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CARE

CHILE

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COOPERATIVA AMERICANA DE REMESAS AL EXTERIOR



AL SERVICIO DE LA HUMANIDAD

8

June 23, 1978

TO : Mr. Ronald E. Ullrich
Chief, Food & Nutrition
USAID/Chile

FROM : Robert F. Linder
Director
CARE/Chile

Dear Ron,

I sure appreciate your assistance regarding the possibilities of CARE developing USAID's OPG projects.

Enclosed, therefore, for your perusal is the project proposal we have been discussing with New York in the hopes that they will provide all the funds, but considering the amount required there has been some delays on their part. We believe that the project is an excellent one and falls well into the primary purposes of OPGs. It will, however, need considerable alterations to comply with your format meanwhile, however, we would appreciate you will look it over and give us your comments when convenient.

Best personal regards,

Yours truly,
Robert F. Linder
Robert F. Linder
Director

RFL/gf
encl: as stated

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PROJECT PROPOSAL

I. General Description of Project.

In 1974 GOC initiated a program of "regionalization"* which is the decentralization of the Executive Branch of GOC. The Regions are numbered I through XII from North to South. In this proposal we will be dealing with the IX Region located approximately between latitudes 37° .5 and 39° .5 South with its capital city Temuco 700 Km. South of the national capital, Santiago.

The IX Region has 32,500 sq.Km. and population exceeds 650,000; this Region has one of the highest population densities of the country (about 20). The Mapuche Indian population accounts for 27.5% of the total: 179,000 Indians live largely in 2,300 "comunidades" having a total area of about 3,500 sp.Km. They practice subsistence farming for the most part; only sugar beets and lupins are being cultivated to some extent as commercial crops. ✓ Of the total Regional population 99,000 have been classified as "rural poor" with the Mapuches tending to predominate in this group.

These Mapuche Indians and other subsistence farmers, along with the poor school and pre-school children in the IX Region will be the direct beneficiaries of this program.

Over the past 15 years, the GOC has worked with CARE in feeding programs directed to the primary school and pre-school children of Chile. This project is intended to increase the income of small farmer families, mostly Mapuche Indians, inhabiting the IX Region of Chile. This will be done by promoting improved cultivation techniques for basic food grains and the processing of such

* See Appendix No.1 Glossary. See Map in Appendix 2.

grains into nutritious foods that will be distributed to school and pre-school children through existing channels. This will develop and encourage the use of these basic grains for human consumption. The grains contemplated for use in this project (oats, lupins, barley) are presently used mostly for animal feed.

During the course of this project's implementation it is hoped to establish the following:

1. Agricultural extension to small farmers to promote cultivation of grains such as oats and barley not being planted for human consumption at present.
2. The development and testing of processed food formulations based on oats, lupins, wheat, barley. The technology to be used is known as "low cost extrusion" and is available.
3. A food processing facility at a location within IX Region. It will preferably be attached to and operated by an existing private company (to be identified in due time). Operation to be supervised by CARE and IX Region Government (Intendencia Regional). (See Appendix 1).
4. The distribution of the processed foods to pre-school and primary school children using CARE's existing food programming counterparts (JUNAEB and JNJI). (See Appendix 1).
5. The marketing of processed foods through regular commercial channels.

II. Objectives:

Goals

- Improve standard of living of small farmers in IX Region - mostly Mapuche Indians - by increasing their income derived from food grain crops.

- Promote extensive human consumption of local food grains such as oats, lupins, barley at present underutilized as human foods.

Intermediate Goals

- Promote crop rotation and intensive cultivation of food grains by small farmers in IX Region.
- Set up and operate a food grain processing facility in the IX Region.
- Encourage use of blended foods produced and processed in the IX Region by school and pre-school children.

TARGETS

First Year:

- Purchase up to 30 MT of raw materials and additives for development work by INTEC/Chile. (See Appendix 4).
- Complete food product development.

Second Year:

- Complete field acceptance and tolerance tests in IX Region.
- Install and start food processing facility in IX Region.
- Purchase 195,000 Kg of processed food.
- Contract crops with 300 small farmers in IX Region (to be harvested and processed in third year).
- Distribute 195,000 kg. of processed foods through JNAEB and JNJI to 60,000 children.

Third Year:

- Purchase 380,000 kg of processed food.
- Contract crops with 600 small farmers.
- Distribute 380,000 kg of processed foods to 120,000 children and to commercial outlets.

Fourth Year:

- Purchase 625,000 kg of processed foods.
- Contract crops with 1,000 small farmers.
- Distribute 625,000 kg of processed foods to 180,000 children in Regions IX, VIII and X and to commercial outlets.
- Complete feasibility study for program expansion.

Fifth Year:

- Maintain fourth year levels of purchasing food, contracting for crops and distributing food.
- Decide on program expansion in accordance with feasibility study completed in previous year.

III. Project Background and Justification.

In order to demonstrate the commitment and concern of both the IX Region Government and the GOC with the improvement of living conditions in the depressed rural areas see Appendix No. 2.

It is considered feasible and desirable to increase the income of the poor rural families by increasing crop yields and by providing outlets for food grain crops such as oats, lupins, barley.

Because of the phasing out of CARE's traditional feeding programs in Chile and the continuing economic difficulties in the country, a program directed, as this one is, to the development of the poorest agricultural sector and the feeding of school and pre-school children amply justifies its initiation and implementation.

The small Mapuche farmers have demonstrated an ability to get lupin yields which are regarded as fairly high, in the 2,500 to 3,000 kilos per hectare range. This has been achieved by intensive cultivation techniques facilitated by the availability of free family labor; cultivation plots are of the order of one ha. It is desired to extend such intensive cultivation techniques to oats, wheat and barley since these cereals together with the lupins can form the base of highly nutritious food blends. Present use of oats, lupins and barley for human consumption is very low.

