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9. ABSTRACT In April of 1977 an A.I.D.- sponsored team of specialists from the Food and Feed Grain Institute of Kansas State University visited Paraguay to evaluate and recommend improvements in local marketing systems for agricultural commodities. The objectives of the study were to evaluate market system development within an area encompassed by the Community Based Area Development Project, evaluate three case study areas, and appraise the capability and needs of the government agency concerned with agricultural commerce and economics. The basic project region was evaluated with regard to market flows, intermediaries in the system, existing and needed physical facilities, training requirements, adaptive research needs, institutional capabilities, and market constraints. Recommendations discussed in this report include the following: (1) The proposed port facilities for Puerto Rosario should be constructed. (2) They would likely generate other commercial activities besides grain exports. (3) Members of the small farmer cooperatives should be offered a training program covering correct grain handling and storage procedures, equipment operation and maintenance, cooperative management, and extension marketing and credit practices. (4) A cotton gin should be constructed in the project area; it would be a very profitable enterprise. (5) The roads in the area need to be improved so that they are usable in wet seasons. (6) A pool of technically trained people in both the public and private sectors should be developed.			
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**Report No. 66**  
**May 1977**

**Evaluation and Suggested  
Initiatives for the**

***Development of Local Marketing  
of Agricultural Commodities  
in Paraguay***



**FOOD & FEED GRAIN INSTITUTE  
KANSAS STATE UNIVERSITY**

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**MANHATTAN, KANSAS 66506**

## REPORT SUMMARY

Title of Report/Publication: Evaluation and Suggested Initiatives for the Development of Local Marketing of Agricultural Commodities in Paraguay

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Principal Investigator: Dr. Roe Borsdorf

## SUMMARY STATEMENT

The objectives of this study are to evaluate and make recommendations for local marketing system improvements within a proposed community based development project area, to evaluate the replicability of the project design as it relates to local agricultural commodity marketing in other areas, and to suggest appropriate areas of institutional development.

The current situation within the basic project region was evaluated with regard to market flows, intermediaries in the system, existing and needed physical facilities, training requirements, adaptive research needs, human and institutional capability, and market constraints. Two other geographical areas were evaluated in the above context to provide comparisons to determine project replicability.

Recommendations set forth encompassed the three objectives within the proposed project area. Recommendations are concerned with community cooperative development (facilities, training and adaptive research), agribusiness development, and potential market constraints based on current expected actions. The last area led to suggested initiatives for developing human resources within the marketing services department of the Ministry of Agriculture.

In reviewing the handling facilities of DECA grain centers, it was observed that the excessive use of augers to handle soybeans could result in excessive bean breakage. It is recommended that the bean handling system be re-evaluated to determine a more satisfactory and efficient design before further construction is initiated.

**EVALUATION AND SUGGESTED INITIATIVES FOR  
THE DEVELOPMENT OF LOCAL MARKETING OF  
AGRICULTURAL COMMODITIES IN PARAGUAY**

Prepared by

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Prepared for the

**AGENCY FOR INTERNATIONAL DEVELOPMENT  
UNITED STATES DEPARTMENT OF STATE**

**AID/ta-C-1162**

**Technical Assistance in Grain Storage, Processing, and Marketing  
and Agribusiness Development**

at the

**FOOD AND FEED GRAIN INSTITUTE  
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## ACRONYMS AND ABBREVIATIONS

BID	-	Banco Interamericano de Desarrollo (Interamerican Development Bank)
BNF	-	Banco National de Fomento (National Development Bank)
COBADE	-	Community Based Development Project
DCEA	-	Dirección de Comercialización y Economía Agropecuaria (Marketing and Agricultural Economics Administration)
CAPA	-	Comité Agrícola Paraguayo-Alemán (Paraguayan-German Agricultural Committee)
MAG	-	Ministerio de Agricultura y Ganadería (Department of Agriculture)
UNIPACO	-	Union Paraguayo Cooperativas (Central Cooperative)
MT	-	Metric Ton
Kg	-	Kilograms
Km	-	Kilometer
Kw	-	Kilowatt
Ha	-	Hectares
Hr	-	Hour

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## I. PURPOSE OF STUDY

This study represents an integral segment of an approach to improve local agricultural product marketing through the Community Based Area Development Project and possible replicable projects.

The services of the Food and Feed Grain Institute were supplied through the Technical Assistance Bureau of USAID/Washington under the world-wide contract with Kansas State University at the request of USAID/Paraguay.

### Terms of Reference

The terms of reference as follows alludes specifically to grains. However, since cotton production is a major cash crop of small farmers, this commodity must be considered along with grains.

- Develop recommendations for local marketing systems and storage facilities tailored to the needs of the Rosario area and the Community Based Area Development Project. Specific recommendations to be incorporated in the interim report and PP.
- Based upon the Rosario area case study and as many additional case studies as time permits develop a general summary of local grain marketing conditions, priority needs for local marketing systems including changes in organization and facilities, recommendations for initiatives that could be taken by MAG for the improvement of the local marketing system to be incorporated in a General Marketing Study (to be used as a basis for future marketing projects).

With respect to the area development project:

- The agricultural engineer will evaluate local grain storage and handling facilities (cooperative storage, intermediaries, on-farm storage); evaluate local grain handling practices; and based upon local costs of materials and equipment, recommend steps to be taken to improve local storage and handling and the types of additional facilities most suited to the marketing needs of the community and the environmental conditions.

- The agricultural economists will evaluate local marketing conditions; analyze costs and returns of local marketing activities; project the needs for grain marketing infrastructure into the future, and recommend changes in the marketing system and specific steps to be taken by the cooperatives, intermediaries, farmers, and community to assure adequate, local-level marketing into the near future.

With respect to the General Marketing Study, the team will examine two or more localities (including one minifundio area, one colony area) to develop generalizations about local grain marketing conditions and recommendations of actions to be taken by the GOP and USAID. Their report should include the following points:

- Assessment of local marketing conditions; what marketing functions are presently performed by farmers, intermediaries, truckers, and cooperatives; what are the costs and returns associated with these functions, the degree of competitiveness in the local marketing situation.
- Assess the opportunities for improving the efficiency of the local marketing system and the extent to which storage/drying facilities could contribute to improved marketing.
- Identify the type of local storage and drying facilities, if it is found that they are needed, and/or the research needed to develop low cost facilities suitable to Paraguayan conditions.
- Identify the actions necessary and the type of program required to be undertaken by MAG to improve grain marketing at the farm level.

Due to time constraints and lack of adequate data, not all issues stated within the term of reference could be satisfied. However, an effort was made to observe, analyze, and meet the following objectives.

#### Objectives

The basic objectives of the TDY Study Team as requested by the RDO of USAID/Paraguay are as follows:

- To evaluate and make recommendations for market system development within the area being encompassed by the Community Based Area Development Project.
- To evaluate three "Case Study" areas (including the COBADE project area) and make recommendations concerning development of local level marketing with regional storage that would apply to a development of a replicable project design for micro-areas.

- To appraise the capability and needs of the Directorate of Comercialización and Economía Agropecuaria, and in view of marketing development needs, to recommend appropriate institutional development processes.

#### Background

The current agricultural commodity environment in Paraguay is described in the "Small Farmer Sub-Sector Assessment" and "Evaluation of the Market System and Potential for Agricultural Products in Paraguay." Both reports view the marketing of agricultural commodities in Paraguay from a national perspective.

The study team approach to local agricultural market system development was to collect information and observations that permitted description and diagnosis of marketing problems by agricultural commodity groups of grains, oil seeds, and cash crops. Wheat, soybeans, and cotton were selected because of similar characteristics in their marketing patterns which involve storage and distribution flows.

## II. RECOMMENDATIONS

This section presents an overall summary of market constraints, recommended local marketing system development initiatives within the proposed COBADE project area, suggestions for a replicable market development approach, and appropriate institutional development requirements.

Projects and programs which attempt to improve agricultural marketing systems must be viewed in perspective of the evolutionary process of marketing systems as countries become more developed. The three basic evolutionary stages of marketing systems are traditional subsistence, production-oriented, and market-oriented. In the case of Paraguay, the production-oriented market system exists where the typical marketing problems are storage, transportation, quality control, and basic markets. The next stage of evolution, the market-oriented market system, is characterized by typical marketing problems of processing, capital and credit, commodity exchanges, marketing services, consumer research, and packaging. Paraguay stands on the threshold of being able to enter the third evolutionary phase. The process of transition is not even. Different geographical areas and sectors of the total marketing system tend to evolve faster than other areas and sectors. In these cases, additional market constraints are added to the total system.

### Market Constraints

The current national agricultural commodity environment in Paraguay is characterized by the market constraints of a limited domestic market and the distance to export markets. However, the national constraints

are transposed to component constraints when evaluating local agricultural commodity marketing systems. These constraints are as follows:

- High distribution costs due to lack of a properly maintained road system. This is not a question of paved roadways, but one of maintenance. Neither dirt nor paved roadways are adequately maintained. The current system increases truck maintenance and reduces the life span of vehicles, therefore adding to already high transport operating costs.
- Lack of development of export markets for raw and processed agricultural commodities. Markets for major agricultural commodities that are exported are a result of increased world demand and prices. Apparently little action has been given by proper governmental authorities in providing marketing assistance and exploration to the sector.

Government related marketing constraints that are common to the current stage of agricultural marketing development are as follows:

- Public programs to facilitate market system efficiency are often either completely absent or ineffectively instituted and managed.
- Shortage of personnel with appropriate technical expertise on marketing issues.
- A strong tendency to place too much emphasis on providing physical "marketing" facilities.
- Marketing firms are expected to finance their activities with equity capital, borrowing from private money lenders, or in some cases, left-over bank credit.

In organizing marketing reforms, it is not enough to know what changes are needed and should be advocated to overcome marketing constraints and cause evolutionary changes. The implementors of programs must also know how the changes must be brought about and what some of the secondary and tertiary affects will be that will occur from marketing development within a given area.

It is not enough to recommend changes solely on the basis of immediate costs and benefits in economic terms, nor solely on the basis that a proposed loan will be repaid under terms negotiated. When instituting marketing changes, some of the considerations that need to be taken into account include the impact on employment, availability of credit and

returns to capital, the human and institutional capability for accomplishing development, diffusion effects of development benefits among the local inhabitants, etc.

Within the context of these considerations, the following subsections contain recommendations and suggested initiatives for the development of local marketing systems in various areas.

#### Recommendations for the Proposed COBADE Area

This area of development represents "a new approach for the economic development of the small farmer..... It fundamentally seeks to achieve a continuing interaction between small farmers and rural community leaders so as to define community needs in terms that respond to the requirements of small farmers and thereby enabling small farmers to contribute to and share in the benefits of the community's development." Within this framework of community based development, consideration can be given to the following recommendations for three major areas.

