) |

Table IV.2 Examples of Rations, continued

| Category | Mode | Project Objectives | Primary Use of Food | Calories per day | Protein grams/day | Monetary Value | Other | Alternative Rations |
|---|---|---|---|---|---|---|---|---|
| FFW | Take-Home | To provide food and employment through public works projects to the neediest households in the community | 1. Full wages<br>2. One-half of the food needs of one worker plus 3 dependents to be covered. | 4700 | 120 | $18.0 | No whole grain soghum short cooking time to conserve fuel | (wheat is local staple)<br>1. Bulgur 12.0 + oil 4.5 + NFDM 6.0<br>2. SFB 18.0 + oil 6.0<br>3. Wheat flour 12.0 NFDM 6.0 + oil 4.5<br>(Rations are per worker per month) |
| SF | On-Site | To increase enrollment and attendance at school in the poorest neighborhoods<br>To improve the nutritional status of children 6-10 yrs. old/ alleviate morning hunger | 1. Incentive to increase enrollment and attendance<br>2. Provide one-half of the daily food needs | 1050 | 35 | $ 1.0 minimum | No whole sorghum as feeding center has no access to dehulling facilities | (Corn and sorghum are the staples)<br>1. CSM 4.5 + oil 0.9<br>2. SFCM 3.6 + NFDM 1.0 + oil 1.0<br>3. SFSG 3.8 + NFDM 0.8 + oil 1.0<br>(Per recipient per month) |
| SF | On-Site (one meal 5 days per week) | To improve nutritional status of children 6-10 yrs. old alleviate morning hunger | 1. Provide one third of food needs and sufficient protein & fat to fill deficits in the home diet<br>2. Incentive to increase attendance and enrollment | 800 | 30 | N.A. | Limited amounts of NFDM as lactose intolerance may exist | (Wheat is staple)<br>1. SFB 3.5 + oil 0.6<br>2. WSM 3.3 + oil 0.5<br>3. Wheat-flour 3.5 + NFDM 0.5 + oil 0.7<br>(Per recipient per month) |
| OCP | On-Site (daily feeding) | To improve nutritional status of children 6 months to 8 yrs. of age | 1. Provide half of daily food needs. | 650 | 18 | $2.5 to $3.5 per person of monetary value to the institution | No Sorghum, short cooking time | (Corn & wheat are staples)<br>1. CSM 4.5 + oil 0.5<br>2. SFCM 4.0 + oil 0.6<br>3. Wheat flour 3.0 + NFDM 0.75 + oil 0.4<br>(Per recipient [illegible]) |

Table IV.2 Examples of Rations, continued

| Category | Mode | Project Objectives | Primary Use of Food | Calories per day | Protein grams/day | Monetary Value | Other | Alternative Rations |
|---|---|---|---|---|---|---|---|---|
| Emergency | Take-Home | To prevent malnutrition, mortality, morbidity, | 1. To meet the minimum food needs for temporary maintenance | 1800 | 45 | N.A. | No Sorghum | (Only SFCM, oil & NFDM are readily available)<br>1. SFCM 12.5 + oil 1.8<br>2. SFCM 7.5 + NFDM 3.0 + oil 1.8 |
| Emergency | On-Site | To prevent malnutrition, mortality, morbidity, | 1. Provide one-half of daily food needs and meet protein and fat deficits in local diet. | 1150 | 45 | N.A. | Cooking facilities extremely limited | (Only Bulgur, SFB, NFDM & oil are available).<br>1. Bulgur 3.5 + NFDM 2.5 + oil 1.6<br>2. SFB 4.5 + NFDM 1.5 + oil 1.6 |

# INDIVIDUAL COMMODITY FACT SHEETS

The following fact sheets provide additional information on each commodity currently used in the FFP Title II program. Included are the nutritional values, ingredients, processes, packaging, shelf life, and selected recipes. The following commodities are included here:

Wheat . . . . . 2
Wheat Flour . . . . . 3
Soy-Fortified Flour . . . . . 4
Bulgur . . . . . 9
Soy-Fortified Bulgur . . . . . .12
Wheat-Soy Milk . . . . . .15
Corn . . . . . .18
Cornmeal . . . . . .19
Soy-Fortified Cornmeal . . . . . .21
Instant Corn-Soya Masa Flour . . . . . .23
Corn Soy Milk . . . . . .25
Instant Corn-Soy Milk . . . . . .28
Sorghum . . . . . .32
Soy-Fortified Sorghum Grits . . . . . .33
Rolled Oats . . . . . .35
Soy-Fortified Rolled Oats . . . . . .37
Non-Fat Dry Milk . . . . . .39
Vegetable Oil . . . . . .42
Rice . . . . . .43
Peas and Beans . . . . . .44
Lentils . . . . . .45

These commodities have been successfully introduced in feeding programs throughout the world where the tastes of the local populace are widely divergent. All commodities can be used in a wide variety of ways. At the end of each commodity fact sheet there is an extra space where indigenous recipes can be added.

Commodities are generally used in combination with other commodities and/or in combination with local foods. Usually the nutritional value of foods can be further increased by combining foods belonging to different categories. For example, cereals and legumes, when combined in a meal, yield an improved protein quality. However there is nothing to be gained by adding NFDM to blended foods; this will only skew the balance towards too high a protein level for the number of calories and will require the addition of fats, oil, or sugar. Including fruits and vegetables adds vitamins and minerals to cereal-legume foods. The addition of fats, oils, and sugar increases caloric density which is a primary concern in most local diets of developing countries. Locally preferred flavorings and spices are often added.

# Wheat

This unprocessed whole grain is used primarily for distribution in emergency situations and in Food for Work programs, and to a lesser extent in school feedings programs.

1. Nutritive Values (per 100 g Wheat)

| | | |
|---|---|---|
| 330 | Cal. | Energy |
| 12.3 | g | Protein |
| 1.8 | g | Crude Fat |
| 72 | g | Carbohydrates |
| 46 | mg | Calcium |
| 354 | mg | Phosphorus |
| 3.4 | mg | Iron |
| 3 | mg | Sodium |
| 370 | mg | Potassium |
| 0.57 | mg | Thiamine ($B_1$) |
| 0.12 | mg | Riboflavin ($B_2$) |
| 4.3 | mg | Niacin |

2. Ingredients

Hard red spring, hard red winter, soft red winter, and white wheat grown in the United States.

3. Packaging

| | |
|---|---|
| Sizes | Bulk or fifty kg (110.23 lb) bags |
| Woven Poly-propylene | Fabric contains an inhibitor to resist ultra-violet absorption along with an anti-skid coating. |

4. Shelf Life One year

5. Local Preparations
(Add local recipes here.)

# Wheat Flour

This processed commodity available as all-purpose or bread flour is used in all categories of programs as a staple food.

1. Nutritive Values (per 100 g Flour)

| | | |
|---|---|---|
| 364 | Cal. | Energy |
| 10.5 | g | Protein (9.0-11.0 for all purpose, 11.3 min. for bread flour) |
| 1 | g | Crude Fat |
| 76 | g | Carbohydrates |
| 132 | mg | Calcium |
| 87 | mg | Phosphorus |
| 4.4 | mg | Iron |
| 2 | mg | Sodium |
| 95 | mg | Potassium |
| 1100 | mg | Vitamin A (4000 to 6000) |
| 0.64 | mg | Thiamine ($B_1$) |
| 0.40 | mg | Riboflavin ($B_2$) |
| 5.3 | mg | Niacin |

2. Ingredients and Processes (per 100 g Flour)

| | |
|---|---|
| Wheat Flour 100 g | Milled and processed from hard wheat. |
| Vitamins and Minerals | Added to help meet nutritional requirements. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty kg (110.23 lb) bags |
| Woven Polypropylene | Fabric contains an inhibitor to resist ultra-violet absorption, along with an anti-skid coating. |

4. Shelf Life — One year

5. Local Preparations
(Add local recipes here.)

# Soy-Fortified Flour

This blended, protein-fortified, processed commodity is generally used for school feeding, as a baking ingredient, and to a lesser extent in MCH and FFW.

1. Nutritive Values (per 100 g SFFL 12%)

| | | |
|---|---|---|
| 357 | Cal. | Energy |
| 16.0 | g | Protein (min.) |
| 1.3 | g | Crude Fat (min.) |
| 72 | g | Carbohydrates |
| 132 | mg | Calcium |
| 4.4 | mg | Iron |
| 155 | mg | Phosphorus |
| 1.8 | mg | Sodium |
| 302 | mg | Potassium |
| 1100 | IU | Vitamin A (4000-6000 IU) |
| 0.64 | mg | Thiamine ($B_1$) |
| 0.40 | mg | Riboflavin ($B_2$) |
| 5.3 | mg | Niacin |

2. Ingredients and Processes (per 100 g SFFL 12%)

| | |
|---|---|
| Bread Wheat Flour 88 g | Unbleached straight-grade flour milled from hard wheats. |
| Soy Flour 12 g | Defatted and lightly toasted. |
| Dough Conditioner | Sodium stearoyl-2 lactylate (SSL) is 0.5% of total mix to minimize adverse effects of soy flour on baking performance, increase loaf volume and improve crumb structure. Potassium bromate is added to improve baking performance. Minerals and vitamins added to help meet nutritional requirements of older children and adults. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty kg (110.23 lb) bags |
| Woven Polypropylene | Fabric contains an inhibitor to resist ultra-violet absorption, along with an anti-skid coating. |

4. Shelf Life One year

5. Preparations (per measures by weight)

The following precautions should be observed when making doughs:

- The absorption requirement of doughs made with SFF usually runs 5-6 parts more water than doughs made with regular wheat flour.

- It is usually best to mix the ingredients at least one less time than usual for similar straight flour doughs to achieve optimum development.

- When using dried yeast, dissolve a portion of the formula water (3 parts water/1 part yeast) 10 minutes prior to addition. Fresh yeast may be substituted for dried at a ratio of 2 1/2 parts fresh to 1 part dried yeast.

SFF 12% can be used instead of regular flour in any bakery product. Additional water is required, which in turn produces an increased yield of bread with better keeping qualities. Mix ingredients 33-40 percent less than usual for normal straight dough to achieve optimal development. Fresh yeast may be substituted for dried yeast at a ratio of 2.5 measures of fresh yeast to 1 measure of dry yeast.

| | | |
|---|---|---|
| Soy Buns or Rolls | 100 | measures SFF 12% |
| | 10 | measures sugar |
| | 1.5 | measures salt |
| | 1.2 | measures dried yeast |
| | 70 | measures water* |

Mix one-half of total flour with other ingredients until smooth. Add remaining flour and mix until developed (eight minutes on medium speed--88 rpm or 1200 strokes by hand). Cover and ferment in a warm (80F or 27C) place for 30 minutes. Punch dough and ferment an additional 20 minutes. Scale the dough into the desired size pieces, shape and allow to rise to desired volume. Bake for 15 minutes at 196C (385F).

*In most cases the normal absorption range is 70-72 pounds (32-33 kilos) of water per 100 pounds (45.5 kilos) of soy-fortified flour 12% when preparing buns or rolls.

**Breads** 12% SFF is ideal for breads, buns, and bread type products. Breads using 12% SFF are easily manufactured using traditional methods with little change in operating procedures. Breads with 12% SFF have good loaf volume, color, texture. Due to the higher protein content, 12% SFF requires additional water in the doughs thus providing increased bread yield with better keeping qualities.

Pan Bread
(Straight Dough Method)

| | |
|---|---|
| 100 | measures 12% SFF |
| 1.2 | measures dried yeast |
| 70 | measures water (variable)++ |
| 3 | measures sugar |
| 2.25 | measures salt |
| 3 | measures lard |

++In most cases, normal absorption range is 69-71 pounds (31-32 kilos) water/100 pounds (45.5 kilos) SFF.

Mix 1/2 total flour with other ingredients until smooth; add remaining flour; mix until developed (8 minutes at medium speed, 88 rpm or 1200 strokes by hand). Cover and give 60 minutes floor time at 27 C (80 F). Scale to desired size, round into balls, and give 10 minutes rest. Mold into loaves, pan and proof to desired size. Bake for 20 minutes at 224 C (435 F).

French Bread
(Straight Dough)

| | |
|---|---|
| 100 | measures 12% SFF |
| 1.2 | measures dried yeast |
| 69 | measures water (variable)++ |
| 2 | measures lard |
| 2.25 | measures salt |

++In most cases, normal absorption range is 69-71 pounds (31-32 kilos) water/100 pounds (45.5 kilos) SFF.