Lupins are of the lupinu albus species, varieties Multolupa and Astra. These are "sweet", i.e. non-bitter, varieties; the "sweet"

characteristic can be maintained by use of certified seed and appropriate cultivation techniques. Lupins have a protein content of 36 to 40% and 14 to 16% fat content, which make them highly interesting as ingredients in blended nutritious foods. An alternative would be the soybean but this is not cultivated in the Region.

Soil quality of the Mapuches' plots tends to be poor, being rated at best 4 to 5, on the scale of 1 to 8. Soil quality and crop yields can be improved by crop rotation, e.g. lupins, wheat, oats, and so on. Nitrogen fixation in the soil by lupins is 60 to 120 kg. per ha. leading to very significant savings in fertilizer. Promotion of crop rotation practice is deemed highly desirable and will depend on the availability of outlets for the grain crops. Outlet for food grains can be provided:

1. by increased direct consumption, involving development of new food habits through education and promotion.
2. by institutional consumption of processed foods at present CARE outlets (about 75,000 recipients per day in the IX region at JNAEB and JNJI, expected to expand to about 106,000).
3. by institutional and commercial consumption of processed foods through other existing outlets.

It is proposed to use outlets 2 (CARE institutional) and 1 (direct family consumption) to achieve the final goals of this project. The CARE institutional outlets will be used in the IX, VIII and X Regions (latitudes 36° to 44° south).

The Regional Government (Intendencia Regional/SERPLAC) has coordinated all activities aiming at rural development under a frame-work called Programa Integrado de Desarrollo Rural, (see Appendix No. 2) under which heading the project proposed herein will come too. A document describing the PIDR exists. Individual projects under PIDR are the responsibility of the Regional Secretariats (Agriculture, Health, Economics, etc.)

IV. Project Implementation and Administration

A. First Year (CY 1978)

1. Negotiation and signing of agreement between CARE and the Government of IX Region.
2. Signing of subcontracts with other participating agencies, i.e. INTEC, Caprosem, U. of Chile/Temuco, others.
3. Development and testing work at INTEC/Chile using extruding equipment provided by CARE (to be ordered upon signing of contract).
4. Field acceptance and tolerance tests in IX Region by Universidad de Chile/Sede Temuco, using food produced at INTEC.
5. Initiate extension work for cultivation of oats and barley by small farmers who will participate in project (Caprosem S.A. and INDAP).
6. Begin training of field personnel for home economics work with small farmer families (Universidad de Chile/Sede Temuco and possibly other agencies).
7. Begin study of IX Region private industry in order to identify the prospective partners for food processing. (PFP).
8. Set up the Project Administration Board (PAB) for the overall administration of the project. GOC IX Region, CARE, Caprosem, and other participating agencies to be represented.

B. Second Year (CY 1979)

1. Continue acceptance and tolerance tests. Note: if required produce additional batches of food at INTEC.
2. Formalize contract with partner in food processing.
3. Order necessary additional equipment for food processing.
4. Install and start up food processing facility.
5. Manufacture food for distribution by JNAEB and JNJI through November.

6. Distribute food: JNAEB through November, JNJI through December.
7. Contract for crops to be planted July through September. This will be done by the Caprosem S.A. seed cooperative under contract to PAB or to the Intendencia Regional.
8. Start home economics extension program aimed at small farmer families. By Universidad de Chile/Temuco campus.

C. Third Year (CY 1980)

1. Continue home economics extension program.
2. Resume food manufacture in January or February.
3. Continue food distribution by JNJI in January.
4. Resume food distribution by JNAEB and JNJI in March in IX Region.
5. Begin market development for commercial sales in September. This will be done by Partner for Food Processing.
6. Resume and expand basic grain production contracts with small farmers in March/April and July/September. To be done by Caprosem S.A.

D. Fourth Year (CY 1981)

1. Continue home economics extension program.
2. Continue or resume food manufacture.
3. Continue food distribution by JNJI.
4. Resume food distribution by JNAEB.
5. Make feasibility study for expansion of food processing facilities to serve both institutional and commercial markets throughout Chile (March through September). To be done by private agencies under contract with Intendencia Regional.
6. Initiate phase-down of CARE participation in food distribution to level previously agreed on with PAB (in June).

E. Fifth Year (CY 1982)

1. Program continues, see implementation and administration plan for CY 1981.
2. Phase-down of CARE participation in food distribution to be completed by June 30.
3. Decide whether CARE is to continue participation into next MYF period.
4. If feasibility study warrants it, expand grain production, food processing, distribution and marketing activities for the benefit of an ever increasing number of small farmers. To be done by Intendencia Regional and private business in IX Region.

V. Materials, Remittances, Costs.

First Year (CY 1973)

Materials and Equipment	
Raw materials and Additives	US\$ 10,000
Brady Extruder/Cooker	12,000
Contract with INTEC/Chile (see Appendix No.4)	12,000
CARE expenses in IX Region	
Transportation	1,100
Expendables	600
10% contingency funds	3,570
Total M&E	39,270
GOC IX Region Input	13,090*

*CARE P&O plus costs unknown at this time.

Second Year (CY 1979)

Additional Manufacturing Equipment	US\$	22,000
CARE participation in purchase of 195,000 kg of processed food (60%)		70,200
Contingency fund (5%)		4,600
Total CARE M&E		96,800

GOC IX Region Input

Participation in purchase of 195,000 kg of processed food (40%)		46,800
CARE P&O		32,270
Home economics extension program		5,000
TOTAL		84,070

Third Year (CY 1980)

CARE participation in purchase of 380,000 kg of processed food (60%)	US\$	136,800
Total M&E		136,800

GOC IX Region Input

Participation in purchase of 380,000 kg of processed food (40%)		91,200
CARE P&O		45,600
Home economics program		10,000
Total GOC		146,800

Fourth Year (CY 1981)

CARE participation in purchase of 625,000 kg. of processed food (40%)	US\$	150,000
CARE M&E		150,000
GOC Input IX Region		
Participation in purchase of 625,000 kgs. of processed food (60%)		225,000
CARE P&O		50,000
Participation in feasibility study (50%), other half on private sector		12,500
Home economics extension program		10,000
TOTAL		297,500

Fifth Year (CY 1982)

CARE participation in purchase of 625,000 kg. of processed food (25%)		93,750
CARE M&E		93,750
GOC IX Region Input		
Participation in purchase of 625,000 kg. of processed food (75%)		281,250
CARE P&O		31,250
TOTAL		312,500

	<u>DIRECT MATERIAL BENEFITS</u>		
	<u>Total CARE/ GOC Cost US\$</u>	<u>FARMERS* US\$</u>	<u>CHILDREN** US\$</u>
First year	52,360	---	---
Second year	180,870	27,800	117,000
Third Year	283,600	54,400	228,000
Fourth Year	447,500	89,300	375,000
Fifth Year	406,250	89,300	375,000

* based on an estimated return of US\$ 0.10 per kg of delivered grain.

