San Julian and Chane - Pirai Colonization

Project Evaluation Report

Agricultural Economist Report

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EVALUATION REPORT OF THE SAN JULIAN, AND CHANE-PIRAI COLONIZATION PROJECT

The purpose of this report is to examine the economic aspects of the settlement project in San Julián and Chané-Piraí. The basic information was obtained from interviews of colonists and technicians working in the area. This information was supplemented with technical studies, reports from the Instituto Nacional de Colonización (INC) La Paz and San Julián, records from offices of the Banco Agrícola de Bolivia (BAB) in San Julián, Montero and Santa Cruz, and interviews with officials of INC and BAB.

Visits to the area were made with other members of the evaluation team; Dr. Allyn Stearman, Anthropologist; Dr. A.J. Dye, Ecologist, and Dr. Eduardo Locatelli, Agronomist. This collaborative support proved valuable for me.

The agricultural economist team member was required to describe and evaluate the San Julián and Chané-Piraí colonization project, covering the following aspects:

a) Performance of the credit component in both sub-areas of the project.

b) Current marketing procedures, recommending modifications which could offer increased benefits to the farmer.

c) Cost efficiency of various land clearing procedures considering risk to farmer and possible management problems.

d) Plans for continued farm development and how well the project has provided a base for this desired development.

e) Production costs provided different power sources: animal traction; combined animal-tractor; tractor operations; and traditional hand operations.

f) Economic impact of the project on the development of Bolivia and the low land regions.

The report covers each aspect and also includes cost analysis per beneficiary of the various project inputs.

I. The Credit Component

A. Period 1977 - 1978

The budget assigned for production credit under the AID Loan 511-T-050 was $500,000, but through October 1978, only $122,670 had been transferred for that purpose.[1/]

During this period, BAB credit regulations were applied to groups rather than to individual requests. Among other requirements, the prerequisites for a group to qualify for a loan were:

1) MACA registration card with a $b. 2.00 fee per Ha. requested.
2) Planting permission from MACA.
3) Registration fee of $b. 200 per group as member of the "Cámara Agropecuaria del Oriente".
4) Income tax card (solvencia tributaria) costing $b. 20.00.
5) Tax on the loan at 0.5% of the requested amount.
6) Signature registration at Notary Public (Juez de Mínima Cuantía), with a fee of $b. 10.00 per signature.

To satisfy these prerequisites, all the members of each group had to go to the city of Montero at least twice, spending about two days each time. These expenses, in one case, amounted to about 25% of the loan.[2/]

1/ INC report, October 25, 1978.

2/ A group interviewed in San Julián, stated that for a $b. 80,000 loan, its expenses amounted to $b. 27,000. ($US 1 = $b. 20.38).

The credit regulations required a rate of interest of 13%, a repayment period of eight months, and that the amount of the loan be not more than 80% of the costs of production.

The amount of credit provided and amount repaid as of September 30, 1978, were:

	San Julián	Chané-Piraí	Total
No. of loans	13	32	45*
Loans approved ($b 000)	600	2,084	2,684
Loans cancelled ($b 000)	27	365	392
Net loans ($b 000)	573	1,719	2,292
Loans repaid ($b 000)	190.3	513.8	704.2
% repaid	33.2	29.9	30.7

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*Forty-seven loans were approved, but two were cancelled.

Sources: BAB agency at San Julián and BAB main office at La Paz.

Among the reasons for high percentage of loan defaults was the low price of corn at harvest time and delays in distributing loans. The average farm gate price was $b 45/quintal with yields averaging 60 qq/Ha. and about 80% of the production marketed.[1/] Consequently, gross cash income was about $b 2,000/Ha., which was also equal to the amount of the loan. However, loan disbursements were made after planting and weeding was finished. Farmers covered these expenses from other sources and used the BAB loan for other purposes.

1/ The average corn area for farmer in San Julián was 1.5 Has. About 15% of the production was retained for consumption. Losses and seed use account for 5% of the production.

This fact has two implications. First, if farmers used other financial sources, they were found at usurious rates of interest and/or agreements to sell the harvest at low prices. Second, to a large extent, the BAB loans were used for consumption.

The Chané-Piraí farmers were in a better position than San Julián's producers. Some of these farmers had off-farm earnings [1/] and most of their loans were for rice production. The average price at harvesting time was $b 450 per fanegada (3.84 quintales or 384 Lb.) at the mill site. Transportation costs from farm to mill were $b 60.00/fanega, the average yield was 12 fanegas/Ha. and 80% of the production for farms under 5 Has. was marketed.[2/]

For farms above 5 Has. 90% of the production seems to reach the market. Thus, gross cash income per Ha. was $b 3,740 for small farms and $b 4,270 for larger farms. The amount loaned was $b 3,500/Ha. which could have been repaid if loans were provided on time. Farmers using hired labor were probably required to use other sources of credit, increasing non-bank obligations. In fact, the estimated cost of rice production was $b 4,350 under a non-mechanized system, which can be divided in $b 2,880 for labor and $b 1,470 for other inputs and fixed costs. Consequently, a small farmer using family labor appeared to be in better position to repay his loan than a commercial farmer contracting hired labor.

1/ Crossley (1977) based on a survey reported that 22.7% had shops, 10.8% ran their own trucks and 7% worked as day labourers. He also pointed out that 22.2% received loans from BAB, 15.1% from farmer's coops and some from merchants and money lenders at usurious rates of interest.

2/ A study presented at a round table meeting of rice farmer in Santa Cruz stated that 15% of their production was retained for home consumption; 3% for seed; and 2% was waste.

B. Period 1978 - 1979

The first year experience resulted in a change of BAB credit policy. In order to reduce farmers' expenses for a loan all but one of the requirements were suspended. The signature registration was still in effect, but this time at a fixed cost of $b 50.00 per group or borrower. Moreover, the paperwork and a field inspection can be done by the BAB agent and farmers were not required to be present at Montero. Nevertheless, approval and disbursements of loans were still delayed. By the second week of November when most of the corn plantings in San Julián had been finished and weedings were in process, not a single loan had been disbursed.[1/] In addition, a new regulation was promulgated that applies to loan defaulters. Farmers owing less than 50% of their previous loans qualified for a new loan with an express condition that the first disbursements will be applied to serve their debts. Defaulters of more than 50% of the loan do not qualify as borrowers, but are forced to pay their obligations plus interests through a judicial process. If the last action is implemented, the drop out rates among these farmers may increase. Furthermore, San Julián has not been classified as a rice area, therefore, no loans will be provided for rice production. In Chané-Piraí the only farmers that will qualify for rice credit are the ones using mechanized systems of production.

In this context, at least three implications might be expected. First,

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1/ At the Montero office they stated that loans disbursements might start by the third week of November.

farmers with incomes off their holdings, and not small farmers are most likely to be potential borrowers. Second, a large proportion of the loans will go to tractor owners,[1/] thus affecting the employment of hired labor. Third, if no combine harvesters are used, a large amount of labor might be required in a relatively short period of time to harvest the crop and transport it to the harvesting equipment. If no hired labor is available at that time, the losses could increase.

The credit goals and the applications received by BAB as of November 13, were the following:

Items	San Julián Corn	Chané-Piraí Corn	Chané-Piraí Rice	Total
Loan targets: Hectares	1,000	500	865	2,365
$b 000	2,500	1,250	3,027	6,777
Loans approved (Has.)	260	60	655	975
No. of loans	17	12	7	36
No. of farmers	140	18	75	233

In addition to these goals, BAB will make credit available for harvesting costs of $b 2,000 per Ha. for up to 4,000 Has. An additional requirement for all production credit is to get a selling-purchase document that will assure the marketing of the product and the repayment of loans.