Mix 1/2 total flour with other ingredients until smooth; add balance of flour; mix until developed (8 minutes at medium speed, 88 rpm or 1200 strokes by hand). Cover, let rise in warm place (27 C or 80 F) for 40 minutes to twice the size. Knead down. Divide into desired size, shape into loaves, let rise in warm place 45 minutes and bake in preheated oven (425 F or 219 C) for 20-25 minutes.

| | | |
|---|---|---|
| Cookies | 100 | measures 12% SFF |
| | 58 | measures sugar |
| | 22 | measures shortening |
| | 1 | measure salt |
| | 1 | measure baking soda |
| | 33 | measures water |

Cream shortening and sugar for 3 minutes at medium speed (88 rpm) or 400-500 hand strokes. Dissolve salt in water and add. Mix 1 minute at medium speed or 200 hand strokes. Add remaining ingredients; mix 2 minutes at medium speed (3-400 strokes). Roll, cut, and bake 9 minutes at 400 F (204 C).

| | | |
|---|---|---|
| Soy Buns | 100 | measures 12% SFF |
| or Rolls | 10 | measures sugar |
| (Straight Dough) | 1.5 | measures salt |
| | 2 | measures dried yeast |
| | 70 | measures water (variable)++ |

++In rolls or buns, normal absorption is 70-72 lb (32-33 kilos) water per 100 lb (45.5 kilos) SFF.

Mix 1/2 total flour with other ingredients until smooth; add remaining SFF; mix until developed 8 minutes, medium speed (88 rpm) or 1200 hand strokes. Cover, and ferment at 80 F (27 C) for 30 minutes. Punch dough and ferment 20 more minutes. Scale, shape, let rise to desired volume; bake 15 minutes at 385 F (196 C).

6. Local Preparations
(Add local recipes here.)

# Bulgur

This processed commodity is generally used as a staple food for all categories of programs.

1. Nutritive Values (per 100 g Bul)

| | | |
|---|---|---|
| 354 | Cal. | Energy |
| 9.3 | g | Protein (min.) |
| 1.5 | g | Fat |
| 76 | g | Carbohydrates |
| 132 | mg | Calcium |
| 338 | mg | Phosphorus |
| 4.4 | mg | Iron |
| 229 | mg | Potassium |
| 1100 | IU | Vitamin A |
| 0.55 | mg | Thiamine ($B_1$) |
| 0.33 | mg | Riboflavin ($B_2$) |
| 4.4 | mg | Niacin |

2. Ingredients and Processes (per 100 g Bul)

| | |
|---|---|
| Whole Wheat 100 g | Cracked, debranned and partially precooked to lower final cooking time, reduce toughness and some of the crude fiber. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty kg (110.23 lb) bags |
| Woven Poly-propylene | Fabric contains an inhibitor to resist ultra-violet absorption, along with an anti-skid coating. |

4. Shelf Life One year

5. Preparations

General Cooking Tips

-Cooks like rice.

-Don't wash or rinse after cooking.

-Use liquids in pan after cooking as vitamins and minerals are in it.

-Don't lift lid while cooking; don't stir.

-Volume more than doubles in cooking.

-It may be soaked, cooked, and then stored in refrigerator.

Basic Recipe

1 measure bulgur
2 measures water
Salt to taste

Place water in container, add salt and bring to a boil. Add bulgur and return to a boil. Remove from heat, cover, and let stand for 15 minutes. Serve. NOTE: Can be used to substitute for rice.

Porridge

1 measure bulgur
2 measures water
Salt to taste

Place bulgur and salt in cold water. Heat and bring to a boil. Remove from heat, cover, and let stand for 15 minutes. Add sugar to taste and cinnamon powder, if desired.

Pilaf

1 cups bulgur
2 tablespoons vegetable oil
1 tablespoon finely chopped onion
2 cups vegetable broth
1/2 teaspoon salt
Few grains pepper

Add bulgur and onion to vegetable oil in skillet. Stir and cook until golden.

6. Local Preparations
(Add local recipes here.)

# Soy-Fortified Bulgur

This processed food commodity is used in all categories of programs.

1. Nutritive Values (per 100 g SFB)

| | | |
|---|---|---|
| 350 | Cal. | Energy |
| 17.3 | g | Protein (min.) |
| 1.5 | g | Crude Fat (min.) |
| 70 | g | Carbohydrates |
| 132 | mg | Calcium |
| 385 | mg | Phosphorus |
| 4.4 | mg | Iron |
| 0.1 | mg | Sodium |
| 467 | mg | Potassium |
| 1100 | IU | Vitamin A |
| 0.55 | mg | Thiamine ($B_1$) |
| 0.33 | mg | Riboflavin ($B_2$) |
| 4.4 | mg | Niacin |

2. Ingredients and Processes (per 100 g SFB)

| | |
|---|---|
| Bulgur 85 g | Cracked, debranned, and partially precooked to lessen final cooking time, reduce toughness, and remove a slight amount of the crude fiber. |
| Soy Grits 15 g | Defatted and toasted or expeller processed. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty kg (110.23 lb) bags |
| Woven Polypropylene | Fabric contains an inhibitor to resist ultra-violet absorption, along with an anti-skid coating. |

4. Shelf Life — One year

5. Preparations (per measure by volume)

General Cooking Tips

-Cooks like rice.

-Don't wash or rinse after cooking.

-Use liquids in pan after cooking as vitamins and minerals are in it.

-Don't lift lid while cooking; don't stir.

-Volume more than doubles in cooking.

-It may be soaked, cooked, and then stored in refrigerator.

| | |
|---|---|
| Basic Recipe | 1 measure SFBul<br>2 measures water<br>Salt to taste |

Place water in a container, add salt, and bring to a boil. Add SFBul, and return to boil. Remove from heat, cover and let stand for 15 minutes before serving.

| | |
|---|---|
| Porridge | 1 measure SFBul<br>2 measures water<br>Salt to taste |

Place SFBul and salt in cold water, bring to a boil. Remove from heat, cover and let stand 15 minutes. Sugar or other flavoring may be added if desired.

| | |
|---|---|
| Kous Kous | 1 1/3 cups SFB<br>2 2/3 cups vegetable broth<br>1/2 teaspoon salt<br>1/2 cup vegetable oil<br>Dash of pepper |

Brown SFB in heavy skillet, shaking or stirring often for about 15 minutes. Add vegetable broth, salt, pepper, and vegetable oil and bring to boil. Pour into a 1 1/2 quart casserole. Cover and bake at 350 F for 15 minutes. Remove cover and stir. Bake 15 more minutes uncovered. Fluff with a fork and serve.

6. Local Preparations
(Add local recipes here.)

# Wheat-Soy Milk

This blended, protein-fortified, processed commodity is a source of good quality protein, minerals, and vitamins and is most frequently used in MCH programs. A source of calories such as fats, oils, or sugar must be added to make this product nutritionally balanced for MCH beneficiaries.

1. Nutritive Values (per 100 gm. WSM)

| | | |
|---|---|---|
| 369 | Cal. | Energy |
| 20 | g | Protein (min.) |
| 6 | g | Crude Fat (min.) |
| 71 | g | Carbohydrates |
| 914 | mg | Calcium |
| 886 | mg | Phosphorus |
| 20.2 | mg | Iron |
| 283 | mg | Sodium |
| 650 | mg | Potassium |
| 1662 | IU | Vitamin A |
| .84 | mg | Thiamine ($B_1$) |
| .67 | mg | Riboflavin ($B_2$) |
| 8.5 | mg | Niacin |
| 40 | mg | Ascorbic Acid (C) |

2. Ingredients and Processes (per 100 g WSM)

| | |
|---|---|
| Wheat 71.4 g | Wheat protein concentrate (which contributes a significant amount of fat to the blend) is combined with either bulgur wheat flour (debranned, cracked and ground to reduce toughness and a slight amount of the crude fiber); or with straight grade flour. All wheat fractions have been partially precooked to gelatinize starch, resulting in improved storage stability and lower cooking time. |
| Soy Flour 16.5 g | Defatted and toasted. |
| Soybean Oil 4.2 g | Processed and stabilized with additives to improve storage stability. Supplies |

| | |
|---|---|
| | essential fatty acids and increases caloric density and body absorption of fat-soluable vitamins. |
| Non-fat Dry Milk 5 g | Dried by spray process to preserve nutritional quality. |
| Mineral Premix 2.8 g | Added to help meet nutritional requirements. Contains tricalcium phosphate, to provide mineral nutrients and to reduce infestation. |
| Vitamin Premix 0.1 g | Added to help meet the nutritional requirements of children and pregnant and lactating mothers. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty lb bags (22.68 kg) |
| Multiwall | Three plies of paper (minimum) with an inner polyethylene or polypropylene plastic liner. The outer paper ply is treated to provide wet strength. |

4. Shelf Life One year

5. Preparations (measures by volume)

Beverage
1 measure WSM
10 measures water

Add WSM to water. Heat mixture to a boil stirring continuously until consistency is smooth. Remove from heat, cool and serve.

Porridge
1 measure WSM
4-5 measures water

Add WSM to cold water. Heat while stirring until mixture comes to a boil. Add seasonings and flavors.

Bakery Products

In bakery products, WSM can be substituted in part for ordinary flour. Substitute 10 percent to 50 percent of the flour portion to fortify any bakery product. Can be used in pan bread, rolls, biscuits, and cookies to suit local conditions.

| | |
|---|---|
| Gruel | 1 volume WSM |
| | 4-8 volumes water depending on desired consistency |

Heat while stirring until mixture comes to a boil. Remove from heat and serve. Sugar and flavoring may be added according to local tastes.

| | |
|---|---|
| Pudding | 1 volume WSM |
| | 3-4 volumes waters |
| | 1 volume sugar |
| | add vanilla or spice to taste |

Combine all ingredients. Mix well and cook until smooth. Serve hot or cold.

6. Local Preparations
(This space intentionally left blank for local recipes.)

# Corn

This unprocessed whole grain is used primarily for distribution in emergency situations, and in Food for Work and MCH programs to a lesser extent.

1. Nutritive Values (per 100 g Corn)

| | | |
|---|---|---|
| 348 | Cal. | Energy |
| 8.9 | g | Protein |
| 3.9 | g | Crude Fat |
| 72 | g | Carbohydrates |
| 22 | mg | Calcium |
| 268 | mg | Phosphorus |
| 2.1 | mg | Iron |
| 1 | mg | Sodium |
| 284 | mg | Potassium |
| 490 | IU | Vitamin A |
| 0.37 | mg | Thiamine ($B_1$) |
| 0.12 | mg | Riboflavin ($B_2$) |
| 2.2 | mg | Niacin |

2. Ingredients

Yellow corn grown in the United States.

3. Packaging

| | |
|---|---|
| Sizes | Bulk or fifty kg (110.23 lb) bags |
| Woven Poly-propylene | Fabric contains an inhibitor to resist ultra-violet absorption along with an anti-skid coating. |

4. Shelf Life One year

5. Local Preparations
(Add local recipes here.)



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# Cornmeal

This processed commodity is generally used as a staple food in all categories of programs.

1. Nutritive Values (per 100 g Cornmeal)

| | | |
|---|---|---|
| 364 | KCals. | Energy |
| 7.9 | g | Protein |
| 1.5 | g | Crude Fat (max.) |
| 78 | g | Carbohydrates |
| 132 | mg | Calcium |
| 99 | mg | Phosphorus |
| 4.4 | mg | Iron |
| 1.0 | mg | Sodium |
| 120 | mg | Potassium |
| 1100 | IU | Vitamin A |
| .55 | mg | Thiamine ($B_1$) |
| .33 | mg | Riboflavin ($B_2$) |
| 4.4 | mg | Niacin ($B_3$) |

2. Ingredients and Processes (per 100 g Cornmeal)

| | |
|---|---|
| Yellow Corn 100 g | Degermed to reduce susceptibility to rancidity. |
| Vitamins and Minerals | Added to improve nutritional quality. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty lb bags (22.68 kg) |
| Multiwall Paper | Three plies of paper (minimum) with an inner polyethylene or polypropylene plastic liner. The outer paper ply is treated to provide wet strength. |

4. Shelf Life — One year

5. Preparation (per measure by volume)

| | |
|---|---|
| Basic Recipe (Porridge) | 1 measure cornmeal<br>1 measure cold water<br>3 measures boiling water<br>Salt to taste |



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Mix cornmeal, cold water, and salt. Slowly stir mixture into the boiling water. Cook and stir until thick. Lower heat. Cover and simmer 15 minutes stirring occasionally to keep mixture from sticking to pan.

| | |
|---|---|
| Fried Cornmeal Mush | Prepare basic recipe and place in a loaf pan. Cool until firm. Remove mush from pan and cut into slices. Put slices in heated, greased fry pan and brown on both sides. |

6. Local Preparations
(Add local recipes here.)

# Soy-Fortified Cornmeal

This processed commodity is most used in emergency programs and to a lesser extent in all other categories.