** based on an estimated value of US\$ 0.60 per kg of delivered processed food.

CARE M&E

Year 1	39,270
Year 2	96,800
Year 3	136,800
Year 4	150,000
Year 5	93,750
	US\$ 516,620
	over 5 years

GOC INPUTS

Year 1	13,090
Year 2	84,070
Year 3	146,800
Year 4	297,500
Year 5	312,500
	US\$ <u>853,960</u>
	over 5 years

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APPENDIX I

GLOSSARY

- Regionalización: Policy and process of decentralizing National Government. Started in 1974 by GOC.
- Intendencia: Government of a Region.
- Intendente: Governor of a Region.
- IX Region: Consisting of Provinces of Malleco and Cautin.
(See Map)
- "Comunidades": Indian communities who farm land in common.
- JNAEB: Junta Nacional de Auxilio Escolar y Becas
(National Council for Aid to schools and scholarships). CARE's school feeding counterpart.
- JNJI: (National Council for kindergartens). CARE's counterpart for kindergarten feeding.
- INDAP: Instituto de Desarrollo Agropecuario. (Institute for Agricultural Development)
- IDI: (Instituto de Desarrollo Indígena. (Indian Development Institute)
- CORFO: Corporación de Fomento de la Producción. Production Development Corporation.
- ODEPLAN: National Planning Office.
- SERPLAC: Regional Planning Office.
- INTEC/Chile: Technological Research Institute.
- CAPROSEM: A seed cooperative in Temuco that will provide most of the seeds to the small farmers benefited by this project.

Republic of Chile
Interior Government
Intendencia IX Region
TEMUCO

Exempt Resolution No. 64
TEMUCO, April 26, 1977

In view of:

1. The importance and priority that the integral Program of Rural Development has as a part of the strategy and Regional Plan of Development of the Frontier IX Region; a program that assists especially the most needy sectors in the rural areas and in general channelling the Governmental program action toward the spatial, social and economic development of the Region, as envisioned in the process of National Regionalization.
2. The importance and effect that is achieved through the integrated Socio Rural Development Program for Los Lagos and Cautin (Contract UNICEF-ODEPLAN) and by the joint actions of Education, Health, and Indigenous Development and the private sector since September 1973.
3. The need to plan and coordinate all of the regional and sectorial resources toward rural development objectives and the need to apply a model of systematic execution and integration of the different services involved in the rural sector to obtain an efficient and permanent of action of all areas involved with the Program for Integrated Rural Development.

The facilities contemplated in the articles 5 of Decree No. 573 of 1974, and Nos. 1-2-3-4-5-6-3- & 9 of Decree No. 575 of 1974.

CONSIDERING:

The urgency to create an intersectorial structure of functions and services that will comply with the needs shown above and the need to leave without effect the Exempt Resolution No. 73 of the Intendencia IX Region of May 13, 1976 and to modify the Exempt Resolution No. 26 of March 3, 1977.

I RESOLVE:

1. To create an Intersectorial committee for the Rural Development of IX Region. This organism will be presided over by the Intendente of the Region and will be made up of:
 - Ministerial Regional Secretary of Agriculture
 - " " " " of Health
 - " " " " of Education
 - " " " " of Public Works
 - " " " " of Economy
 - " " " " of Land and Colonization

These members will participate permanently and decisively when the Intendente Regional requests it. They will have the responsibility of the execution and maintainance of the actions of the Integrated Program for Rural Development as well as the participation in the channeling of human, technical, material and financial resources of their Ministries or dependant services in a coordinated and efficient manner.

In addition, the following persons will also participate as permanent guests and with power to intervene in the deliberations of this Committee; to be designated by the Intendente:

- a representative of the Private Sector of the Region.
- a Vicerector, Director or Representative of each one of the Universities of the Region.

- a National Director of the Indigenous Development Institute (IDI).
 - the Executive Director of the Basic Program of Rural Development, designated by the Intendents.
2. The Regional Secretary of Planning and Coordination of the IX Region, will have the responsibility for the general planning and coordination of the program, in line with the National policies of the National Planning Office, ODEPLAN, and through an interdisciplinary and multisectorial team of studies with the attributes and responsibilities stipulated in the Decree Laws No. 573 and 575 of 1974 and D.S. No. 746 of 1975.
 3. Assign the Regional Secretariat for Planning and Coordination of the IX Region, the responsibility of drawing up a list of regulations which will show in detail and facilitate the functioning of the intersectorial committee of the Integrated Program of Rural Development.

MAKE NOTE AND BE ADVISED

DANIEL ARRIAGADA PINEDA
Coronel
INTENDENTE IX Region

FRANCISCO CONTRERAS ACUÑA
Secretario Abogado
INTENDENCIA IX Region

INTEGRATED PROGRAM OF RURAL DEVELOPMENT (IX REGION)

1. GENERAL PERSPECTIVE OF THE PROGRAM

1.1 Regional Government and Integrated Program of Rural Development

- The strategy of Development of the Frontier comprises 4 large areas of concern in the priority tasks of development. Concerns that are established specifically in the concepts indicated below:
- a) Development of the productive agricultural and forestry sector.
 - b) Development of the industrial sector with an emphasis on the derivatives of the processing of agricultural and forest, raw materials, specially with an orientation to food.
 - c) Development of tourism.
 - d) Integral development of the rural sector with a special emphasis of small farming sector, specially the economically and socially depressed sector.

