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EVALUATION OF COSTA RICA OPG 515-0127

CARE SOYBEAN PRODUCTION AND PROCESSING

BY:

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1.0 SUMMARY

1.1 Processing Component

The processing component of the Soybean Production and Processing Project was evaluated. The following statements summarize this evaluation.

1.2 Construction of Plant

CARE sensed a need for a production facility that would be capable of producing low-cost nutritious foods. Necessary actions were taken to secure funding, a good design, and to have a Processing Plant built and operated.

The Plant has made approximately 650 tons of very low-cost food which has been used in the Costa-Rica feeding programs. Based on these observations, CARE has built a successful plant that can produce nutritious foods in Costa Rica.

1.3 New Product Development

When the problem of "poor acceptability" of Nutrisoy was identified, CARE took prompt action and identified the need to modify the product to make it satisfactory. CITA, likewise, very rapidly developed an instant drink, FRESCORCHATA, as a partial replacement for NUTRISOY. In addition, several other products were identified in a remarkably short time for use in the feeding programs. As a result, the plant is now operating, at about 1/2 capacity, and is expected in only a few months to increase production by making other soy-fortified products now under development.

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1.4 Increased Cooperation

In order to facilitate the development, production and distribution of new soy-fortified foods, a coordinating group was established consisting of CARE, CITA, and DESAF. CARE is responsible for the plant's production, CITA for product development and quality control, and DESAF for the distribution of the foods to the beneficiaries. The three organizations work closely together and this arrangement is providing a very positive and effective working relationship.

1.5 Funding

DESAF and the MOH have utilized these foods in their feeding programs but would like to have a larger variety of foods by the start of the new school year in March, 1982. Thus CARE has been provided with funds not only to produce these foods but also to develop new products at CITA and to build storage facilities and a warehouse alongside the Plant that were urgently needed to store raw materials and finished products.

## 2.0 METHODOLOGY

### 2.1 Evaluation Team

The Processing component of the Soybean Production and Processing Project was evaluated by a team consisting of:

- Max Rutman, INUAL, Santiago, Chile
- Paul Crowley, USDA, Washington, D.C., U.S.A.
- Ron Tribelhorn, CSU, Fort Collins, Colorado, U.S.A.
- John T. McLeod, CARE, Costa Rica

The team convened in Costa Rica October 5-9, 1981.

### 2.2 Review

The team evaluated the project by reviewing relevant project documents, by inspecting the processing facility, through discussions with representatives of CARE, CITA, DESAF, MOH, USAID/Costa Rica, and by visiting a school which uses products produced by the factory.

### 2.3 Scope

The evaluation team gave special consideration to the extent to which the goal and purpose of the project were achieved, the outputs and inputs of the project, and lessons learned through the project. Important conclusions and recommendations for future action are noted.

### 3.0 GOAL

#### 3.1 Reduction of Malnutrition

As stated in the OPG, the goal is to help improve the nutritional status of the target population by reducing malnutrition by 50%. Data showing the changes in malnutrition are not available except for limited information concerning the CENS (see ANNEX #1). This data indicates a steady reduction in malnutrition during the life of the project.

#### 3.2 Evaluation of Goal

Regretably, it is not possible to attribute a percentage of this improvement in nutritional status to this project because of the many other products used in the nutrition programs in Costa Rica and the concurrent improvement in the general socio-economic well being of Costa Rica during the period 1975-1980.

#### 3.3 Targeting Assistance

The evaluation team noted that the present rapid economic deterioration which Costa Rica is suffering will undoubtedly impact negatively on malnutrition if nutrition programs in Costa Rica are not reinforced and better targeted to the most vulnerable groups.

#### 4.0 PURPOSE AND OUTPUTS

##### 4.1 Primary Purpose

According to the OPG, "The primary purpose of this project is to establish a manufacturing facility to produce low-cost nutritious foods and blended supplements utilizing locally grown foods to the greatest extent possible to be used in the Government of Costa Rica food distribution programs". A manufacturing facility was constructed and inaugurated by the President of Costa Rica in June, 1979. Production of Nutrisoy and other products in the plant indicate that the Plant is capable of full production with minimal operational problems.