Future Implications of BAB Credit Policy:

In order to increase the farmer's productivity speeding up the completion of the "pioneering stage of colonization", and consequently assuring his permanence in the area, medium and long term loans must be provided.

1/ There are two 134 H.P. tractors in the area and one with 180 H.P. There are 80 stationary harvesters.

In order to develop more efficient exploitation systems, investments in traction, whether animal or mechanical will be needed along with the establishment of permanent crops and/or cattle raising.

The present BAB regulations will not allow these kinds of loans. In fact, there are three conflicting aspects: First, the maximum amount of credit that can be provided is 65% of the "garantía prendaria" (determined by crops production) and 70% of the "garantía hipotecaria" (determined by land and other commercial values-except for small farmers who cannot use their land as "garantía hipotecaria"). Second, small farmers in Santa Cruz are defined as those that own 50 Ha. or less. Third, the maximum area to be financed in Santa Cruz will be no more than 10 Has.

Under these regulations, a small farmer is unlikely to acquire animal traction. The investment needed for a team has been estimated at $b 60,000 1/ while for a cattle farm a $b 50,000 investment will be required. Assuming that a farmer gets financing for 10 Has. of rice, the expected value of his crop will be $b 48,000, implying that no more than $b 31,200 can be borrowed. 2/

Non-Governmental Credit Institutions:

A. Production Credit

Most of the San Julián's farmers faced financial problems at harvesting time during 1977-78. To cope with this problem a savings and loan cooperative was organized as a branch of the San José Obrero Cooperative of Santa Cruz. The Cooperative provided short term loans to 180 farmers

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1/ K. Graber, "Créditos de Capitalización: Una Alternativa al Sistema Tradicional, mimeograph, Santa Cruz, April 1978.

2/ Credit regulations approved by AID and BAB for short and medium run loans dictate that they last for no more than seven years and are for a maximum of $b 35,000 per farmer.

from 10 nucleos. The average amount of each loan was $b 2,000 at a 12% rate of interest. This Cooperative at present has 200 members and a credit committee in charge of evaluating the credit needs of each farmer using more detailed analysis and field verification than the BAB agent. The members of the Cooperative back each loan and as a result no defaults have occurred.

B. Consumption Credit.

The orientation program has as one of its goals to promote Consumption Credit Cooperatives. During the 4 month period of orientation, colonists are exposed to Cooperative Education. The program also provides a $b 20,000 grant to build office and storage rooms at the NADEPA level. This means that each Cooperative has 360 families as potential members. Working capital is a $b 50,000 loan at no interest that has to be repaid in a period of eight years. At present, there are three Cooperative buildings constructed and two of them with the working capital. The number of members was 100 in 1976; an additional 253 in 1977; and an undetermined number in 1978.

Recommendations

a) The current BAB credit policy for small farmers should be modified in order to allow San Julián farmers to get medium and long term loans.

b) The credit experience in San Julián and Chané-Piraí suggests that loans should be under close supervision, especially when involving farmers without experience. Coordination with other organizations working in those areas will be required. The BAB agents will not be able to do a sound job of supervision given the location and structure of farms.

A system that would reduce the costs and delays in providing credit must be developed. One alternative would be to have at the NADEPA level, a working group composed of an extensionist, an INC promoter, the CIU, and the farmer's representative working with the BAB agent.[1/] This group should, among other functions, help farmers determine their credit requirements and regulate credit use.

The risk involved dealing with two annual cash crops with marketing problems, would be reduced by subsidizing credit through low rates of interest. Consequently, a credit line for that purpose should be considered, coming preferably from an AID grant. Such a credit line might be handled by non-profit organizations and/or the Savings and Loan Cooperative working in the project area.

II. The Marketing Situation

The main cash crops in both the San Julián and Chané-Piraí areas are rice, soybeans, and corn. Sugar cane used to be an important crop in Chané-Piraí until world market prices declined drastically. At present, only

1/ The agricultural credit regulations for colonization, financed by the AID loan 511-T-050 consider such group, but at the ASC level. It has not been implemented.

farmers that have a quota from the sugar mills continue cane production. Some cane producers without quotas keep their cane plantations, but do not harvest them.

The cane price per ton at the mill level during the 1978 year fluctuated from a minimum of $b 91 to a maximum of $b 280 with a more frequent value of $b 250. From this price, a discount of $b 40/ton is made as a fixed duty. An established hectare of cane requires about $b 100/year to maintain it. Harvesting cost is $b60/Ha. and transportation cost from the farms to the mill is $b 100/ton. The yield per Ha. fluctuates from 40 to 60 tons with the most probable yield around 40 T/Ha. (In new areas, the first harvest could reach up to 120 tons/Ha.) From these figures, it can be estimated that under favourable price conditions the net profit would be $b 100 per ton of cane or $b 4,000/Ha., which still make cane production attractive. But, if prices drop to $b 150/ton or less, the cane remains in the fields.

A. Rice

Rice is the most important crop, not only in the areas of the project, but in the Department of Santa Cruz as a whole. Climatic and soil conditions of the Chané-Piraí zone are more appropriate for rice production.[1/] In San Julián, where about four ecological regions might have

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1/ Mesa Redonda sobre el Análisis de la Problemática Arrocera en Santa Cruz, Agosto 23-25, 1978, MACA.

influence, it would appear that the rainfall would not be adequate. On this basis, BAB has decided to finance rice production in Chané-Piraí, but not in San Julián.

The total area of rice in Bolivia decreased from 72,800 Ha. in 1975-76 to 62,815 Ha. in 1976-77. The 1977-78 production did not increase significantly from the previous year, but for 1978-79 production of about 100,000 tons of unhulled rice is expected which is similar to 1975-76. The variation in area and production of rice is a consequence of the Bolivian Government policy of restricting the rice production.

1) Price Policy

The ENA (Empresa Nacional Arrocera) established a guaranteed price of $b 3.39/Kg. for unhulled rice (with 13% of moisture and 1% of foreign matter) or $b 592/fanega. This price was highly attractive and as a result, rice production rose sharply. The 1975-76 production was more than 100,000 tons of unhulled rice. (79,134 tons of hulled rice)[1/] The domestic demand, estimated at 54,000 tons of hulled rice, resulted in an excess supply of about 25,000 tons. At that time, ENA inaugurated the Buenavista silos with total storage capacity of 24,000 tons. (16 silos with 1,500 tons-capacity each). In order to maintain the guaranteed price, ENA bought rice up to its total storage capacity. The over production resulted in low prices at the farm level because ENA purchases were made mainly

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1/ Plan Operativo 1978.

from intermediaries.[1/] In 1976-77, rice production decreased 6.7% in relation to the previous period. (74,160 tons of hulled rice). The ENA purchases of rice were only about 8,000 tons of unhulled rice because of insufficient storage and lack of capital, the later being the most important. The estimated supply of hulled rice during this period was 118,917 tons, including the previous stocks. Excess supply amounted to about 63,000 tons. Among the measures taken to reduce the excess supply, ENA reduced its selling prices 15% and at the same time potential external markets were explored, resulting in an export of 17,500 tons to Brazil at subsidized prices.[2/]

In 1977-78, ENA stopped its purchases and guaranteed prices were abolished. The Government decided to let the market system work, but at the same time some measures, such as providing credit only to certain regions and areas, were taken to desincentivize rice production. Other forces were also interacting. The 1977-1978 corn production exceeded domestic demand and prices decreased significantly in relation to the previous period. Since rice and corn are the two major cash crops for colonists, it is expected that in 1978-1979 corn production will decrease, while the rice production increases.