This last point is a great concern of the Regional government and has been channelled into the INTEGRATED PROGRAM FOR RURAL DEVELOPMENT. This channel, which will specially involve the participation of both public and private sector, because it is a program of subsidiary action of the state directed toward a sector that is incapable of initiating its own development will adjust to a process of planning and coordination of action emanating from the National and Regional planning organism. In order that the Regional government and competent organisms achieve a rational and optimum use of the human, material and financial resources provided by the Central Government for development.

The strategy for the Frontier development should clearly distinguish itself in two areas of action.

- First, that action which does not require the direct state support for initiation of growth.
- Second, that action in which the public sector is essential because the area alone could not achieve results.

V. Intersectorial Committee for Rural Development.

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Page 5

The Regional Ministerial secretaries will see that their respective services, or dependant institutions execute works and implement programs, (training, production, reforestation, public health etc).

With these dependant and similar organizations work teams and units will be formed under their supervision in order to carry out the tasks of the program.

In this manner special participation will be given to INDAP (National Institution for Agricultural Development), IDI (Institute of Indigenous Development), CONAF (National forestry Corporation) SMS (National Health Services) INACAP (National Capacitation Institute) CORFO (Production Development Corporation) VIALIDAD (Highway department) ARTESANIAS (Handycraft) SCEE (Society for the construction of Education Establishments) UNIVERSITIES, specially in research and statistics.

Appendix 2.0

Programas Ministeriales ODEPLAN 1977 (Ministerial Programs 1977)
(Unofficial translation)

SOCIAL PROGRAM

V.1. GENERAL OBJECTIVES

a) Eradication of extreme poverty

The extreme poverty attempts against human dignity and its existence constitutes a vicious circle because poverty generates more poverty and more impediments for persons to try to get out of it and obtain their fulfilment as human beings.

b) Equal opportunities to all Chileans:

Will continue those programs intended to assure each person, work, education, health, the obtainment of an appropriate lodging and social security.

V.s.12 Junta Nacional de Auxilio Escolar y Becas (JUNAEB).

- b) Program of Assistance. The volume of financial resources will be increased by 12.3%, that is destined to this program, having as principal objective the improvement of caloric and protein content of the feeding rations up to a 30% of the daily requirements of children attending primary education. The goals for next year, according to the budgetary assignation for 1977, are the serving of 750,000 breakfasts and 200,000 lunches daily during 180 days.

National Commission of Scientific and Technological Research
(CONICYT)

2. Child care and Education program.

Executing Organism: Ministry of Interior through the Junta Nacional de Jardines Infantiles.

Objectives

- Provide to pre-school children of extreme poverty and adequate care in education and nutrition that guarantees a normal psydo-physiologic development and good results in school.
- Give free time to mothers of limited resources to allow them to work and contribute to their homes.

GOALS for 1977:

Assist at least 50,000 pre-school children through Jardines Infantiles and Centros de Atención Integral.

To attain this goal there is a budget for 1977 of \$ 238.104.000 approved by the Treasury.

VI.1 MINISTRY OF AGRICULTURE

.....

General Objectives

- a) Increase extension and research. This will be accomplished by searching those conditions that will make possible the private competition as a means to improve these services.

Land Tenure

- Finalize the material delivery of the 15,000 parcels of land programmed during 1976 before May 1 of 1977.
- Finalize assignation of all the land of CCRA to end the process of assignation.
- The Institute of Agricultural Development will make before April 30 a diagnosis of the (minifundista) small farmers sector with the aim to start as soon as possible from this date with a legal program for the regularization of the deeds for this sector.

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Appendix 2.2
(Unofficial translation)

Policy of Rural Development: The traditional policy has been focused only to develop land activities. Nevertheless, it is necessary to attain integral rural development, considering all the elements, the geographic situation and the economic potential. In regarding social aspects, this must be extended to the improvement of the conditions of life of rural inhabitants; for this, the Plan contemplates the continuation of the implementation of policies in the rural area regarding health, education, housing, electricity and communication.

Also it will continue and will push forward the Program of rural training specially orientated towards the training of agriculturalists.

Perspectives of development of the area

The increases of the anticipated surfaces for 1981, in relation with 1975, are in the order of the 200,000 ha. that is to say, 14%, which together with the better expected yields, will permit an increase of the agricultural production superior to the increase of the population.

On the other hand, good perspectives are seen of an extra increase in the value of the production in a short time in exports, specially because of the tendency shown in recent years by the legumine grains and dry fruits, and in a middle time, by a major industrialization of agricultural products in general.

It is estimated that in the 1975-1981 period, agricultural investment will reach 729 million dollars, of which only 6,2% will correspond to investments effected by the public sector.

Ministro Roberto T. Kelly

Chile- Estrategia y perspectivas de Desarrollo (1976)

Appendix No. 3

B. Agencies, Institutions etc. participating in Project.

1 Intendencia Regional (IX Region Government).

1.1 To act as partner in formal agreement with CARE.

1.2 To mobilize Regional resources for project, including manpower, institutions and funds.

1.3 To carry out specific tasks through the agency or regional secretariats (Planning, Economics, Agriculture, HEW)
Details on this will be spelled out separately.

2 CARE

2.1 To Provide materials and equipment for both the development and testing and the actual production phases.

2.2 To check out progress of all project activities.

2.3 To insure benefits to small farmer families and food recipients.

2.4 To finance, organize and oversee delivery of processed food to appropriate local agencies (JUNAEB, JNJI)

2.5 To check on quality of processed foods.

3 Instituto de Investigaciones Tecnologicas INTEC/CHILE

(Under Contract to CARE and Regional Government)

3.1 Carry out development and initial testing of processed foods.

3.2 Engineer production facility to be set up in IX Region (possibly with technical assistance from USDA/Colorado State University).