1. Nutritive Values (per 100 g SFCM)

| | | |
|---|---|---|
| 358 | Cal. | Energy |
| 13.8 | g | Protein (min.) |
| 1.5 | g | Crude Fat (max.) |
| 72 | g | Carbohydrates |
| 132 | mg | Calcium (110 to 165) |
| 182 | mg | Phosphorus |
| 4.4 | mg | Iron |
| 1.0 | mg | Sodium |
| 375 | mg | Potassium |
| 1100 | IU | Vitamin A (4000-6000 IU) |
| 0.55 | mg | Thiamine ($B_1$) (.44 to .55) |
| 0.33 | mg | Riboflavin ($B_2$) (.26 to .4) |
| 4.4 | mg | Niacin (3.5 to 5.3) |

2. Ingredients and Processes (per 100 g SFCM)

| | |
|---|---|
| Cornmeal 85 g | Degermed to reduce susceptability to rancidity. |
| Soy Flour 15 g | Defatted and toasted. |
| Minerals and Vitamins | Added to help meet nutritional requirements of older children and adults. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty lb bags (22.68 kg) |
| Multiwall Paper | Three plies of paper (minimum) with an inner polyethylene or polypropylene plastic liner. The outer paper ply is treated to provide wet strength. |

4. Shelf Life — One year

5. Preparation (per measure by volume)

| | |
|---|---|
| Basic Recipe | 1 measure SFCM<br>1 measure cold water<br>3 measures boiling water<br>Salt to taste |

Mix SFCM, cold water, and salt. Slowly stir mixture into the boiling water. Cook and stir until thick. Lower heat. Cover and simmer 15 minutes, stirring occasionally to keep mixture from sticking to the pan.

6. Local Preparations
(Add local recipes here.)

# Instant Corn-Soya Masa Flour

This blended, protein-fortified, processed commodity is designed for use in the preparation of tortillas and similar products or gruels to be consumed by both children and adults.

1. Nutritive Values (per 100 g MF)

| | | |
|---|---|---|
| 365 | Cal. | Energy |
| 12.2 | g | Protein |
| 4.0 | g | Crude Fat |
| 71 | g | Carbohydrates |
| 132 | mg | Calcium |
| 245 | mg | Phosphorus |
| 4.4 | mg | Iron |
| 1.0 | mg | Sodium |
| 326 | mg | Potassium |
| 1100 | IU | Vitamin A |
| 0.55 | mg | Thiamine ($B_1$) |
| 0.33 | mg | Riboflavin ($B_2$) |
| 4.7 | mg | Niacin |

2. Ingredients and Processes (per 100 g MF)

| | |
|---|---|
| Masa Flour 95 g | Whole ground corn, partially precooked in lime water, followed by washing and drying to produce the traditional flavor and performance characteristics suitable for preparation of a wide range of food staples in the form of arepas, corn cakes, corn chips, tortillas, and enchiladas, or gruels. |
| Soy Flour 5 g | Defatted and toasted. |
| Mineral and Vitamins | Added to meet nutritional requirements of older children and adults. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty lb bags (22.68 kg) |

| | |
|---|---|
| Multiwall Paper | Three plies of paper (minimum) with an inner polyethylene or polypropylene plastic liner. The outer paper ply is treated to provide wet strength. |

4. Shelf Life — One year

5. Preparations (per measure by volume)

Tortillas

1 measure MF
2 measures boiled water
Salt to taste

Mix MF, salt, and boiled water and knead to blend well. Shape dough into small balls. Pat out by hand to form tortillas. Cook tortilla on both sides in heated, greased frying pan or griddle.

Corn Chips

1 measure MF
2 measures boiled water
Salt to taste

Prepare same as tortilla dough. Slice into thin triangles. Fry in hot oil (350°F, 177°C) until crisp.

Gruel

1 measure MF
4 measures boiled water
Salt to taste

Slowly stir MF into salted boiling water. Cook 2 minutes. Remove from heat and let stand 3 minutes before serving.

Emergency Survival Ration

1 measure MF
4 measures boiled water

Mix MF and boiled water until smooth. Form dough, flatten, and place on hot rock to cook (on both sides).

6. Local Preparations
(Add local recipes here.)

# Corn Soy Milk

This blended, protein-fortified, processed commodity is a source of high quality protein, minerals, and vitamins and is most frequently used in MCH programs. A source of calories such as fats, oils, or sugar must be added to make this product nutritionally balanced for MCH beneficiaries.

1. Nutritive Values (per 100 g CSM)

| | | |
|---|---|---|
| 378 | Cal. | Energy |
| 20 | g | Protein (min.) |
| 6 | g | Crude Fat (min.) |
| 60 | g | Carbohydrates |
| 907 | mg | Calcium |
| 667 | mg | Phosphorus |
| 18.5 | mg | Iron |
| 283 | mg | Sodium |
| 594 | mg | Potassium |
| 1942 | IU | Vitamin A |
| 0.65 | mg | Thiamine ($B_1$) |
| 0.58 | mg | Riboflavin ($B_2$) |
| 6.2 | mg | Niacin |
| 40 | mg | Ascorbic Acid (C) |

2. Ingredients and Processes (per 100 g CSM)

| | |
|---|---|
| Processed Cornmeal 63.0 g | Cornmeal is dehulled, degermed and partially precooked to gelatinize starch. This facilitates digestion, lowers cooking time, and increases storage stability. |
| Soy Flour 23.7 g | Defatted and toasted. |
| Non-fat Dry Milk 5 g | Dried by spray process to preserve nutritional quality. |
| Soybean Oil 5.5 g | Refined, deodorized and stabilized oil is added to provide essential fatty acids, raise caloric density, and increase absorption of Vitamins A, D, and E. |

| | |
|---|---|
| Vitamin Premix 0.1 g | Added to help meet the nutritional requirements of children and pregnant and lactating mothers. |
| Mineral Premix 2.7 g | Added to help meet the nutritional requirements of young children and pregnant and lactating mothers. Contains tricalcium phosphate to provide mineral nutrients and to reduce infestation. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty lb bags (22.68 kg) |
| Multiwall Paper | Three plies of paper (minimum) with an inner polyethylene or polypropylene plastic liner. The outer paper ply is treated to provide wet strength. |

4. Shelf Life One year

5. Preparations (per measure by volume)

To avoid excessive lumping, mix CSM with cold water.

Cooking time for CSM is 2 minutes, but when used in soups and cereals varies from 2 to 10 minutes.

Stir constantly while CSM is cooking.

| | |
|---|---|
| Beverage | 1 measure CSM<br>2 measures cold water<br>8 measures hot water<br>Sugar and salt to taste (optional) |

Add CSM to cold water and stir until smooth. Stir mixture into hot water; bring to a boil and cook, stirring frequently for 2-10 minutes. Oil, fat, salt and/or sugar may be added during cooking. Serve hot or cold.



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| | |
|---|---|
| Porridge or Gruel | 1 measure CSM<br>1 measure cold water<br>2 measures hot water<br>Sugar and salt to taste |

Mix CSM with cold water until smooth. Stir into hot water. Add salt and sugar. Cook gently, stirring constantly, for 2 to 10 minutes. Makes about 1 1/2 measures of CSM porridge containing 35 gm. protein and 1000 kcal.

Variations

If porridge is to be served cold, increase the amount of hot water to 3 measures. The mixture thickens as it cools.

Add oil, butter, or other fat for more calories and richer flavor.

To make a savory porridge, omit sugar. Add onion, peppers, or other vegetables and aromatic spices such as ginger or curry.

| | |
|---|---|
| Unleavened Dough | 4 cups CSM<br>4 cups cold water<br>2 teaspoons salt<br>4 tablespoons oil (or melted fat)<br>2 tablespoons sugar (optional) |

Mix all ingredients together. Let rest for 15-20 minutes. Knead thoroughly on floured board. Shape into small portions. Cook on dry griddle or greased skillet. (Yield: 20-40 pieces.)

6. Local Preparations
(Add local recipes here.)

# Instant Corn-Soy Milk

Instant CSM was developed primarily as a weaning food and for use as a beverage or porridge in child feeding programs. It is digestible without cooking, and is processed with uniformly smaller particles to give the smoother mouth feel that is particularly desirable in these applications. Conventional CSM is produced to provide a relatively coarse grind product giving a texture that is more desirable for a variety of cooked products.

Instant CSM, being a completely precooked product, requires only the addition of hot or cold potable water to prepare a porridge that will contain almost twice as much food as an equal volume of cooked porridge made from CSM. The higher caloric density and decreased bulk of ICSM porridges are advantageous for feeding very young infants. The elimination of cooking in the preparation of weaning food or preschool ration greatly facilitates programming.

The composition and nutritive value of Instant CSM and CSM are identical.

This blended commodity is generally used in MCH programs and to a smaller extent in emergency programs. A source of calories such as fats, oils, or sugar must be added to make this a nutritionally balanced food for MCH recipients.

1. Nutritive Values (per 100 g I/CSM)

| | | |
|---|---|---|
| 378 | Cal. | Energy |
| 20 | g | Protein (min.) |
| 6 | g | Crude Fat (min.) |
| 60 | g | Carbohydrates |
| 907 | mg | Calcium |
| 667 | mg | Phosphorus |
| 18.5 | mg | Iron |
| 283 | mg | Sodium |
| 594 | mg | Potassium |
| 1942 | IU | Vitamin A |
| 0.65 | mg | Thiamine ($B_1$) |
| 0.58 | mg | Riboflavin ($B_2$) |
| 6.2 | mg | Niacin |
| 40 | mg | Ascorbic Acid (C) |

2. Ingredients and Processes (per 100 g I/CSM)

| | |
|---|---|
| Processed Cornmeal 59.2 g | Dehulled, degermed and fully precooked to gelatinize starch. This makes it more easily digestible, eliminates the need to cook before serving and increases storage stability. |
| Soy Flour 17.5 g | Defatted and toasted. |
| Nonfat-dry Milk 15 g | Dried by spray process to preserve nutritional quality. |
| Soybean Oil 5.5 g | Refined, deodorized and stabilized oil is added to provide essential fatty acids, raise caloric density, and increase absorption of Vitamins A, D, and E. |
| Mineral Premix 2.7 g | Added to help meet the nutritional requirements of children and pregnant and lactating mothers. Contains tricalcium phosphate to reduce infestation. |
| Vitamin Premix 0.1 g | Added to help meet the nutritional requirements of children and pregnant and lactating mothers. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty lb bags (22.68 kg) |
| Multiwall Paper | Three plies of paper (minimum) with an inner polyethylene or polypropylene plastic liner. The outer paper plv is treated to provide wet strength. |

4. Shelf Life One year

5. Preparations (per measure by volume)

-Add Instant CSM slowly to the liquid stirring constantly. Addition of Instant CSM to boiling water may cause excessive lumping and should be avoided. Optimum dispersion is achieved by using a vessel with a large liquid surface area and agitating the surface area during addition. Stirring will remove any agglomerates.



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-Use only potable water. If there is doubt as to purity, water should be boiled before using.

-If Instant CSM is to be served hot, the food should be stirred during the cooking operation and excessively hot fires should be avoided.

-May be baked, boiled, steamed, or fried. Cooking results in some thickening.

-Intentionally a bland product, flavor may be enhanced by use of spices indigenous to area or addition of sweetening, particularly sugar.

| | |
|---|---|
| Beverage and Weaning Food | 1 measure I/CSM<br>2-3 measures potable water<br>Sugar and salt to taste (optional) |

Slowly add I/CSM to hot or cold water, stirring continuously and vigorously until all small lumps have disappeared. Add sweetening or flavors as desired. (For weaning food, add less water.)

| | |
|---|---|
| Porridge | 1 measure I/CSM<br>1 measure potable water |

Add I/CSM to hot or cold water, stirring vigorously until all small lumps have disappeared. May be cooked over low heat, stirring continuously. Mixture will tend to thicken if cooked.

| | |
|---|---|
| Dough | 4 measures I/CSM<br>1 measure water |

Mix by placing I/CSM in a vessel and make a small "well" in the center and slowly add water. Mix until all water is absorbed and all dry powder is agglomerated. Add more I/CSM or water if necessary to make a firm dough.

The "stiff" porridge may be rolled into nutritious balls and eaten, or it may be patted flat and baked on a hot surface forming a tortilla. It may also be broken in smaller portions and deep-fat fried in vegetable oil. It may also be patted flat and fried in vegetable oil making a chappati-like food. It may be baked over a low fire in a deep vessel and served after removal from the vessel by breaking off small individual portions.