The predicted production for this period is about 100,000 tons of unhulled rice. The predicted domestic consumption of rice for the same period is 67,170 tons.[3/] The supply-demand balance clearly shows an excess

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1/ Mesa Redonda sobre Análisis de la Problemática Arrocera en Santa Cruz, Agosto 23-25, 1978, MACA.

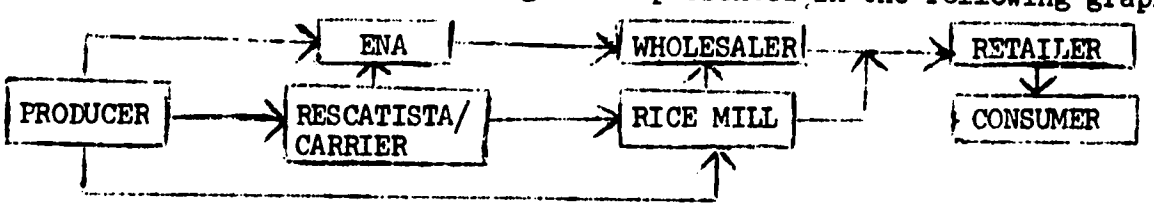
2/ The Investigation of External Markets showed that the producing and marketing costs for rice were higher than the prices offered.

3/ A. LeBaron and J. Mantilla, Estimaciones de Demanda Para Productos Escogidos de Origen Agropecuario en Bolivia 1980-1985, Junio 1977, OPS, MACA Bolivia (p. 28).

supply and prices will decrease, unless ENA decides to go into the market. At present, ENA has increased its storage capacity with the construction of 6 rural storage centers (Centros de Acopio) in the main rice production areas of Santa Cruz. Each center has a capacity to store 2,640 tons. One is located in the Chané-Piraí area at San Pedro. These centers have increased the ENA's storage capacity up to 28% of the total rice production (under dynamic marketing conditions, this capacity should be increased). The ENA buying capacity will be decided by the end of this year. Nevertheless, there are expectations that ENA will intervene in the rice market.[1/]

2) Marketing Channels

Rice marketing in the Chané-Piraí and San Julián areas does not differ from the pattern for the Santa Cruz region as a whole. The more common channels in rice marketing are represented in the following graph:



The producer could sell his/her product to ENA directly, but this is less probable, especially during the last years when there was no market intervention by ENA. The most frequent pattern is that the carrier or

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1/ ENA's participation in rice marketing has been narrowed only to exporting.

"rescatista" (intermediary that makes future purchase of the production by providing cash advance to the farmer) will buy the production at the farm gate and bring it to rice mills. The wholesalers buy from the mills and sell to retailers and, finally, to consumers.

During the 1975-1977 period the "rescatista" provided a large portion of ENA's purchases and it is likely that this will happen again when ENA resumes its market intervention again on a smaller scale. If the "centros de acopio" start operating, farmers will have more opportunites to make direct transactions with ENA.

The pattern described fits the Chané-Piraí farmers needs, but in order to maximize their revenues, they need to organize into marketing groups. If the mechanized system is going to prevail in rice production, economies of scale will be achieved by working as a group, rather than as individual producers.

The San Julián farmers face an additional problem: the lack of a bridge across the "Río Grande". When the river rises, crossing is delayed, resulting in serious losses, especially when transporting wet, unhulled rice. Therefore, there should be a "Centro de Acopio" with a dryer and a grader at one of the NADEPAS. This Center would be smaller and less sophisticated than the ENA's Center, because at present, San Julián has not been defined as a rice producing area. Nevertheless, rice will continue to be one of the farmer's sources of income.

With storage facilities it is possible to take advantage of the seasonal market-selling the product when prices are high. An additional

important aspect is a system of marketing information. Price information is needed on a daily or weekly basis for the most important markets. Such a system is not impossible given the present situation. A radio system in the area has daily contact with Montero and Santa Cruz - eventually, it might reach Cochabamba.

3) Grading System

At the time ENA established a guaranteed price, they also established a grading system. Seven grades of rice were established: extra, superior, buena, primera popular, segunda popular, tercera popular, and "chaposo" (broken grains). This system has not worked except for ENA purchases. Up until 1977, there were only two official grades in the market "Primera" and "Segunda". At the beginning of 1978, three grades were recognized: "Superior", "Buena" and "Popular".

The competition between the ENA grading system and the operating grading system used resulted in additional benefits for wholesalers. They purchased rice from ENA; mixed small quantities of high quality rice with large quantities of a lower quality; and sold the mixture as "primera" grade. This is a market inefficiency; while ENA expends resources in grading rice, wholesalers expend additional resources to mix the graded products.

a) Seasonal Prices: Monthly price data for Santa Cruz is scarce. The MACA official publication "Boletín de Noticias de Mercado Agropecuario" reports price information for 1978 at only two levels: producer and retail.[1/] For each level and each month, minimum, maximum, average and

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1/ It can be expected that in the near future, a wholesale level will be added as it is done for La Paz and other most important markets.

most frequent prices are quoted.

Given the poor information available for Santa Cruz, no inference can be made, but the wholesale prices for La Paz suggest three possible seasonal prices during the year. From January to April, prices fluctuate about the annual average. From May to August, prices are higher and reach their annual peak. From September through December (and sometimes January) prices are below the annual average. This needs to be studied with additional information. There is also a need to study the correlation among prices in different markets. There is no evidence that prices from La Paz and Santa Cruz markets are closely related.

b) Annual Prices

Prices paid by the "rescatista" in Santa Cruz from 1972 to 1978 have changed a great deal. Taking as a base year 1972 = 100, the price index in 1973 was 143.3, but jumped in 1974 to 296 and maintained this level in 1975. In 1976, there was a decrease to 280 and this continued for 1977. This year the price has further decreased to 257.4.

Mill prices, on the other hand, behaved somewhat differently. In 1973, the price index was 145 jumping to 252.5 in 1974. From then until 1977, the indexes have decreased continuously to 219, 210 and 190.1, respectively. In 1978 the index, increased to 204.

This analysis complementing the seasonal price variation should be taken into account for production planning and marketing purposes. Nevertheless a partial equilibrium analysis as such will not be definitive. The possible interrelations with other crops must be considered in a

general equilibrium framework.

c) Corn

Corn is an important item in the diet of Bolivian highlanders, but is second in importance in the project area. During 1976-77, area in corn in Bolivia was 109,000 Ha. but decreased to 107,690 Has. in 1977-78. Corn production was 146,940 tons in 1976-77 and 116,395 tons in 1977-78. The total supply in 1977-78 was 158,644 tons including stocks from the previous period. Domestic consumption for the same period was 127,445 tons, resulting in an excess supply of 31,149 tons.[1/] In an attempt to deal with this problem, MACA sponsored a panel discussion, which among other things, recommended reducing the area devoted to corn for the period 1978-79.