##### 4.2 Production Levels

Continuous full-time production has not been undertaken, except for a three month period in 1979 when NUTRISOY was manufactured. During this period, the plant operated continuously for 71 days, 8 hours per day, and produced 353,355 kg of NUTRISOY packaged in 20 kg. bags. This represents 95% of the rated capacity - 665 kg/hr. Since that time the plant has not run continuously because of inadequate demand for product in the feeding programs. This problem has recently been partially solved through efforts by CARE, DESAF, and CITA; a new product, FRESCORCHATA, was developed by CITA, and beginning in July, 1981, about 50 tons per month have been produced in the Plant and distributed to the schools and CENS.

##### 4.3 Processing Controls

Quality control, plant monitoring of process parameters and standardization of individual product manufacturing techniques have not been demonstrated on a continuous basis. There is a need, therefore, to improve these areas to ensure that a good product is manufactured consistently and that process parameters are defined to prevent the production of inferior quality products.

#### 4.4 Production of the Low-Cost Nutritious Food "NUTRISOY"

It has been demonstrated that low-cost nutritious foods such as NUTRISOY can be manufactured in the processing plant. NUTRISOY has been made at a production cost of  $\text{Q}6.30/\text{kg}$  which is considerably lower than any other food product of comparable nutritional value now available in Costa Rica.

Because the consumption of NUTRISOY in the feeding programs was low, NUTRISOY production attained only 20-25% of its original production goal of 2,000,000 lbs/year. The low production of NUTRISOY, therefore, has been directly attributed to acceptability problems. Although a thorough analysis of the poor acceptability was not made by the evaluation team, CARE, CITA, and others in Costa Rica have attributed it to one or more of the following:

1. inadequate instructions to cooks for preparation,
2. lack of flavoring including absence of a sweetener,
3. excessively large and unsophisticated packaging,
4. accumulation of stocks due to poor distribution,
5. poor institutional "marketing", and
6. NUTRISOY is not a locally available nor known food.

#### i.5 Identification of New Products

Because of the poor acceptability of NUTRISOY, it was recommended by the last evaluation team that an investigation be made into identifying suitable products that could replace the unsuccessful NUTRISOY. This recommendation suggested the cooperative involvement of CARE, CITA, and DESAF in developing new products. As a result, CITA was assigned primary responsibility for developing new products and to date has identified several potential foods. These include:

1. FRESCORCHATA Instant powdered drink made of extruded Rice and Soy mixed with sugar, spices and flavors.
2. FULL-FAT SOY FLOUR Full-Fat Soybean Flour to extend and supplement wheat flour in cookies and noodles.
3. SOY-FORTIFIED BLACK BEANS Instant precooked black bean flour extended with soybeans.
4. CEREAL FLAKES Breakfast Cereal based on Corn, and/or Rice, Soybeans and Sugar.
5. NUTRISOY "II" An improved form of NUTRISOY to be based on a formulation similar to the original corn-soy-milk product.

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#### 4.6 FRESCORCHATA

Of the above five products, only FRESCORCHATA has undergone complete development and is being manufactured in the plant and distributed to the recipients in the feeding programs. FRESCORCHATA was evaluated by CITA and found to be acceptable in the school lunch feeding program. Since July, 1981, 50 MT/month have been produced for this program. During this period, the plant capacity has been calculated at 345 kg/scheduled hour<sup>1/</sup>.

Plant design capacity for making FRESCORCHATA is 1,125 kg/hr which would permit production of 216 MT per month for one process line operating one shift per day. The current production of FRESCORCHATA represents 31% of the available plant capacity. At this rate, yearly production would be approximately 500 MT or one half of nominal full production capability of the plant.

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<sup>1/</sup> This rate is calculated from the number of days that the FRESCORCHATA was produced and assuming each day was entirely used for making the product.