(NOTE: To ensure that water is potable, it should be boiled for ten minutes prior to mixing.)

6. Local Preparations
(Add local recipes here.)

# Sorghum

This unprocessed whole grain is intended primarily for distribution in emergency situations and in Food for Work programs in those areas where sorghum is a common staple food.

1. Nutritive Values (per 100 g sorghum)

| | | |
|---|---|---|
| 332 | Cal. | Energy |
| 11 | g | Protein |
| 3.3 | g | Crude Fat |
| 73 | g | Carbohydrates |
| 28 | mg | Calcium |
| 287 | mg | Phosphorus |
| 4.4 | mg | Iron |
| 350 | mg | Potassium |
| 0.38 | mg | Thiamine ($B_1$) |
| 0.15 | mg | Riboflavin ($B_2$) |
| 3.9 | mg | Niacin |

2. Ingredients

Yellow grain sorghum grown in the United States.

3. Packaging

| | |
|---|---|
| Sizes | Bulk or fifty kg (110.23 lb) bags |
| Woven Poly-propylene | Fabric contains an inhibitor to resist ultra-violet absorption along with an anti-skid coating. |

4. Shelf Life One year

5. Local Preparations
(Add local recipes here.)

# Soy-Fortified Sorghum Grits

This processed commodity is generally used for emergency programs, and where sorghum is a local staple food, for other categories.

1. Nutritive Values (per 100 g SFSG)

| | | |
|---|---|---|
| 359 | Cal. | Energy |
| 15 | g | Protein (min.) |
| 2.0 | g | Crude Fat (max.) |
| 68 | g | Carbohydrates |
| 132 | mg | Calcium |
| 180 | mg | Phosphorus |
| 4.4 | mg | Iron |
| 500 | mg | Potassium |
| 1100 | IU | Vitamin A |
| 0.55 | mg | Thiamine ($B_1$) |
| 0.33 | mg | Riboflavin ($B_2$) |
| 4.4 | mg | Niacin |

2. Ingredients and Processes (per 100 g SFSG)

| | |
|---|---|
| Sorghum Grits 85 g | Yellow or white grain sorghum which has seedcoat, hulls and germ removed. |
| Soy Grits 15 g | Defatted and toasted, (or expeller) grits made from selected soybeans. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty lb bags (22.68 kg) |
| Multiwall Paper | Three plies of paper (minimum) with an inner polyethylene or polypropylene plastic liner. The outer paper ply is treated to provide wet strength. |

4. Shelf Life — One year



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5. Preparations (per measure by volume)

| | | |
|---|---|---|
| Porridge | 1 | measure SFSG |
| | 3 | measures cold water |
| | 0.1 | measure oil |
| | | Salt to taste |

Add SFSG, salt and oil to cold water. Heat and bring to a boil. Cover and simmer (steam) over low heat for 15 minutes. Remove from heat and let stand for an additional 15 minutes.

| | | |
|---|---|---|
| SFSG Pilaf | 1 | measure SFSG |
| | 3 | measures boiling water |
| | 0.1 | measure oil |
| | | Salt to taste |

ADD SFSG, salt and oil to boiling water. Return to a boil. Then cover and simmer (steam) over low heat for 15 minutes. Remove from heat and let stand for an additional 15 minutes. (Broth may be substituted for water and any cooked meat, fish, or vegetables or other seasoning may be added.)

To make SFSG porridge, add SFSG to cold water, and cook as above.

NOTE: When SFSG is used for preparations that are rice based, slightly increase the amount of liquid.

6. Local Preparations
(Add local recipes here.)

# Rolled Oats

This processed commodity is generally used for porridge and baking in all program categories.

1. Nutritive Values (per 100 g Rolled Oats)

| | | |
|---|---|---|
| 390 | Cal. | Energy |
| 15 | g | Protein (min.) |
| 5.9 | g | Crude Fat (min.) |
| 68 | g | Carbohydrates |
| 53 | mg | Calcium |
| 405 | mg | Phosphorus |
| 4.5 | mg | Iron |
| 2.0 | mg | Sodium |
| 352 | mg | Potassium |
| - | IU | Vitamin A |
| 0.60 | mg | Thiamine ($B_1$) |
| 0.14 | mg | Riboflavin ($B_2$) |
| 1.0 | mg | Niacin |

2. Ingredients and Processes (per 100 g SFRO)

| | |
|---|---|
| Rolled Oats 100 g | Partially precooked white oats. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty lb bags (22.68 kg) |
| Multiwall Paper | Three plies of paper (minimum) with an inner polyethylene or polypropylene plastic liner. The outer paper ply is treated to provide wet strength. |

4. Shelf Life — One year



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5. Preparations (per measure by volume)

| | |
|---|---|
| Porridge | 1 measure RO<br>2 measures water<br>Salt |

Add RO to lightly salted boiling water. Stir occasionally and cook for one minute. Add flavors or seasoning as desired.

6. Local Preparations
(Add local recipes here.)

# Soy-Fortified Rolled Oats

This processed commodity is generally used in MCH programs and to a lesser extent in other programs.

1. Nutritive Values (per 100 g SFRO)

| | | |
|---|---|---|
| 375 | Cal. | Energy |
| 20 | g | Protein (min.) |
| 5 | g | Crude Fat (min.) |
| 60 | g | Carbohydrates |
| 85 | mg | Calcium |
| 442 | mg | Phosphorus |
| 5.5 | mg | Iron |
| 1.8 | mg | Sodium |
| 572 | mg | Potassium |
| 6 | IU | Vitamin A |
| 0.67 | mg | Thiamine ($B_1$) |
| 0.17 | mg | Riboflavin ($B_2$) |
| 1.2 | mg | Niacin |

2. Ingredients and Processes (per 100 g SFRO)

| | |
|---|---|
| Rolled Oats 85 g | Partially precooked white oats. |
| Soy Flakes 15 g | Defatted and toasted. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty lb bags (22.68 kg) |
| Multiwall Paper | Three plies of paper (minimum) with an inner polyethylene or polypropylene plastic liner. The outer paper ply is treated to provide wet strength. |

4. Shelf Life — One year

5. Preparations (per measure by volume)

| | |
|---|---|
| Porridge | 1 measure SFRO<br>2 measures water<br>Salt |

Add SFRO to lightly salted boiling water. Stir occasionally and cook for one minute. Add flavors or seasoning as desired.

6. Local Preparations
(Add local recipes here.)

# Non-Fat Dry Milk

This vitamin fortified processed commodity is used in all program categories, but especially in MCH programs.

1. Nutritive Values (per 100 g NFDM)

| | | |
|---|---|---|
| 363 | Cal. | Energy |
| 35.9 | g | Protein |
| 0.8 | g | Fat |
| 52.3 | g | Carbohydrates |
| 1308 | mg | Calcium |
| 1016 | mg | Phosphorus |
| 0.6 | mg | Iron |
| 532 | mg | Sodium |
| 1745 | mg | Potassium |
| 5000 | IU | Vitamin A (range 5000-7600 IU) |
| 0.35 | mg | Thiamine ($B_1$) |
| 1.80 | mg | Riboflavin ($B_2$) |
| 0.9 | mg | Niacin |
| 7 | mg | Ascorbic Acid (C) |
| 440 | IU | Vitamin D (min.) |

2. Ingredients

Nonfortified

Fat and water removed from pasteurized, fresh, sweet milk by spray process. Contains the lactose, milk proteins, and milk minerals in the same relative proportions as the fresh milk from which it is made. Fat content does not exceed 1-1/2 percent by weight.

Fortified

Same as nonfortified, but includes not less than 5000 IU of Vitamin A and 440 IU of Vitamin D. Stabilized and blended in a dry, edible, and soluble carrier.

3. Packaging

| | |
|---|---|
| Sizes | Fifty lb bags (22.68 kg) |
| Multiwall Paper | Three plies of paper (minimum) with an inner polyethylene plastic liner. The outer paper ply is treated to provide wet strength. |

Inspection and Testing

1. Non-fat dry milk is U.S. Extra Grade, and shall meet the United States Standards for Grades of nonfat dry milk (spray process), in effect as of April 1, 1973.

2. Inspection and testing procedures for the purpose of determining the grade and weight will be done in accordance with the following USDA procedures:

a. USDA General Instructions for Sampling Nonfat Dry Milk, dated July 13, 1970, as revised (DA Instruction No. 918-30).

b. USDA Methods of Laboratory Analysis for Dry Whole Milk and Non-fat Dry Milk, dated November 30, 1972, (DA Instruction No. 98-103-1).

4. Shelf Life One year

5. Preparation

- NFDM is an excellent source of protein and minerals, and when fortified with Vitamins A and D, provides significant amounts of these vitamins. However, it is not a good source of energy and should be combined with energy-rich foods, i.e., starchy staples, oils, and fats.

- It is recommended that NFDM be used in its dry form. In its dry form it can be easily added to a wide variety of foods mashed with fruits, combined with porridges and stews, or sprinkled over rice and pasta. Three tablespoons (20 g) NFDM is enough for supplementing children's intake per day.

- Availability and promotion of NFDM, particularly in its reconstituted form may discourage breastfeeding and encourage bottlefeeding. All programs that use NFDM should increase educational activities which encourage exclusive breastfeeding for four-to-six months. Beyond four-to-six months, weaning foods containing NFDM along with continuation of breastfeeding should be encouraged.

Dry Form: Preparation Precautions

A. In order to avoid contamination:
   1. Foods should be prepared immediately before eating.

   2. Special care should be taken with left-overs--either discarded or stored in refrigerators when possible. If in a dry form, foods usually can be stored in tightly closed containers for longer periods of time.

B. Do not add NFDM to milk or milk products such as CSM, ICSM, or WSM.

Reconstituted Form: Precautions

A. If reconstituted as a beverage, clean boiled water must be used and the milk consumed immediately after preparation or refrigerated because it spoils very easily.

B. NFDM should not be substituted for whole milk since whole milk provides important calories that are missing from NFDM.

C. If reconstituted NFDM is overdiluted, a child will not receive the proper amount of nutrients intended.

D. NFDM in any form is not an adequate substitute for breastfeeding and should never be used exclusively for feeding a child.

Correct measure to reconstitute milk from NFDM are:

By volume: 1 part NFDM powder plus 5 parts water
By weight: 1 part NFDM plud 10 parts water

Add 3 to 4 tablespoons (50 g) each of oil and sugar per 1000 mil (1 litre).

# Vegetable Oil

This processed commodity is generally used in all program categories as an ingredient in cooking and as a supplement to increase the caloric content of foods.

1. Nutritive Values (per 100 g Vegoil)

| | | |
|---|---|---|
| 884 | Cal. | Energy |
| 100 | g | Fat |

2. Ingredients (per 100 g Vegoil)

| | |
|---|---|
| Soybean and/ or other vegtable oils | Deodorized, refined and partially hydrogenated (i.e., combined with hydrogen) to improve storage stability. "Winterized" to ensure retention of liquidity over a wide temperature range. Bleached to lighten color. Stabilized with citric acid and sometimes with monoisopropyl citrate, butylated hydroxy tuluene to improve storage stability and flavor.<br><br>Provided to supply essential fatty acids and increase caloric density as well as increase absorption of certain fat-soluble vitamins. |

3. Packaging

| | |
|---|---|
| Sizes | One gallon (3.8 liters), five gallons (19 liters), and 55 gallons (209 liters). |
| 1 gallon tins (3.8 liters)<br>5 gallon pails (19 liters) | Tin plate with flexible spouts. Packed and banded in weather resistant cases, six cans per case. Liquid tight steel pails with tamper-evident flexible spouts and cap seals. |
| 55 gallon drums | Liquid tight steel drums with cap seals. |

4. Shelf Life One year

5. Local Preparations
(Add local recipes here.)

# Rice

This processed commodity is used in all categories of programs as a staple food.