3.3 Collaborate with Universidad de Chile/Sede Temuco in field acceptance tests.

3.4 Provide backup quality control of processed foods.

3.5 Carry out additional development work whenever required.

4. Universidad de Chile/Sede Temuco

4.1 Carry out field acceptance and tolerance tests of processed foods in IX Region.

4.2 Carry out educational and promotional work aimed at the direct consumption of oats and lupins by the population at large in the IX Region.

5. Private Sector (Under contract with Regional Government and CARE)

5.1 Caprosem S.A.: provide seeds and extension services to small farmers for the cultivation of oats, lupins, barley, wheat; purchase grain crops from small farmers on behalf of project for supply of food processing facility.

Company X (to be selected at later date): operate food processing facility under contract to project.

Contract will state food specifications and production quotas, year by year.

6. Public Sector (Regional Government)

6.1 Instituto de Desarrollo Agropecuario INDAP

To provide credit to small farmers using existing credit schemes.

To provide extension services to small farmers where required.

6.2 Corporación de Fomento de la Producción CORFO

To select Company X

To insure that operation of food processing facility is carried out in compliance with contract signed by Company X, to select and oversee local contracting agencies whose services may be required for the setting up of the food processing facility.

6.3 Servicio Regional de Planificación y Coordinación SERFLAC

To coordinate and oversee all project - related activities by public sector in IX Region.

To insure budgeting and availability of project - related public funds, as required.



Instituto de Investigaciones Tecnológicas (CORFO)
Casilla 667
Santiago de Chile
Ave. Sta. María 06500 (Lo Curro)
Teléfono 201055

Santiago, October 7, 1977.
N° 83.320.77.

Mr. Robert Linder
Director of CARE/CHILE
Orrego Luco 42 (Providencia)
CITY

RE: Proposal for Precooked Food
Blends.-

Dear Sir:

Following your conversations with Messrs. F. Rossi and A. Trier of our Food Technology Department, enclosed please find a proposal for the development and testing of precooked food blends. We will be happy to discuss this proposal with you in more detail.

Also attached is a draft of a standard contract form (in Spanish) for the attention of your lawyer.

INTEC is well staffed to provide additional services as required by the rural development program to be carried out in the IX Region. In particular we will be able to assist local agencies such as the Temuco campus of the University of Chile regarding acceptance tests of food, provide technical backup to select the local company that will be in charge of operating the food processing plant, carry out the engineering work necessary for specifications, design, construction and startup of the plant, etc.

The budget of our proposal amounts to US\$ 11,880, with a schedule of 6 months effective working time. This sum does not include tax (IVA). I assume your institution has a tax exemption, which will have to be clarified with your lawyer.

INTEC's compensation can be either in U.S. currency or local currency, preferably under a lump sum payment plan. For instance 35% down payment when actual work starts, 35% three months thereafter, and 30% final payment on delivery of final report.

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Instituto de Investigaciones Tecnológicas/CORFO
Casilla 667
Santiago de Chile
Avda. Sta. María 08500 (Lo Curro)
Teléfono 201055

The contract can be signed any time you deem it convenient, but actual work shall commence once the machine is delivered at the INTEC site, which will be the starting date for the 6 month - long project.

With best wishes, and ready to embark upon such an interesting r & d work for rural development, I remain,

Very truly yours,

RICARDO BERNER
DIRECTOR OF COMMERCIALIZATION
INTEC/CHILE

Encl. 2

RBB/sps.



Instituto de Investigaciones Tecnológicas/CORFO
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PROJECT PROPOSAL

DEVELOPMENT OF PRECOOKED BLENDED FOODS
BY LOW-COST EXTRUSION TECHNOLOGY

Submitted to : CARE/CHILE
Submitted by : Instituto de Investigaciones Tecnológicas

Santiago, Chile
October, 1977



DEVELOPMENT OF PRECOOKED BLENDED FOODS BY LOW-COST EXTRUSION TECHNOLOGY

1.- INTRODUCTION

This proposal is submitted at the request of CARE/CHILE with the aim of developing blended foods to be used at a later stage in a rural development program in the IX Region.

- 1.1 Low-cost extrusion technology has been advanced in recent years under the sponsorship of USAID/USDA and CARE. The adequacy of this technology for the production of low-cost nutritious food blends has been demonstrated. The technology is flexible in allowing a rather wide range of input raw materials chosen among cereals and food grain legumes in such a way as to insure a nutritional value balanced in both protein and calorie content.
- 1.2 It is desired to apply this technology for the benefit of underprivileged rural populations in southern Chile making maximum use of existing CARE/CHILE and GOCh structures and programs.
- 1.3 INTEC/CHILE, a non profit publicly owned research institution, has pursued development work based on conventional extrusion technology since 1970. Machinery and equipment used in this work were made available to INTEC under USAID programs. Development work has covered:
 - 1) Precooking of cereal flours;
 - 2) do. grain legume flours;
 - 3) do. cereal/legume flour blends;
 - 4) texturization of soy and peanut flours;
 - 5) Application of precooked and textured products to specific foods.

This work continues and will in particular cover texturization of lupin and cottonseed flours. Some work has also been done on the conventional equipment to simulate low-cost extruder processing of flour blends.



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The INTEC/CHILE development work has materially contributed to the commercial introduction of conventionally extruded and textured foods to Chile on a large scale. For instance, the production rate of precooked flour blends for use in GOCh food distribution programs through the National Health Service SNS to families exceeds 10,000 metric tonnes per annum.

- 1.4 Introduction of low-cost extrusion technology to the country will require availability of a machine for test runs of the contemplated flour blends. It is deemed that development work at INTEC/CHILE for three specific blends can be carried out on such a machine within a period of six months effective working time.

2.- PROJECT OBJECTIVES

- 2.1 To completely develop, specify and panel test up to three extrusion cooked food blends incorporating raw materials such as oats, lupins, wheat, barley plus DSM and other additives as required.
- 2.2 To evolve preliminary process designs (grain to finished product) for the food blends chosen for actual production and to make preliminary cost estimates on the basis of raw materials and factory costs.
- 2.3 To supply batches for food acceptance tests in the IX Region by other agencies in the amount of up to 5 metric tonnes.