#### 4.7 Levels of Production

Production in the Plant to date is shown in Table I.

Table I: PRODUCTS MANUFACTURED AT THE PROCESSING PLANT  
THROUGH SEPTEMBER 30, 1981

Products	Kilos Produced
1. FRESCORCHATA	118,285
2. NUTRISOY	520,395
3. COOKED SOYBEAN	901,680
4. CEREAL FLAKES	3,555

#### 4.8 Cooked Soybeans

Part of the cooked soybeans has been used to develop new foods such as cookies and noodles. When institutional products, such as FRESCORCHATA, are not being manufactured, older inventories of soybean are processed to make animal feed. This allows full employment of plant operators and recovery of costs through sales of the processed soy product. Proceeds are channeled back into the project development funds. Processing records indicate the extruder is operating at the rated capacity of 600 kg/hr for this product.

#### 4.9 Acceptability and Nutritional Impact of FRESCORCHATA

The improved acceptability of FRESCORCHATA compared with NUTRISOY was achieved by changing both the ingredients and package design. These changes resulted in an increase in the FOB cost of the product by 50 to 100% over the cost of NUTRISOY. Although the increase is large, the relative nutritional impact of FRESCORCHATA over NUTRISOY might be sufficient to justify the cost increase. A study on product use should be undertaken to evaluate these factors.

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4.10 Production Costs

FOB costs of several different foods manufactured in the Plant are given in Table II. Also listed in Table II are Milk Powder and Milk Extender, two products now purchased for the feeding programs. Although FRESCORCHATA costs more than NUTRISOY, it is still considerably cheaper than local milk products.

Table II: PRODUCTION COSTS OF LEC PRODUCTS<sup>1/</sup>

Product	Production Cost ¢ / kg	Specific Production Costs	
		¢/100 gms Protein	¢/1000 Cal.
FRESCORCHATA	10.46	6.6	2.86
NUTRISOY	6.31	3.4	1.66
COOKED SOYBEAN	5.14	1.3	1.27
CEREAL FLAKES	8.30	-	-
FULL-FAT MILK POWDER	50.00	14.3	6.9
MILK EXTENDER	29.00	17.1	-

<sup>1/</sup> Costs from CARE records (25 July, 1981) and available data.

At ¢10.46/kg, FRESCORCHATA production costs are still 1 to the cost of milk products. Development of FRESCORCHATA requires considerable changes in formulation to achieve the cost acceptability. Consideration should be given to other formulations using indicators that show the actual cost change. Specific production costs are given in Table II. These are considered as two indicators which might help

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#### 4.11 Production of FFSF

The OPG called for 600,000 lbs/year of Full Fat Soy Flour. Although a large portion of cooked soybean has been manufactured, only a minor amount has been utilized in product development mainly due to a lack of suitable end uses. CITA and CARE, however, have recently developed a potential use for FFSF in cookie production. Plans are in progress to furnish 2 bakeries with FFSF blended with wheat flour. The blend mixture would be used to make cookies for a trial in the school feeding program. If successful, soy fortified cookies will be distributed for use in the feeding programs at about \$15/kg.

#### 4.12 Product Development

A recommendation from the last project evaluation indicated that products should be developed cooperatively by CITA and CARE according to the needs of DESAF. This recommendation was adopted and the arrangements have been successful in achieving the development of suitable products. In the brief period since the last evaluation a tremendous amount of work has been completed by CITA toward this recommendation. CITA has completed six major studies products (FFSF-1, Cereal-2 and FRESCORCHATA-3). In addition studies (Improved NUTRISOY, Cookies, Black Beans, Cereals) are pending completion in early 1982. Product development requires a great deal of time and the evaluation team for the rapidity with which the recommendation was progress made on product development. The product list below lists some of the products associated with amount of production which might be expected per exclusively. When more than one product is produced, production will be shared.