The first area of recommendation concerns itself with grain storage, handling and marketing. Since the colonies and large independent operators within this area now have adequate grain storage handling and marketing facilities, the proposed project should address itself to cooperative-small farmer development.

The recommendations for physical grain handling and storage at the cooperative level are as follows:

- Due to the development of the colonies and independent large scale operators, as well as the emergent participation of small-farmer cooperative units, the installation of any DCEA grain storage and handling center should be considered with caution.

- Though four small-farmer cooperative units have been organized in this area and have initiated operations, it is apparent that these units lack proper grain handling. Storage and marketing facilities are required for adequate functioning of these units.

- In considering the possible location for unused UNIPACO grain handling and storage equipment, as well as other required and future equipment, careful consideration should be given to proper grain flow requirements.

The following locations for the UNIPACO grain storage and handling equipment, consisting of a dryer (10 MT/Hr capacity), storage bins (2 X 150 MT) and a truck scale are recommended as follows:

- The dryer and storage bins to be located at the Itacurubi cooperative due to the lack of adequate facilities at this time.
- Since this cooperative has a 25 Kw generator ordered which is inadequate to power the dryer, it is recommended that the dryer be powered by the power-take-off of a tractor (80 h.p.) <sup>1/</sup>
- Due to the high costs of diesel fuel, consideration should be given to the adaptation of a woodburner (see adaptive research). Metal duct work can be built to collect wood furnace heat. The duct would be loosely connected to the burners because of dryer vibration.
- Location of truck scale should be deferred until location of a proposed cotton gin has been decided and decision of Port Rosario has been made.

The following recommendations with respect to the wood burning dryer at the General Aquino Cooperative are as follows:

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<sup>1/</sup>

Some tractors have power-take-off shafts that run at 550 RPM and 1000 RPM. If the available driving tractor has both, use the 1000 RPM drive and an 8.5 inch pulley to drive the 5 inch pulley presently on the fan hub. If the tractor has only a 550 RPM power-take-off, use a 15 inch drive pulley. A two-bearing permanent driving shaft will have to be mounted where the present electric motor is located and properly aligned with the fan pulley. If this shaft is properly positioned, the present drive belt can be used. The tractor pto can then be fastened to the opposite end of the drive shaft with two universal joints and necessary connections.

- The dryer as installed represents an extreme fire hazard, therefore, strong precautions are recommended when operating.
- Due to fan vibration, the unit should be detached from the wall.
- Dryer operation could be improved by bulk reception from the dryer which would require future bulk storage facilities.

The following recommendations are given with respect to the cooperative at Villa Rosario.

- Speedy repairs to the dryer should be undertaken before further deterioration makes the unit totally unoperational.
- Location of the dryer should facilitate bulk movement of grain to the storage bins.
- A small, wet holding unit with gravity flow to the dryer should be considered.

In advance to required cleaning equipment (see adaptive research), currently not at hand at these cooperatives, adequate weighing and sampling equipment should be added to check volume and quality of grain received.

The installation of the UNIPACO equipment and future additions depending on growth and expansion of cooperatives should be closely coordinated with proper training for total management of equipment and resources.

The location of the proposed port facilities for Puerto Rosario was visited and observations and recommendations can be summarized as follows:

- The installation of a small port facility may generate other commercial activities besides grain exports.
- Based on observations of current market flows and current production, a 3000 ton facility with proper handling equipment, including a truck scale seems sufficient.
- The facility should be built so as to allow for future expansion as required.

- This facility would alleviate the current stress on transportation from all production sectors as well as reduce demurrage costs due to closed roads after rains.
- Before construction of this port facility, an in-depth analysis for confirmation of current observations and expected future market flows and production should be undertaken.

The implementation of the above recommendations as well as growth and success of the cooperative small farmer unit will require some kind of human resource development. In addition to the current crop production extension service, a system of in-country training packages by national as well as foreign consultants should be considered under the proposed project. This training program should last for 1 to 3 weeks by area and cover the following:

- Correct Grain Handling and Storage Procedures
  - grain and oil-seeds characteristics
  - sampling for moisture, foreign materials and damaged grains (grain standards)
  - cleaning procedures
  - drying procedures under different conditions and by type of grain
  - handling and storage procedures
  - quality management through good aeration procedures
  - proper fumigation procedures
- Equipment Operation and Maintenance
  - specific training of operator by equipment
  - preventive maintenance and repair
  - at least two operators per type of equipment
- Cooperative Management
  - manager should be trained in overall equipment operation, maintenance and sound managerial practices.

- Extension Marketing and Credit
  - assembly of agricultural commodities
  - grading, sorting and packaging
  - transportation
  - developing market outlets
  - sound management uses of production and marketing credit

This proposed training package should be made available to all marketing-channel participants within the Community Based Development Project area.

Since this proposed project is basically a pilot project it should include an area of adaptive research which can eventually be transferred to other similar projects in other areas in the country. The most promising areas of adaptive research appear to be:

- using wood as a source of fuel for drying
- small batch-type dryers (IRRI dryers)
- passive system of solar drying
- equipment sizing at farm and cooperative level based on volume operation
- possible off-season cash crop

At the present time, the Food and Feed Grain Institute (KSU) is in the process of implementing a research unit in Costa Rica which will be concerned with problems involving grain storage, drying, handling and conservation in tropical areas. It seems feasible that this research institution could provide future technical assistance concerning these areas.

Existing marketing channels for agricultural commodities are not fixed permanently. They change and adapt themselves according to changes of supply, demand prices, taste preferences, infrastructures, and institutional changes, as well as evolutionary influences. Therefore, the introduction of a new marketing link such as a cooperative storage and/or process facility will alter the existing marketing channel for a given commodity.

The second general area of recommendations involves the introduction of a new link into the existing marketing channels for cotton in this area, with subsequent impact on marketing functions such as transportation and storage requirements, and general benefits to various groups.

It is apparent that enough production of raw cotton in the general area of the proposed project is at hand to justify the construction of a cotton gin. Though a prefeasibility study shows this proposed cotton gin to be a very profitable enterprise, an in-depth feasibility analysis should be conducted to reflect the following:

- A discounted cash flow analysis measuring total earning power of the investment.
- Proforma financial statements should be constructed to show period by period sources and application of funds, operational statements, and balance sheets.
- A financial rate of return analysis reflecting the earning power of equity capital will show potential investors the earning power of their investment.

Such an analysis should be based on expected production and demand volumes for a length of time of at least 8 years into the future besides showing total earning power and return to equity capital, such an analysis will facilitate obtaining credit from different credit sources.

Finally, though present cotton storage facilities in the area at farm and merchant level was deemed as adequate, the implementation of a cotton gin will alter the flow of raw cotton so as to increase the need for adequate storage.

Finally, the appeal of such a project can also be reflected in the creation of employment which would go a long way in decreasing present under-employment and through the added benefits increase the present economic situation of the area. Since this COBADE project calls for a total community involvement, it is essential that all groups relevant to the agricultural sector be included in the implementation decision processes concerning themselves with location and ownership.

Another major issue concerning this gin deals with the location of such a plant. At the time of the visit, two opposing forces seemed deadlocked as to the "best" location of the gin. This situation, besides harming relations between adjoining communities, may put the whole project in jeopardy. Therefore, if the purpose of such a project is to benefit the region as a whole, a locational study is recommended to define the "best" socio-economical location for the gin. In doing such a study, consideration should be given to transport costs to and from the gin to Asunción, Paranaqua and Port Rosario, variable costs according to location, changes of market flows depending on the location, etc. Though the population in the COBADE area amounts to a rough estimate of only 50,000 people, a potential market exists for edible oils. Furthermore, edible oils are being exported through Port President Stroessner to the freeport of Paranagua in Brazil. Therefore, the possibility of adding an oil extraction unit to the cotton gin should be examined in a future feasibility study since at the present time, all raw cotton is being

trucked to the Asunción area for processing and edible oils are being hauled to the COBADE area, the disposal of cotton seed meal through appropriate marketing channels will have to be established to make an oil extraction unit a viable enterprise.

Appendix D contains an outline of a complete feasibility and location analysis approach.

The third area of concern deals with potential market constraints which may hamper the successful development of this region. Specifically, constraints deal with roads, possible credit deficiencies and need to establish marketing outlets if off-season cash crops are introduced.

- Within the area of the proposed cotton gin, transportation to and from the gin may be hampered by the lack of properly maintained dirt roads.
- Since the cotton gin project as presented in the pre-feasibility study calls for private investment from producers, acopiadores, merchants, truckers, etc., consideration should be given to the possible creation of a lack of production credit which is mostly being provided by local merchants. Therefore, a contingency fund for additional production and marketing credit through BNF or any other suitable source should be established to bridge this possible gap during the first few years of implementation.

Since COBADE tends to integrate the community including small farmers and cooperatives, an in-depth marketing study should be undertaken to determine if the current marketing within the region and connecting channels to major markets will be adequate enough to absorb in an efficient manner the expected increases in future agricultural production.

Such analysis, as well as extension marketing services, should be provided under the auspices of the DCEA. The analysis and services should include the points stated on page 18, and deal specifically with the efficiency and effectiveness rather than a description of the existing marketing system.

Such services should be closely linked with the development of institutional marketing needs as proposed in the third subsection of the recommendations.

#### Replicable Approach to Local Marketing Development

In constructing a local development design that is replicable, consideration must be given to efficiency versus effectiveness of local marketing systems. In general, efficiency in marketing is concerned with the costs for performing marketing functions such as storage, transportation, exchange, etc. Underlying the concept of efficiency is that the marketing functions must be performed in connection with a given volume of product and that resources used should be kept to a minimum in accomplishing the tasks.

Effectiveness is concerned with whether the marketing system is performing its functions reasonably well in terms of the objectives of the systems. The effectiveness of a marketing system needs to be evaluated in terms of several objectives, as serving the different interests of producers, distributors, and consumers. And the system may not perform equally well for all -- particularly in the short run.

The currently proposed pilot project (COBADE) as a framework for implementing future similar projects is a sound overall approach since it is constructed to provide a systematized community development approach that includes the small farmer segment of the community. Local market development objectives are basically the key to exactly how replicable this project framework may become in terms of marketing agricultural products. Objectives must be considered in the context that geographical areas differ in production levels, types of crops, future potentials

for production, infrastructures, people, present marketing system development, etc. The objectives and strategy of local market system development are not replicable from one area to another because of these differences and must be redefined for each individual project area.

In view of the observations and evaluations made of the Pastoreo and Minifundio areas (see Section III); market flows, future potentials, and production differences indicate these areas would obviously require different marketing development objectives as well as different marketing objectives, than the current proposed COBADE area.