3.- PROPOSED ACTION

- 3.1 To install and operate at INTEC/CHILE, on a temporary basis, one Model 2160 Brady Cooker/Extruder for development and testing purposes. This work to be completed over a period estimated to be six months effective working time.
After completion of this phase the Cooker/Extruder will be available for transfer to a location in southern Chile for actual food production.



- 3.2 To determine Cooker/Extruder operating conditions for the processing of up to three food blends incorporating two or three of the following flours: oat, lupin, wheat, barley.
To determine conditioning requirements for the food grains involved in the processing.
- 3.3 To run chemical, physical, bacteriological and panel analyses on samples of the processed blends chosen for actual production.
Ditto for modifications of these blends involving DSM, sugar, salt, additives, flavors, etc.
Some acceptance tests to be run with children at neighbouring schools.
- 3.4 To establish preliminary specifications for production processes (grain to finished product) for each of the food blends designated for actual production.
- 3.5 To estimate cost of final products on the basis of raw materials costs and processing yields/losses.
- 3.6 To supply batches of food as required for acceptance testing in the IX Region by other agencies up to a total of 5 metric tonnes.

4.- INPUTS AND BUDGET

Note: INTEC/CHILE is a non profit organization. Costs charged represent best present estimates. The actual contract to be signed by CARE and INTEC can provide either for i) lump sum payment or ii) payment according to actual expenditure as per detailed accounting.

4.1 CARE/CHILE inputs not billed

- One model 2160 Brady Cooker/Extruder complete with 100 HP motor and starter, 50 cps, 380/220 V, plus attachment for water injection and spare parts required for 2,000 hours running time on 6% fat content flour blends.



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- Raw materials including clean oat, lupin, barley and wheat grain plus straight wheat flour, DSM, sugar, salt, minor additives. Total estimated at up to 30 tons. Details to be supplied in due time.
- Packaging materials, ditto.

4.2 INTEC/CHILE expenses requiring direct payment (stated in US. currency)

i.	Installation of extruder/cooker	1,000
ii.	Utility operating costs:	
	Extrusion cooking	500
	Grain conditioning and crushing/grinding	400
	Extrudate milling/blending/packaging	500
iii.	Expendable laboratory materials	750
iv.	Transportation	150
v.	Personnel costs	7,500
vi.	10% contingency funds	<u>1,080</u>
	Grand total	11,880

5.- TIME SCHEDULE

6 months effective working time counted from the date on which the extruder/cooker is delivered at the INTEC facilities.



What's it for . . . What's the price?

LOW-COST EXTRUSION COOKING

We move and learn at different speeds depending upon what we are exposed to during our development. This article describes a technology which possibly can be used by less developed countries to produce nutritious foods at a low cost.

In simple terms, extrusion cooking is a process in which materials are heated and worked mechanically while they are passing through a compression screw and extruded through a die or other restriction. When applied to foods, the extruded materials generally reach temperatures of 250-350 F in the extruder, remaining there, however for only a few seconds. The material generally becomes plastic during cooking and often expands or puffs when leaving the die as moisture contained in the material flashes to steam.

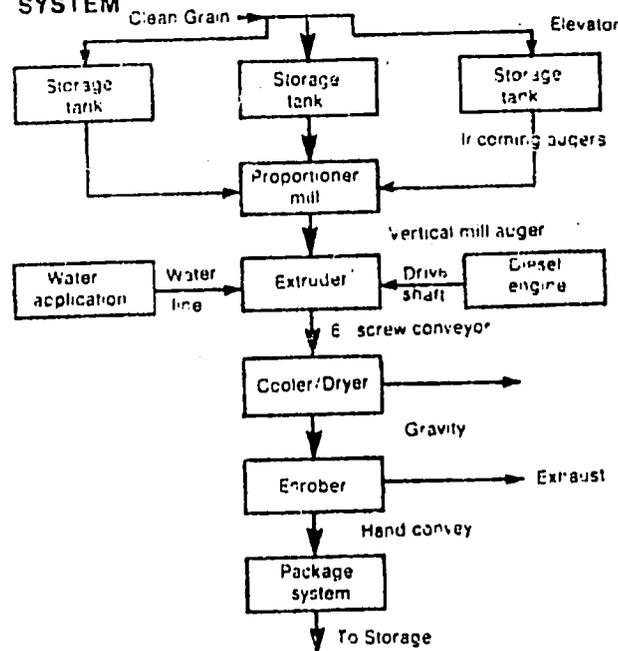
This results in changes in materials that make extrusion cooking a very valuable and unique process. It removes the raw, uncooked flavor from food, replacing it with cooked or toasted flavors that people have learned to like. It gelatinizes starch and modifies protein so that their functional properties are changed. The products become more susceptible to enzyme action and absorb water differently. Under extreme conditions, extrusion cooking can even break down starch molecules, dextrinizing them and making the product soluble or even sweet. It can destroy the natural enzymes and prevent their adverse effects. It can rebuild products by plasticizing and reforming them in new shapes and sizes. And it can change texture by creating porous, aligned structures that are in some instances quite unique.

Extrusion cooking is now practiced widely in the manufacture of textured soy protein products which are used as low-cost meat substitutes and extenders. It is used extensively to cook cereal flours to make food ingredients like the processed corn meal used in corn-soy milk (CSM), to make pet and animal feeds, and to make snacks like the popular corn curls.

Although it is a relatively new technology, it has been adopted quickly and now plays an important role in food manufacturing in the United States and Europe. For this reason it has been of special interest in programs in which developing countries have looked for technology to produce low-cost nutritious foods. Low income masses in the less developed countries (LDC's) usually derive most of their

calories and protein from cereals such as rice, corn, wheat, sorghum, etc. The staple is usually supplemented with legumes and an occasional portion of meat, fish, or chicken. Such diets tend to be low in calories and deficient in protein, especially for certain groups: women of child bearing age, infants and preschool children.