1) Price Policy

The Government has not taken any action to reduce corn price fluctuations; consequently, farmers were greatly affected by the increase in supply given a less variable demand. The average price expected at a wholesale level for the 1977-78 harvest was $b 80.00/qq., but the price received was around $b 60.00/qq. The effect of this price during 1978-79 will be seen in a shift from corn to rice production for farmers who have this alternative.[2/]

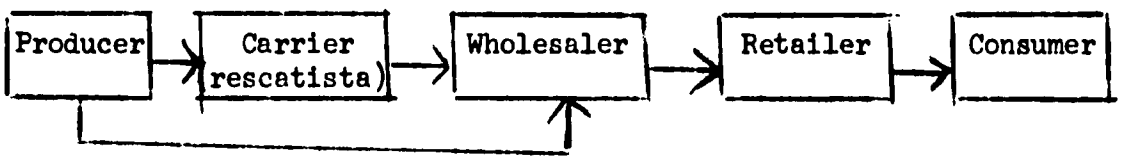
2) Marketing Channels

The marketing of corn follows a simpler pattern than rice.

1/ Mesa redonda sobre el maíz y el sorgo, auspiciada por MACA. Informe preliminar.

2/ The identification of rice areas and the BAB credit policy introduce rigidities in farm planning. San Julián is not considered a rice area and consequently, no BAB credit will be available for that crop.

The most common channel is from producer to the transporter or "rescatista" to the wholesaler and then to the retailer before the product finally reaches the consumer. Sometimes, the product is sold directly from the producer to the wholesaler, avoiding the "rescatista". The following figure traces the marketing pattern as observed in San Julián and Chané-Piraí.



The INC office at San Julián is considering the possibility of participating in the marketing process, substituting for the "rescatista". Although this prospect is only in the planning stage, it is worth more careful analysis. The price fluctuation at a wholesale level during 1978 showed values as low as $b 50.00 and as high as $b 110 per quintal. Although such fluctuations may not be the rule, the seasonal variation in prices suggest the convenience of storing corn for some period of time. The location of farms around nucleos and NADEPAS, and the farmer's experience with Savings and Loan Cooperatives suggest that the best locations for storage facilities would be at the NADEPA level. The adequate size and technical aspects to minimize costs and grain losses should be the matter of a detailed study.[1/] There are three other necessary conditions for such a system to operate adequately. First, working capital will be needed to cope with immediate financial needs of farmers. In other words,

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1/ It appears that the C.I.U. (Comité de Iglesias Unidas) is considering the possibility of bringing in an expert in storage and grain conservation.

farmers willing to participate in the marketing project should be paid a certain percentage of the expected price as soon as the product is delivered for storage.

Second, a grading system needs to be established, and this will require additional farmer training. And third, and most important, a price information system has to be started.

c) Soybeans

Soybean production has been increasing rapidly in the Santa Cruz region. At present, 7,000 Has. of the national total of 12,000 Has. is planted in this region. In 1975-76 the area in soybeans was 7,000 Has. This area was maintained in 1976-77 mostly because of marketing problems. The oil mills had not started their operation as expected and consequently, supply exceeded demand. Before that, in 1974-75 soybean growers incurred serious losses as a result of climatic conditions. Land already prepared for planting was not used because of an abnormally wet season.[1/]

The area devoted to soybeans in 1977-78 has not been estimated, but is expected to be higher than the previous period.

The supply-demand balance[2/] for 1977-78 shows that the total domestic soybean production was 18,300 TM., while the estimated demand was 46,875 TM., thus resulting in a deficit of 38,820 TM. In other words, only 35% of the estimated demand is being satisfied. The imports of crude soybean oil in 1977 were 2,630 tons with a value of $b 2,015,793 and 6,412 tons of

1/ Personal interview to Ing. Oscar Jimenez, Acting Credit Director of the BAB office at Santa Cruz.

2/ Plan Operativo Agropecuario 1978.

refined soybean oil with a value of $b 5,362,317.[1/]

An interinstitutional group[2/] analyzing the soybean problems in Santa Cruz concluded that: the price of soybeans did not make them profitable; BAB loans were usually late; it was necessary to mechanize production; and lack of an improved seed production program were hindering soybean development. They also estimated that the demand for soybeans in Santa Cruz was 23,000 tons (oil mills: 22,000 tons and animal feed mills 1,000 tons). Regional production will satisfy about 50% of those requirements. Consequently, there is room for an increase in the area in soybean production.

Based on a cost analysis, a guaranteed price for soybeans was approved. This price, delivered to the oil mills, is $b 4,350/ton ($b 217.50/quintal) which is considered too high by oil processors. They have requested that the price be lowered to a level of $b 4,100/ton ($b 205.00/quintal),[3/] but negotiations are still pending.

d) Wheat

The area devoted to wheat has decreased over the last few years. In 1975-76 the planted area was 80,815 Has. decreasing to 73,415 Has. in 1976-77. Yields decreased by 26% during the same period. Drought and continuing marketing problems are among the reasons cited for this decrease in planted area. Wheat mills have imported large quantities of wheat to satisfy their needs to 1978.[4/]

1/ Boletín de Noticias de Mercado Agropecuario.

2/ Mesa redonda sobre el Análisis de la Problemática Soyera en Santa Cruz, Preliminary Report, 1978.

3/ Ing. Oscar Jimenez, BAB office at Santa Cruz.

4/ 85% of the imports come from Argentina, USA and Uruguay.

In 1976-77 production of wheat was estimated at 48,085 tons and with stocks of previous imports at 49,844 tons and current imports in 1977 of 229,382 tons, the total supply was 327,321 tons. Demand for the same period was estimated at 285,585 tons producing an excess supply of 41,736 tons. But aside from imports, there was a deficit of 237,500 tons in national production.

It appears that the promotion of wheat production offers good possibilities in terms of reducing the Bolivian balance of payments problem through import substitution. An effective policy to increase domestic wheat production would require emphasis on agronomic research, a strong improved seed production program, and a protected domestic market in the early years of the project. The Guatemalan experience shows that by taxing imports of wheat and transferring these taxes to wheat producers through a guaranteed price, the domestic production can be increased substantially. The subsidy to wheat producers can be justified on grounds of lack of adequate technology. Under a traditional system, yields are generally low, resulting in high per unit production costs in relation to the imported product. The transfer of technology, mainly the use of improved seed and fertilizer could substantially lower production costs eventually, making the domestic product competitive with imported wheat.

e) Other Products

Other production alternatives that offer immediate possibilities for the colonized areas are swine, dairy and cacao production. Imports of lard during 1977 were 987 tons of raw fat and 28,209 tons of refined fat. Dried milk imports amounted to 6,475 tons in the same year with a value of

US$ 8,623,477. Other forms of imported milk had a value of US$ 6,182,705. In addition, cacao has at present a good market. World prices have been increasing steadily during the last few years and it is expected that this trend will continue. The average export price received was US$ 1.135/Kg. of raw cacao in 1976 and $2.94/Kg. in 1977. Bolivia exported 120 tons of raw cacao in 1975 and 146 tons in 1976. Past exports of cacao were 30 tons in 1973 and 161 in 1974. Cacao butter exports increased from 28 tons in 1973 to 104 tons in 1976.

CONCLUSIONS

A marketing analysis of the production alternatives open to the colonized areas suggest that the most attractive crop at present is soybean. Corn and rice have over-production problems and consequently prices can drop.

Production of wheat has a good potential if more research is done to reduce costs of production and if a protective policy is maintained.

Dairy and swine production look attractive given the possibility of import substitution. Dairy production would require a processing facilities to overcome high transportation costs and delays in reaching markets.