The segments of the framework that are directly replicable include adoptive small farm technology, cooperative production and marketing structures, extension marketing activities, and community project identification and implementation under the auspices of the community agricultural development committee.

While the above are transferable, intensity of emphasis will change by area. As the cooperative production and marketing structure is transferred to areas without prior knowledge or use of this mechanism, greater effort must be placed into establishment and basic operations. Crop production patterns and technical feasibility of changing crops will determine what technical aspects of the cooperative structure may be transferred. The same situation holds for extension marketing activities. While these activities consist of such components as assembly, sorting and grading, packing, shipping, finding outlets, utilizing credit, etc., alternative combinations and intensity of activities will be required in different geographical locations due to the characteristics of these locations.

If this concept intends to encompass an area where a government grain service center exists, it may or may not be able to utilize such a facility. This would depend upon the proper evaluation of marketing objectives, including and not including the service center. In many instances, this project structure will not be able to utilize such a center until development occurs within the affected area.

The total community based development concept is not a project design in which marketing system development can be duplicated region by region, but it is a replicable design which will achieve success if the foregoing discussed alternations are considered when transferring the basic project design.

#### Institutional Development Needs

Marketing activities are performed by individuals working together within the framework of many and varied institutions. The institutions give form and continuity to the individual actions and to the overall marketing process.<sup>1/</sup> Often institutional growth lags behind other programs because trained personnel are not available to staff facilities or to implement market activities.

The basic need for institutional development calls for human resource development within two areas:

- Developing a pool of technically trained people to handle problem identification and policy implication studies as related to marketing needs; and
- Creating a large number of individuals with operational and management capabilities to perform the functions essential for the efficient operation of marketing and agribusiness institutions of all kinds.

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<sup>1/</sup>

Institutions denotes both the public and private sectors, such as governmental marketing agencies, private enterprise firms, producer organizations, cooperatives, etc.

Within the present framework of DCEA, consideration should be given to future continuity and expansion of present services and assistance as required. The present operational structure and input of DCEA could be improved along the two areas mentioned above. Furthermore, technical training concerning storage and marketing of all agricultural commodities at department or district level seems to represent a desirable addition to existing production extension services provided by MAG. This service should be provided by DCEA in coordination with MAG.

The analytical and policy issues which could be strengthened are basically four. First, initiate in-depth interior and exterior marketing analysis dealing with effectiveness and efficiency rather than only with information and descriptive issues. Based on supply and demand, market shares, costs advantages and disadvantages, prices, etc., a thorough understanding of weaknesses and strengths of present marketing channels can be gained upon which sound policy decisions can be based. Second, the development of a capacity for sound feasibility analysis and locational studies for storage and processing facilities will help towards better decision making with future involvement in grain and commodities (See Appendix E). Third, pricing and marketing policies with respect to such agricultural products as wheat, which suffers from high production costs, should be reviewed since present policies do not contain enough incentives, nor are they flexible enough to increase production at a faster rate. Fourth, adequate grading standards for all agricultural commodities should be established to meet special internal grading requirements and facilitate a better, less costly, and less wasteful marketing process.

The operational issues which would increase the operational effectiveness of DCEA are as follows: First, due to the limited size of the internal market, the Paraguay economy depends to a great extent on export markets. Furthermore, since Paraguay has a locational disadvantage as compared with other countries producing the same agricultural commodities, a promotional market-oriented "Sales Department" for Paraguayan agricultural commodities would help unlock new markets, expand existing ones, and may help increase world market share. Second, an extension marketing management and credit assistance department could help reduce current marketing costs, improve quality of products, reduce spoilage and price fluctuation by increasing the effectiveness and efficiency of current marketing channels.

While the above could be achieved with in-country or out-of-country training, the assistance at department or district level could perhaps be done totally within the country depending on the design of a given training project as previously explained in this section.

Institutional development needs require special emphasis, and as previously noted, maybe out-of-country training would be a desirable objective for speeding up implementation of the process to achieve required levels of institutional development.

It is recommended that a separate project be considered that concerns itself solely with solving institutional needs at DCEA. It would be expected that further development of a governmental agency would result in a transfer of training and information to other institutions, both public and private, as required.

### III. EVALUATION OF THREE LOCAL MARKETING AREAS

Three local area marketing structures were observed on a case study basis. Observations included available storage and handling procedures, market flow data if available, available facilities, estimated current production, and possible future production. The detailed notes of individual observations are attached in Appendix A, B, and C. The basic study area was within the Department of San Pedro where the proposed Community Based Area Development pilot project is to be located. Other case studies were more confined and were used as a basis for comparing observations for recommendations under Section II.

#### COBADE Area

Observations made within this area were confined to geographical areas involving the localities of Itacurubí del Rosario, General Aquino, and Villa del Rosario. Market channel flows for cotton, soybeans, and wheat are illustrated in Figures 1 through 3. These flows illustrate many different aspects, such as:

- Final destination of commodity to areas in and near Asuncion reflecting a high concentration of agribusiness industries at or near the capital city.
- The high concentration of industries around the capital city implies a backhaul of products derived from wheat and cotton, such as wheat flour and edible oils.
- While wheat and soybeans tend to move directly from producers (colonies and coops) to final destination points, cotton illustrates a greater involvement of intermediaries within marketing channels.
- Concentration of production is split heavily along commodity lines, with colonies producing 76 and 91 percent for wheat and soybeans, respectively, and cotton being concentrated 100 percent with small individual producers of which only 9 percent is being produced by cooperative members.

FIGURE 1: Flow Diagram of Cotton Marketing Channels in COBADE AREA.

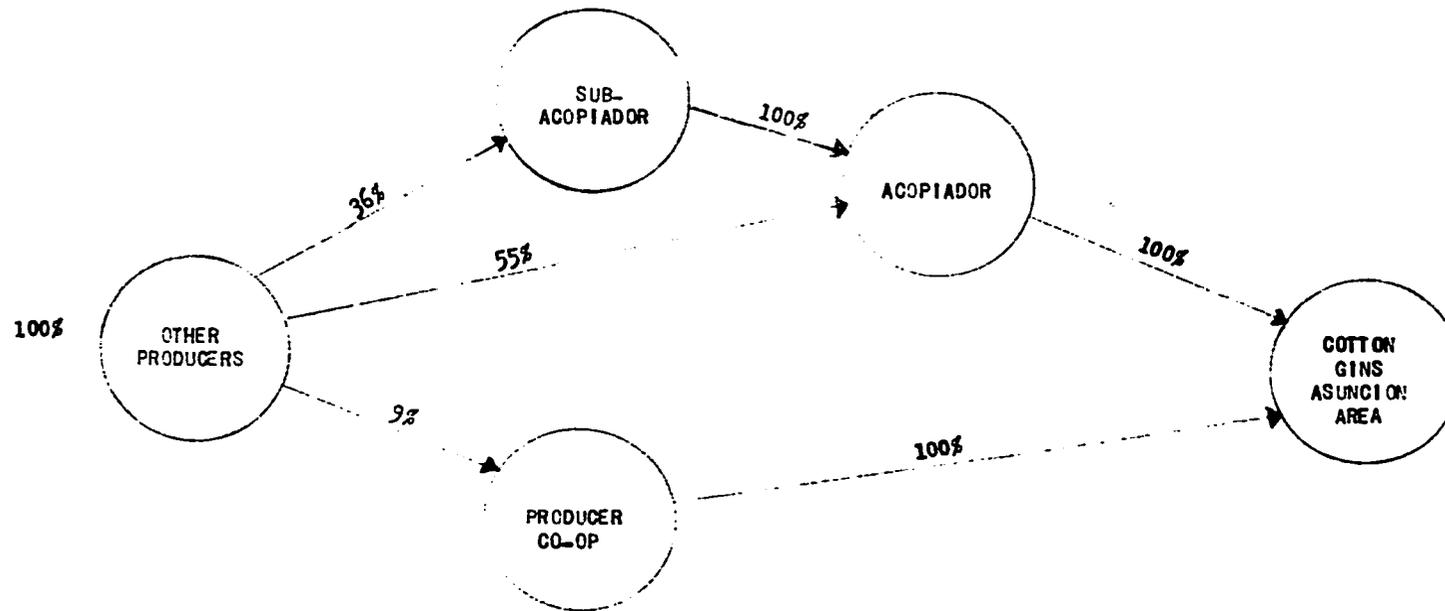


FIGURE 2: Flow Diagram of Soybean Marketing Channels in COBADE AREA.