Table III: PRODUCTION AT LEC PLANT OF VARIOUS PRODUCTS

Product	Percentage of Extruded Product Component in Formula	Yearly Production <sup>1/</sup>
FRESCORCHATA	40	2,250 MT
NUTRISOY	90	1,000 MT
FFSF	100	1,200 MT

<sup>1/</sup> One shift - 8 hours and 250 days per year

Since Table III is for one shift, maximum production from three shifts can be determined by multiplying the yearly production by 3.

#### 4.13 Production of Additional New Products

The projected production of additional products for the plant includes 125 MT of FFSF for use in 500 MT of cookies, 300 MT of Cereal Flakes, 100 MT of Soy Fortified Black beans and up to 500 MT more of FRESCORCHATA with new flavors. For these requirements, one shift processing would be adequate but there would be enough capacity for expansion into other products based on Table III.

#### 4.14 Recipients

The original OPG called for 500,000 children in the 0-12 year old age group to receive low-cost foods with emphasis on the pre-school age children. FRESCORCHATA is currently reaching 400,000 school age children who each receive the instant drink twice per week. During

January-June 1981, 33,000 preschool beneficiaries received NUTRISOY which was 30% of the potential MOH beneficiaries. School children received only small amounts of NUTRISOY during this period.

#### 4.15 Management Transfer

Initially the plant was managed by Soy Agil, S.A., under a contract with CARE. Previous evaluations have confirmed that the plant was functional, plant operators were trained, and the operation properly managed under close CARE supervision. Soy Agil, however, terminated its contract in December, 1980, since NUTRISOY was being produced only in small quantities and because Soy Agil's Plant Manager wished to work on other new projects of interest. Since that time, CARE has assumed management of the Plant and has hired personnel to operate it until new management can be identified. Local labor laws are being strictly followed by CARE management and the Ministry of Labor and Public Security approved the Plant's internal by-laws on October 6, 1981.

#### 4.16 Transfer of Title

The OPG suggested the need to turnover title of the plant (buildings and equipment) to the GOCR and for CARE eventually to withdraw from administration of the plant. Plans are now being implemented by CARE to transfer title of the plant to a responsible governmental agency but thus far no plans have been made for CARE to withdraw from its administrative role.

## 5.0 INPUTS

### 5.1 Financial

During the five year life of the project (9/29/76 - 9/29/81), a total of \$3,897,300.00 in financial inputs have been used in the Soybean Production and Processing Project. Of this amount, \$499,700.00 was provided by USAID through an Operational Program Grant (OPG 515-0127). In addition, CARE has provided inputs of \$318,900.00 and the GOCR has provided inputs of \$3,078,700.00<sup>1/</sup>.

### 5.2 Processing Inputs

Financial inputs used for the processing component of the project, i.e., the development, construction, and operation of the processing plant, were \$1,940,600.00<sup>1/</sup>. Of this amount, \$484,000.00 were used for plant facilities (buildings, equipment, and installation of equipment), \$1,026,600.00 were used for plant operations (\$721,300.00 for raw materials, \$254,800.00 for processing, \$16,600.00 for packaging, and \$33,900.00 for product development at CITA) and \$430,000 for project administration.

### 5.3 Timeliness of Financial Inputs

Financial inputs to the project have generally been made on a timely basis so that plant construction and operation have not been delayed by financial constraints.

### 5.4 Technical Assistance

AID/W, through USDA and Colorado State University (CSU), has provided technical assistance for the design of the processing facility, for procurement and installation of imported equipment,

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<sup>1/</sup> In order to use common units for financial inputs, colones inputs are reported in U.S. dollars using a conversion of 08.60 per \$1.00. The actual conversion varied during the project and exceeded 08.50 starting in October 1980.

and for training plant personnel. In addition, AID/W provided technical assistance to CARE to help select and contract with a local plant management group (Soy Agil) and to identify applications for the full-fat soybean flour (FFSF) which was expected to be manufactured in the factory. These inputs from AID/W have not been quantified except that AID/W, through USDA, contributed \$12,500 to a contract between CARE and CIATECH (a Government of Mexico research institution) to supply advice to CARE and CITA on potential applications of FFSF in nutritious foods.