1. Nutritive Values (per 100 g Rice)

| | | |
|---|---|---|
| 363 | Cal. | Energy |
| 6.7 | g | Protein |
| 0.4 | g | Fat |
| 80.4 | g | Carbohydrates |
| 24 | mg | Calcium |
| 94 | mg | Phosphorus |
| 0.8 | mg | Iron |
| 5 | mg | Sodium |
| 92 | mg | Potassium |
| 0.07 | mg | Thiamine ($B_1$) |
| 0.03 | mg | Riboflavin ($B_2$) |
| 1.6 | mg | Niacin |

2. Ingredients and Processes (per 100 g Rice)

| | |
|---|---|
| Rice<br>100 g | Milled from short, long, or medium grain rice containing not more than 20 percent broken. Not more than ten days prior to packaging, fumigate with Methyl Bromide or Phostoxin to inhibit infestation by weevils or other insects. |

3. Packaging

| | |
|---|---|
| Sizes | Bulk or fifty kg (110.23 lb) bags |
| Woven Poly-propylene | Fabric contains an inhibitor to resist ultra-violet absorption along with an anti-skid coating. |

4. Shelf Life — One year

5. Local Preparations
(Add local recipes here.)

# Peas and Beans

These unprocessed commodities can be used in all categories of programs.

1. Nutritive Values (per 100 g)

| | | |
|---|---|---|
| 340-350 | cal. | Energy |
| 22.5-24.1 | g | Protein |
| 1.2-1.5 | g | Fat |
| 60-64 | g | Carbohydrates |
| 64 | mg | Calcium |
| 5.1 | mg | Iron |
| 340 | mg | Phosphorus |
| 1005 | mg | Potassium |
| 35 | mg | Sodium |
| 0.74 | mg | Thiamine |
| 3 | mg | Niacin |
| 0.29 | mg | Riboflavin |
| 120 | IU | Vitamin A |

2. Ingredients

| | |
|---|---|
| Peas and Beans | Whole dry peas, split peas or dry edible beans of U.S. Grade Number 2 or better. Fumigated for pest control. |

3. Packaging

| | |
|---|---|
| Sizes | Fifty kg (110.23 lb) bags |
| Woven Poly-propylene | Fabric contains an inhibitor to resist ultra-violet absorption along with an anti-skid coating. |

4. Shelf Life — One year

6. Local Preparations
(Add local recipes here.)

# Lentils

These are dry whole lentils with seedcoat. They can be used in all program categories.

1. Nutritive Values (per 100 g)

| | | |
|---|---|---|
| 340 | cal. | Energy |
| 24.7 | g | Protein |
| 1.1 | g | Fat |
| 60.1 | g | Carbohydrates |
| 79 | mg | Calcium |
| 6.8 | mg | Iron |
| 377 | mg | Phosphorus |
| 790 | mg | Potassium |
| 30 | mg | Sodium |
| 0.37 | mg | Thiamine |
| 2 | mg | Niacin |
| 0.22 | mg | Riboflavin |
| 60 | IU | Vitamin A |

2. Ingredients

Lentils — Unprocessed whole lentils U.S. Grade Number 1 or better, fumigated to protect from pests.

3. Packaging

Sizes — Fifty kg (110.23 lb) bags

Woven Polypropylene — Fabric contains an inhibitor to resist ultra-violet absorption, along with an anti-skid coating.

4. Shelf Life — One year

5. Local Preparations
(Add local recipes here.)

# Composition of Mineral and Vitamin Premixes

A. Mineral Premix

| | Amount for 2,000 lb of Final Food |
|---|---|
| Tricalcium Phosphate, food grade, must have an apparent specific gravity of .55 grams per cc. or less | 40.00 lb |
| Zinc Sulphate, hydrated FCC grade ($ZnSO_4.7H_2O$) | .08 lb (36 g) |
| Ferrous fumarate, purified FCC grade | .92 lb (418 g) |
| Iodized Salt (0.007% $I_2$)1/ | 13.00 lb |
| | 54.00 lb |

B. Vitamin Antioxidant Premix

| Ingredients | Amount for 2,000 lb of Final Food |
|---|---|
| Thiamine mononitrate | 2.5 g |
| Riboflavin | 3.5 g |
| Pyridoxine hydrochloride | 1.5 g |
| Niacin | 45.0 g |
| Ca D-pantothenate | 25.0 g |
| Folic acid | 1.8 g |
| Vitamin B12 | 36.0 mg |
| Vitamin A (stabilized retinyl palmitate) | 15.0 million USP Units |
| Vitamin D (stabilized) | 1.8 million USP Units |
| Alpha tocopherol acetate | 68,000.0 IU |
| Butylated hydroxy anisole | 20.0 g 2/ |
| Butylated hydroxy toluene | 20.0 g 2/ |
| Ascorbic acid (stabilized ethyl-cellulose, coated) | 364.0 g |
| Soy flour, defatted (toasted) or starch to reach total weight; (additional soy flour may be added as a carrier, if desired) | |
| TOTAL | 2.0 lb |

1/ Iodized salt 15.0 lb per 2,000 lb for WSM.

2/ Not added to WSM or when antioxidant is already added to soy oil.

# STORAGE SPECIFICATIONS

Storage space requirements should be given careful attention. The amount of space necessary in a warehouse depends upon the total volume of food to be stored and on the number of different commodities. Each commodity should be stacked separately. Separate stacks require more usable volume than one large stack (i.e., a warehouse large enough to hold 50 MT of wheat will hold less than 50 MT of wheat and sorghum stacked separately).

The difference between gross volume of a warehouse and usable volume for storage must be taken into consideration. Table VI.1 gives the dimensions and gross volume of warehouses of various sizes. Table VI.2 gives the approximate usable volume for storage in those warehouses depending upon the number of stacks.

In estimating how much usable space is needed per commodity, the following rules of thumb may help. (Please keep in mind that these are estimated figures.)

> One MT of a bagged commodity (50 lb. bags) requires approximately 2 cubic meters of usable storage space.
>
> One MT of vegoil in tins requires approximately 1.4 cubic meters of usable storage space.

Thus, using Table VII.2, a small warehouse might hold approximately 36 MT of wheat (36 MT x 2 cubic meters for each MT = 72 cubic meters--the amount of usable stacking volume in a small warehouse ); or 16 MT of wheat and 16 MT of WSB and 8 MT of vegoil.

Refer to the table below as a means of estimating storage space.

Table VI.1 Warehouse Sizes

| Dimensions (meters) | Small Warehouse | Medium Warehouse | Large Warehouse | Very Large Warehouse |
|---|---|---|---|---|
| Length | 10 | 20 | 40 | 100 |
| Width | 5 | 10 | 15 | 20 |
| Area | 3 | 200 | 500 | 2000 |
| Eaves height | 3 | 4 | 5 | 6 |
| Gross cubic vol. | 150 | 800 | 3000 | 12000 |

In using the stacking suggestions below, do not stack fiberboard cases of oil tins higher than 8 layers. Do not stack flours and meals higher than 20 layers. Do not stack grits or whole grains higher than 30-40 layers.

Table VI.2 Space Utilization

| Stacking Conditions | Small Warehouse | Medium Warehouse | Large Warehouse | Very Large Warehouse |
|---|---|---|---|---|
| | ----(usable stacking volume in cubic meters----- | | | |
| 1 Stack (to eaves height; 1 m clear of walls) | 72 | 576 | 2,460 | 10,560 |
| 2 Stacks (to eaves height) | 63 | 544 | | |
| 2 Stacks (to eaves height; 4 m central gangway) | | | 2,220 | 10,200 |
| 8 Stacks (to eaves height; 4 m central gangway) | | | 1,920 | |
| 8 Stacks (1 m. less than eaves height; 4 m central gangway) | | | 1,530 | |
| 28 Stacks (to eaves height; 4 m central gangway) | | | | 8,040 |
| 28 Stacks (1 m less than eaves height; 4 m central gangway) | | | | 6,600 |

## STORAGE INSPECTION CHECKLIST

A. Yard Area Surrounding Warehouse

___ 1. Inspect the yard for signs of rodents (i.e., pellets, tracks, burrows, holes, signs of feeding).

___ 2. Check to see that conditions do not attract insects (i.e., spilled commodities or other edible materials, empty containers, bird nests, weeds, trash, piled or damaged dunnage).

___ 3. Remove trash and unnecesssary equipment and supplies regularly.

B. Warehouse

___ 1. Screen openings with wire netting with mesh not larger than 6.35 mm.

___ 2. Make doors of tightly fitting metal.

___ 3. Check for roof leaks.

___ 4. Check for holes in the walls.

___ 5. Ensure that the floor is sufficiently hard packed to prevent burrowing by rodents.

___ 6. Check to see that the warehouse is well lit.

___ 7. Clean and service the anticoagulant traps and rodent bait stations regularly, and keep them filled with fresh bait.

___ 8. Use rodent tracking powders.

___ 9. Position commodity stacks at least one meter from walls and from other stacks.

___ 10. Keep passageways clean.

___ 11. (For large and very large warehouses) Provide three to four meter wide central gangways.

___ 12. Stack at a reasonable height for ease of handling and to prevent damage to containers by crushing or falling from stacks.

___ 13. Lift bags by the body instead of corners (to prevent tearing or weakening of the bag).

___ 14. Place bags on stacks, do not throw.

___ 15. Make sides of stack flush.

___ 16. Provide air spaces between the individual stacks.

___ 17. Clean empty bags thoroughly before reuse and stack neatly.

___ 18. Use dunnage that is clean and treated with approved insecticide prior to use.

___ 19. Stack clean unused dunnage neatly.

___ 20. Remove broken dunnage.

___ 21. Cover the top of dunnage to prevent spillage of food from damaged containers to ground or floor below.

C. Commodities

___ 1. Stack individual commodities separately.

___ 2. Separate food stocks from non-food stocks.

___ 3. Separate damaged containers from good containers.

___ 4. Observe damaged containers carefully, and fumigate them if insects appear.

___ 5. Examine the exteriors of stacked food containers to assure that they are clean and free of mold, insects, rodents and birds.

___ 6. Set up a program to remove damaged commodities properly.

___ 7. Use insecticides or fogs.

___ 8. Use fumigants.

___ 9. Keep adequate records for a program of stock rotation (i.e., what is received first is distributed first).

___ 10. Check to see that commodities are stacked off the floor and away from walls in small as well as large warehouses.

# INSECT AND RODENT CONTROL

## Cleaning and Inspecting

If you follow good storage procedures for commodities, as addressed in the following chapter, the insect and rodent problems will be minimal. The problems can be further controlled by a program of cleaning and inspecting.

The program should include (1) closing or removing open food containers, (2) repairing damaged packages, (3) removing and disposing food unfit for human consumption, and (4) inspecting and cleaning the storage area regularly according to a planned, scheduled program.

## Insect Control

### Fumigation

In all cases, READ THE MANUFACTURER'S LABEL BEFORE USING FUMIGANTS.

Fumigants are invisible in the gaseous state and they penetrate the material being fumigated. Fogs, mists, smokes, and aerosols are not fumigants since they are visible and do not penetrate the materials being fumigated.

Fumigation is the use of a gas to kill insects and rodents. The purpose of fumigation is to destroy all stages of insects present in the material to be treated. An atmosphere that is toxic to insects will also kill rodents or other forms of animal life. Fumigation, as described below, will not eliminate mold or bacteria. There is no residual kill, therefore insects or rodents may recontaminate the commodity immediately after fumigation. For this reason great emphasis is placed on cleaning, while sprays and fogs are used to eliminate insects which may reinfest stored foods.

Before fumigating, spray a residual (contact) insecticide around the perimeter of the pile. It is important to use dunnage, to clean and spray the floors and walls, and to place warning signs.

To conduct an effective and safe fumigation, the following conditions must be met.

Temperature. Effective fumigations require a minimum temperature of 12.8 C (55 F), with higher temperatures producing increasingly better results.

Tarpaulins. Waterproof sheets of material, or tarpaulins, should be used to cover and protect commodities from moisture. To calculate the size needed:

Width = 2 x height of stack + width of stack + 2 meters

Length = 2 x height of stack + length of stack + 2 meters

If more than one tarpaulin is used, the overlap should be rolled and clipped together, or the seams taped.

If the tarpaulins are not available, the commodities can be fumigated in an airtight bin or in a well-sealed warehouse.

Sealing. If fumigation is to be done in the open or on a dirt floor, place a tarpaulin under, as well as over, the stack. Seal the top tarpaulin to the bottom tarpaulin or to the floor by placing heavy objects around the perimeter. Taping the tarpaulin to the floor is usually ineffective because the sealing tape frequently comes loose. Loose sand, sand in plastic tubes, or dunnage can be used.

Fumigants. The two fumigants most commonly used, phosphine and methyl bromide, have the ability to penetrate through a large volume of material. However, methyl bromide does not penetrate as well as phosphine. Therefore, phosphine should be used on bags lined with polyethylene film. Phosphine will thoroughly penetrate all paper bags, woven plastic bags, and jute or cotton bags.

a) Methyl Bromide ($CH_3Br$): Fumigate for at least one day (24 hours). Penetrates best in a vacuum vault. Sometimes after several uses will give a chemical reaction resulting in objectionable odors and higher bromide residues.

b) Phosphine ($PH_3$): Fumigate for at least three days. This slow acting fumigant penetrates deeply. Do not use in vacuum fumigation. Does not leave a permanent chemical residue, but some solids do remain after the release of gas, and these should be removed. Initially there is an odor that serves to warn of the presence of this gas, however, the odor will disappear.

