

HIGH LYSINE OPAQUE CORN PRODUCTION

CARE - COLOMBIA

MARCH 1976

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I. PROJECT PURPOSE AND DESCRIPTION

A. Goals

1. Improve the nutritional status of the at-risk target population receiving nutritional supplements, supplied by the GOC. In this case, Bienestarina (a Colombian produced high protein vegetable mix) will be distributed using locally-grown high lysine corn.

B. Purpose

1. Increase by 50% the effectively usable protein productivity of land used for raising high lysine opaque corn when compared to normal corn production.
2. Establish and maintain an effective marketing mechanism for high lysine opaque corn. Create demand for 4,000 tons/year within three years of project implementation.
3. Raise participant farmer's incomes by an average 300 pesos/month. (US\$10.00 per month).
4. Market high lysine opaque corn produced through Bienestarina production plants for later use in distribution to at-risk target population as established by ICBF (Colombian Institute of Family Welfare).

C. Inputs

1. Financial
 - a. CARE (through grant from AID). US\$52,665.00. For supply of material inputs (seed, fertilizer, insecticides), and purchase of high lysine corn production.
 - b. ICBF. US\$45,000.00. For supply of material inputs and purchase

training for farmer participants in program. Informal training through technical assistance and días de campo (field days) will be conducted throughout the planting seasons.

D. Outputs

1. 11,180 tons corn produced according to following schedule:

First season	80 tons
Second season	800 tons
Third season	1300 tons
Fourth season	2000 tons
Fifth season	3000 tons
Sixth season	4000 tons

2. 11,180 tons corn sold according to following schedule:

First season	80 tons
Second season	800 tons
Third season	1300 tons
Fourth season	2000 tons
Fifth season	3000 tons
Sixth season	4000 tons

3. 5590 hectares produce high lysine opaque corn according to following schedule:

First season	40 hectares
Second season	400 hectares
Third season	650 hectares
Fourth season	1000 hectares
Fifth season	1500 hectares
Sixth season	2000 hectares

4. 100 informal and formal training courses held for 500 campesinos during first year of project.
5. 2,000 pesos average profit/hectare per planting season on land used for raising high lysine opaque corn.

General Description of Project

This project is largely predicated on the knowledge that external food assistance from the United States, delivered through private and voluntary agencies such as CARE through the auspices of AID, as well as multinational food assistance through the World Food Program, will soon be coming to an end in Colombia. The feeding program has begun to phase down and will completely phase out before the end of 1978.

The Colombian government has responded to the challenge of decreased foreign food assistance by initiating an ambitious food and nutrition plan. The thrust of this plan is to improve the nutritional status of target population groups by raising their incomes.

However, the Colombian government is extremely cognizant of the fact that a sizable percentage of the population will be unaffected (at least in the immediate future) by even the successful implementation of such a program and must continue to receive supplementary inputs. Several possibilities are being explored (food stamps, direct supplementary food distributions, etc.). The GOC has elected as a key strategy the production and distribution of a high protein vegetable mix Bienestarina. It is to increase the quality of the Bienestarina produced that this project addresses itself.

Through this project and in coordination with ICBF (Colombian Family Welfare Institute), ICA (Colombian Agricultural Extension Service), Colombian Coffee Federation and CIAT (Center for Tropical Agricultural Investigation), CARE

intends to foster the small landholders' production of high lysine opaque corn (VE-21) in Southern Cauca and Northern Mariño. All corn produced will be marketed through the Colombian Institute of Family Welfare (ICBF) plants producing the high protein vegetable mix Bienestarina and/or through the Colombian Coffee Federation's animal concentrate plant located in Popayan, Cauca.

VE-21 is a variety (rather than a hybrid) brought originally from CEMMYT, Mexico and improved on by ICA as regards its adaptability and cristalline properties. It is a tall opaque variety of good protein quality and yellow relatively hard kernels.

A high degree of adoption of the recommended "package of practices" will be assured through the methodology of risk-sharing applied by ICA-CIID (International Center for Development Investigation) in its corn-growing experiments in the Rural Development Project in Caqueza, Cundinamarca. The first target population of small farmers has been identified in Guayabal, Cauca. The twenty small farmers have worked closely with ICA personnel for the last five years and is a model community. While all are poor, they have been interested and active in improving their income through the practices prescribed by ICA. It is also likely that for the first planting season, several larger landholders, better able to withstand risk, will be encouraged to plant the high lysine opaque corn.

By this pincher movement gained by both small and medium farmer adoption, the project designers believe that widescale future adoption will be easier than if a single approach is used.

Within three years of project inception high lysine opaque corn production of 4,000 tons/year, and approximately 2,000 hectares under production, will be reached. This will assure the minimum required amounts of high lysine opaque corn for the Bienestarina plants. Moreover, this project will substantially improve participant small farmers' incomes.

