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FEASIBILITY STUDY FOR THE ESTABLISHMENT OF A CATTLE FATTENING CENTER IN "EL CHAPARE" INVOLVING THE PARTICIPATION OF THE SMALL FARMERS OF THE REGION

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SUMMARY AND CONCLUSIONS

SUMMARY

The present study analyses the feasibility of installing a Cattle Fattening Center in the Chapare for the company UNAG. The cattle, steers of approximately 240 kg liveweight, would be bought in the Beni and transferred to the Center. There they would be fed and given the necessary veterinary care and subsequently divided into two groups: the steers to be fattened in the Center and those to be fattened by the small farmers in the district.

The stock fattened by the small farmers, after one year and weighing approximately 404 kg, would be bought back by the Center and subsequently sold, together with the animals fattened at the Center itself, to the meat processors in Cochabamba.

To implement the fattening, a number of investments would be required which would be in the case of the small farmer:-

1. Purchase of 20 steers annually.
2. Clearing and sowing approximately 10 ha of brush.
3. Approximately 2.3 km of fencing.
4. Construction of corral, chute and crush.

Investments for the Fattening Center would be:-

1. Purchase of 1,000 steers annually.
2. Clearing and sowing approximately 500 ha of brush.
3. Approximately 33.3 km of fencing.
4. Construction of a corral.
5. Purchase of machinery and equipment.
6. Construction of housing and other facilities.

The funds required to cover the necessary investments by both the small farmer and the Center would be furnished by the Banco Central de Bolivia and other intermediate banks (ICIs) in accordance with the credit terms at present prevailing.

The analysis and the financial evaluation on the lines studied clearly indicate that the Project is not viable, neither for the small farmer nor for the Fattening Center. The principal reasons as regards the small farmer as as follows:-

1.Financial Aspects

The high cost of minimal infrastructure and the sowing of pastures, also the cost of the annual purchase of cattle is revealed in financing which due to its high cost reflects negatively in the cash flows.

This aspect becomes even worse if one takes into account the expensive choice that the peasant takes when he dedicates all his land to fattening cattle, as against the cultivation of coca which, under present circumstances, is far more profitable.

2.Cultural Aspects

From a cultural point of view, the Chapare farmer would find it difficult, at least to begin with, to handle the Beni cattle. These animals are used to grazing in large prairies and to being handled from a horse and with a lasso. Equally, the farmer would have to change the way in which he traditionally handles cattle, that is to say without any kind of method as regards feed or health. The fattening program would require the application of various modern techniques in the management of livestock and pastures.

3.Geographical Aspects

The ecological and climatic conditions which prevail in the region make it difficult for the Project to succeed. There are no natural pastures in the Chapare suitable for fattening livestock which means that the land must be cleared and pastures sown, involving high labor costs.

Equally, the fertility of the soils in the Chapare is limited, chiefly due to the high rainfall which washes away the nutrients in the soil. For this reason, fertilizing the pastures with lime is contemplated, making the operation even more costly.

In the case of the Fattening Center the reasons are as follows:-

The Fattening Center shows an even worse financial situation which, because of the magnitude of the capital investment and working capital required, does not permit of any chance of viability.

The chief problem is the high incidence of variable costs which impedes the development of an economy of scale which would absorb the fixed costs.

As a result, even if the Project could count on high prices, these would not allow large margins of profit, because all the costs would increase in proportion to any rise in prices, especially those related to the purchase of cattle for fattening.

As regards the costs of financing, the possibility of reducing them by making a larger personal contribution has been considered. Nevertheless, even with a much larger personal contribution, the viability of the Center would be marginal.

Conclusions

The end envisaged by the present study of bringing cattle from the Beni to be fattened in the Chapare in a modern and profitable manner, such as carried out by UNAG, does not turn out to be feasible - at least under present conditions.

The small farmer and the Center would have to make a number of expensive investments which are not justified. For the small farmer, the situation is even worse as it would imply a radical change in his habits and also in his way of raising cattle. It turns out to be too much change, too much investment, too much debt and very little gain.