5.5 Timeliness of the Technical Assistance

Technical assistance supplied by AID/W has been supplied on a timely basis.

5.6 PL 480, Title II, Inputs

A part of the raw materials used in the factory have been furnished by the U.S. through PL 480, Title II; specifically 85 tons of non-fat dry milk valued at \$124,800.00, 11 MT of whole yellow corn valued at \$7,100.00, and 42 MT of CSM valued at \$17,240.00 have been used by the Plant. The milk powder supplied through PL480 is used in the production of NUTRISOY and FRESCORCHATA and is the sole source of milk powder used in the Plant. The corn has been used in the production of NUTRISOY and was also procured locally to augment Costa Rican supplies which were short in 1980/81<sup>2/</sup>. The 42 MT of CSM was blended with NUTRISOY as a means of extending the supply.

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<sup>2/</sup> Typically Costa Rica produces the vast majority of corn used in the country (60-90,000 tons per year) and imports only small quantities (3-6,000 tons per year). In 1980/81, however, Costa Rica imported 61,000 tons to satisfy the increased demand for animal feed which made corn difficult to obtain for use in the plant.

6.0 BENEFICIARIES

The beneficiaries in Costa Rica's supplementary feeding programs are concentrated in the school lunch program which covers 90% of all schools. Preschool children and pregnant and lactating women, the most vulnerable groups, have very small coverage -- 20% to 30% in CEN's and Health Posts. Furthermore, those who are covered by existing delivery systems might not be those who are most in need (as was reported by a CARE sponsored study in 1976<sup>1/</sup>):

	Costa Rica	Delivery Systems	Coverage %
Pregnant	80	13	30%
6 mo-2	220	24	23%
2 - 5	470	50	90%
6 - 12		426	

<sup>1/</sup> Pre-School Nutrition Evaluation, April 22, 1976, by Mary Anderson

## 7.0 LESSONS LEARNED

### 7.1 Acceptability of Products

A major problem encountered during implementation of the project was the reportedly poor acceptability of NUTRISOY among feeding program recipients. Although not stated explicitly in the project design, it was assumed that NUTRISOY, which is quite similar to the CSM and CSB used for many years by the GOCR in their feeding programs, would be acceptable to recipients and could be programed with minimal effort. Accordingly, relatively little effort was made to confirm the acceptability of NUTRISOY before production was started although small consumer panel tests were held, recipe booklets were printed for schools and CENS, and limited acceptability tests were undertaken in schools. When NUTRISOY production started, in 1979, the product was launched with little promotion and with little effort to assure delivery to schools. The resulting poor reception of NUTRISOY caused an enormous setback to the project in that the factory was forced to close down operations until a more acceptable product could be developed and produced.

Future attempts to introduce any institutional food including substitutes for Title II foods should involve local organizations to undertake comprehensive acceptability tests and also accompany the food introduction with a close monitoring and promotion program.

## 7.2 New Product Development

The success or failure of a plant should not rest entirely on one product such as the case with NUTRISOY. In most applications for LEC technology, one product has been enough to be successful, particularly in institutional feeding programs. New programs should not assume that a single product will be a success. Alternate plans should be made to develop additional products in the event that the initial product fails or if less plant capacity is required than anticipated to produce the first product. If production of one product must be stopped because of a lack of raw materials, processing changes or poor acceptance, valuable production time and losses of key personnel can result.

New food processing projects should have a built in program to identify and develop new products in order to add a diversification dimension to the future of the plant.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Recommendation: Product Development

It is recommended that CARE, CITA, and DESAF continue aggressively to develop products which can be made in the Plant and used in the GOCR feeding programs. Special emphasis should be placed on foods which have a low cost/nutritional-effectiveness ratio and foods which can impact strongly on malnutrition among vulnerable groups. CARE and CITA, in consultation with DESAF, should establish priorities for work on specific product development activities.