Cacao is a crop that must be considered seriously. On the production side, there are advantage in shifting from annual to permanent crops. On the marketing side the world market offers attractive prices.

Although lacking definitive analysis, orange production offers possibilities-not in the fresh form, but as processed juice and jelly.

Santa Cruz is a potential market that could be developed in few years.[1/] The population growth rate and the level of income indicate the possibility of developing a stable market for orange juice. The implications of installing a processing plant in San Julián can be measured in terms of multiplicative effects of investments and the strengthening of the consolidation phase.

III. COST EFFICIENCY OF LAND CLEARING PROCEDURES

The traditional system of land clearing is "slash and burn" done by hand. The "slash" acti ity (chaqueado) requires from 20 to 30 man-days per hectare whether it is primary forest or secondary growth forest. The "burning" activity may require 6 man-days and land preparation for planting requires about 15 man-days. The labor requirement under this procedure ranges from: 41 to 51 man-days per Ha.

The use of animal traction will reduce labor requirements only for land preparation to 3-4 man-days and might help to do a better clearing job. This implies that the total labor requirement will be from 29 to 40 man-days per Ha.

The use of machinery can reduce considerably the time required for land clearing, eliminating the farmer's participation for this activity. Land preparation will take about five hrs. including land levelling. It is usually done by contract. Clearing may be done in 5 to 10 hrs. depending on the type of vegetation and machinery used. The cost ranges from $b. 3,000 to $b. 6,000.

The average costs associated with these alternatives are summarized in the following table:

1/ Honduras and Peru are examples of how new markets for orange juice can be rapidly developed.

	Slash and Burn		Animal Traction		Machine	
	Man-days	Cost $b.	Man-days	Cost $b.	Hrs.	Cost
1) Land clearing	25	1,250	25	1,250	7.5	4,500
2) Burning	6	300	6	300	-	-
3) Land preparation	15	750	3.5	270	4.5	1,200
	46	2,300	34.5	1,820	12.0	5,700

The unit cost of animal traction is estimated at $b. 75/day, while the prevailing wage rate is $b. 50/day.

The financial comparison of the three alternatives favours the use of animal traction, followed by the traditional system and last the mechanized system. Although this last is more expensive and does not use the farmer's labor, most technicians are in favor of it. The arguments usually center around better land preparation, greater planting density, possibility of mechanized harvesting and, of course, more area in agricultural use. Some of these so called "advantages" may not be so. The latest agronomic findings argue against intensive land preparation and a "no" tillage system is recommended. The impact of more area incorporated for agriculture would be beneficial only if there is a market for the increased production. Finally, proposing a strong mechanized system for small farmers ignores one of the main objectives of colonization, that is to reduce unemployment in the rural sector.

Among the disadvantages of mechanization, there is one aspect to be considered seriously. The majority of the soils in San Julián have a thin layer of topsoil, with a sandy subsoil. Consequently, levelling these soils might result in removing the arable soil and replacing it by a poor subsoil.

In conclusion, the use of animal traction appears to be the most efficient system for small farmers. It will increase their marginal productivity, without reducing significantly their participation in the indicated activities. No or minimum tillage is a way to improve yields. The use of animal traction to remove unburned logs will permit a more uniform planting density. Another alternative to be considered is to complement the use of animal traction with mechanical harvesting equipment to save time at harvest. Otherwise, labor shortages would be expected for larger plantings.

IV. FARM PLANNING

Better farm planning will require a general equilibrium analysis for the project as a whole. This implies an analysis of the production alternatives in relation to markets for both inputs and products. There are linear programming techniques that would identify the best alternatives open to the farmers, given the availability of resources (land, labor, fertilizers, chemicals, animal traction, machinery, credit) and the demand for products in relation to expected prices. This approach implies continuous planning as the market conditions for both inputs and products are changing.

An alternative to this approach is the partial equilibrium analysis; that is, product by product analysis without considering interactions among them. The production alternatives proposed by technicians operating in the project area are based on this approach. Even for this type of approach, there is information lacking. A detailed soil study is usually desirable

for farm planning, and no recommendations can be definite in absence of such an study. The Soils Department of MACA in 1968 estimated that about 44% of the soils in San Julián are adequate for intensive cropping (soils type I and II); 18% presented some limitations for cropping (soils type III and IV); 33% were adequate for cattle raising and 5% had no use, except for forest. If these figures are correct, cattle raising should be considered as one alternative, but intensive cropping will be the most important activity.

At present, a rotation of annual crops during a 3-year period after land clearing seems to be appropriate. After that grass planting, preferably a grass-legume mix, would appear the best way to control weeds. Depending on the land potential, grazing land could be used for cattle raising or permanent crops such as cacao, oranges, or other fruit and industrial trees. If none of these alternatives are adopted, grazing land could be farmed again after 4-5 years.

The project has provided an adequate base for these alternatives. Land clearing is done by hand, which allows the possibility of introducing a no-tillage system. Annual crops in rotation or association are being planted initially followed in some areas by grass planting after a 3-year period of cultivation. There is a need to expand this practice but using legumes associated with improved grass. Some farmers are considering going into the cattle raising business, but it does not seem to be the general rule. At present, there are no plans for reforestation or establishment of permanent tree crops on a commercial scale. More research is necessary in order to answer not only agronomic, but also economic questions.

V. SYSTEMS OF PRODUCTION

A. Traditional and animal traction production systems

Greber 1/ has made a detailed analysis of traditional systems versus the use of animal traction based on his observations in the project area. Adjusting his cost estimates, they can be summarized as follows:

	Traditional System			Use of Animal Traction		
Crop	Labor	Other Variable Costs	Fixed Costs 2/	Labor	Other Variable Costs	Fixed Costs
Corn	$b.2,200	1,225	540	825	1,525	1,540
Rice	$b.3,050	1,370	540	1,410	1,270	1,540

The above figures suggest a significant reduction of labor expenses with the use of animal traction in relation to traditional systems. This fact would allow the farmer to handle a larger area if harvesting were mechanized. Crops such as rice and soybeans, must be harvested in relatively short periods of time. If no hired labor is available during the harvesting period, the use of animal traction could be complemented with a pool of stationary threshers.

1/ Kenneth Greber. Créditos de capitalización: una alternativa al sistema tradicional, Santa Cruz - April 1978, mimeograph.

2/ The Cost of clearing new land is included which is estimated at $b.1,500/Ha. Assuming that the same area can be farmed three consecutive years, the annualized cost to be imputed each year at 13% rate of interest is $b.540.

The estimated time required for a single farmer to harvest one Ha. and have the products ready for marketing are: 1/

Crops	Harvesting	Handling for Marketing
Rice	12 days	2 days
Corn	6 days	10 days
Soybeans	4 days	2 days

It appears that soybeans are the crop with the least labor requirements, but harvesting must be done in no more than a 10-day period. Rice has a longer harvesting period but it is the most labor intensive. These facts explain in part why corn will continue to be planted in larger areas than other crops unless some techniques are introduced to improve the farmer's marginal productivity.

B. Mechanized Systems

If mechanized systems are going to be introduced in the colonized areas, the immediate effect will be an increase in the farmed area. The total area farmed per parcela will increase up to 10 Has. which is the maximum amount for which BAB will make credit available to small farmers.