General Conditions Expected at End of Project

1. Bienestarina production
 - a. Assured regular and adequate supply of high lysine corn for production of Bienestarina. Within three years, a production of 4,000 tons/year of high lysine opaque corn is expected.
2. Production
 - a. Institutionalization of credit availability for high lysine opaque corn production as evidenced by willingness of Caja Agraria to finance crop production of high lysine corn.
 - b. 1,500 farmers successfully produce 4,000 tons/year of high lysine opaque corn. This has as a repercussion an increased average farmer income of 3,600 pesos /year.
 - c. Institutional technical assistance agency awareness of the importance and value of the project. This is evidenced by ICA

willingness to give technical backstopping to this project and to implement similar projects in other parts of Colombia.

II. PROJECT BACKGROUND

Project background can be divided into two elements:

A. Corn Production and Practices in Colombia.

Much of the information for this section is taken from "Descripción de factores asociados con bajos rendimientos de maíz en fincas pequeñas de tres Departamentos de Colombia" (Description of factors associated with low yields of corn in small farms of three Colombian departments) by Madora Ruiz de Londoño and Per Pinstруп-Anderson, CIAT Sept. 1975. Some relevant facts and figures about corn production in Colombia are the following:

1. In more than 70% of the farms producing corn, yields are less than 800 kilos/hectare. National average yields are between 1,000-1,400 kilos/hectare, similar to yields obtained 20 years ago.
2. Common cultural practices followed are:
 - a. 50% of farmers plant corn simultaneously with other crops.
 - b. The average lot planted in corn is .8 hectares. (2 acres)
 - c. Density is less than technical recommendations call for.
 - d. Very limited use of modern factors of production-improved seed, fertilizer, insecticides, etc.

3. The study suggests that the increased yield on the basis of only one of the "package of modern inputs" is not sufficiently high to compensate for cost and increased risk. (page 8).
4. The principal problems discovered in corn production were: (page 9).
 - a. Soil deficiencies, particularly phosphorous and nitrogen.
 - b. Rainfall variation.
 - c. Presence of insect damage.
 - d. Presence of diseases.
 - e. Lack of knowledge of certain cultivation practices.
 - f. Marketing difficulties.
 - g. Unavailability of certain inputs.
5. The area planted in corn as a percentage of total productive land is 20 to 25%. This represents 600-800 thousand hectares. It has remained relatively stable for the past 20 years.
6. Production.
 - a. 800,000-900,000 tons/year are produced in the country. The demand for corn has risen constantly while supply has stayed relatively constant. This led to the need of importation of significant quantities of corn during recent years. (page 12).
7. Use of modern inputs (page 31).

The percentage of small farmers using modern factors of production is extremely low. For example: 8% use

weedkillers, 5.3% use improved seed, 16.2% use chemical fertilizer, and 26.4% use insecticides. Only 1.3% use at least 3 of the above mentioned inputs.

The picture emerging from the above cited data is that corn production is stagnant. There is a very low adoption rate for the cultivation practices needed in order to assure increased yields/hectare.

B. History of High Lysine Opaque Corn in Colombia

The opaque -2 gene in maize caused attention after the initial laboratory results from Purdue revealed its extraordinary lysine and tryptophane contents in 1963 and 1964.

High lysine opaque corn was introduced to Colombia from CYMMIT in the mid 1960's. It was considered to be a viable alternative to solve nutritional and economic problems. Commercial opaque-2 maize double crosses were first released in Colombia in 1969 in sufficient quantity for use by the farmer. There was a concerted drive on the part of ICA and other agricultural sector agencies to encourage the planting and home consumption of the high lysine opaque hybrid, particularly by small farmers. Well over US\$1,000,000 was spent on perfecting the technology and on the dissemination of this technology to small farmers. However, by 1973, there was virtually no high lysine corn still being grown in Colombia.

What caused this dramatic reversal from what had originally been hailed as a panacea? A series of factors caused the program's failure.

1. The project was sold to small farmers as the way to improve

their nutritional status. The private sector apparently did not see any likelihood of profit from the sale of seed to small farmers and failed to supply adequate quantities of hybrid seed.

2. Small farmers who grew the high lysine corn were disappointed with its use for home consumption. It was "different" from their usual corn and therefore deemed unacceptable. The kernels were softer than farmers were used to, the color was different, the grain was "opaque", etc.
3. Yields per hectare were lower than for the high yielding hybrid corns (H-207 for example). However, yields were higher (using technical recommendations) than locally grown corn even with technical recommendations.
4. There was no adequate market for the high lysine corn produced. IDEMA failed to encourage production with an active purchase program.
5. Shelf-life was limited. Spoilage rapidly occurred as the soft endosperm was subject to insect damage.
6. Because small farmers could not replant from their own seed stock, the combination of these factors spelled the ruination for the expensive campaign mounted for the raising of high lysine corn.