CITA has made substantial progress since the last evaluation in developing new products which can be made in the Plant (FRES-CORCHATA, Cereal Flakes, Soy Fortified Cookies, Precooked Black beans/Soybeans, etc.). However, much work remains to be done in evaluating these products, developing technical specifications, and economical manufacturing procedures, and translating the product concepts into institutional realities. In addition, new products such as special weaning foods directed to malnourished children, 6 months - 2 years, and special supplements for pregnant and lactating women might be emphasized. CARE should work closely with DESAF and the MOH to help assure that the foods developed for the plant will reach those most in need of nutritional supplements. The composition of the foods and the cost of manufacture should also be optimized to increase nutritional impact and acceptability.

8.2 Recommendation: Training

It is recommended that CARE in cooperation with plant operators arrange for training of Plant personnel in the complete range of Plant operations including procurement of commodities and spare parts, storage of raw materials and finished products, processing and process control, quality control, and maintenance.

8.3 Recommendation: Availability and Instruction

It is recommended that special efforts be made by CARE and CITA to ensure that FRESCORCHATA and other products are made available to the recipients and that the cooks receive proper instruction in the preparation of the new foods. (CITA may also wish to consider arranging for evaluation of its methods for introducing these new products through consultation with institutional marketing experts).

Earlier evaluations of the project indicated that there were serious problems in the distribution of NUTRISOY and in providing instructions to cooks for its use, and that these contributed to poor acceptability and failure of the product. The distribution of all products being delivered to schools by the CNP is currently encountering serious problems because the sales in the CNP outlets have greatly increased, over four times, in recent months. It is, therefore, becoming increasingly difficult for the CNP to effectively distribute food to the schools. It should be noted that FRESCORCHATA and other new foods require special marketing efforts to introduce the products to the cooks and recipients in order to avoid potential problems of misuse and/or poor attitudes.

8.4 Recommendation: Plant Management

It is recommended that CARE and the GOCR arrange to transfer management and operation of the processing plant to an experienced food processing company. Operation of the Plant by such an organization, in the long run with commercialization, would be expected to result in even more efficient operations, lower costs, and more consistent quality products.

When the Plant terminated production of NUTRISOY in November, 1979, Soy Agil, the Plant operator which worked under contract to CARE, was only required on an intermittent basis to work on new product development. In December, 1980, the contract with Soy Agil terminated and CARE assumed direct responsibility for plant operations. CARE hired a Plant Manager, Ing. Eugenio Valenciano, on February 1, 1981, who received limited training from Soy Agil. In addition, there are presently 24 workers, 24 guards and other personnel staffing the plant. Since March, 1981, operations have been largely for conversion of excess soybeans to animal feed and, starting in July, production of FRESCORCHATA for use in the feeding programs. It is expected that production of FRESCORCHATA will continue at a rate of at least 50 tons per month and that additional products such as improved NUTRISOY, breakfast cereal, FFSF, etc., will be made in significant amounts beginning with the new school year.

In order to receive maximum benefit from the services of an experienced company, it would be appropriate for CARE and the GOCR to review contracting options and take those actions required. CARE might wish to obtain technical assistance for this purpose as provided by Mr. Alden Ackles (AID/USDA Consultant), who previously helped acquire the services of Soy Agil. It should be noted that the present CARE plant personnel might continue to be employed in the plant as employees of a new contractor.

8.5 Recommendation: Management Transfer Plan

It is recommended that CARE and the GOCR develop a plan for CARE's eventual phase out of involvement in plant operation and transfer of CARE's responsibilities to a Costa Rican entity.

The original OPG Project anticipated that eventually the Plant would be turned over to the GOCR in order "to continue the program without further assistance and therefore the need for a continuing CARE administrative role". Annual evaluations have taken note of this and recommended that a plan should be developed for the GOCR to take over the program.