Dosage and Time Exposure. Since this varies significantly, follow manufacturer's recommendations carefully.

Monitoring for Presence of Fumigants. Devices available to quickly indicate the presence of fumigants in air are:

a) Phosphine detector tubes, with a device for withdrawing accurately measured quantities of air. Various tubes are available to measure concentration of phosphine under the tarpaulines during fumigation, and to monitor concentrations around the stacks or when leaks may occur.

b) Halide flame detectors are available to determine the presence of methyl bromide.

Safety Precautions. It should always be remembered that fumigants are toxic chemicals, capable of killing man as well as pests. Accidents can take place before, during, and after fumigation if precautions are not taken. Remember the importance of following manufacturer's instructions!

a) Operators should never work alone.

b) Gas masks should be immediately available during fumigation and aeriation.

c) It is important to follow the manufacturer's instructions carefully.

d) Protective clothing is advisable. Do not wear gloves when applying methyl bromide. Clothing should be removed and washed immediately after fumigation. If chemicals come into contact with exposed parts of body, wash immediately with large amounts of soap and water even though the chemical has disappeared from the skin.

e) It is essential to use the monitoring devices discussed above before allowing personnel to re-enter fumigated areas.

Inspection and Follow-Up. For safety reasons, monitor around the bags after removal of the tarpaulin. After the fumigant has gone, inspect the fumigated area for live insects. The fumigation is successful if it has completely killed all stages of insect life.

The tarpaulin should not be left on the stacks for an extended period of time, as condensation may form underneath allowing the growth of molds.

Insecticides (Other than Fumigants)

Again, READ THE MANUFACTURER'S LABEL BEFORE USING INSECTICIDES.

Insecticides are useful tools when used with stack rotation and thorough cleaning. Nothing takes the place of cleanliness.

Sprays. Insecticide sprays are applied to surfaces and will leave a residue that continues to kill insects that contact it. Effective life of the residue depends on many things, including type of insecticide, surface to which it is applied, temperature, and humidity.

Fogs and Mists. Insecticide fogs and mists move through the air to reach insects that may not be reached by contact sprays. They are especially effective against flying insects and insects that cannot be reached with contact sprays (for example, on surfaces of bags containing food). Close all doors and openings in the warehouse to prevent escape of the fog or mist.

# Rodent Control

The primary method of rodent control is cleaning to eliminate harborage and food in the warehouse and around the storage area. Remove debris, weeds, trash, and food outside. Keep the inside of the warehouse clean of all food, especially containers of food unfit for human consumption and awaiting disposal. Remove or repair torn and broken packages. Openings into storage buildings should be protected against rodents with screen having openings not larger than 6.35 mm. Doors must fit tightly and they must be kept closed when not in use.

## Bait Stations

To help control rodents, bait stations containing fresh anti-coagulant poison should be maintained around the periphery of the grounds and around the exterior of the building. Bait stations must be checked frequently so that the bait does not become wet, moldy, or infested with insects.

## Tracking Powder

Tracking powder can be used in limited areas (not where it could contaminate food) where a mouse problem is suspected. The powder is taken into the mouse's system when he licks his paws and body to clean himself.

## Traps

Traps can be used, however, they must be given daily attention to be effective.

## Glue Boards

These are useful against mice. They can be distributed among the stacks of food where mice become entangled with the glue and cannot escape. Glue boards must be inspected frequently, to be certain that they are fresh and effective.

# Nutritional Considerations

## A. Age Groups

Physiological and other considerations pertaining to specific age groups should influence commodity choice. These are discussed in the subsections below.

### Newborns

Newborn infants are not considered primary Title II recipients; however, they may be indirect recipients of the nutrient provided to their lactating mothers. On the other hand, in unusual circumstances, Title II commodities are requested by institutions such as orphanages, where very young infants do not have access to breast milk. It is undesirable to use commodities now on the list, except with careful formulation, for the exclusive feeding of young infants (i.e., as breast milk substitutes).

### Young Infants

Infants less than 6 months old are not to be considered primary Title II recipients; this is an age group in which the dominant mode of feeding would be breastfeeding. It is generally considered desirable to introduce complementary feeding sometime between the ages of 4 and 6 months. By this age, the digestive tract is more developed, although perhaps not to the stage of being able to readily utilize table foods. If an infant is thriving on breast milk alone, complementary feeding might well be postponed beyond 6 months; if growth is faltering before 4 months, as is common among undernourished populations, such feeding may become desirable as soon as this condition is detected.

### Older Infants

After 6 months of age, digestive tract capabilities are generally well developed; it is less difficult to feed semi-solid foods, and it gradually becomes possible to use solid hand-held foods such as bread. The use of blended foods for this age group may be due to the logistics of a particular program rather than the specific physiological needs of the recipient; or it may be due to the fact that in take-home distribution, blended foods may be targeted more successfully than other commodities. It does appear that the protein level in the blended foods is higher than is needed.

For infants completely weaned from the breast, or for those whose supply of breast milk is minimal, it is still important to provide at least 50 percent, preferable more, of total energy intake as a liquid, energy-dense, nutritionally complete food with an important fat content.

For supplementation of a more adequate amount of breast milk, the list of foods which can be used includes CSM, WSB, and soy-fortified cornmeal, all with added oil or sugar to reduce the unnecessarily high protein contents to approximately eight percent and to increase energy densities. The poor digestibility of wheat protein concentrate makes WPC-soy inappropriate. Oats are recommended. However, properly processed oats do not require fortification with soy; despite relatively inferior protein digestibility, protein content and quality are high enough to make oats a good source of protein when unfortified. Fat content is also uniquely high, although not as digestible as that of corn.

Wheat and corn could be used with small amounts of peas as a protein supplement. Sorghum, however, is not recommended because its protein quality is low, and the digestibility of both its protein and carbohydrates in questionable.

After older infants have been weaned and are relying heavily on a staple with a low protein content or on one with poor protein quality, supplementation with CSM, ICSM, WSB, NFDM, soy flour, or possibly legumes can be considered. If at all possible, it would be highly desirable to add vegetable oil as well.

## Preschool and School Children

In young children, the major continuing concern is the energy density of the diet (bulk to be consumed in meeting energy requirements). If energy density is too low, or bulk is too high, insufficient food may be consumed to meet energy or nutrient needs. With increasing age, this becomes progressively less of a problem.

When rice, corn, millets, sorghum, cassava, sweet potato, or plantain are the major sources of energy for this age group, relatively small amounts of protein-fortified commodities will do much to improve the quality of the diet and the efficiency of energy utilization, even if energy intakes are less than desirable. Energy supply can be increased with grains, oil, or sugar, the last two only if the protein value of the diet has first been raised to a safe level.

If wheat is the major source of energy in the diet and enough is available to satisfy most of the energy requirement, then relatively small amounts of soy flour, legumes, or NFDM will suffice to ensure that protein needs are met or small amounts of oil and almost any other source of energy can complete energy requirements. For sources of energy which are inferior sources of protein, in quality or amount, the blended foods or NFDM would be ideal supplements. Although digestive functions are presumably more mature in this age group, it must be remembered that both the energy and protein of some foods such as wheat concentrate in WPC-soy are relatively poorly absorbed.

## Adolescents

Above school age, there are unlikely to be any commodity-specific needs. The progressive changes in nutritional needs have been portrayed in Table A.4. The most notable change in this period is the usual increase in energy requirements and food intake associated with adolescents. During puberty, the requirements of boys and girls are equally high and qualitatively similar. The female spurt, however, does tend to occur earlier than that of the male. Moreover, the female growth spurt, sexual maturation, and cessation of growth occur over a considerably shorter time span, and nutritional status at this critical time may affect later adult reproductive and lactational performance; thus it is important that energy and protein needs be adequately met. After sexual maturation and the cessation of growth, protein needs become less critical because increases in muscle mass do not continue. On the other hand, because males' adolescent growth, with functionally important increases in muscle mass, continues much longer than that of females, the satisfaction of higher energy and protein requirements must be prolonged.

## Adults

In older adults, energy requirements may be expected to fall, with the rate of decline depending on the patterns of physical activity typical of the particular community, while nutrient requirements remain unchanged.

## Pregnancy and Lactation

It should be noted that during pregnancy and lactation, requirements for energy, protein, and most other nutrients increase (see Table III.1). While this does not impose unique commodity requirements, it does imply a need for additional food. Iron requirements during pregnancy are a

special consideration. For women whose iron intake has been inadequate or marginally adequate before pregnancy, and whose body iron stores are depleted, it seems probable that the requirement during pregnancy cannot be met by dietary means. In such circumstances, consideration should be given to concurrent distribution of iron supplements.

## B. Digestion Factors and Nutritional Density

### Lactose Intolerance

Lactose is a component of milk and milk products. Many populations, particularly the non-white, are intolerant of large doses of lactose, thus many individuals in these populations develop symptoms of lactose intolerance when given large doses of lactose. Lactose intolerance may therefore be relatively widespread in a number of populations targeted by food-aid programs.

It is important to remember, however, that few individuals are intolerant to all levels of lactose, and that most healthy individuals are tolerant to a glass of milk. The practical implication for commodity selection and program design is that even in populations where a high prevalence of lactose intolerance has been reported, milk in small quantities (e.g., 250 milliliters or 8 ounces at a time) is well tolerated without apparent effect on the digestibility of other foods. If milk or milk-containing commodities are considered a desirable inclusion in food distribution programs, they can be used at levels not exceeding existing consumption, and can probably be used without problem in levels that do not exceed the equivalent of one glass of milk in a single feeding. Beyond that, experience with the local population is the best guidance.

In spite of this assurance, it would be prudent for program administrators to make a special effort to monitor the introduction of NFDM and milk-containing commodities in

new populations since a small percent of children cannot tolerate even small amounts of NFDM at a single feeding. Allowing a few days of gradual introduction for adaptation to NFDM by children who have not been consuming it likely will prevent distressful symptoms.

## Toxic Effects

Commodities on the present Title II list are clear of any known toxic effects. The only potential concern would be excessive levels of fortification, intended to meet nutrient deficiencies in particular populations. Since not all individuals require similar levels of nutrients or consume the same amount of a food, high fortification levels of potentially toxic nutrients may endanger individuals who consume unusually large amounts of the fortified food. Feeding programs are not intended to be treatment and rehabilitation programs; specific nutrient deficiencies are more appropriately treated by individual therapy.

## Digestibility

Poor digestibility of some foods may make them inappropriate or less appropriate than other foods particularly for MCH beneficiaries. Small stomach capacity may make it difficult to consume larger quantities to compensate for lower digestibility. Rolled oats, soy-fortified cornmeal, soy-fortified bulgur, soy-fortified wheat flour, CSM, ICSM, WSM all combined with additional oil or sugar are among the most satisfactory products for this group. For infants and young children up to 24 months a majority of calories should come from breastmilk, a combination of breastmilk and other milk products or other milk products that are energy dense, nutritionally complete and an important source of fats. For infants, peas, beans, and lentils may need to have the outer seed coat removed to improve digestibility.

Since on-site feeding usually provides only one meal, it is necessary to ensure that the food supplement contains sufficient nutrients without being too bulky to be consumed in one sitting. This is especially critical for the six to 24 month-old and to women in the last trimester of pregnancy. The following table lists the amounts of commodities necessary to provide 425 KCalories. The importance of fats and oil can be clearly seen.

Table A.1 Grams of Some Foods Needed to Yield 425 KCals

| PL 480 Commodities | Ration Size |
|---|---|
| 1. Cornmeal, Wheat flour, WSM, or NFDM | 118 g |
| 2. Cornmeal, Wheat flour, WSM, or NFDM (plus 20 g oil) | 68 g |
| 3. Rolled oats, CSM or ICSM | 110 g |
| 4. Rolled oats, CSM or ICSM (plus 20 g oil) | 64 g |
| **Some Local Foods** | |
| Fresh Cassava | 280 |
| Fresh Yam | 350 |
| Dry Cassava Flour | 125 |
| Cooked Maize Og. | 785 |
| Cooked Wheat Macaroni | 275 |
| Sorghum Flour | 120 |

The stomach of a child two years of age cannot hold more than 350 to 400 ml; a six to eight month old can hold only 200 ml. Forty grams of dry cereal flour makes 250 ml of a thick porridge. In some PL 480 programs, a dry granola-like preparation or hand held foods are used, which reduces the total volume to be consumed. Apart from adding a concentrated source of calories, fats and oils make thicker porridges physically less viscous, thereby improving palatability and reducing bulk. Local foods that can be added to reduce bulk also include groundnuts, sesame seed, fatty fish, sugar, and palm oil. Tables A.2 and A.3 show how stomach capacity limits the nutritional effectiveness of commodities.