Notwithstanding these weighty arguments, clear evidence exists as to the beneficial nature of high lysine opaque corn if certain constraints can be lifted. To quote from the CIAT Annual Report, 1973 (pages 127-

129): "Studies continued to evaluate the nutritive quality of vitreous endosperm (VE-21) maize and to compare it to that of the soft opaque (H 208) maize. Additional experiments with rats confirmed previous results (CIAT Annual Report, 1972), indicating that vitreous whole kernels as well as their separated endosperms are nutritionally inferior to opaque-2 kernels and endosperms, respectively (Table 9). However, studies with growing pigs showed that vitreous kernels were only slightly inferior to opaque-2 kernels, supporting a 10% less body gain but with similar feed conversion than the opaque-2 group during a 63-day experimental period (Table 10). Vitreous kernels are significantly superior to common maize both for growing rats and pigs.

A comparison of opaque-2 and vitreous kernels in combination with soybean meal to provide approximately 12% crude protein-diets showed that there is practically no difference in the nutritive quality of the two maizes under these conditions (Table 11).

Chemical analyses of the endosperms suggest that lysine may be the most limiting amino acid responsible for the slightly lower nutritive value of vitreous endosperm maize as compared to the opaque-2 (H-208) maize (Table 12). Preliminary observations in rats support this suggestion. Despite these nutritive differences, the propagation of the vitreous endosperm variety (VE-21) seems to be promising

to improve human and swine nutrition in tropical areas, as it will reduce the supplemental protein requirements, and it will be less susceptible to weevil damage than the opaque-2 maize. " (Underlining added).

To reinforce these points, let us examine the following quotation from "Yields and Acceptability of Opaque-2 Maize in the Tropics of Colombia" by C. A. Francis, et al from CIAT:

"Yield trials with farmers and acceptance surveys were conducted in Colombia in 1969-70 to assess the potential use of opaque-2 maize in the tropical regions of the country. . . There was a marked increase in yields when traditional farmer technology was replaced with a package of cultural practices which included adequate fertility, insect control, and weed control. Opaque-2 hybrids significantly improved the yield potential over the farmer's traditional varieties, whether he used his existing technology or accepted the package of improved packages. Farmer, wholesaler, and consumer acceptability of opaque-2 floury maize was found to be low. This may be improved by education, promotion and eventual development of a flint-type maize with the same nutritional quality as the opaque". (from Summary).

Moreover, as quoted from the same paper, (page 4): " The producer survey suggested that three factors may limit acceptance of opaque-2 maize: lower yields of opaque relative to normal maize, adverse farmer attitudes toward opaque-2, and difficulties in storing this maize

on the farm. For the present, farmers expected a higher price for this opaque maize to offset the disadvantages they associated with the crop. At the time of this survey, few of the wholesalers were willing to buy opaque-2 maize, due to a lack of information about potential markets and consumer attitudes. Consumer acceptance was found to be low, due to the floury nature of the grain - a type less used in the areas of the survey-. The majority of homemakers would buy the traditional flint maize, if both types were offered at the same price. There was no educational effort whatever in the study of consumers, and the survey results suggested that changes in cooking methods might give much better success in acceptability."

This project has been designed taking into account the difficulties analyzed, referred to in the history of high lysine opaque corn in the past in Colombia.

Following is a chart which summarizes past difficulties and the proposed solutions to each:

<u>Difficulty</u>	<u>Solution</u>
1. Sold as "nutrition panacea" to small farmer.	1. The project is based strictly on economic considerations.
2. Difficulties with home consumption-unacceptable	2. All production (except that used for seeding) will be sold.
3. Lower yields.	3. Compensated for by higher sales value/ton produced.

<u>Difficulty</u>	<u>Solution</u>
4. No adequate market	4. All production guaranteed through Bienestarina plant. Secondary market in Coffee Federation's Feed plant in Popayan.
5. Storage difficulties	5. Technical improvements in seed used (VE-21). Also, rapidity for sale guaranteed.
6. Hybrid seed used. Could not be re-sown.	6. Variety rather than hybrid used.

III. PROJECT ANALYSIS

A. Economic Effect of Project

Farmers participating in this program will receive a price which is based on the price of commonly produced corn in the area. It is calculated that there should be a 20% price differential per ton produced in favor of the high lysine corn. One half of this difference is to compensate for the expected lower yield per hectare calculated as being 10% compared to high yielding hybrid corn. The other 10% is to encourage farmers to participate in the program and to assure an improved economic well being for the participants. This differential will be maintained by ICBF through its purchases.