FIGURE 1. BLOCK DIAGRAM OF SNACK FOOD SYSTEM



Most of the people affected by malnutrition in these countries are found in small rural communities or in urban slums. In both areas, a common heritage of poverty, ignorance, poor sanitation and other conditions contribute to the problem of malnutrition and interfere with its solution.

Solution to problem

What can be done to solve the problem? One approach is to start from the food supply side and add needed nutrients by fortification with essential

amino acids, minerals and vitamins. Also blended foods consisting of mixtures of cereals and legumes or of cereals and protein sources such as soy and oil seeds can be processed into nutritious food products which are organically acceptable to the consumer.

Extrusion cooking's potential as a technology for producing these kinds of foods from commodities grown and processed in developing countries has been studied by the Agency for International Development (AID), the U.S. Dept. of Agriculture (USDA), and other governments and research organizations for several years. For example, the government of Colombia is currently developing an integrated

TABLE I. CAPITAL COSTS FOR SNACK FOOD FACILITY

A. Purchased Equipment	
Vertical conveyor	\$ 300
Storage tanks	2,025
Incoming conveyors	900
Proportioner mill	22,900
Extruder	4,500
Diesel engine	8,500
Water application kit	125
Product conveyor	600
Cooler/dryer/separator	7,200
Enrober	2,000
Packaging machinery	114,000
Electrical Equipment	1,400
B. Transportation Costs	
Crating	\$ 1,000
Freight	1,000
Shipping	3,800
C. Installation Costs	
Labor	\$ 1,150
Supplies	400
D. Services to Facility	
	—0—
E. Building	
	29,500
F. Land	
	500
	\$ 181,000
G. Contingency	
(20% of fixed costs)	36,360
Total capital costs	
less working capital	\$ 218,160

health and nutrition program which is intended to overcome malnutrition among children under two years of age and pregnant and lactating women in the poorest 30% of the population. One element in the program provides a subsidy for purchase of nutritious processed foods, one of which will be textured soy protein products, manufactured by two Colombian companies using large-scale extrusion cooking equipment.

Previous research and market tests

Also, for the past several years a variety of processed foods have been distributed in direct distribution feeding programs in schools and health centers in Colombia. Among these foods are the imported processed blended foods in which cereals and soy flour provide a nutritious, low-cost food suitable for consumption as a beverage, soup,

or flour for baking, including the CSM products furnished by the U.S. under P.L. 480, products which contain about two-thirds precooked corn meal made with extrusion cookers. According to the agreement between the Colombian government and the food donor organizations, imported foods will be phased down over time and discontinued altogether by 1978. Beginning in January of 1976, Colombia started manufacturing a locally formulated blended food, Bien-estarina, in three mixing plants having a total capacity of about 20,000 tons per year.

A third type of product, snack foods, can be made by extrusion cooking, like the corn curl snacks made by Jack's Snacks in Costa Rica. In other places puffed snacks made by other processes are consumed in enormous quantity. For example, in India a puffed rice product called Muri is consumed at the rate of about 500,000 tons per year. Muri is made by a primitive process called sand roasting, in which parboiled rice is moistened and shaken in hot sand until it puffs like popcorn. An economic analysis has shown that it can be made using modern extrusion cooking equipment and sold in competition with the traditional product, returning more than 50% on the investment. Furthermore, extrusion-cooked Muri can be fortified with protein, vitamins, and minerals and can be made with broken rice rather than whole rice to reduce the cost.

With all this information in hand, AID began the selection of the most economical equipment capable of producing extruded products. In 1974, Colorado State University (CSU) initiated a project in conjunction with AID and USDA to study the use parameters of two low-cost extruders, the Brady #206 Crop Cooker, manufactured by Koering Farm Division, and the Insta Pro extruder, Model 500, manufactured by Triple "F," Inc. ("Low-cost" refers to a very low capital cost per unit of throughput as compared with other extruders—generally less than \$5-10 per pound of throughput per hour versus \$10-100 for other types of extruders. They usually cost less than \$10,000 for a unit, whereas other extruders cost \$20,000 and more.)

Since it was felt that investigation of the extrusion cookers' capabilities required also an evaluation of the complete processing system (which included pre-processing and postprocessing of the major ingredients and blends), the pilot plant at CSU was provided with ancillary equipment flexible enough to address problems which could surface in testing programs performed in developing countries. In addition to the two extruders, the pilot plant equipment included a diesel tractor to serve as the power source to drive the equipment, bulk storage tanks for raw ingredients, a proportioner/grinder (Modern Mill Model 600), and conveying equipment.

A wide variety of raw ingredients were tested and extruded on both extruders. Extensive work was done on corn, sorghum, wheat and rice, normally in combination with soybeans. To a lesser extent, work was done on other combinations, some of them in LDC test locations using ingredients not normally available in the United States. To date all raw ingredients evaluated have been extruded successfully.

Economics of system

The economics of low-cost extrusion systems must be considered before they can be judged

Extrusion Cooking . . .

feasible. As an illustrative case, the cost of a plant that would produce a nutritious cereal snack will be presented. This example may be used in developing the cost for other similar systems. The costs may then be used to set a value for the products

TABLE 2. MANUFACTURING COSTS* FOR SNACK FOOD SYSTEM

Direct Production Costs

Raw Materials	
Grains	\$ 55.70
Enrobing ingredients	35.20
Packaging Materials	65.50
Labor	5.10
Utilities	
Electricity	1.20
Fuel	3.50
Maintenance	2.68
General supplies	.25
Shipping costs	4.50
TOTAL	\$163.63

Direct Manufacturing Costs

Payroll overhead	.42
Laboratory	.25
TOTAL	\$.67

Indirect Manufacturing Costs

Depreciation	7.17
Interest on borrowed capital	21.35
TOTAL	\$ 28.52

TOTAL MANUFACTURING COSTS \$192.82

*Costs given in \$/hr.

manufactured by the plant and/or determine how production rates affect the product value. This value can be used as an index of the economic feasibility of the system in comparing LEC's to alternative systems.