While developing a plan to transfer management responsibilities from CARE to the GOCR, CARE and the GOCR might wish to consider the following options:

- a. The GOCR could contract with a private sector company to operate the plant on a cost-plus fee basis to manufacture foods for the GOCR. Foods so produced could be used either exclusively for GOCR feeding programs or for both feeding programs and for sale by the GOCR through CNP or other appropriate distribution centers.
- b. The GOCR might lease the Plant to a food manufacturing company which would utilize it to produce foods for purchase by the GOCR per a) and simultaneously manufacture soy based nutritional foods for commercial sales under its own label.
- c. The GOCR might utilize a Costa Rican PVO, perhaps an outgrowth or successor to CARE, to oversee the contracting as in (a) above or leasing as in (b) above.

The choice among these alternatives would probably depend on prospects for developing commercial markets for the products as well as attaining full production of the Processing Plant. Until commercialization or full capacity is reached, the current management arrangement would appear to be the most satisfactory. When commercialization is feasible, lease of the facility to a private company with strong marketing competence would probably be preferred. In any case, the team believes CARE and the GOCR should begin to develop a plan for transfer to a Costa Rican entity.

It should be noted that CARE is now arranging for the title of the Plant to be transferred to the GOCR and this is expected to be completed in a few months.

8.6 Recommendation: Supervision and Data Collection

It is recommended that CARE continue to monitor production at the plant. In addition, CARE should concentrate on monitoring and collecting data related to delivery, consumption, and nutritional impact of the products.

A substantial effort has been made on monitoring plant operation during the life of the project. Information obtained from discussions during the review indicated that information is available on product delivery, however, there is not a lot of information available on the consumption or nutritional impact of the products. The CNP and other outlets should be monitored closely to ensure that the products are being received and delivered to the beneficiaries. Acceptability and nutritional impact, where possible, should then be studied to determine if the various products are improving nutritional status. Evaluations should be made on individual products to learn the nutritional input of each.

8.7 Recommendation: Evaluation of Products

It is recommended that CARE, CITA, and DESAF evaluate each product made for the program from an economical and nutritional standpoint.

Because of the present uncertainties in the Costa Rican economy, uniform price changes of ingredients do not exist. These price changes affect the cost of producing a finished product and can sometimes result in using ingredients that increase the overall cost but contribute little to the nutritional advantage of the product.

A sensitivity analysis, therefore, which identifies the economics of

an ingredient change and compares it with the corresponding cost due to nutritional and acceptability changes in the product should be done to ensure that optimum formulations have been obtained and maintained.

8.8 Recommendation: Promotion of Soy Foods and Commercialization

It is recommended that CARE continue to promote the human consumption of soybeans in Costa Rica by pursuing commercial uses of soybeans as well as the distribution of soy fortified foods by the GOCR.

Although CARE has been doubling soybean production in Costa Rica from 240 ha. in 1979/80 to 452 ha. in 1980/81 and to about 1,000 ha. in 1981/82, the soybean program in Costa Rica is still in its infancy and needs strong support to thrive. Production of soy foods in the Plant is still vital to help launch soybean production in Costa Rica and conversely, soy availability is vital to the success of the factory. However, since the capacity of the plant is limited, other uses of soybeans in Costa Rica are required to justify soybean production increases beyond 2,500 hectares<sup>1/</sup>. CARE, therefore, should attempt to promote additional food uses of soybeans to expand consumption.

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<sup>1/</sup> This figure will vary depending upon the products produced and the percentage of soy they contain.

ANNEX #1

NUTRITIONAL STATUS OF CHILDREN, AGED 2-6 YEARS,  
IN THE CEN HOT MEAL PROGRAM (23,000 BENEFICIARIES)

Degree of Nutrition	1976	1977	1978	1979	1980	1981
Over weight	4.4	4.1	5.9	8.5	8.5	9.0
Normal	35.8	43.8	44.3	47.7	50.3	50.87
1°	44.2	41.1	40.7	35.3	35.3	34.3
2°	14.1	10.2	8.7	8.2	5.7	5.6
3°	1.5	0.8	0.3	0.19	0.14	0.16

Source: Dr. Carlos Díaz Amador, Ministry of Health, Dept. of Nutrition