The techniques of risk-sharing which have been devised in Caqueza, Cundinamarca will be incorporated into this project to increase the percentage of small farmer acceptance of the total "package of technologies". As shown in the CIID Informa study, volume 4-#1, page 8, the incorporation of risk-sharing methods increased farmer adoption of new technologies from 22% to practically 100%. Acceptance of the

total "package of technologies" is required in order to assure acceptable yields for the high lysine opaque corn. It is expected that the recommended "package of technologies" will be improved seed (VE-21), fertilization, insect control, and increased density of planting.

3. Technology to be Used.

This can be sub-divided into the technology in farm production and that in marketing mechanisms.

1. Farm Production

The technology to be used is a modification of the farmers' current technologies with modern factors of production. The area where the project will be implemented in the first planting season --Guayabal-- has a modest percentage of farmers who have already adopted some of the recommended technologies. Furthermore, it is believed that with the implementation of the risk-sharing techniques demonstrated in Caqueza, a favorable adoption rate of the total "package of packages" can be assured. The tentative "package of practices" for the project is the following:

- a. Adequate seed bed preparation.
- b. Improved seed. It is contemplated that the high lysine opaque variety VE-21 will be used initially.
- c. Fertilization. Exact quantities of fertilization will vary according to the indications from soil tests.

- d. Weed control. Either hand weeding or herbicides will be utilized.
- e. Insect control. Adequate insect control will be acquired through commercially available insecticides.
- f. Isolation from other corn varieties. Non-crossing will be assured by:
 - 1. Geographical isolation. At least 200 yards separation from traditional corn and/or
 - 2. Variations in dates of planting. VE-21 will be planted at least two weeks earlier or later than other corn grown in the area to avoid contamination.
- g. Adequate storage practices for harvested seed. CIAT (Dr. Steve Temple) is currently studying potentially effective storage systems.

After the initial phase in the first planting season has been carried out in Guayabal, further areas of expansion will be chosen on the basis of surveys showing the appropriateness of the land and the likelihood of farmer acceptance of new technologies.

Expansion of production will be on basis of pre-established demand.

2. Marketing

High lysine opaque corn has a shorter shelf-life than corn currently grown in the area. A market will be assured through the Bienestarina production plants run and managed by ICBF. In order to assure rapidity in corn marketing, purchasing will initially be done directly by the Revolving Fund established by ICBF-CARE-Cafeteros in Cauca for this project.

Once received by the Plant, the corn will be ground into corn-meal and made into Bienestarina for distribution through established ICBF channels. Beneficiaries are segments of the Colombian "poorest majority" at risk population, particularly pregnant and lactating mothers and pre-school aged children.

C. Socio-Cultural Factors

Several of the reasons intimately related to the failure of the original high lysine opaque corn project were socio-cultural in nature. These negative features

have been circumvented in the conceptualization of this new project.

1. The high lysine opaque corn was not considered acceptable by the small farmers for food and feed by the small farmer himself. This project contemplates no use at the farm level for the harvested high lysine opaque corn except that needed as seed for the next planting season.
2. No adequate market was assured for the original high lysine opaque corn. This problem has been avoided by assuring a market for all production through Bienestarina plants, and animal concentrate plants managed by the Coffee Federation.
3. There are regional prejudices in Colombia related to corn color. These prejudices can be overcome by improved prices offered for high lysine opaque corn and by not demanding that any corn be used for home consumption.

D. Project Relationship to Guidelines

As discussed in earlier sections, the project fits the guidelines well.

Specifically:

1. It is designed to work with a portion of the "poorest majority".
2. It demands extensive local counterpart participation.
3. It requires Colombian national assistance and commitment.
4. It has potential widespread applicability throughout Colombia.

5. It is innovative in nature.

E. Institutionalization of Project

1. ICBF will buy all production up to a maximum of 4,000 tons/year.

It is believed that as the project is implemented, a demand for high lysine opaque corn will be stimulated for alternative uses (Animal Feed, other corn-based foods produced by private enterprise). The project will be considered to be institutionalized with regard to marketing when a demand for at least an additional 3,000 tons/year has been created for other uses than the production of Bienestarina. It is believed that this will occur within four years of project inception.

2. A second aspect of institutionalization is credit availability for the production of high lysine opaque corn. Production credit is currently readily available for the production of regular corn. The Caja Agraria and other credit entities currently have no line of credit for the production of high lysine opaque corn. Therefore, in the early stages of the project, credit will be made available for needed inputs through the Revolving Fund established and managed by ICBF-CARE. The project will be considered to be institutionalized when the Caja Agraria finances at least half of the high lysine opaque corn production credit. It is believed that this

will occur within three years of project inception.