Snack food facility

The system is designed to produce a nutritious cereal snack that can be eaten from small bags without further processing. The raw materials used to produce the snack were maize and soybean in a 70% cereal/30% oil seed ratio. After extrusion the product was enrobed in an oil-spice-salt solution to improve its flavor.

A diagram of the system is shown in Figure 1. The raw materials are charged directly to the bulk storage; a proportioning mill is necessary for mixing the raw materials, as well as for pregrinding to achieve good product uniformity. A cooler/dryer is used to separate the fine materials for reprocessing. After the product is cooled it is enrobed and packaged. Two form-fill packaging machines are utilized at considerable expense, although at the rate of production chosen, a hand packaging system appears to be slightly more expensive.

A summary of the capital costs for the snack food production facility is shown in Table I. The working capital for a two-month period for this system would be \$70,710, reflecting the investment in packaging equipment for the system.

The manufacturing costs (Table II) are presented on an hourly cost of production basis. The influence of the high cost of packaging materials can

be seen to substantially increase the direct production costs. The high capital investment due to packaging machinery costs also largely affects increasing manufacturing costs.

The general assumptions used in calculating the cost of any low cost extrusion system is shown in Table III.

TABLE 3. ASSUMPTIONS USED IN DEVELOPING ECONOMIC ANALYSIS OF THE LEC SYSTEM

Raw Ingredients

Ratios	70% maize/ 30% soybean
Amount purchased (% of production)	105
Amount reduced to waste during dehulling (% of production)	-0-

II. Packaging

Type of bag	polyethylene
Bag size	60 g.
Cost per bag	\$0.003
Cardboard case size	48 bags
Cost of case	\$0.38

III. Labor Costs

Number of:	
Supervisors @ \$1.00/hr	1
Extruder Operators @ .50/hr	2
Packaging Equipment Operators @ .50/hr	2
Laborers @ .30/hr	6
Janitors @ .30/hr	1

IV. Shipping Costs

Maximum truck load (tons)	4.8
Shipping rate (\$/ton-mile)	\$0.30
Avg. shipping distance (mi)	30

V. Production Rate (lb/hr)

1000

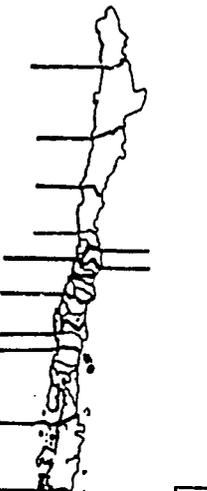
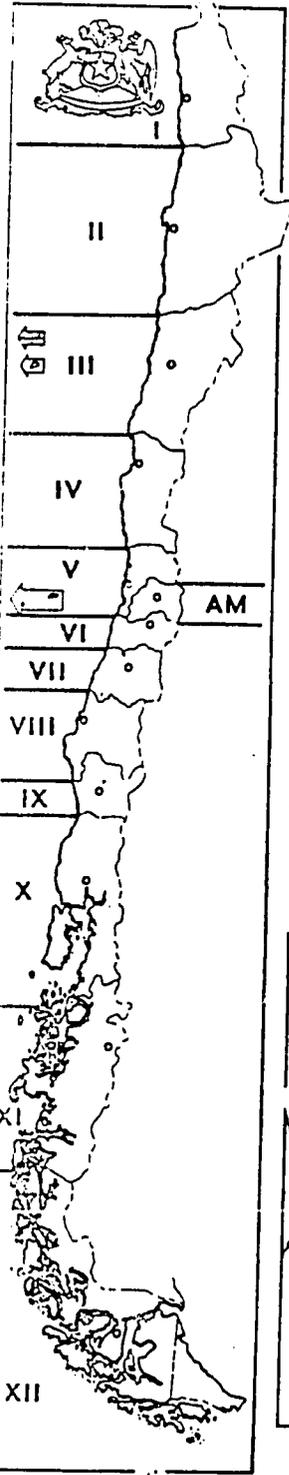
VI. Utility Usage

Electrical (kw/hr)	20
Fuel (gal/hr)	5

Position statement

At this point it is important to note that AID and USDA are supporting this work to explore low cost extrusion cookers as a technology which they believe might have applicability in developing countries and which would not otherwise be considered. According to USDA's Paul Crowley, "It is not our purpose to promote extrusion cooking as a technology when it is not appropriate or when some other technology is better. Nor do we intend to suggest low-cost extrusion cookers or machines made by particular companies when other types are more appropriate. Our aim is simply to make available knowledge of a new technology to those who might use it to the benefit of those in need."

This article is based on material supplied by USDA, AID, and Colorado State University. Next: Who's Trying It?



PAUTA PARA LAS TAREAS DE REGIONALIZACION con el Mapa Mudo Mundicrom.

MAPA DE CHILE

- 1º Trazar con líneas gruesas, en ROJO el límite entre regiones.
- 2º Colocar el número correspondiente y agregar nombre de región y capital.
- 3º Perfilar en NEGRO los contornos de cada región, dejando en azul las fronteras de provincias así como sus capitales.
- 4º Destacar en NEGRO las capitales de cada región.
- 5º Colorear cada provincia así como el escudo nacional.
- 6º Indicar en azul los números de algunos o todos los paralelos y meridianos, principalmente en las islas.

MAPA DE SUD AMERICA

- 1º Destacar Chile con el colorido.
- 2º Colocar nombre de países.

MAPA CHICO DE PROVINCIAS

- 1º Anotar nombre de cada provincia.
- 2º Agregar trazos que delimiten cada región, dejando en azul las fronteras provinciales.
- 3º Colorear cada provincia.

TERRITORIO CHILENO ANTARTICO

- 1º Darle el mismo colorido de Magallanes.
- 2º Reforzar de rojo la V que lo limita así como la frontera con Argentina.
- 3º Indicar grados 90 y 53.