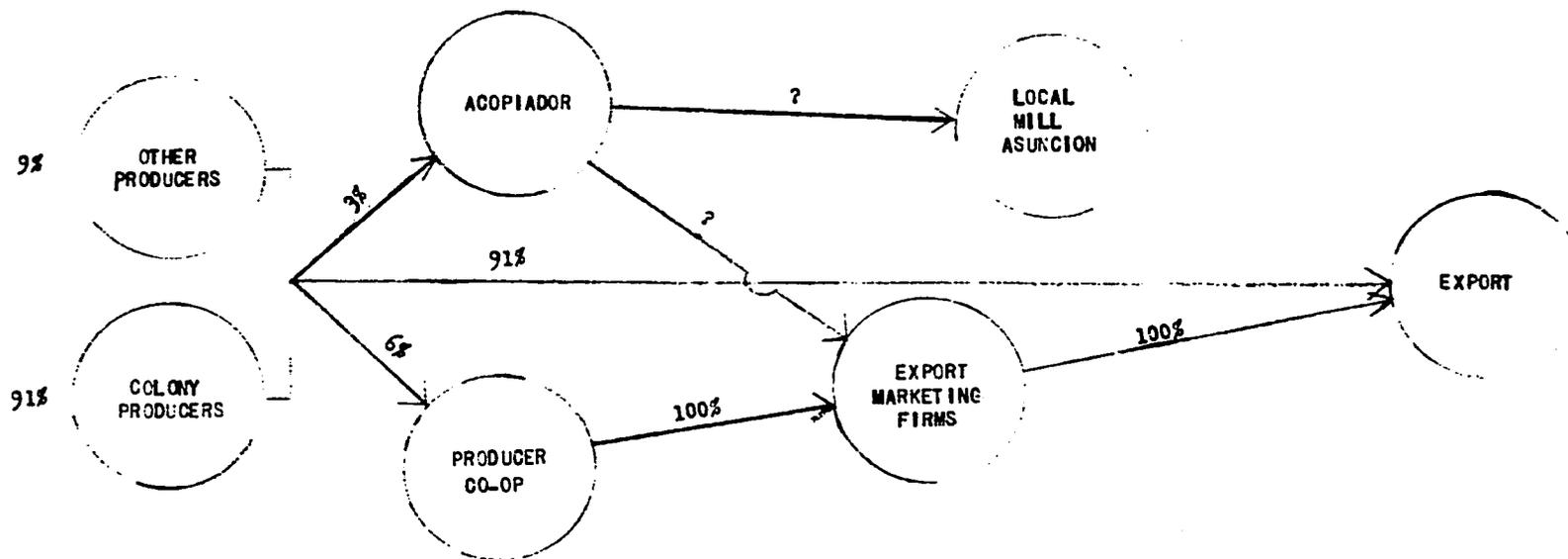
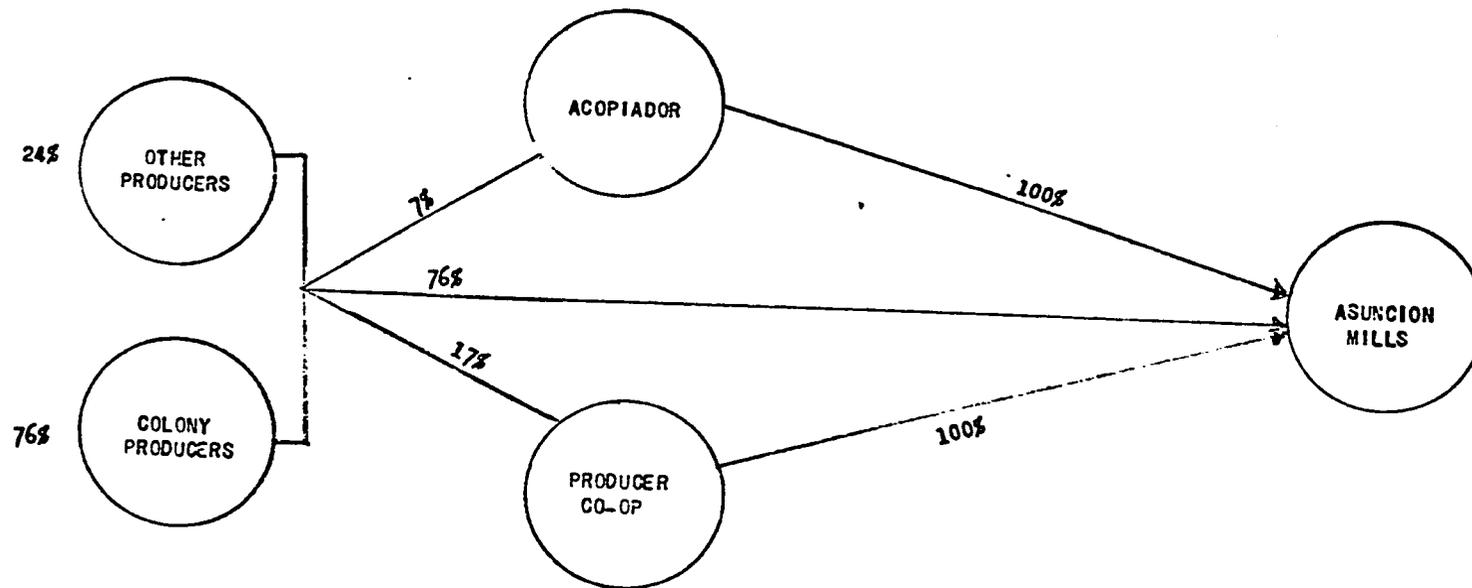


FIGURE 3: Flow Diagram of Wheat Marketing Channels in COBADE AREA.



Transport methods vary according to commodity. Cotton is 100 percent transported by truck while soybeans and wheat movement are 3 and 63 percent by truck transport respectively. The balance of these commodities are shipped by river transport from Port Rosario and Port Mbobicuá.

Transport cost for raw cotton is extremely high to the Asunción area (\$23.81/MT) due to the characteristics of the commodity (i.e., sacked raw cotton being high volume, low density), as well as lack of properly maintained road infrastructure causing high truck operational cost.

Transport costs for wheat or soybeans from the Rosario area to Asunción via truck amounts to approximately \$21.83 per metric ton. While river transport for wheat from Port Mbobicuá to Asunción is approximately \$11.11 per metric ton, soybeans can be transported by barge to Buenos Aires for approximately \$15 per metric ton.

Currently, storage and handling facilities for cotton in this area are barely adequate due to the recent increase in cotton production.

Collected data about current cotton production and potential expansion is shown in Tables 1, 3 and 4. These figures illustrate that future expanded production of raw cotton may stress current handling, storage, and transport facilities.

Soybeans are a very sensitive commodity and much damage can result if not properly handled. The safe long-term storage level is 11% moisture and average relative humidity in this area will not allow this level to be reached with natural air drying. Some type of heat drying is essential to reduce soybeans to a level of 14 percent moisture for short-term storage (2 to 3 monthly). Aeration is needed in bins or silos where beans

are held for any great length of time before shipment. When heat dryers are used, soybean exposed temperatures must be accurately controlled to minimize cracking, maximize processing, and retain a viable germination level if soybeans are to be used for seed. Handling must also be gentle to minimize cracking and other physical damage.

Current total storage availability for wheat and soybeans in the Rosario area is sufficient. Should this area expand to the limit of potential expansion (potential hectares times present yields), present and planned total storage facilities seem to be sufficient.

Table 1

ESTIMATED TOTAL HECTARES UNDER DOUBLE CROPPING CULTIVATION  
AND POTENTIAL EXPANSION - COBADE AREA

Place	Cultivated (Ha.)	Potential (Ka.)	Total suitable for farming
Estancia Triangulo (Herman Yuilfs)	116	134	250
Itacurubí Coop	386	614	1000
Friesland (Mennonite Colony)	2000	1000	3000
Gral. Aquino Coop	703	4000	4703
Virgen del Rosario Coop	103	unknown	103
Volendam (Mennonite Colony)	<u>4000</u>	<u>1000</u>	<u>5000</u>
TOTAL	7,300	6,748	14,056

Table 2

EXISTING AND PLANNED STORAGE AND DRYING CAPACITY - COBADE AREA

Place	Existing Storage (MT)	Planned Storage (MT)	Existing Drying Capacity (MT/Hr)	Planned Drying Capacity (MT/Hr)
Estancia Triángulo (Herman Yuilfs)	2500	unknown <sup>1/</sup>	8	unknown
Itacurubi Coop	<u>2/</u>			<u>2/</u>
Friesland (Mennonite Colony)	2500	1500	8 <sup>3/</sup>	
General Aquino	<u>4/</u>		1	
Virgen del Rosario Coop	300 <sup>5/</sup>		1	
Pto. Rosario		3000		
Volendam (Mennonite Colony)	<u>8000</u>	—	—	
TOTAL	13,500	4,500	52	

<sup>1/</sup> Mr. Yuilfs has plans for increased drying and storage capacity, however, exact figures could not be obtained.

<sup>2/</sup> Only a warehouse. Possible location for the UNIPACO storage bins (300 tons total) and dryer (10 ton/Hr.)

<sup>3/</sup> They have 4 bins with perforated floor for drying.

<sup>4/</sup> Warehouse only.

<sup>5/</sup> Not operational.

Table 3

ESTIMATED CURRENT PRODUCTION  
FOR THE PLACES VISITED - COBALE AREA

Place	Soybean (MT)	Wheat (MT)	Cotton (MT)
Estancia Triángulo	232		
Itacurubí Coop	225	425	unknown
Friesland (Mennonites)	3500	2000	
General Aquino Coop	52	235	301
Virgen del Rosario Coop	26	unknown	124
Volendam	<u>7200</u>	<u>5400</u>	<u>      </u>
TOTAL	11,235	8,060	425

Table 4

ESTIMATED 1975/76 COTTON PRODUCTION IN THE SAN PEDRO DEPARTMENT

Location	Production (MT)
Villa de San Pedro	2,415
Villa del Rosario	630
Arroyo Morotí	100
Vacá Jhú	420
Itacurubí del Rosario	2,771
General Aquino	1,674
San Estanislao	2,343
Santa Clara	1,275
Choré	1,242
Tacuara	500
Nueva Germania	92
Lima	412
Felipe Matiauda	970
Jejuí	260
Col. Guayayhú	100
Col. Liberación	100
Col. Carolina	<u>200</u>
TOTAL	15,504

Source: Anteproyecto de una desmotadora de algodón en Pto. Rosario, Departamento de San Pedro, Paraguay. Autor: Victoriano Cardozo, Asunción, Paraguay. Marzo 1977.

Though some producers have adequate present and planned storage facilities for soybeans and wheat, others have none or unoperational present facilities. This would include the cooperatives at Itacurubí, General Aquino, and Virgen del Rosario. Due to double cropping, wheat may use the same handling, drying, and storage facilities as those being used for soybeans.

While technical expertise at the colonies and major producers was deemed as excellent, a definite lack was observed in the three cooperatives within this area.

#### Pastoreo and Port Pte. Stroessner Area

Observations were made within general areas adjacent to the highway to Port Pte. Stroessner. Included were two private firms handling soybeans, a large producer cooperative, a colony area, and the Pastoreo area in general.

Market channel flows for cotton, soybeans, and wheat in the Department of Caaguazú are illustrated in Figures 4 through 6. When compared to market channel flows of the COBADE area (Figures 1 through 3), these flows illustrate a wide diversity of production and marketing of agricultural products.

- Concentration of production of agricultural products by commodity and producer. For example, wheat and soybeans are produced exclusively by colonies whereas cotton is produced exclusively by small farmers.
- Marketing channels are less developed than the COBADE area.
- Lack of cooperative enterprise among small farmers is evident. Transport methods are limited to truck transport. Transport cost for soybeans from export firms to the Port of Paranaguá is approximately \$28.57 per metric ton. Trucking cost from the Pastoreo area to export firms in the Port Pte. Stroessner area is roughly \$5.95 per metric ton. Conversely, transport costs to the Asunción area is approximately \$15.87 per metric ton.

Minifundio Area

Observations were made of the minifundio area in the Department of Paraguari, in and around the localities of Paraguari, Carapeguá, Acahay, La Colmena, and Ybycuí. This area is characterized by the abundance of minifundios and large cattle ranches. The minifundios range from an average of less than 10 hectares (82 percent of the Carapeguá area) to no more than 20 hectares per minifundio in the Ybycuí area. It is apparent that as the distance from the local towns increases, the hectares per minifundio also increases. This area is also characterized by the lack of other cash grain off-season crops such as wheat. Only 2,000 hectares of soybeans and 2,200 hectares of wheat is being produced by larger farmers. Furthermore, while the colony at La Colmena had a very intensive production of vegetables with a marketing outlet in Asunción, the minifundios produce less and less of this type of crop as the distance to the capital city increases.