3. The third aspect of institutionalization is small farmer acceptance of the new technology required for opaque corn production. It is felt that the combination of risk-sharing with several successful and profitable growing seasons will be sufficient to convince farmers of the usefulness of the new technology. This will be considered to be institutionalized when at least 100 farmers in the project area grow high lysine opaque corn for two growing seasons and, when interviewed, express intention to continue to grow high lysine opaque corn in the future.

F. The Role of Women

Women will be key participants in project execution as well as beneficiaries of its success. In Cauca and Mariño (the areas of central project activity) extensive agriculture and subsistence farming predominate. Women perform both important home and farm chores and are fundamental to the sustenance of the family. While it is impossible to quantify the percentage of the family income which is derived from the woman's participation, many key elements of the corn production cycle are done largely with women's participation. This is expected to remain unchanged, or even increase, with the adoption of the technology relevant to the raising of high lysine opaque corn.

Moreover, women are key beneficiaries in the reception of Bienestarina production. Because women in their child-bearing years are particularly vulnerable to the ravages of malnutrition, and because mother's health status is vital to children's health status, the vulnerable group of pregnant and breast-feeding women is viewed as crucial.

From both of the above expressed points of view, this project involves women, first as active participant in project execution, and later as primary beneficiary of project success.

IV. PROJECT DESIGN AND IMPLEMENTATION

- A. Participants in Project
- B. Expected Growth of Project
- C. Financing
- D. Operations Plan

This project represents the marriage of three circumstances:

1. The creation of a demand for high lysine opaque corn through the ICBF Bienestarina plants, and animal concentrates factory run by the Cauca Coffee Federation.
2. The existence of the promising variety VE-21 of high lysine opaque corn through CIAT and ICA technology and,
3. A methodology for radically increasing farmer acceptance

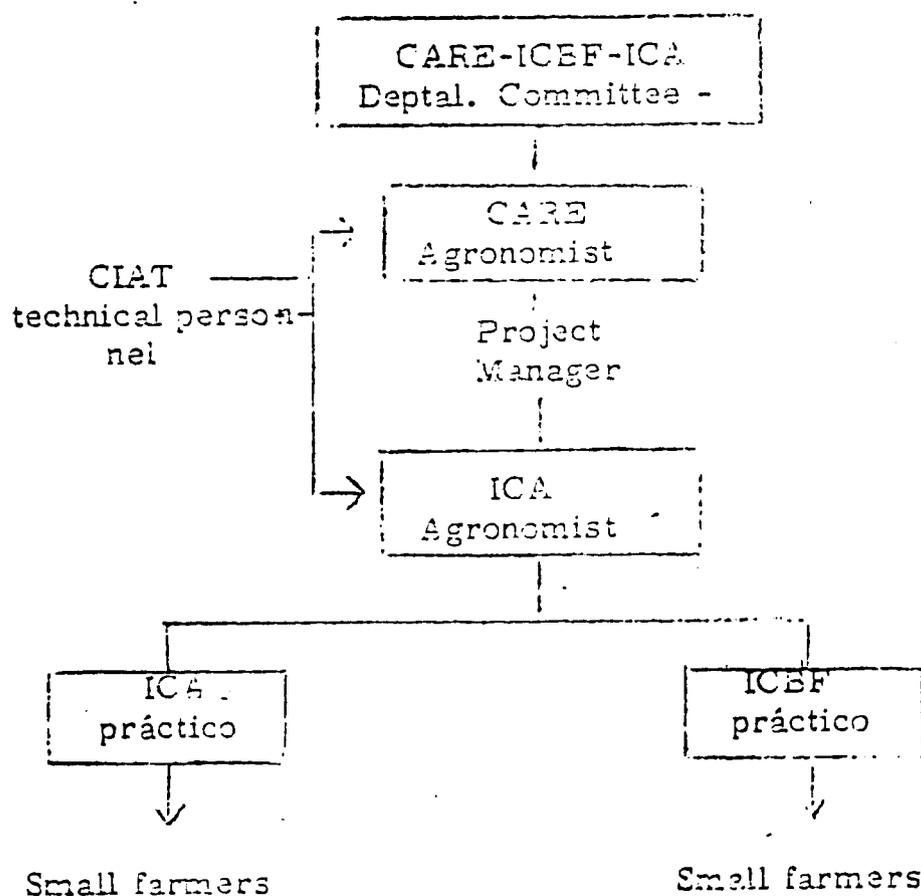
of new technologies through risk-sharing techniques as devised in Caqueza.