From a management point of view, it seems that a small farmer could handle that amount if most of the activities are mechanized. Among the activities that restrict the small farmer from increasing his farmed area are clearing new land, land preparation, weeding and harvesting. The use of mechanization should help in clearing new land, land preparation and harvesting. Weed control would require the use of herbicides.

1/ Based on Graber's estimates.

Theoretically for this system to work, a machinery pool must exist with a very good repair shop, a complete stock of parts, and well trained personnel to repair and operate the machinery. The experience of some Latin American countries, e.g. Honduras, indicates that the most common problems are maintenance and machinery operation. If these problems are not solved tractors will last only few years. 1/

Assuming these problems can be solved there are other aspects that need to be considered. An increase in production would be beneficial only if there is a potential market. The marketing analysis shows that soybeans are the only crop that offers attractive possibilities in the near future because of present insufficient production in relation to the domestic demand and because of the fixed guaranteed price.

The costs of producing soybeans under a mechanized system, using hired machinery, has been estimated as follows: 2/

A) Variable costs/Ha:	
1. Operational costs	$bs.4,286.60
2. Indirect costs	2,041.65
B) Fixed Costs/Ha:	
1. Interest on operational costs	339.20
2. Depreciation	186.40
3. Interest on fixed capital	1,090.15
TOTAL Cost/Ha.	$bs.7,944.00

1/ Honduras experience shows that tractors handled by organized peasants lasted less than 5 years - only 2 years in some cases.

2/ Mesa Redonda sobre el Analisis de la problemática soyera en Santa Cruz.

The expected yield is 1.5 tons/Ha. and the guaranteed price $b.4,350/ton which give a gross income of $b.6,525. If the oil processors' request is accepted, the price would be $b. 4,100/ton and consequently there would be a gross income of $b.6,150. It might be concluded that soybeans do not offer good possibilities. This may be true for commercial farms who have larger fixed costs but for a small farmer the variable costs would be the operational costs: the interest on a loan and depreciation. Under this assumption his costs of production would appear to be: $b.4,812 and consequently he would derive a net income of at least $b.1,340/Ha.

On the other hand the production of soybean under a mechanized system hardly uses hand labor at all and makes the farmer dependent on machinery. There is a high risk involved in this. The soybeans have a very short period of harvesting, about 10 days. If a harvester is not ready during this period or if it rains, the probability of serious losses are high. Such a problem must be considered seriously when dealing with small farmers. It would require a very careful planning of machine use and a good maintenance system.

Under BAB's current policy it is likely that the promotion of mechanized rice will be expanded. It has been shown that the effect of an increase in rice production will be a drop in prices. This will be greater in the short run than in the long run. This fact makes this crop too risky because of marketing problems rather than production problems. Unless external markets are found, which is doubtful under present

conditions, the increase in rice production should slow. A similar reasoning applies to corn. An increase in corn production would result in lower prices.

Under these circumstances there is some hope for small farmers who rely on family labor or mechanized systems. When prices drop too low, commercial farms would incur losses, while a small farmer would receive the benefit coming from his labor. The break-down costs of production for rice based on labor use and clearing new land is the following: 1/

Labor use:	$b.3,650
Cash expenditures:	1,370
Fixed costs:	100
	$b.5,120

These figures show that more than 70% of the costs are assigned to labor. Consequently, if prices or yields are below their "normal" levels, small farmers would be in a better position than commercial farms, because they can afford to get a lower return on their labor in the short-run. In the long run, when production adjustments take place, it is more likely that small farmers would remain in rice and corn production.

Combined Animal Tractor Systems

Systems of production using animals and tractors are presently used in the Santa Cruz area by the Mennonites. Technically this system can increase substantially the marginal productivity of the farmer, but it requires a high level of skill and management. It has been pointed out that . if tractors are not handled properly and maintenance is lacking, more risks than benefits are involved.

1/ Based on Kenneth Graber's estimates.

Another problem to be considered for such a system to work is the education level of the colonists. A survey in San Julian in 1976 showed that 49.8% of the colonists are illiterate. The rest, which includes children of school age, can read and write. 1/ This and the other cultural differences of the colonists as compared with the Mennonites diminish expectations that technologies of production can be easily transplanted from one group to another.

REMARKS

The arguments developed above suggest that the introduction of mechanized systems of production in the colonized areas must be considered carefully. The use of animal traction seems to be more appropriate to increase the marginal productivity of labor without reducing the use of it.

The combined animal-tractor systems are less likely to be adopted by small farmers. Tractor use for land preparation is of more questionable benefit given the recent findings on no-tillage cultivation. A combination of stationary threshers with animal traction for other agronomic activities appears attractive and should be investigated.

VI. ECONOMIC IMPACT OF THE PROJECT

The analysis of the economic impact of the project will be based on the San Julián area, but the conclusions will apply to the Chané-Pirai area also given the similar farm structures in both areas.

The number of farmers settled in San Julián will be 1,392 by the end of this year, or approximately 1,400. Data collected on the patterns of production show that corn and rice are the main cash crops, while other

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1/ Nancy Guerrero. Informe estadístico sobre la encuesta realizada en 1976 - Colonos Zona San Julian, Octubre 1977.

crops such as beans and soybeans are less significant. Vegetables and permanent crops are planted to satisfy mainly direct home consumption needs. Some attempts to market vegetables have shown that these alternatives are less likely to have economic impact. The rule applies here what is good for one farmer can be a disaster for large number of producers. A single farmer marketing green peppers will find such activity profitable. But if 5 or more producers decide to go into this business the market will be ruined. Other farmers marketing eggs have succeeded in the beginning but as competition increased they soon found a large reduction in profits. Such experiences suggest that the markets for vegetables, eggs or chickens are small. Among fruits, papayas are grown in all farms, but they rarely reach the markets of Montero and Santa Cruz.

The areas devoted to different crops as farmers began their activities and develop through the pioneering stage are the following:

Year after Settlement	Area in Crops (% of total area cult.)				Total Area (Has.)
	Corn	Rice	Others	Beans* Soybeans	
1st.	40	40	20	20	1
2nd.	50	30	20	20	2
3rd.	50	25	25	25	3 to 4;

* These crops are mainly winter crops planted in a rotation with corn or rice.

After the third year, farmers would be cropping as much as they can handle; that is, between 3 to 4 Has. The introduction of animal labor will increase farmers capability to handle a larger area, perhaps up to 6 Has.

Unless new crops or alternatives are introduced it can be expected that farmers will continue the pattern of production of the third year. Among the reasons for the predominance of corn in the cropping plan are: all the farmers have experience with this crop; it is used for home consumption; and it involved lower risk than rice. Insufficient rain and occasional frosts also affect rice more than corn.

Assuming that these conditions will remain for some years in the future 1/, the areas devoted to each different crop and the expected production will be as follows:

Crop	Area (Has.)	Yield (Ton/Ha.)	Production (Tons)	Proportion W.N.F. Domestic Production
		Traditional System		
Corn	2,800	3.0	8,400	7.2%
Rice*	1,400	2.3	3,220	3.0%
Soybeans	1,400	1.5	2,100	11.0%
		With Animal Traction		
Corn	4,200	3.0	12,600	10.8%
Rice*	2,100	2.3	4,830	4.5%
Soybeans	2,100	1.5	3,150	17.0%

* Yields and production are given as unhulled rice. The relationship of milled to unmilled rice is about 0.7.

1/ Different farm planning proposals for the consolidation stage emphasize those crops as complementary to other production activities, such as cattle or permanent crops.