It is clear that blended foods can meet the protein needs. It is also clear that CSM and WSM simply cannot meet caloric needs when compared to stomach capacity. Therefore, additional sources of energy such as vegoil and sugar should be added when these foods are used as the primary souce of nourishment.

Table A.2 Meeting Protein Needs vs. Stomach Capacity

| | Stomach Capacity (1) | Daily Protein Requirements (2) NPU = 70 | Cups of Blended Food Required to Meet Daily Requirements (3) |
|---|---|---|---|
| | | | WSM/CSM |
| At birth (3) | 1/8 Cup | 12-15 g | 1.44 Cups |
| 6 months | 1/2 Cup | 20 g | 1.92 Cups |
| 1 year | 1 Cup | 23 g | 1.92 Cups |
| 2 years | 2 Cups | 23 g | 1.92 Cups |
| 3 years | 3 Cups | 23 g | 1.92 Cups |
| 4 years | 4.5 Cups | 29 g | 2.78 Cups |
| 5 years | 5.5 Cups | 29 g | 2.78 Cups |
| 6 years | 6.0 Cups | 29 g | 2.78 Cups |

(1) Assumes a normal health child. With malnutrition, stomach capacity would be less.

(2) Safe level - grams/day (WHO Technical Report Series 522)

(3) While these blends are weaning foods, we have included preweaning figures to show the full range of stomach capacity and nutrient demands.

Table A.3 Meeting Caloric Needs vs. Stomach Capacity

| | Stomach Capacity | Daily Calorie Needs * | Cups of Food Required to meet Daily Needs WSM/CSM |
|---|---|---|---|
| At birth | 1/8 Cup | 350-500 | 1.86 |
| 6 months | 1/2 Cup | 820 | 4.36 |
| 1 year | 1 Cup | 1180 | 6.28 |
| 2 years | 2 Cups | 1360 | 7.25 |
| 3 years | 3 Cups | 1560 | 8.32 |
| 4 years | 4.5 Cups | 1720 | 9.17 |
| 5 years | 5.5 Cups | 1870 | 9.98 |
| 6 years | 6.0 Cups | 2010 | 10.73 |

* WHO Technical Report Series 522

## Nutrient Density or Protein to Energy Ration

Among PL 480 commodities currently available, all except rice and sorghum (and oil, butter) contain an adequate ratio of protein to energy. However, because the concentration of energy is to low per 100 grams in all commodities (except of course in oil and butter), additional oils, fats, and sugar from PL 480 or other sources need to be added so that sufficient calories will be consumed within the bulk constraints of these groups. See Table 4 on next page. When an energy-rich food is added however, the protein to energy ratios decline causing commodities such as bulgur, wheat flour, whole wheat, corn, and cornmeal to fall below recommended protein levels. They then require protein supplementation. Good quality protein supplements for this purpose include NFDM, blended foods, soy flours, and peas, beans, and lentils. Table A.4 identifies the recommended concentrations of protein, vitamin and mineral per 1000 calories for various recipient categories.

In Table A.4 the protein to energy ratios of Title II commodities are compared with recommended levels. As shown in this table, all commodities can not provide adequate protein for the requirements of various categories of beneficiaries, if consumed alone. Therefore, blended or soy-fortified foods are needed, or locally available foods or other protein-rich commodities will need to be added prior to consumption. For example, the addition of NFDM to rice, sorghum, corn or bulgur can improve the protein to energy ration of these commodities to meet the required levels of protein for any beneficiary age group. On the other hand, the addition of NFDM to already high protein to energy ratios found in blended foods or soy fortified foods will provide no nutritional advantage in terms of protein adequacy.

Table A.4 A Guide to Nutritional Quality Standards*

| Nutrient | Nutrient/1000 kcal | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Age in Years | | | Adolescent | | Young Adult | Preg. (later half) | Lact. (first months) |
| | 0-1 | 1-3 | 4-6 | 7-9 | | | | |
| Protein** (g) | 29.6 | 15.5 | 14.4 | 13 | 20 | 17 | 20 | |
| Vitamin A ( | 440 | 240 | 220 | 240 | 400 | 400 | 390 | |
| Vitamin C (mg) | 30 | 20 | 15 | 12 | 17 | 18 | 25 | |
| Thiamin (mg) | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| Riboflavin (mg) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| Niacin (mg) | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 |
| Calcium (mg) | | 435 | 320 | 270 | 360 | 250 | 570 | |
| Iron (mg) | 15 | 9.5 | 7.2 | 6.0 | *** | *** | **** | **** |

Source: NAS Interim Guidelines, 1982.

Table A.5 - Protein (g.) to Energy Ratios (1000 Cals.) of Commodities Compared to Recommended Levels

| | Age Groups and Recommended grams of Protein per 1000 Cals. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 7-9 yrs. 13.0 | 4-6 yrs. 14.4 | 1-3 yrs. 15.5 | Adult 17.0 | 10-15 yrs. 20.0 | Preg. 20.0 | 6-12 mths. 20.6 | Lact. 22.0 |
| Rice (12.9) | X | | | | | | | |
| Sorghum (16.5) | X | X | X | | | | | |
| Corn, Cornmeal, Bulgur (17.9 to 18.4) | X | X | X | X | | | | |
| Flour, Wheat, Oats, SFCM, SFSG (20.2 to 23.2) | X | X | X | X | X | X | X | X |
| SFWheat flour, SFRO (36.9 to 37.3) | X | X | X | X | X | X | X | X |
| Beans, Peas, Lentils (39.4 to 43.6) | X | X | X | X | X | X | X | X |
| CSM, ICSM, WSM (45 to 50) | X | X | X | X | X | X | X | X |
| Cheese, Soy-flours (63 to 92) | X | X | X | X | X | X | X | X |
| NFDM (99) | X | X | X | X | X | X | X | X |

1. Based on NAS Interim guidelines, 1982.

2. A seventy percent efficiency of utilization has been assumed for commodities not containing milk protein except sorghum for which a fifty percent utilization efficiency rate is used, ninety percent efficiency of utilization is assumed for commodities having a milk component. A sixty percent utilization efficiency is used for legumes (including soy flours).

# Nutrition Education

This annex is included to facilitate the strengthening of nutrition education activities in PL 480 programs. Both in FVA, Washington and in the field there is realization that potential of PL 480 commodities in accomplishing nutrition goals can be significantly improved through nutrition education.

Educational activities are needed in all programs to ensure appropriate use of commodities or to improve local food habits or both. In addition to assuring optimal commodity use, changing deleterious local feeding practices is an essential prerequisite for achieving improved nutritional status in our programs. The following chart lists some educational messages regarding commodity use.

Examples of
Nutrition Education Messages on
Use of Commodities

| | |
|---|---|
| All Commodities | - Safe and hygenic storage and preparation. |
| | - The locally available equivalents that can be used in case commodities become unavailable. |
| Bulgur | - Can be used as rice extender or rice substitute. |
| Blended Foods | - Use especially for "vulnerable groups", i.e. children under 3 years and pregnant and nursing mothers. |
| | - Do NOT add NFDM to blended foods. |
| | - Add oil and/or sugar to blended foods. |
| NFDM | - Combine with other foods like bread, porridge, couscous, etc. |
| | - Preferably, do NOT consume in beverage form. |
| Oil | - Use in place of animal fat or butter. |
| Soy-fortified foodgrains | - Do NOT sift out soyflakes.<br>- Do NOT soak and drain excess water because it contains important nutrients. |

This annex contains information on developing or strengthening nutrition education activities to achieve these objectives. It is divided into two parts as follows.

Provides guidelines for developing effective nutrition education materials; the same guidelines can be used for evaluating existing materials such as those listed in Section I of the guide or those currently in use locally.

Lists examples of nutrition education materials that may be useful prototypes for developing local materials in PL 480 programs.

## A. Developing and Adapting Nutrition Education Materials: Blending Science and Creativity

Marcia Griffiths

It is widely believed that the potential effectiveness of nutrition education has yet to be realized, mainly because of errors in conceptualizing and designing messages and media strategies. In some instances, nutrition education efforts have even been counterproductive by wasting scarce resources for poorly planned materials and activities or by offering misleading advice.

Providing the plan for developing successful nutrition education materials is clearly impossible. However, our review of some 300 materials from around the world and our experience in 25 countries over the past twelve years leads us to confidently recommend several steps in the design process that successful projects have have in common, and that could serve as guidelines for any nutrition education project. Besides serving as a checklist for materials you may be developing, the guidelines might also be helpful in evaluating the appropriateness of existing materials and in formulating a plan to adapt them to special needs. The elements are:

1. Establishing and adhering to carefully selected, realistic, nutritional, and educational priorities and goals.

2. Guaranteeing active participation by the target audience in designing the messages and media strategy: particularly having them identify the key attitude and practice changes that will lead to better nutrition.

3. Rigorously following message and materials design principles, creatively expressing the essential content.

4. Designing materials in response to a media plan.

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5. Testing the materials with the target audience before final production.

6. Appraising the reach and initial impact of each material after it has been used for several months.

These guidelines indicate that there is a scientific as well as a creative side to materials development. Neither statistics from an "impact" evaluation nor the physical appearance of a material is enough by itself to assess the value of a material. A look at the process used in developing the material, the degree of attention given to crafting it, and the role it plays in the overall communications strategy would be a more reliable basis for judgment.

When reviewing materials for your own or other programs, you should find the following questions, which are suggested by the guidelines above, helpful.

1. Were nutritional and educational priorities and goals for the project adhered to in the materials?

The field of nutrition encompasses many topics, from breastfeeding to home nutrition gardens. The relevance of the topics in different countries and communities varies greatly, as does the appropriateness of using education to address them. Policy-making officials and the intended audience should be consulted to identify the topics so that they correspond to the actual priority problems as closely as possible. The priorities should then be evaluated individually to determine the extent to which education can or cannot respond to these problems. However, sometimes the solutions to dietary problems require more than education. For example, educational projects should not attempt to address the problem of iodine deficiency (goiter) unless a source of iodine is readily available to the population at risk.

The projects that have met with the most success are those that have directed resources to correcting one or two pressing problems. A broad program goal should be written for each topic and referred to frequently as the strategy is constructed and the messages and materials are designed.

2. Did the community, or members of the target audience, participate in:

   a. identifying the specific attitudes or practices that prevent better nutrition?

b. finding a solution to each priority problem in either behavioral or motivational terms?

Having precisely stated recommendations and persuasive rationales ensures that messages will be acted upon. Programs fail to communicate effectively when they merely restate their goals to the audience and when an excess of information and recommendations blurs the intended outcome. Although "Breast Is Best" is a well accepted slogan, it does not call a woman to action. "Breastfeed your child for at least two years" is good advice, but, without having examined why women do not do so, it will not be compelling.

The challenge is to identify the problem-within-the-problem, and to do this, we cannot rely on our perceptions alone. The target audience must be asked for help in exploring their perceptions and practices. This research involves their trying new practices, refining old ones, and telling investigators what will and won't work. For example, if the problem is that women are weaning their children from the breast at an early age, the reason should be sought. Investigation with the women may show that they believe prolonged breastfeeding leads to enlarged, sagging breasts. This, then, would be the real problem--the mothers' concern that they will no longer be attractive. The message should address this concern creatively and with correct information to assure mothers that breastfeeding for additional months will not ruin their figures.

The kind of research that explores that character of constraints to desired behaviors is called "qualitative research." It is not used to quantify the prevalence of a custom, but to explore what it is and why it is important to the target audience. The research consists of open-ended discussions with a small sample of the target audience. Through qualitative research, nutrition educators can listen, discover new questions and answers, and effectively alter what we have been doing for years with only limited success. The outcome of the investigation will shape the communications strategy: the message and the media mix.

3. Does the message conveyed adhere to good design principles?

Our experience has shown that there are some key design factors to consider in formulating the creative strategy and writing or designing each message or material. The message strategy should address both scientific and creative concerns. The scientific demands that each message:

- Fits the goals of the program.
- Focuses on the problem.
- Expresses the solution in terms of the specific actions required.
- Includes incentives for carrying out those actions (reflect the insights gained from qualitative research).
- Is linguistically and culturally relevant.