A. Participants in Project

1. ICBF. Financial participation through the use of PINA supervised credit fund. Technical assistance through the naming of an agricultural extensionist to oversee the project. The buyer of production through Bienestarina plants producing high protein vegetable mixes.
2. ICA. Technical assistance at two levels, corn program experts and rural development project extensionists whose principal offices are in El Bordo, Cauca.
3. Cauca Coffee Federation. Alternate marketing mechanisms through their animal concentrate plant in Popayán.
4. CIAT. Suppliers of seed and technology for the project. Technical backstepping in project design and execution. CIAT is providing the project with the original VE-21 seed and will make available other promising varieties periodically for field testing.
5. CARE. Financial participation in the establishment of Revolving Fund for financing project inputs. Technical and training assistance through a CARE project manager.
6. Small farmers. Participate by use of land and labor inputs in carrying out the project design.

This project will be implemented according to the following

organizational chart:



The functions of the departmental committee will be to make major policy decisions relating to such items as: Small farmer selection criteria, number of farmers to participate, and number of hectares to be seeded for planting season, terms of credit, purchasing policies for production etc.

The project manager will be directly responsible to the Committee for correct project implementation. He will report to the Committee on a periodic basis regarding key features of project progress.

Other personnel will be field implementers. They will organize small farmers, give technical assistance, monitor progress, report to project managers, etc.

Monitoring of total project development will be carried out by CARE, ICBF and ICA staff stationed in Bogotá.

B. Expected Expansion of Project

It is expected that through six growing seasons, the project will expand in the number of participant farmers, the number of hectares planted, tons harvested of corn and project related expenses for inputs and marketing. Predictions are as follows:

Planting season	# Campesinos involved	# hectares planted	# tons harvested	Material-cost inputs (US\$)	Small Farmer inputs (US\$)	Cost purchase for Bienestarina plants (US\$)
1	40	40	80	8,000	6,000	16,000
2	250	400	800	80,000	60,000	160,000
3	300	650	1,300	130,000	90,000	260,000
4	400	1,000	2,000	200,000	150,000	400,000
5	500	1,500	3,000	300,000	225,000	600,000
6	500	2,000	4,000	400,000	300,000	800,000

After third growing season, sizeable portion of total expenses will be absorbed by Cauca Coffee Federation, ICBF directly and Caja Agraria.

C. Financing

<u>Source</u>	<u>Description</u>	<u>Amount (US\$)</u>
1. ICBF	Credit for material inputs, marketing, technical assistance	49,500
2. ICA	Technical assistance	7,830
3. CLAT	Technical assistance	2,680
4. Cafeteros	Working capital for marketing	45,000
5. Caja Agraria	Credit for inputs	45,000
6. CARE (through AID)	Credit availability for inputs/ marketing, technical assistance and training	80,080

Total project value US\$230,090

Small farmers will contribute, during the first year only, land and labor, considered as worth US\$ 66,000.

The percentage of AID input to total project value (first year only) is 35%. After the first year, the AID proportion of the total value is even lower as the other entities are expected to enable the project to expand from its modest beginning.

D. Operation Plan

The following is the operation plan:

<u>Item</u>	<u>Date</u>
1. Project conceptualization	July 1975
2. ICBF concurrence regarding project design	Oct. 1975
3. Agreement in principle with ICBF	February 1976

<u>Item</u>	<u>Date</u>
4. Agreement in principle with ICA	February 1976
5. Agreement in principle with CIAT	February 1976
6. Baseline data for project collected	February 1976
6A. Presentation to AID for funding	March 1976
7. Formal agreements for constitution of Revolving Fund by ICBF-CARE	May 1976
8. Formal agreement for technical assistance ICA	May 1976
9. Formal agreement for technical assistance CIAT	May 1976
10. Name project manager for project by CARE	July 1976
11. Training of CARE project manager	July 1976
12. Small farmer motivation	July-Oct. 1976
13. Development risk-sharing methodology, specific to project site and cost information	July-Oct. 1976
14. First planting.	October 1976
15. Supply inputs on as needed basis.	October 1976
16. Informal and formal courses	October 1976 - January 1977
17. Cultural practices carried out as needed.	October 1976 February 1977
18. Technical assistance visits once a month average	October-Feb. 1977
19. First harvest	February-March 1977

<u>Item</u>	<u>Date</u>
20. Marketing for first harvest. Seed purchase for future increased plantings.	March 1977
21. Evaluation first harvest. Revisions of model as needed.	March 1977
22. Selection of new areas for project expansion	December 1977- March 1977
23. Repetition of steps 12-21 as needed for six planting seasons.	March 1977 Onwards