The flow of agricultural commodities produced for sale goes to Asunción by means of acopiadores and truckers charging approximately \$7.94 per metric ton from Carapeguá to \$11.94 per metric ton from La Colmena. Again, La Colmena suffers from an unpaved road which is not adequately maintained.

Market flows for commodities are very similar to those illustrated in Figure 4 for all products produced by small farmers. This illustrates the fact that little market outlet development has taken place within the area nor has any significant amount of cooperative development taken place, with the exception of credit cooperatives.

Since grains and oil-seed production are not major commodities within the area, no assessment of current storage nor needed storage is possible.

FIGURE 4: Flow Diagram of Cotton Marketing Channels in Department of Caaguazú.

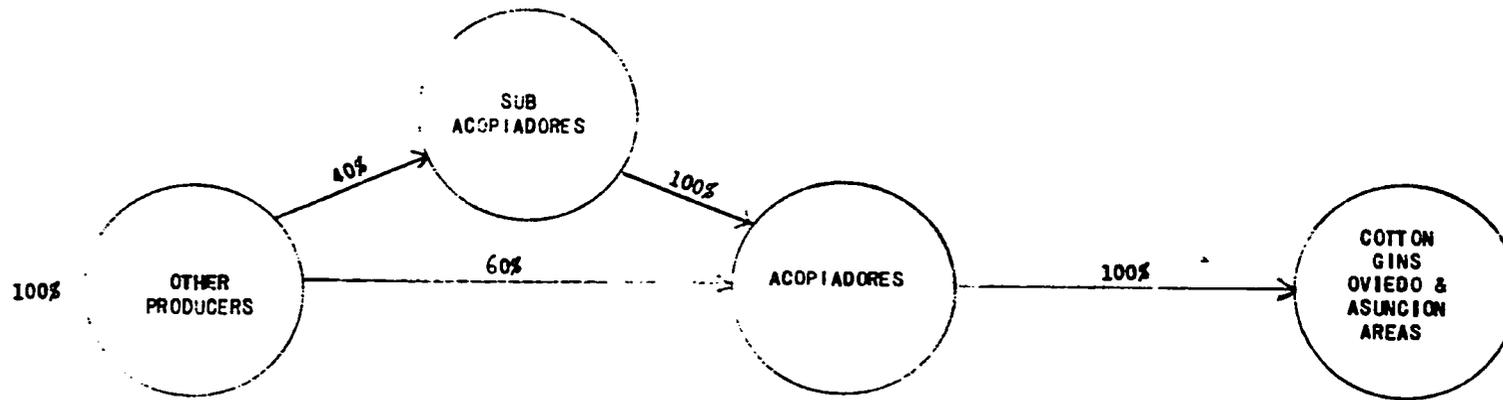


FIGURE 5: Flow Diagram of Soybean Marketing Channels in Department of Caaguazú

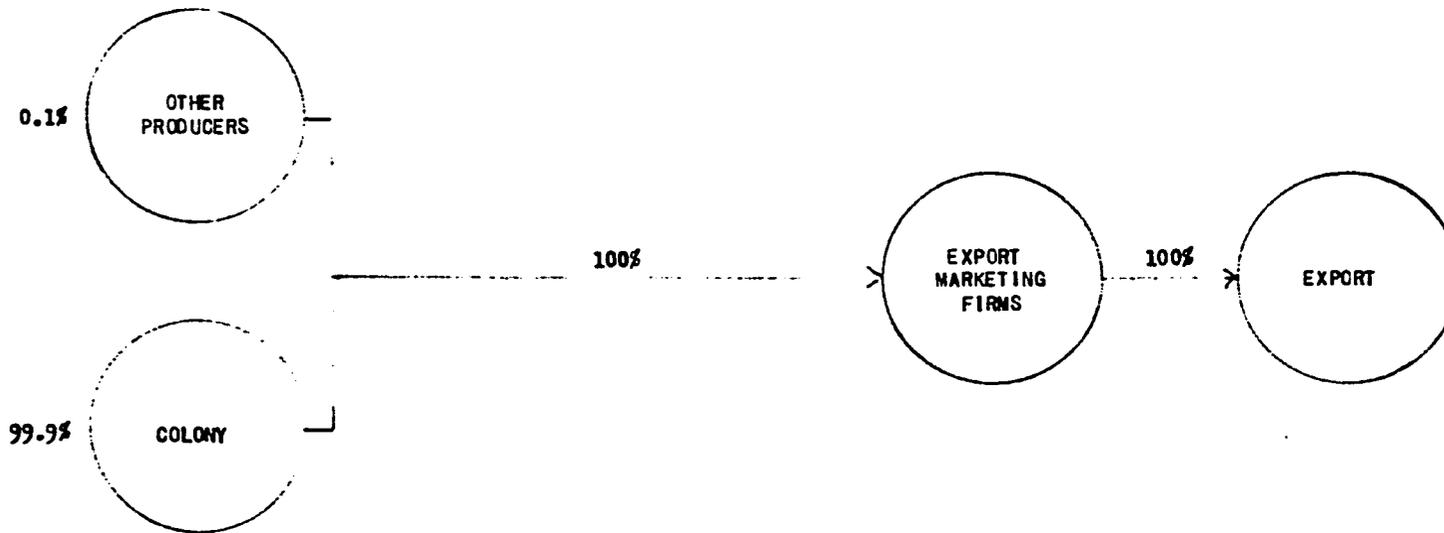
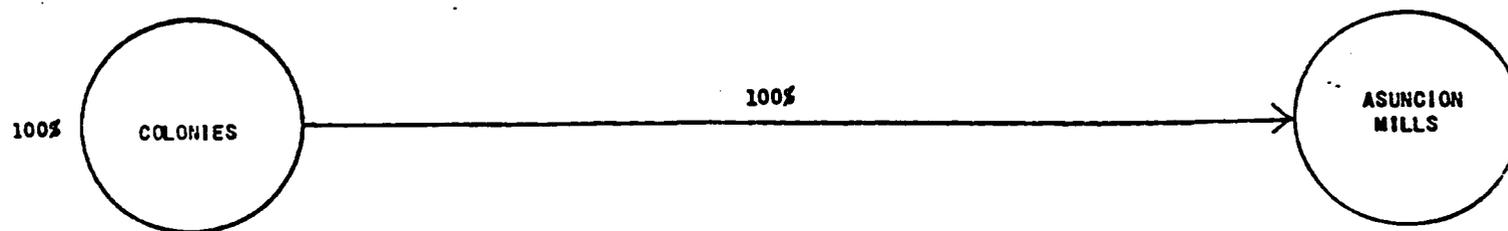


FIGURE 6: Flow Diagram of Wheat Marketing Channels in Department of Caaguazú.



#### IV. PRESENT RESPONSIBILITIES, STRUCTURE AND FUNCTIONS OF DCEA

##### Present Responsibilities

DCEA is a dependent branch of MAG and was created by presidential decree in 1971. The present responsibilities of this branch are as follows:

- Operate and administrate warehouses and silos owned by MAG.
- Set standards for the conservation and preservation of grains and sub-products as well as other agricultural commodities at each step of the respective marketing channels and enforce these standards.
- Construct official grading and quality standards for grains and other agricultural products which are marketed in the country.
- Conduct marketing studies as well as price analysis at the national and international level, and also investigate more economical means for agricultural inputs.
- Publish informative price bulletins of agricultural commodities at the level of production and consumer as well as the tendencies of the different agricultural products.

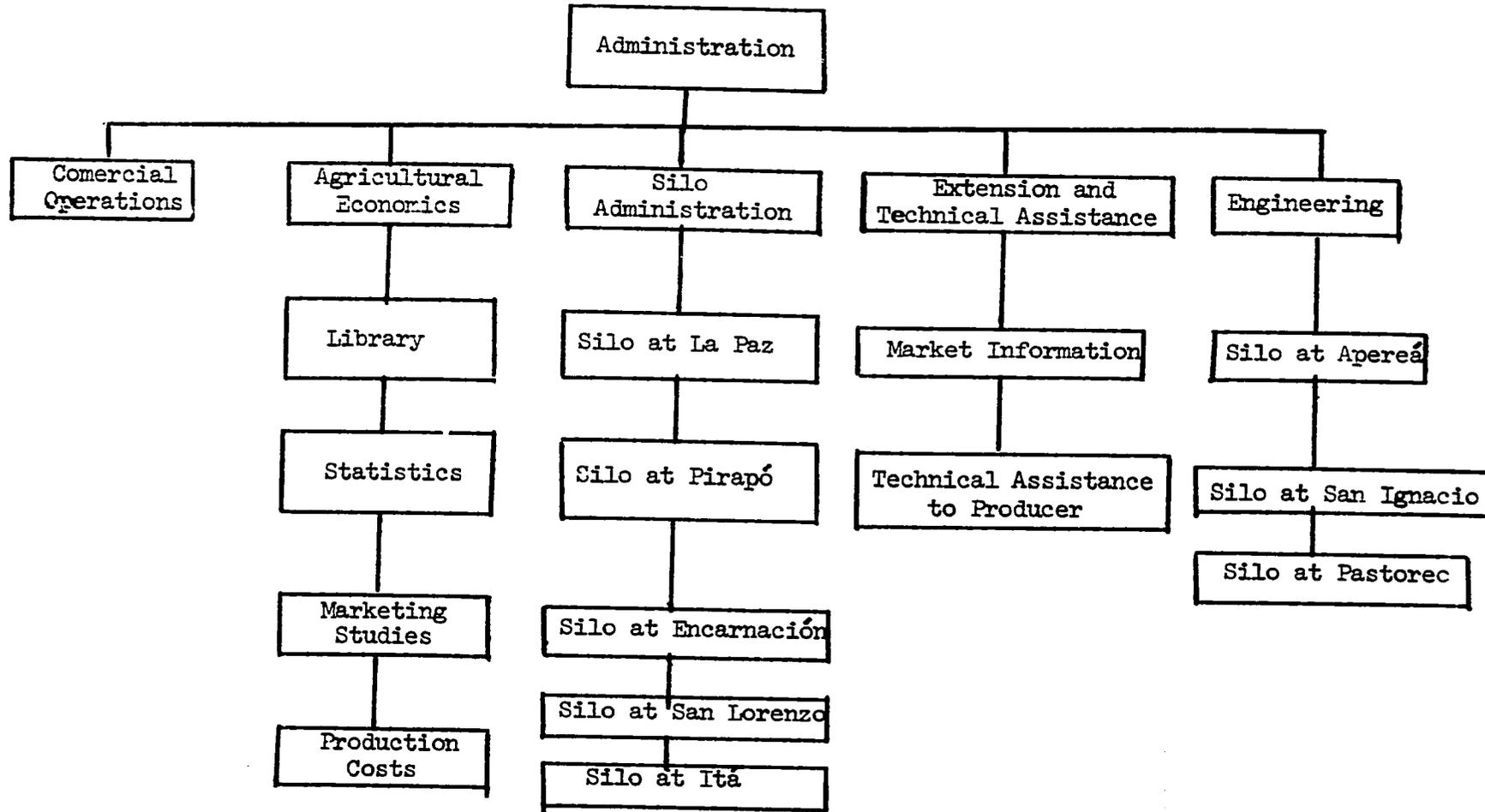
The goal of this department consists of improving the marketing system so that an equitable marketing procedure of agricultural commodities is achieved among all participants, and especially for the producer who normally has had a weak bargaining position.