The artistic side demands that each message

- Expresses a single idea.
- Portrays a situation or characters the target audience can identify with.
- Is persuasive and believable.
- Is memorable.
- Bears the stamp of the project and thus calls attention to other project materials.

4. Does the material fit into the project's overall media strategy?

Too often, before working with the audience and, in some cases, even before selecting the priority topic, educators decide to produce or copy other project's flip charts, comic books, or radio spots. While budgetary constraints sometimes preclude producing certain types of materials, the chances for a program's success are limited when the materials are determined before the direction of the program.

When the qualitative research has been completed and decisions have been made about what messages must be conveyed to whom, it will be time to select media that the research sample identified as those that they see or hear often and who they consider authorities on a given subject. It may be a single medium--such as, field, workers, radio, television, newspapers--or, what has proven more successful, a combination of media. In all cases, the medium will dictate the material. There is no point, for example, in designing pamphlets or posters that were not contemplated in the media plan. They only burden the system and use up scarce resources. Likewise precious resources can be misused to stage a play that the audience might only see one time, discuss, and then forget. It is better to have a few carefully crafted materials that can be seen or heard frequently by the intended beneficiaries of a program than many items that they will view indifferently.

5. Has the material been tested with the audience before final production?

Reports on a number of projects indicate that the pretesting of messages and materials is becoming common practice among nutrition educators and that the experience has been beneficial. However, pretesting is no substitute for the initial qualitative research where the basic concepts for a program are decided. Pretesting will not uncover new ideas or solutions to problems. It will provide a reading on an audience's initial perceptions of materials and will save time and money that might have been spent in correcting errors later in the program. Pretesting is a final test of materials before they are printed and distributed. It ensures that the design principles were followed and that the materials are:

- Understandable
- Memorable
- Persuasive or believable
- Culturally relevant
- Actionable

Like the initial audience work, pretesting is qualitative research. It can be done with a small sample and in a variety of ways. Whenever possible, it should involve the artist or writer.

- Each part of the material can be tested alone and then altogether. For example, text and graphics or script and music. This determines whether one component of the material detracts from the other.
- One material can be compared to another.
- One creative style can be compared to another.
- The material can be placed within a larger presentation (a radio spot within a short program or a discussion of weaning food within a longer health talk).

6. How is the material working out?

Materials development does not stop with the printing of a flipchart or the recording of a radio spot. Once the material has been used by community workers or aired on the radio for several months, personnel should go to the field to assess the responses of people for whom the message was to have reached. Have they been exposed to the material? Can they remember what they heard or saw? What is their opinion about it? Have they done anything about the message? Careful pretesting should have eliminated major problems with the materials, but a check after it has been in use can often highlight subtle problems that will make the next wave of radio messages better, or indicate the need for adding pages to a flipchart, or revising

subsequent training plans. If a material from another program is being adapted, then the reactions of program personnel toward the material should be sought. Perhaps they didn't modify the material, but have suggestions for how it should be changed.

Careful materials development is not a one or two-step process. There are many decisions to make and there is a need for constant consultation with the intended audience and with community workers, if they are the medium for the message. As the most recent nutrition education efforts in countries such as Indonesia and Brazil have shown, impressive results can be achieved by combining science and art in materials development.

## B. Selected Nutrition Education Materials

Three categories of materials are listed here. These are

- o Guides and Manuals
- o Training Materials
- o Mass Media and Support Materials (for face-to-face or interpersonal education)

### Guides and Manuals

These are for use as references by trained professionals such as nutritionists, public health workers, home economists, teachers, nurses, social workers, physicians; these materials can be adapted for local training and education purposes.

o Manual on Feeding Infants and Young Children by Margaret Cameron and Yngve Hofvander, Third Edition, Oxford University Press, 1983, English, 214 pages, U.S. $9.95.

Useful primarily in MCH programs, this manual provides detailed information on the nutritional problems, needs, and recommended diets of weaning age children. The chapter on recipes for weaning foods emphasized locally available foods, but includes recipes based on donated foods such as bulgur, CSM, and ICSM. The manual also contains chapters and appendices on growth monitoring and screening for malnutrition, management of diarrhea, and food composition tables. It has been widely used and acclaimed since the publication of its first edition in 1971.

A local adaptation of the Cameron and Hofvander Manual for India is "The Feeding and Care of Infants and Young Children" by Dr. Shanti Ghosh, published by Voluntary Health Association of India in 1980 (Third Edition). English (118 pages) and Hindi. Price: Rs9.00 U.S. $3.00.

La Nutrition de la Mere et du Petit Enfant. Excerpts from a U.N. expert group edited by Y. Hofvander. French, 96 pages; English 120 pages. FAO, 1983. Paris Special Publications Series 2, ED82/WS/3.

This is a resource text for use by health and nutrition professionals involved in MCH programs. Chapters cover the principles of nutrition for mothers and infants and applications of basic nutrition in the feeding of mothers, infants and young children. There is some overlap with the "Manual on Feeding Infants and Young Children" by Margaret Cameron and Yngve Hofvander which is described above.

o Nutrition for Developing Countries by M. King, F. King, D. Morley, L. Burgess and A. Burgess. Published in Spanish in 1977, English in 1972.

This is a comprehensive nutrition reference for MCH and school feeding programs worldwide. It includes chapters on monitoring nutritional status and growth; taking measurements, nutrients in foods; causes of malnutrition; helping families help themselves and community level actions; health and family planning education. Home gardening and food preservation techniques are described. Recipes are included for soybeans and blended foods. The Spanish edition uses examples from Latin America.

o Improving the Nutritional Status of Children During the Weaning Period. Edited by Karen Mitzner, Nevin Scrimshaw, and Robert Morgan. Published by AID and USDA's Home and Village Prepared Weaning Foods Project (HOVIPREP . November 1984, English, 258 pages.

This is a collection of papers relevant for MCH programs. It covers current knowledge regarding what works and what does not in the areas of planning, implementing, and evaluating large-scale programs, including donated food programs, which are aimed at weaning age malnutrition. Chapters cover identifying the nature and magnitude of malnutrition, practical field methods for collecting information of prevailing practices and conditions, case studies of successful programs, centrally processed weaning foods and how evaluation can be built into programs. In addition to its usefulness for program implementers, trainers and educators, sections of this manual are useful for planners and policymakers.

o Feeding Young Children. A field guide for the use of local foods and dried skim milk in nutrition programs in Africa. By Andrea Hiel, J.G. A.J. Hautvast and A.P. den Hartog. A Field Guide for the Use of Local Foods and Dried Skim Milk in Nutrition Programs in Asian Countries. By O. Baldecanas et al. Draft Edition, 1983. English, 41 pages plus inserts.

These two field guides have been published by the Netherlands Nutrition Foundation, Wageningen. They contain recommendations relevant for MCH and school feeding programs including recipes from countries of each respective region, for the use of non-fat dried mild (NFDM) in food aid programs. Local diets, basic principles of nutrition, storage of NFDM, and lactose intolerance are other topics included in the guide.

o OXFAM'S Practical Guide to Selective Feeding Programmes. By Oxfam Health Unit. Revised and reprinted in 1984. Published by Oxfam, 274 Branbury Road, Oxford OX2 7D2, United Kingdom. English, 92 pages.

This is particularly useful for emergency programs and is based on experiences in refugee camps. Included are recommendations on how to organize programs (logistics, equipment needs) as well as how to conduct need assessments, and surveys. Appendices include how to measure, weigh, chart, calculate, and construct some of the equipment for taking heights, weights, and arm circumferences of participants.

o The Management of Nutritional Emergencies in Large Populations. By C. deVille de Goyet, J. Seaman, and U. Geijer. World Health Organization, Geneva 1978. English, 98 pages.

This guide is intended for use by health personnel of local or international relief programs engaged in managing widespread and severe malnutrition. Contents include nutritional needs, food composition, and assessment of nutritional status; organization, administration, and logistics (transportation, storage) of various types of feeding operations; and communicable disease containment. One chapter is devoted to the selection, composition, and preparation of donated food commodities.

## Training Materials

Training materials are available in English, Spanish or French. They will need to be adapted and pretested for local use.

o Manual on Child Development, Family Life, Nutrition FAO, The African Training and Research Centre for Women, Ethiopia. by Jean Ritchie. 1978. English, pp 209. (Also available in French.)

This is a comprehensive training manual for all programs that combines background text as reference and training modules. The first 5 chapters include principles of nutrition and assessing family and community nutrition problems. Chapters 6 and 7 cover starting a nutrition program. Included are "21 learning experiences" or training modules ranging from 4 on "preparation of high protein/high calorie dishes suitable for weaning and preschool children" to "bulk in young children's food", "calculation of human energy and nutrient requirements", "recording the growth of

children", "family visits to study child-rearing practices and child behavior", "conducting acceptability tests for new foods and new dishes with illiterate target groups". Although written for use in Africa, it has worldwide potential due to its practical, applied orientation.

o Guidelines for Training Organizers of Group Feeding Programmes for Use in Africa. Food Policy and Nutrition Division, FAO, Rome, 1984. English, 308 pp.

Relevant for all types of programs, especially MCH and school feeding programs. The guide includes checklists and tips for organizing and evaluating a training program, and how to select and adapt the modules. The 25 modules or "training units" contain ideas for training activities and handouts in addition to learning objectives, a list of resources and the subject matter or content for each. Annexes include information on food composition, nutritional status assessment, and recipes for donated foods. The guidelines were pretested in Kenya in 1983.

o Guidelines for Training Community Health Workers in Nutrition. WHO offset publication No. 59. WHO, Geneva, 1981. English, 153 pages.

Relevant for MCH and school feeding programs. Nine modules include nutrition for young children, nutrition of the mother, measuring and monitoring the growth and nutrition of children. Each module contains learning objectives, training content, and exercises (reinforcing activities). The guidelines also contain a two-page list of steps in the preparation of a training plan and an annex devoted to training hints such as organization and planning teaching aids.

A local adaptation of these guidelines is the Nutrition Handbook for Community Workers, by the Caribbean Food and Nutrition Institute, CFNI and Ministry of Health. Kingston, Jamaica, 1982. English, 176 pages.

o Nutrition Training Manual Catalogue. Published by AID's International Nutrition Communications Service (INCS) Editors R. Israel and P. Lamptey, 1980. English, 102 pp.

This reviews 116 training materials including textbooks, guides, modules, course outlines, etc. These are considered exemplary in the field of nutrition for developing countries. It is organized by topics such as Mother and Child Feeding, Program Management, etc.; indexed by title, author and region.

**Mass Media and Support Materials**

Many of these were developed for programs that have no food distribution component, but lend themselves to adaptation for a feeding program.

o Materiales Maria Maya. "Ademas del Pecho . . . . La Alimentacion del Nino Pequeno: desde 4-6 meses hasta que coma igual a los grandes" (Diet for Weaning Age Children). Published by Materiales Maria Maya, Guatemala, Spanish.

The teaching kit contains an introductory volume on the use of the materials plus four guides (one on each of four themes) and large drawings or posters for use in group sessions. Each guide contains subject matter or content for the community worker and ideas for group activities. The themes are When should weaning foods be started? Why is bottle feeding dangerous? Which foods are best? Is cleanliness important?

o Applied Nutrition Education Program, Caritas and Government of Dominican Republic, 1985, Spanish.

This set of materials includes a growth chart for children up to 5 years of age and a set of twelve laminated posters or large drawings with messages on the reverse side. For use in programs that have growth monitoring as an educational or motivational activity. Based on the age of each child, whether he/she gained or did not gain weight and whether he/she has diarrhea, community workers select only one or two messages for each mother at each visit. Scripts of the supporting radio broadcasts and flip charts for use in group sessions will be available shortly.

o Du Poisson pour les Enfants (Fish for the Children), 45 slides and La Bouille au Lait (Gruel with Milk), 30 slides. By Institut National de Sante Publique de Cote d'Ivoire. Abidjan, Ivory Coast, French.

Two slide sets with accompanying guides for use with mothers. The materials emphasize the importance of good weaning foods starting at five months of age and provide recipes for making two weaning foods.

o Feeding Your Baby and More about Child Care. From the Voluntary Health Association of India. English.

These black and white slides are accompanied by booklets and can be used for training or with mothers. Contents include diet for pregnant and nursing mothers and weaning age children.

Guide to Mass Media and Support Materials for Nutrition Education in Developing Countries. By Marcia Griffiths et al. Publication of the AID project, International Nutritional Communication Service, INCS. January, 1985. English, 128 pp.

This contains 316 reviews of education materials. They are organized by content (weaning, breastfeeding, etc.) Indices include geographic regions and languages so materials can be located easily. Addresses of sources for obtaining these materials are also provided.