A. Short range effects

1) On prices:

The effect on prices of an increase in supply of rice and corn, if other things remain constant, depend on the price-elasticity of demand. The values for these parameters can be expected to be small, given that both products are the main components of the rural diet. For practical purposes, the price-elasticity of demand for corn can be assumed to be around -0.2 and for rice -0.4. The estimated demand is 127,500 tons for corn and 55,500 tons for rice. Henceforth the expected effect of an increase in the supply of corn and rice coming from the San Julian area would be a fall in prices of 33% for corn and 15% for rice if animal traction is not used. The use of this input would reduce prices 49% and 20% for corn and rice respectively.

2) On employment:

The breakdown of labor requirements in relation to family labor availability by months gives an idea of hired labor needs. Table 1 indicates the balance of labor under a traditional system and the alternative using animal traction.

The assumption underlying the figures is:

a) The available labor per family is one. Wife and children's labor will be used to farm 1 ha. of other crops such as vegetables, permanent crops, and raising cattle, pigs or chickens on small scale.

b) The availability of labor varies by month due to holidays and illness.

Under the traditional system the total labor used is 227 per year:

199 of family labor and 26 of hired labor. The use of animal traction, while increasing the area farmed, reduces the use of family labor to 122.5 and hiredlabor to 11.5.

The opportunity cost for family labor in the highlands as reported by Zuvekas [1/] is estimated at $b.10.00/day. The opportunity cost for hired labor in Santa Cruz is the prevailing wage rate of $b.50.00.

Based on these assumptions the impact of the San Julian area on employment is the following:

Family labor traditional system: 278,600 work/days

Family labor, with animal traction: 171,500 work/days

Hired labor traditional system: 36,400 work/days

Hired labor with animal traction: 16,100 work/days

The prevailing wage rate in San Julian of $b.50.00/day implies that the net social gain for family labor will be $b.40.00/day. Hence the total social benefit of providing occupation to unemployed and underemployed farmers coming from the highlands will be $b.11,144,000 under a traditional system and $b.6,860,000 with the use of animal traction.

B) Long Range Effects

The long-run demand elasticities for both corn and rice could be assumed to range from 1 to 2. If other things are kept constant, prices for both crops would be 3 to 5% lower than current prices in real terms. Consumers will benefit directly from lower prices as a result of an

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1/ Clarence Zuvekas Jr., Unemployment and underemployment in Bolivian Agriculture: A critical survey of the literature. USDA/ERS, February 1977.

increase of the "consumer suplus" (area below the demand curve). On the production side, as the more inefficient producers leave rice and corn production, a contraction of the supply can be expected. Eventually, prices will increase somewhat. The equilibrium price could be lower than current prices in real terms if San Julian farmers continue producing both crops.

TABLE 1

LABOR REQUIREMENT

TRADITIONAL SYSTEM

Crops	Area (Has.)	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	Total
Corn (Summer)	2	-	-	15	15	3	24	16	12	10	10	-	-	
Rice (Summer)	1	7.5	7.5	2	12	12	[illegible]	7	7	-	-	-	-	
Soybean (Winter)	1	10	10	-	5	2					-	5	7	
Total Labor Required		17.5	17.5	17	32	17	24	23	19	10	10	5	7	199
Family Labor Available		20	20	20	20	20	18	18	16	16	16	18	18	
Hired Labor Required		-	-	-	12	-	6	15	3	-	-	-	-	26
With Animal Traction														
Corn (Summer	3	-	-	-	12	1.5	2.5	2.5	14	14	10	-	-	
Rice (Summer)	1.5	-	6	1	2.0	2.5	-	14	12	2	0	-	-	
Soybean (Winter)	1.5	1.5	1.5	-	7.0	3.5	-	-	-	-	-	2.5	4.5	
Total Labor Required		1.5	7.5	1	21	7.5	2.5	16.5	26	6	16	2.5	4.5	122.5
Family Labor Available		20	20	20	20	20	18	18	16	16	16	18	18	
Hired Labor Required		-	-	-	1	-	-	-	10	-	-	-	-	11.5

VII. COSTS OF PROJECT INPUTS

The costs of project inputs are analized in terms of expenditures that have already been made and progress to date. The following Table summarizes the financial plan as it was proposed in the CAP and the amendment to that plan during its implementation.

Financial Plan (US$ 1,000)

Items	Assigned	Amended	Expenditures up to 30/9/78 Amount	% w.r.t. amm.
1) Roads	7,838	6,732	4,397.7	65
2) Production services	990	962	13.47	1
a) Agricultural Service Center	490	462	147.67	32
b) Credit	500	500	122.67	25
3) Social services	327	558	255.36	46
a) Potable water	277	467	230.51	50
b) Health posts	25	58	0	0
c) Orientation*	25	33	24.85	75
4) Project Admin.	240	58	81.16	140
a) Admin- support	40	3	0.1	0.3
b) Technical Assist.	200	30	2.05	0.7
c) Titling Admin.	0	25	79.01	316
5) Project Location	250	262	192.75	74
a) Land	0	0	0	0
b) Land Resource study **	250	262	262	100
Total	9,645	9,700	5,280.05	54.4

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*INC monthly report dated Oct. 25 does not indicate expenditures on the orientation program. At the main office they indicated expenditures of $24,850 until November 1978.

** The Bolivian Project Coordinator, Mr. Ballivián, indicated that by November 1978 GEOBOL has received the whole budget assigned to "Land Resource Study".

The main project goals were: (1) "To channel the migration of campesinos" into the San Julián sub-area by opening up a fertile agricultural area by constructing an all weather road and access trial in the area and providing production and social service to the settlers and (2) to consolidate the existing settlement in the Chané-Piraí sub-area by providing an all weather road and production services".[1/]

The details of each input as described and other accomplishments up to now, are the following:

1) Construction of a 80-Km all weather road extending from Chané-Independencia at the southern extreme of the sub-area to San Juan del Piraí in its northern reaches. The road design was for an eight meter roadbed with approximately four meters of a crushed rock, all-weather surfacing. No bridges or major drainage structures were anticipated.

The specifications for this road were maintained but the length was reduced from 80 Km. to 77.35. In addition, a bridge is being constructed at the beginning of the road in Chané-Independencia. A rough estimate of the construction work already done is 68% excluding the bridge. The right of way has been cleared the whole length. There is 60 Kms. of roadbed; ditches and culverts are 50% finished; and a 2-Km. section with crushed rock is being tested. The original budget for this road, including AID, GOB and community contributions, was

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1/ C.A.P. Bolivia - Sub-tropical lands development, AID.

US$ 3,469,000. But with the re-allocation of AID funds, it was reduced by about US$ 442,400. The expenditures already made on this road amount to US$ 1,396,141.29, which represents 46% of the budget.

2) Construction of a 100-Km. all-weather road from a point on the German/GOB road west of the Rio San Pablo. The original budget for this road US$ 5,161,000 was reduced by about US$ 663,600. The original contract was amended specifying that the road will consist of an 8-meter roadbed up to Km. 59 and from there to approximately Km. 74, a 4-meter roadbed.

About 60% of the road has been constructed and expenditures already amount to $1,779,010.68, representing 40% of the budget. In addition, investments in machinery and equipment used for road construction amounted to $1,236,034.97. These were used to construct dry weather-access-trails to nuc ..s away from the main road. The goal has been to construct 800 Kms. of these access-trials, but it will not be accomplished because the number of nucleos established will be considerably lower than proposed.