##### Organizational Structure

The organizational structure of DCEA is given in figure 7 and consists of the following:

- one administration headed by Mr. Virgilio A. Rolón (Ag. Engineer)
- five departments consisting of (1) Commercial Operations, (2) Agricultural Economics, (3) Silo Administration, (4) Extension and Technical Assistance, and (5) Engineering.
- five divisions
- one library

FIGURE 7 ORGANIZATION OF DCEA



### Departmental Functions

Each department within DCEA has been assigned a specific set of functions which are as follows:

- Elaborate grade standards and marketing policies jointly with the other departments of DCEA.
- Organize a registry of merchants, acopiadores, industries, and wholesalers.
- Enforce weighing and grade standards for grains and sub-products at each step within respective marketing channels.
- Establish standards for sanitary and technical conditions which will apply to transportation of agricultural commodities within the country as well as for export.

The department of agricultural economics is responsible for the following functions:

- Marketing studies of agricultural commodities related to internal and external commercialization.
- Production cost studies of agricultural products.
- Seminars and meetings about specific or closely related marketing aspects.
- Publish statistical data about prices, production volumes, tendencies, marketing perspectives, etc.
- Work jointly with the other departments of DCEA and other administrations of MAG.

The functions of the Department of Silo Administration consists of:

- Organizing, directing and operating the warehouse silos, elevators and other installations under DCEA.
- Facilitating administrative services which will help to accomplish the services and other functions provided by the warehouses and silos under DCEA.
- Accounting for the administrative operations related to budgeting, sources of funds, assets, credits, and operational costs of the silos.

Essentially, the silo administration is the most fundamental characteristic of the DCEA. At the present, their capacity and location is as follows:

- Three rehabilitated silos
  - Encarnación: 1,400 MT
  - San Lorenzo: 800 MT
  - Itá: 1,600 MT
- Two new silos with warehouses
  - Pirapó: 2,600 MT in silos, 4,000 MT warehouse
  - La Paz: 2,600 MT in silos, 4,000 MT warehouse
- Under construction
  - Apereá: 2,000 MT in silos, 4,000 MT warehouse
  - San Ignacio: 4,000 MT in silos
  - Pastoreo: 2,600 MT in silos, 2,000 MT warehouse
- The total storage capacity amounts to:
  - Silos = 17,600 MT
  - Warehouse = 14,000 MT
  - Total = 31,600 MT

The administrative staff for the silo service centers is located at DCEA headquarters and is composed of:

- one administrator in charge of all the silos (agricultural economist)
- one technical assistance in charge of operational matter
- one bookkeeper
- secretaries and staff assistance

Furthermore, each silo has the following key personnel:

- one administrator (agricultural engineer)
- one receiver in charge of weighing and sampling
- one plant operator

The general operational procedure of the storage centers is as follows; the receiver after weighing and analyzing the incoming grain advises the plant operator as to the required cleaning, drying, and storage requirements. The grain is documented as to its quality, quantity, and grade. Out of three copies of the receipt, the farmer gets one for his records, the center keeps one, and the third is forwarded to headquarters in Asunción. Should the grain exceed 14 percent moisture, it is dried down to at least a level of safe storage. Any grain containing more than 2 percent foreign material is automatically cleaned. Since these centers do not buy or sell any grain, the farmers have to find a buyer. Once he has sold it, he retrieves the grain and pays for all the processing and storage costs (see Table 5 for individual charges for soybeans and wheat). At time of delivery, the grain is checked to see if it meets the original standards when it was received and processed.

Table 5

CHARGES FOR CUSTOM SERVICES AT STORAGE SERVICE CENTERS

Operation	Soybeans G/Kg	Wheat G/Kg	Difference
Receiving, Grading	0.10	0.10	
Cleaning	0.35	0.25	-0.10
Drying (Reduction of 3%)	0.50	0.35	-0.15
Storage Kg/month	0.20	0.20	
Rent of storage (365 tons)	70,000/month	70,000/month	
Warehouse	200 per m <sup>2</sup> /month	200 per m <sup>2</sup> /month	
Sacking	8/bag	8/bag	
Loading out	100/ton	100/ton	
Transfer from bin to bin	0.10/Kg	0.10/Kg	
Ventilation	0.10/Kg	0.10/Kg	
Truckscale usage	150/truck	150/truck	

The department of extension and technical assistance has the following functions:

- Gather, process, and distribute national and international marketing information at different levels of the respective marketing channels.
- Assist producers in the formation and development of producers associations and cooperatives (jointly with the General Administration of Cooperatives).
- Familiarize the producer with grading standards and marketing procedures.
- Publication of a weekly bulletin about prices, trends and marketing development.

The functions of the engineering department can be summarized as follows:

- Design and supervise to insure that construction and enlargement of the silos, elevators, and other installations are being met.
- Maintain and repair the installations as required.

#### Sources of Information

The sources of information utilized by DCEA in order to meet its objectives are the following:

- Reuters Market News Service
- USDA publications
- Private and public publications from Brazil, Argentina, Colombia, etc.
- UN publications
- Own information

The analysis of gathered production information is handled by the department of extension and technical assistance while marketing type of information is processed by the agricultural economic department. This is not a duplication of effort since both departments work closely together.

Dissemination of Information

In order to meet its goal of diffusion of information, DCEA has an "Integral Marketing Information Service" which through telex information, monthly and daily bulletins and radio and newspapers are able to reach all participants in the marketing system throughout the country.

With the processed informative material, DCEA is able to forecast short term marketing trends, however, it is not able to forecast on a long term basis since this would require more information than what is now available.



**APPENDIX A**

**COBADE AREA DESCRIPTIVE NOTES**

ITACURUBI COOPERATIVE

-Physical facilities

- ° Warehouse with office space
- ° CAPA is in process of purchasing a 25KW generator for cooperative

-Operations

- ° CAPA provides mechanized custom work to cooperative members
- ° Custom rates are: plowing \$2100/Ha, disking \$1000/Ha, planting \$1000/Ha, harvest wheat \$4500/Ha, harvest soybeans \$5000/Ha
- ° Member pays 30% of services at time of land preparation and balance after harvest
- ° Cooperative provides credit through BNF for above
- ° Same system extends to cotton, except bags for cotton obtained by cooperative from gin

-Member Production

- ° 50 members with 10-15 hectares per member
- ° 150 hectares soybeans, average yield 1500Kg/Ha, production 225MT
- ° 386 hectares wheat, average yield 1100Kg/Ha, production 425MT

-Marketing

- ° Members bring cotton to cooperative or cooperative will furnish transport for .20-.30\$/Kg
- ° Soybeans sold through Herman Julifs
- ° Wheat trucked to Asuncion at cost of 2.5 to 3\$/Kg

-Comments

- ° Members of cooperative still use merchants as independent credit source, hence member will sell part of his crop to merchant to pay off debt

HERMAN JULIFS.

-Physical facilities

- ° Four circular bins, 500MT capacity each
- ° Flat storage, 500MT capacity
- ° Mechanized with leg elevator, bin unloaders, drier, cleaner, aeration fans, truck scale, truck dump
- ° Dryer had 8MT/Ha capacity in removing 5 points of moisture (18% to 13%)

-Operations

- ° One pass drying for soybeans received at 18% moisture or less (to 13.5%)
- ° Two pass drying for soybeans received in excess of 18% moisture (to 13.5%)

-Production

- ° 116 hectares with yield approaching 4000Kg/Ha
- ° Expected increase to a total of 250 hectares

-Marketing

- ° Soybeans also purchased from local farmers and cooperatives
- ° Soybeans purchased, cleaned, and dried on commission basis under contract with ANDREA (firm located in Europe)
- ° Soybeans shipped f.o.b. Port Rosario to Buenos Aires via barges up to 1300 MT capacity, then transferred to ocean vessel
- ° Market information received via link to telex in Asuncion, from Europe daily prices quoted which can be paid for soybeans

-Area Production

- ° Regional production 13,000 MT
- ° Average yield approaching 2000Kg/Ha

-Comments

- °Operator has excellent knowledge of handling soybeans and maintaining quality
- °Would be an excellent trainer for other receiving center personnel, if willing to do so

FRIESLAND COLONY

-Physical facilities

- °Storage capacity of 2500 MT
- °Another 1500 MT storage under construction
- °8 MT/Hr. diesel fueled dryer unit
- °Four drying bins with perforated floors, with tractor powered aeration fans
- °Two diesel generators of 120KW each, steam generator of 70KW

-Operations

- °Diesel fueled dryer used only if grain exceeds 18% moisture, grain under this moisture level dried in bins (expected time- 20 days)
- °Colony based on credit system under which each member has two credit accounts; one for clearing and preparing land for cultivation as well as machinery purchase, the second for production requirements, etc.
- °Cooperative credits commodity sales to member accounts and thus has a sufficiently large revolving account

-Production

- °Total of 17,000 hectares, 3000 hectares suitable for crop production
- °Currently 2000 hectares under double cropping
- °Average yield soybeans 1750Kg/Ha, production 3500 MT
- °Average yield wheat 1110Kg/Ha, production 2000 MT

-Marketing

- °Colony sells members grain at best possible price
- °Soybeans exported to Europe via Port Rosario and Buenos Aires, Agent COINPAR
- °Wheat shipped to Asuncion via truck or barge

-Comments

- °Potential expansion amounts to an additional 800 hectares being brought into cultivation

GENERAL AQUINO COOPERATIVE (Branch of Virgen del Rosario)

-Physical facilities

- °Warehouse of 25 x 30 Km
- °1 MT/Hr. wood fired dryer, dryer installed inside building
- °Dryer is nonoperational due to vibrations of either engine or fan housing of dryer being mortared into wall
- °Plans are to install a 20KW generator

-Operations

- °Credit system basically same as at Itacurubi Cooperative

-Member Production

- °205.5 hectares of wheat, average yield 1150Kg/Ha, production of 236 MT
- °33.5 hectares of soybeans, average yield 1576 Kg/Ha, production of 53 MT
- °185.25 hectares of cotton, average yield 1625Kg/Ha, production of 1625 MT