V. HIGH LYSINE OPAQUE CORN BUDGET (FY'77) FOR AIC SUBMISSION

	US\$ Salary Monthly	AID (to CARE)	ICA	CIAT	ICBF	Caja Agraria	Coffee Fed.
<u>I. Personnel and Salary Benefits (47%).</u>							
<u>A. Local Personnel</u>							
Project Director-Agronomist-12 mo.	420	5,040					
Agronomist - 3 months	650		1,950				
Agricultural extensionist - 12 months	250				3,000		
Agricultural extensionist (3)-6 mo.	225		4,050				
Agronomist - 1 month	1,500			1,500			
Sub-total		5,040	6,000	1,500	3,000		
<u>B. Travel Expenses</u>							
For project director-15 days/mo. x US\$15/day x 11		2,475					
ICA agronomist 2 days/mo. x US\$15/ day x 11 months			330				
ICA agr. extensionist 10 days/mo. x US\$10/day x 11 months		1,100					
ICBF agr. extensionist 10 days/mo. x US\$10/day x 11 months		1,100					
CIAT agronomist 6 days/year x US\$30/ day				180			
Sub-Total		4,675	330	180			
<u>II. Training costs</u>							
Sub-Total		8,000	1,500	1,000	1,500		
<u>III. Commodity Costs (locally procured)</u>							
Seed, fertilizer, insecticides					45,000	45,000	
Purchase high lysine corn production For F-100 or equivalent		52,665					45,000
Sub-total		58,665			45,000	45,000	45,000
<u>IV. Other Costs</u>							
1. Vehicle maintenance		1,200					
2. Office supplies-printing&stationary		1,000					
3. Postage, telephone and cables		1,000					
4. Light, water, cleaning services		500					
Sub-Total		3,700					
TOTALS		80,080	7,830	2,680	49,500	45,000	45,000=230,090
V. CARE Overhead Costs (7.5%)		6,000					
		86,080					

VI. LOGICAL FRAMEWORK MATRIX

<u>GOALS</u>	<u>Objectively Verifiable INDICATORS</u>	<u>Means of Verification</u>	<u>Important Assumptions</u>
1. Improve income of small farmer participants in project.	1. Average increase of 300 pesos/month expected	1. Survey of income sources among participating small farmers	1. No sizeable additional sources of income become available to target population
2. Improve nutritional status of population receiving Bienestarina	2. Measurable changes in pre-school and school children receiving Bienestarina food supplement	2. Benchmark and follow-up surveys of target population by ICBF	2. Bienestarina plants produce as planned.
<u>PURPOSE</u>	<u>EOPS</u>	<u>Means of Verification</u>	<u>Important Assumptions</u>
1. Increase usable protein productivity of land.	1. 50% increase in effectively usable protein when compared to normal corn production.	1. CIAT studies with laboratory animals combined with yield data from participating farmers.	
2. Establish effective marketing mechanism for high lysine corn.	2. Demand for 4 000 tons/year within three years of project initiation.	2. Sales records monitored by CARE project manager	2. Sales value of potentially competitive crops in terms of protein value (particularly soya) does not shift demand curve away from opaque corn.
3. Market high lysine opaque corn through Bienestarina production plants.	3. 3, 000 tons/year high lysine corn marketed through Bienestarina plants.	3. Bienestarina plant records.	

OUTPUTS	OUTPUT INDICATORS		Means of Verification	Important Assump- tions
1. Corn produced according to following schedule:	1. Semester	Production	1. CARE-ICBF project records.	1. Successful first season implementation, successful yields.
	1	80		
	2	800		
	3	1,300		
	4	2,000		
	5	3,000		
	6	4,000		
2. Corn sold according to following schedule:	2. Same as output 1 above		2. CARE-ICBF project records. Cross check with ICBF Bienestarina plant records and Cauca Coffee Federation records.	
3. 5,590 hectares put into production high lysine corn according to following plan:	3. Semester	Production (Hect)	3. CARE-ICBF project records.	3. Average yield remains 1,500 kgs/hect. -It is possible to overcome initial small farmer resistance to high lysine corn raising.
	1	40		
	2	400		
	3	650		
	4	1,000		
	5	1,500		
	6	2,000		
4. Small farmers trained in techniques of high lysine corn raising.	4. 10 formal training courses held for 50 farmers. 90 informal training sessions held for 450 farmers		4. ICBF-CARE-ICA records.	
5. Increased profit/hectare on land used for raising high lysine corn when compared to common corn.	5. 2,000 pesos increased profit per hectare/planting season.		5. CARE-ICBF project records.	5. Prices for inputs do not rise disproportionately to sales value of corn produced.