3) The original budget for two Agricultural Service Centers (ASC) - one in Chané and the other in San Julián - was $ 490,000 but it was reduced to $462,000. The costs incurred up to the present are not given per ASC. The total is $147,673.68, representing 32% of the amended budget. Work completed is estimated at 20% for Chané-Piraí and 35% for San Julián.

4) The promotion of settlement in the San Julián area among communities from the Altiplano and valleys was to be coordinated by INC and carried out by SNDC and DESEC, but these two entities have not participated in the program. INC promotion has resulted in 40 families settled in nucleo 30. INC reports indicate that 81 families were being encouraged to move to San Julián. The San Julián technical advisor considered that this program was not desirable.

The drop-out rate was higher with colonists promoted by INC than with campesinos moving to the area by themselves. There are no records of expenditures on this GOB financed activity.

5) Potable Water

The target was to construct approximately two hundred 8" diameter wells. Only 16% of this goal has been achieving, but the cost has been 50% ($230,510). Part of this expenditure was used to buy $159,869 worth of materials to construct other wells, which can be broken down as follows:

1. 4,800 meters of 1 1/4" water pipe line
2. 800 meters of 6" " " "
3. 14,000 meters of 4" " " "
4. 800 pipe connections

6) The Orientation Program

The orientation program has been administered by the United Church Group, providing new settlers basic instruction in nutrition, cooperativism, sanitation, building construction and basic agricultural practices. This program has been assigned a budget of $33,000, of which 75% has been expended.

7) The Survey and Land Preparation for Settlement of the Areas

This activity was broken down in technical assistance, administrative support and a land resource study.

Technical assistance to INC in management, project evaluation, and personnel training has been accomplished to a very low degree. Only 0.7% of the assigned budget has been spent. A similar conclusion applies to administrative support. The activities carried out for this activity is less than 0.3% of the approved budget.

The administration of titling used more financial resources than that budgeted. The total amount spent represents 316% of the line item, but this activity has not accomplished its main goal: to provide titles to the colonists. It was planned that two years after a farmer settled a title would be given. No titles have been provided to date. However, personnel expect to accomplish this activity by 1979.

The land resource study was assigned to GEOBOL. At present, the total amount budgeted has been transferred to GEOBOL, but the final report has not been delivered to INC. An extension of the deadline was requested and GEOBOL expects to deliver the final report by March 1979.

The study to be published by GEOBOL can be considered as a general type of land resource mapping and can not be used for planning purposes at the farm level. For that purpose a detailed study is necessary. It seems that GEOBOL has the technical capability to carry out such a study, but will require additional financial resources.

AID Grant

A grant of $150,000 was used to contract the project coordinator, Mr. Harry Peacock. The amount that will be spent by July 1979 is $168,600, which will exceed by 12.4% the original budget.

Government Funds

The GOB assigned a total budget of $5,104,000 to the project. The financial reports provide information on expenditures on "personnel services" and "works and general expenses". There is not a detailed breakdown as it was originally planned. The reported expenditures up to September 30, 1978 are the following:

Year	Personnel Services ($US)	Works and General Expenses	Total
1975	183,479.88	140,542.93	324,022.81
1976	317,301.66	83,188.35	400,490.01
1977	475,663.98	78,897.44	554,561.42
1978	350,924.02	389,020.15	739,944.17
Total:	1,327,369.50	691,548.87	2,010,018.37
%	66	34	100

World Food Program (Programa Mundial de Alimentos - PMA)

The contribution of the PMA program to the "San Julián" sub-area in food provided up to Septemter 30, 1978, is reported as follows:

Wheat and soybean flour	97,621.5	Kgs.
Rice (domestic)	15,007.5	"
Oats	7,509.6	"
C.S.M.	15,019.2	"
Vegetable oil	10,137.9	"
Canned fish	11,237.4	"
Tea	500.2	"
Total:	157,033.4	Kgs.

United Church Group

The United Church Group has as one of its goals to induce a farmer to have one hectare of vegetables and permanent crops after 3-4 years of settlement.

The contribution of this group to the San Julián sub-area in terms of personnel services, budgeting and number of colonists assisted through the years they have been working are as follows:

Budget:	1976	1977	1978
Personnel Services	$ 30,500	35,500	19,000
Colonist Support	21,500	56,792	48,025
Total	$ 52,000	92,292	67,025
No. of colonists assisted	200	387	388
No. of nucleos	5	11	10
Cost/colonist	$ 260.00	238.48	172.74

Costs per Beneficiary

The number of families settled in San Julián up to November 1978 was 1,392, but an additional 800 families will be settled in next year. Hence, the total number of families settled is estimated at 2,200 55% of the goal (4,000 families).

In Chané-Piraí, the number of families already settled was estimated at 6,000, but at present, there are about 7,000 families in the area. In addition, there are 550 families beyond the end of the road which is under construction.[1/]

As a consequence, the costs incurred per beneficiary, considering

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1/ The average family size has been estimated at 3.0 for S n Julián, and 4.5 for Chané-Piraí.

expenses up to present and at the end of the project, are summarized in the following table:

a) San Julián Sub-Area

Activity	Cost/Colonist ($) Budgeted	Cost/Colonist ($) Expenditures	Cost/Person ($) Budgeted
1) AID/loan			
Roads and trials	1,836.00	1,370.47	612.00
Agri. Serv. Centers*	105.00	33.56	35.00
Credit*	113.63	27.87	37.90
Potable water	212.27	104.78	70.76
Health posts	26.36	0	8.79
Orientation	15.00	11.30	5.00
Admin. support	1.36	0.05	0.45
Technical assist.	13.64	0.93	4.55
Titling admin.	11.36	35.91	3.78
Land resource study	119.10	119.10	39.70
Sub-total	4,409.00	2,400.00	1,469.70
2) AID/grant	68.18	76.64	22.73
3) Gov't funds	2,320.00	917.73	773.33
4) United Church funds**	223.74	223.74	74.58

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* The budget and expenditures are assumed to be equal for San Julián and Chané-Piraí sub-areas.

** The figures refer to number of farmers assisted (975) by this program.

In addition to these costs, PMA has contributed 157,033.400 Kgs. of food, (71.4 Kg. per family).

b) Chané-Piraí Sub-Area*

Activity	Cost/Colonist		Cost/Person
1) AID Loan:	Budgeted	Expenditures	Budgeted
Roads	$ 384.68	199.45	85.48
Agri.Serv.Center	61.57	21.10	13.68
Credit	35.71	8.76	7.93

* The costs refer to 7,000 families.

A comparison of costs per beneficiary between the two sub-areas could be misleading. The Chané-Piraí sub-area has been settled for more than 10 years, while San Julián is in process of settlement. In fact if the access road to the sub-area were extended up to Km. 100, 600 more families would be settled. By extending the access-trail, roads with relatively small financing, 480 more families are likely to be settled.

In addition, it seems possible to extend the colonized area south-east of the German/GOB road, which could incorporate up to 200,000 Has. to settle about 2,000 families. This possibility would consist of an additional project, but the costs per beneficiary can be expected to be significantly less than for San Julián area, given the administrative support, equipment and machinery available. At present, close to the end of the project, the project has a complete repair service for machinery and vehicles and the following equipment:

1 D-8 tractor with two-year service

1 D-7 " " " "

4 D-8 completely rebuilt

2 motorgraders

1 well drilling equipment with one year use

In addition, they are expecting to get:

12 pick-up trucks

5 dump trucks

2 water tank trucks