-Marketing

- °Wheat trucked to mills at Asuncion at freight rate of 2.5 to 3 ¢/Kg
- °Soybeans production sold to Hernan Juilfs

°Cotton trucked to Asuncion gins at freight rate of 3¢/Kg

-Comments

°Area has large potential for expansion of production, estimated 4000 hectares

VIRGEN DEL ROSARIO COOPERATIVE

-Physical Facilities

°10 x 20 Km warehouse

°Two 150 MT metal bins, unoperational

°Unassembled used wood burning dryer in bad condition (needed new sheet metal, at least one pulley, possibly new bearings, metal straightening, especially of fan housing)

°Farm equipment, ie. tractors and tillage equipment, combines

-Operations

°Due to financial losses, BNF will not extend credit

°While custom mechanized services were offered to farmers in past, rates of operation, small plots, and poor maintenance could not make this a successful operation, consequently part of the tractor fleet was sold to private farmers

-Member Production

°83 hectares cotton, average yield 1500 Kg/Ha, production of 124 MT

°17 hectares soybeans, average yield 1500 Kg/Ha, production 26 MT

°No production data available on wheat

-Marketing

°Cotton trucked to Asuncion at freight cost of 3¢/Kg

°Soybean production sold to Herman Julifs

°No wheat data available

VOLENDAM COLONY

-Physical facilities

°Storage capacity of 8000 MT

\*4900 MT underground

\*300 MT bins (2 x 150 MT)

\*2100 MT bins (6 x 350 MT)

\*700 MT bin at Port Mbobicua (2 x 350 MT)

°Two diesel fueled dryers of 15MT/Hr for commercial grains

°Diesel powered generator of 115 KW

-Operations

°Grain accepted at 18% moisture and dried to 14% moisture in one pass

°Port facilities (Mbobicua) allow loading barges direct from trucks or bins

-Member Production

°4000 hectares under double cropping; soybeans and wheat

°Soybeans average yield 1800 Kg/Ha, production 7200 MT

°Wheat average yield 1350 Kg/Ha, production 5400 MT

-Marketing

°Soybeans exported FOB Port Mbobicua to Buenos Aires to Europe, freight to Buenos Aires \$15/MT

°Wheat shipped to Asuncion via barge (Port Mbobicua), freight cost of 1.3 to 1.5 ¢/Kg

-Comments

°Potential expansion approximately 1000 hectares

Port Rosario

The site of the location of the ship loading auger for the Friesland colony was visited. Ships with capacity of 800 to 1500 MT could dock here. Because of the road system, space in this area and water depth, the site seemed to be a logical port location.

Visit with Mr. Ulrich Lacker

Mr. Lacker is the German advisor to the cooperative of Virgen del Rosario and its branches. At the present time, there is a detailed plan for converting these cooperatives (mainly minifundios) back to horse drawn agricultural machinery except for the combines which will be harvesters mounted on a tractor and costing \$6000 each.

The reason for going back to less technology is due to the inability to amortize big tractors and harvesters plus the lack of adequate maintenance. Furthermore, this area is dotted with minifundios which makes large equipment not feasible. The horse drawn agricultural implements will be imported from Brazil, the sprayers will be built in the Friesland Colony, and the small, tractor-operated harvester will be imported from Denmark. The grain cleaners will be handoperated or if necessary they can be powered by a 4.5 HP motor. A revolving capital of \$10,000 will be set up for the cooperative.

In Lacker's opinion, going back to horse power will reduce the risk involved, especially with wheat, since should the crop fail, the farmer will lose only his labor, insecticides, fungicides, seed and no credit which he otherwise would have to pay for custom work.

Mr. Lacker secured plans for the General Aquino and Villa del Rosario cooperatives wood burning driers and will help to install the Villa del Rosario Unit. He states that the wood burning driers will attain a 20<sup>o</sup>C temperature rise to the driers with a maximum of 100<sup>o</sup>C.

**APPENDIX B**

**PASTOREO AND PORT PTE. STROESSNER AREA DESCRIPTIVE NOTES**

SAPASA (Sociedad Anonima Paraguaya de Servicio Agrícola)

This is a privately owned facility which buys soybeans for export through the freeport of Paranagua.

-Physical facilities

- ° Underground storage facility 14,000 MT
- ° Receiving pits are divided into 4 units for different moisture and dockage contents
- ° Soybeans are handled by bucket elevators to belt conveyors, with individual operations connected by gravity flow
- ° Two precleaners with 45 MT/Hr capacity
- ° Wood fueled dryer capable of reaching 120°C in plenum chamber, 15 MT/Hr capacity

-Operations

- ° While current firm has owned facilities for one year, facility has been in operation for four years
- ° Soybeans, if dry enough (14% moisture or less) can flow directly to cleaner and storage, otherwise flow is precleaning, drying, storage
- ° Reception of soybeans up to 20% moisture with flow including two dryer passes to reduce moisture to 13.5+%
- ° Reception of soybeans mainly in bulk, with small amounts sacked
- ° Currently handling 600 MT daily with approximately 90% of soybeans requiring drying
- ° Outbound shipment in bulk or a truck
- ° System is not simultaneous for reserving and shipping but planned investment by firm will correct this deficiency

-Marketing

- ° Purchases from surrounding cooperatives and colonies
- ° Soybeans exported through Port of Paranaqua
- ° Firm finances approximately 7000 hectares of soybean production
- ° Production credit in form of seed, fertilizer, insecticides and labor

-Comments

- ° Estimate of production of soybeans, Department of Alta Parana, at +100,000 for 76/77

MINGA GUAZU COOPERATIVE

-Physical facilities

- ° Total storage capacity of 17,300 MT
  - \*13,000 MT in underground storage
  - \*300 MT in steel bins for corn storage
  - \*4000 MT in Las Palmas (branch facility)
- ° 4 receiving pits
- ° Reception area has bucket elevator, two precleaners, two wood fueled dryers 15 MT/Hr capacity each
- ° Fleet 15 trucks, semi units
- ° Feed mill 12 MT/Hr

-Operations

- ° 1500 members with 20 hectares per member average
- ° Soybeans dried to at least 13% moisture level due to long storage time (December)
- ° Length of storage time due to cooperative's use of truck fleet to move soybeans to export through Paranaqua at a rate of 2000-2500 MT/monthly
- ° Feed mill produces concentrate for members as well as other farmers
- ° Premixes imported from Brazil and concentrates produced with corn base for poultry, swine, cows and horses

ALFA S.A.

-Physical Facilities

- °Grain handling facility is just completing construction while starting to handle soybeans
- °10,000 MT underground silo and two bins of 1,500 MT each
- °Two 40 MT/Hr. and one 15 MT/Hr. dryer units, all diesel fueled
- °Complete pre- and post-cleaning facilities
- °Legs and belt movement systems with fast loadout hopper

-Marketing

- °Estimated annual volume of operation 20,000 MT
- °Soybeans exported via truck to freeport of Paranqua outbound to Europe
- °Truck freight cost approximately \$28.57/MT

SOMERFELD COLONY

-Physical facilities

- °Members of colony use on-farm storage which generally consists of old houses, wood cribs, flat storage, and metal bins
- °Two farmers own dryer units estimated at 4 and 12 MT/Hr. capacity

-Operations

- °210 families and 1265 members
- °31,000 hectares out which are suitable for cropping

-Member Production

- °2861 hectares soybeans, average yield 1600 Kg/Ha, production 4578 MT
- °719 hectares wheat, average yield 1000 Kg/Ha, production of 719 MT
- °Fertilization of wheat standard practice, recently members applying fertilizer (12-30-10) to soybeans
- °Soybeans held on field until moisture down to approximately 14% if possible

-Marketing

- °Soybeans sold to highest priced buyer

CAMPO NUEVE

This locality is the base for the extension agent Mr. Oscar Siani as well as the site for the new grain storage facility being built by MAG.

-Physical facilities

- °Total area of about 6,000 hectares
- °An average of about 2 or 3 hectares per family

-Operations

- °560 families
- °Average of five members per family

-Member production

- °1,000 hectares cotton, average yield 1800 Kg/Ha, production 1800 MT
- °70 hectares tobacco, average yield 1600 Kg/Ha, production 112 MT
- °200 hectares corn, average yield 2000 Kg/Ha, production 400 MT
- °10 hectares soybeans, average yield 1500 Kg/Ha, production 15 MT

-Marketing

- °The farmers in this area do not produce off-season crops such as beans, onions, or garlic due to the lack of marketing outlet for such crops
- °Garlic was introduced a few years ago, but it failed because a marketing outlet had not been organized

°Except for soybeans, all products go by truck to the Asuncion or Ovideo area

-Comments

- °The farmers obtain credit in cash or in terms of agricultural inputs from BNF and from acopiadores. This credit mechanism is similar to the others described in appendixes A and C.
- °Truck freight costs to Asuncion and Port Pte. Stroessner are approximately \$15.87 and \$5.95 per MT, respectively
- °The extension agent works under a yearly program and at the time of visit was involved in:
  - \*Establishing a pilot project for swine production
  - \*Introducing treated cotton seed
  - \*Encouraging farmers to fumigate before diseases become apparent (preventative) since farmers like to wait until the disease occurs before fumigating
  - \*Improve plant material in tobacco

BERGTAHL

This colony was not visited. However, total landholding is estimated at 11,000 hectares of which 2,000 hectares are under cultivation. No storage data was available. The members of this colony also sell to any buyer depending on price offered.

PASTOREO

This area belonging to the Department of Caaguazu is serviced by the extension agent Mr. Javier Espesini. About 3,215 families live in this area. Land under cultivation is distributed as follows in the Department of Caaguazu.

- 2450 hectares in wheat (all within colony areas)
- 7550 hectares in soybeans (all within colony areas)
- 5000 hectares of cotton (all outside colony areas)
- 980 hectares of tobacco (all outside colony areas)
- 4500 hectares of corn (all outside colony areas)

**APPENDIX C**  
**MINIFUNDIO AREA DESCRIPTIVE NOTES**

BNF MANAGER - PARAGUARI

-Production of Department of Paraguari

- °48,000 hectares of cotton, average yield 800 Kg/Ha, production 38,400 MT
- °35,000 hectares of corn, average yield 1,200 Kg/Ha, production 42,000 MT
- °2,000 hectares of wheat, average yield 1,100 Kg/Ha, production 2,200 MT
- °800 hectares of rice, average yield 1,500 Kg/Ha, production 1,200 MT
- °2,000 hectares of soybeans, average yield 1,000 Kg/Ha, production 2,000 MT

-Comments

- °Except for a few large farmers, area consists of minifundios with 20 hectares and less
- °Average farm has roughly 8 hectares
- °350 minifundios are direct credit customers and BNF supplies them with about 50 percent of their credit needs
- °Other 50 percent is still obtained from acopiadores and merchants

DISTRICT OF CARAPEGUÁ

The team visited the extension agent and the manager of the local credit cooperative.