<u>INPUTS</u>	<u>BUDGET SCHEDULE</u> US\$	<u>Means of Verification</u>	<u>Important Assumptions</u>
1. <u>Financial</u>(*)			
a. CARE (from AID) Cash for material inputs and working capital for high lysine corn production purchases.	a. 58,665	a. Pertinent accounting records.	
b. ICBF. For material inputs and purchase of high lysine corn production.	b. 45,000	b. Pertinent accounting records.	b. Counterparts comply with obligation (financial and personnel) as established in contracts.
c. Caja Agraria. For financing material inputs.	c. 45,000	c. Pertinent accounting records.	
d. Cafeteros. Working capital for marketing.	d. 45,000	d. Pertinent accounting records.	
2. <u>Technical</u>			
a. ICBF. Agricultural expert providing technical assistance to small farmer participants.	a. 3,000	a. Pertinent accounting records.	
b. ICA. Agricultural expert (50% of time) plus agronomist (25%)	b. 6,330	b. Pertinent accounting records.	
c. CIAT. Agronomist and technical assistance.	c. 1,500	Same as b.	
d. CARE (through AID) Agronomist (100% time). Project supervision	d. 13,415	Pertinent accounting records.	
3. <u>Training</u>			
a. CARE (through AID). Organization and implementation of formal courses. Informal on the spot training.	a. 8,000	a. Pertinent accounting records.	

(*) Small farmers will also contribute land and labor during the first year.

<u>INPUTS</u>	<u>BUDGET-SCHEDULE</u>	<u>Means of Verification</u>	<u>Important Assumptions</u>
b. ICA/ICBF. Training courses both formal and informal	b. 3,000	b. Pertinent accounting records.	
c. CIAT. Informal training to CARE/ICA/ICBF personnel	c. 1,180	c. Pertinent accounting records.	

A. Evaluation

Evaluation is a fundamental element in any on-going project. CARE has a standard format for trimesterly evaluations of on-going projects. This format (the Project Implementation and Evaluation Report, or PIE) is prepared yearly, prior to the new fiscal year. It allows periodic monitoring of goals, proposed inputs and outputs. This allows CARE-Colombia as well as CARE-New York to monitor project progress and to take corrective action as required. This evaluation is supplemented by specific observations by the CARE staff regarding any particularly noteworthy deviations from predicted progress.

AID will be sent every four months copies of the PIE's as well as specific project observations.

In addition to the evaluations above mentioned, individual farm production, and cost data will be collected as well as relevant marketing data. The information will be regularly analyzed by CARE/ICA/and ICEF personnel. This information will be available on request to AID.

Following this page is the PIE proposed for this project.

FPC-CARE

CARE COLOMBIA

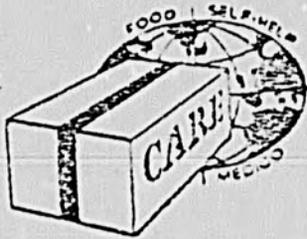
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CONMUTADOR 41 32 53 - 43 29 95 - 32 25 56

APARTADO AEREO 7240 - CABLES CARECOL

AL SERVICIO DE LA HUMANIDAD

15 AÑOS



March 31, 1976
No. 1788

Mr. Cary Kassebaum
Social Development Unit
USAID
Bogotá

Dear Cary:

Attached please find 15 copies of the Planning, Implementation and Evaluation Report (PIE) for the High Lysine Opaque Corn Production proposal submitted to AID on March 25.

These copies should be included as the last page of the above mentioned proposal.

Thank you for your attention to this matter.

Sincerely,

Samuel Levinger
Assistant Director
CARE-Colombia

Attached: as stated

/cich.

ACTION:
BAIR w/a-3
INFO:
DIA:
CHRON:
R. F.
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DUE BY:
4-7-76

PLANNING, IMPLEMENTATION & EVALUATION REPORT

Form AIP 1.5

Page 2 of 2

Country COLOMBIA

FY 1977

PCN

Title HIGHLY PRODUCTIVE CORN TECHNOLOGY

	FIRST TRIMESTER			SECOND TRIMESTER			THIRD TRIMESTER			TOTAL			REMARKS
	Plan	Actual	Deviation	Plan	Actual	Deviation	Plan	Actual	Deviation	Plan	Actual	Deviation	
INPUTS:													
<u>Financial</u>													
a) CCMC managed													
C.C.L.	120,945	20,200		26,150			60,595			120,945			
P.S.O.	0,635	2,878		2,878			2,878			0,635			
b) Non-CMC managed													
Counterparts	100,510	20,100		30,200			50,310			100,510			
Small farmers	66,000	13,200		19,800			33,000			66,000			
PROJECT ACTIVITIES / TARGETS:													
Increase by 50% usable protein productivity of land.	-			-			50%			50%			Measured at end of FY.
Produce 880 tons high lysine corn	-			80			800			880			
Raise participant farmer's income by US\$10.00 per month.	-			-			10%			10%			Measured at end of FY.
Raise high lysine corn on 440 hectares land held 100 farms and/or informal courses	15			35			400			440			
INTERMEDIATE GOALS:													