Size (Ha.)	Number of farms	Percentage
1 - 4.9	2064	58.0
5 - 9.9	860	29.2
10 - 20.9	405	11.4
21 - 30.9	94	2.6
31 - 50.9	67	1.9
51 - 99.9	23	0.6
100 +	38	1.1
Total	3551	100.0

-Production

- °4800 hectares cotton, average yield 1000 Kg/Ha, production 4800 MT
- °850 hectares corn, average yield 1200 Kg/Ha, production 1020 MT
- °No soybeans or wheat produced
- °No off-season cash crops produced

COLONY AT LA COLMENA

-Production

- °800 hectares commercial cotton, average yield 1500 Kg/Ha, production 1200 MT
- °200 hectares seed cotton, average yield 1500 Kg/Ha, production 300 MT
- °450 hectares corn and beans, average yield and production unknown
- °500 hectares onions, average yield 9000 Kg/Ha, production 4500 MT
- °40 hectares grapes, average yield and production unknown
- °Vegetables, hectares under cultivation, average yield and production unknown

-Marketing

- °Cotton for seed is sold to MAG and is delinted at the colony
- °Cotton lint as well as raw cotton is trucked to Asuncion at a freight cost of \$11.90 per MT
- °Onions and other vegetables are marketed through the cooperatives

marketing outlet in Asuncion  
°Grapes are either sold as table grapes or are processed into wine  
which is marketed in the Asuncion area

YBYCUI AREA

-Production by locality

°Ybycui

- \*12,000 hectares cotton
- \* 6,000 hectares corn
- \* 1,500 hectares rice
- \* 1,500 hectares soybeans
- \* 1,500 hectares wheat
- \* 400 hectares tobacco

°Acahay

- \* 5,000 hectares cotton
- \* 2,000 hectares corn
- \* 300 hectares rice
- \* No soybeans
- \* No wheat
- \* 20 hectares tobacco

°Mbuyapey

- \* 1,500 hectares cotton
- \* 500 hectares corn
- \* 450 hectares rice
- \* 500 hectares soybeans
- \* 20 hectares wheat
- \* 100 hectares tobacco

-Comments

°At the outskirts of the city of Ybycui a cotton gin is being constructed  
by a private firm



**APPENDIX D**

**OUTLINE FOR ANALYSIS OF PROPOSED COTTON GIN  
FACILITY (COBADE AREA)**

The work plan presented herein has been developed to analyze the location and economic feasibility of the proposed cotton gin facility in the COBADE area.

The basic procedure for this type of analysis normally utilizes the services of computer facilities since computer programs are available for each step in the analysis. The use of computer facilities allows the use of larger quantities of data and more in-depth analysis in short time spans usually required for feasibility studies. In the use of computer programs, sequential steps are linked together in the system so that once original data are put into the computer, much of the needed information for the remaining steps is generated internally to the system. This procedure minimizes the chance of computational errors and provides flexibility for analyzing a wide range of alternatives. However, analysis may be done by manual computation, but this increases the required time and the potential for large and costly errors.

The basic steps that need to be applied to analysis of this facility are as follows:

1. Supply projections of cotton reflecting production factors such as hectares planted, yields, and harvesting and marketing practices for the expected supply area. This will determine season and annual operating volumes for the facility.
2. Optimum shipping patterns developed using current shipping patterns and freight rates. The output from this step provides information for determining (1) the needed capacity of storage, handling, processing, and transport, and (2) total transportation costs for projected volumes.
3. Economic feasibility analysis using IRR cash flow analysis is determined from inputs by projected accounting periods for capital costs, working capital requirements, operating revenues, and operating costs. This step produces the internal rate of return, net-present values, and fully discounted benefit-cost ratios for the facility.

4. Sensitivity analysis of step 3 allows the alteration of capital costs, working capital requirements, operating revenues, and operating costs by consideration of locations, volume inputs, volume outputs, etc. Through this step a location can be determined which will allow the firm the highest return to capital invested. This procedure will also give guidance to firm management, in that it can be used to answer "what if" management questions.

5. Economic impact analysis measures the direct rate of return, the associated rate of return, and the social rate of return for the project. This impact analysis determines the impact of the proposed facility upon local areas inhabitants, including producers, marketers, laborers, etc.

6. Financial analysis of the proposed facilities is constructed based upon input provided by the economic feasibility analysis, by the analysis of accounting information of existing operations and by expected terms of financing for the proposed facility. The output will include projected depreciation schedules, projected operating statements, proforma source and application statements, and proforma balance sheets by accounting period over the expected planning horizon of the firm.

Such an analysis will enhance the ability to obtain proper credit funds from different credit sources and help answer questions that managers of new credit sources may have.

7. Financial analysis of the proposed facilities under the proposed program is then performed. Input will be provided by the economic feasibility analysis, by the analysis of accounting information from existing operations, and by expected terms of financing for the proposed program. The output will include projected depreciation schedules, projected operation statements, proforma source and application statements, and proforma balance sheets by accounting period over the planning horizon of the proposed program.

A master plan for program implementation can then be developed on the basis of the results from the analysis, especially those from feasibility analysis, impact analysis, and financial analysis.

**APPENDIX F**

**EVALUATION AND RECOMMENDATIONS  
OF REGIONAL STORAGE SERVICE  
CENTERS**

At the request of USAID, and DCEA, the Agricultural Engineer of the grain marketing team was requested to evaluate and make recommendations about the Grain Centers at San Ignacio and Pastoreo now under construction.

The team was able to visit the two listed above. Neither of these were completely constructed and the following observations are based on what was seen plus expected completion plans. It is possible that some items may be resolved before completion.

1. At San Ignacio the layout is such that maintenance and replacement parts are only available from the contract supplier. If different pieces of equipment are installed, some remodeling will be necessary in many cases. At Pastoreo no equipment was installed so this could not be evaluated. A quick review of the plans indicated that it was similar to San Ignacio. The above is not necessarily bad if the supplier is a long-time company with a good reputation and has easily accessible parts and teaches the operating and maintenance crews how to operate and service this equipment.
2. Both installations have deep pits for the leg and dump. Water can be a problem unless waterproof concrete floors and walls are poured and surface water is drained away from the area. If this becomes a problem, an automatic sump pump, installed in the bottom of the pit, will protect pit equipment.
3. Pastoreo had concrete silos in which it was obvious that slip form construction was not used. This modern method should be used on all new units with continuous pouring to maximize strength and quality sector bonding. This alone is not enough because the mixtures should be under the control of a qualified structural engineer to accurately measure out ingredients including water and checking reinforcing steel positions. He should also see that tamping is done properly to prevent honey combing.

The San Ignacio silos were metal and seemed to be properly installed.

Normally metal silos are less expensive as compared to a quality built concrete silo but also life expectancy is much less.

4. At San Ignacio, auger conveyors to gravity seemed to be the pattern of movement though they were not yet installed. Nothing was installed at Pastoreo yet. Soybeans are very sensitive to cracking when being handled. Leg elevators with buckets, gravity flow when possible, and through belts for horizontal soybean movement should be used as much as possible.

Where augers are necessary to unload bins the operating crew should always see that they operate full and never at partial capacity. The country has good soybean handling equipment at Volendam colony; Sapasa, Minga Guazú Coop, Alfa Center and possibly others that should be studied by the system designers.

The flow of grain into and out of the receiving center must be balanced to prevent any bottlenecks. This will help to prevent augers from operating at partial capacity. Because of starting point the dump pit operator should never empty the pit (with augers) to the point of partial auger flow.

5. The dump pit at San Ignacio had special openings that requires a special hopper bottom truck to unload. This should be made flexible to take any type of trucks farmers own. The group could not determine how soybeans of different moisture and quality arriving at the same time could be separated. Pastoreo was not far enough along to evaluate this.
6. The gravity spouts to outer bins seemed at quite a low angle which could cause spout clogging. Belt conveyors could shorten the soybean fall into bins and lower the height of elevators being used. Where gravity spouting is used, all grain should be directed into a vertical position at the center of the bin. This will prevent excessive pressure on any wall section. Bin spreaders, if properly installed, will maintain a near level top and allow more uniform aeration throughout the grains.
7. Since oil is expensive and becoming more scarce, wood burners such as is used at Sapasa and Minga Guazú coop grain centers, should be investigated as an alternate fuel in areas where wood is plentiful. Labor to supply the work, maintain the fire, and adjust dryer temperature will be greater than for an oil fired unit but should be much cheaper than the oil.
8. At San Ignacio the aeration, though not yet installed, had connecting collars to bins that were smaller than the fan openings. This will give a venturi effect and reduce the air flow through the grain with the same horsepower when compared to an unrestricted opening. An engineer knowledgeable on air flow through grains should check the fan capacity, full bin static pressure and horsepower to determine its performance. Soybean resistance to air flow (static pressure) is very low when compared to wheat. However, since wheat may be stored in some of these bins at future dates, Figure 8 should be a guideline for selecting aeration fans. Aeration fans at commercial installations in the United States operate as low as 1/50 cfm per bushel but this is in very dry areas where humidities are much lower than those the writer has observed in Paraguay. We would recommend air flows of 1/10 cfm per bushel or about .11 cubic meters per ton.

Management of aeration is complex and operators need training to make this most effective.

A new development or technology developed in the United States has potential in saving fuel at these centers. This could lead to adaptation by centers operated by private enterprise and cooperatives. For this system to work, full bin aeration capability would have to be increased to 20 cfm per ton ( $\frac{1}{2}$  cfm per bushel). This technology is called drieration and consists of stopping the drying at 1 to 2 percentage points above the desired storage or market acceptance level. At this level, the grain is moved into the high rate aeration bin while hot and allowed to stay undisturbed for 5 to 8 hours. This allows grain core moisture to move to the grain surface and the high rate aeration (pressure system) will take out 1 to 2 percentage points with no heat. Since drying and bin filling is a continuous process this aeration would continue until the bin is full and all grain has cooled to ambient conditions.

The KSU Engineering Staff has just received DCEA plans and specifications for the government conditioning and storage centers. Since the specifications are in Spanish, these are currently being translated into English for a detailed analysis. The visiting Ag Engineer was very much concerned about some of the expected problems as he discussed in this report. Primarily the extensive use of augers could cause much damage to the beans and further construction should be held up until the plans can be revised to handle the beans with U-trough belts or their equivalent. The K.S.U. Engineers will give a more detailed analysis after studying the specifications and plans.

FIGURE 8 BIN AERATION AND FAN RELATIONSHIP