For these reasons, it is recommended that a study be made on a more conservative basis, more suited to the present customs of the small farmer. That is to say, one which investigates the means of improving and technifying what he already has i.e. his native cattle and traditional agriculture. For these reasons, alternatives must found for the functions originally defined for the Fattening Center. These functions are the purchase and distribution of cattle to the small farmer, technical assistance and finally, the re-purchase of the fattened cattle to ensure him a market.

It is further recommended that experimental modules are organized in order to obtain tachnical and economic data of the Chapare on a field level. The number of units, their location and financing would be the subject of an analysis outside the context of the present study.

1. INTRODUCTION

1.1. Objectives and scope of the work.

The chief objective of the present feasibility study is to determine the viability or non-viability of establishing a Cattle Fattening Center in the Chapare. This center, apart from fattening its own cattle will serve as a center for the purchase and distributing of steers to the small farmers in the area. These farmers will fatten the cattle and sell them to the Center so that they can be marketed in Cochabamba.

Also, the results of the present work will be of use to the firm Unión Agrícola Ganadera S.A. (UNAG) to enable them to consider the possibility of investing capital and taking out loans in order to set up the Cattle Fattening Center. For this reason people from UNAG have taken an active part in the Study and have indicated the technical limits within which the company would be prepared to participate in the Project.

The principal aims contemplated which are subject to the requirements of the Agency for International Development, are the following:- a) to estimate the number of young cattle available in the Beni for purchase and fattening in the Chapare; b) to determine the cost of purchasing and transporting these cattle; c) to establish what is needed to instal the Cattle Fattening Center and the cost. This is where the animals will be concentrated, fed, rested, vaccinated, fattened and/or distributed to the small farmers; d) to analyze the economic factors involved in fattening cattle at the level of the small farmer and the means of distributing and returning the animals to and from the Center and the small farmer; e) to determine the potential demand for the cattle and establish the means of selling these animals to the meat processing firms in the City of Cochabamba.

1.2. Methodology

This study is based on the gathering of basic information in the Beni, the Chapare and in the City of Cochabamba.

In the Beni, the availability of cattle has been established by means of interviews and study of the cattle population.

In the Chapare it was possible to appraise the chief existing cattle operations and the characteristics of the district. Furthermore, enquiries were carried out amongst the farmers in the Chapare in order to determine the attitude of the peasants towards the Project, to find out their ways of breeding and fattening cattle and their marketing methods.

Also the chief meat processors in the City of Cochabamba were interviewed and it was possible to determine their present and future requirements which could be sustained by means of contracts and agreements.

The information obtained in order to carry out the study has been fully backed up with secondary information, opinions of experts and practical people who are at present engaged in farming.

Finally, the financial results of the Project have been forecast for the Fattening Center as well as for the small farmer which has made it possible to arrive at the respective conclusions and recommendations.

2. ESTABLISHMENT OF THE AVAILABILITY OF CATTLE IN THE BENI

2.1. Ports of embarkation, destination Puerto Villarroel.

2.1.1. Locality.

The ports of embarkation for cattle in the Beni destined for Puerto Villarroel are situated in the Provinces of Cercado, Moxos and Mamoré on the banks of the Mamoré and Securé rivers; these ports are detailed in the following table:-

1. SITUATION OF PORTS OF EMBARKATION (See Map in Annex I)

Province	Port of Embarkation	River
Mamoré	San Miguel de Gasser	Mamoré
Mamoré	San Antonio de Rivera	Mamoré
Cercado	Habana	Mamoré
Cercado	Buenos Aires	Mamoré
Moxos	Montevideo	Mamoré
Moxos	Puerto Ganadero	Mamoré
Moxos	Lomita Quitón	Mamoré
Moxos	Puerto Machiro	Mamoré
Moxos	Villa Mata	Mamoré
Moxos	Concepción	Securé
Moxos	Gundonovia	Securé
Moxos	Barranco Colorado	Mamoré
Marbán	Camiaco	Mamoré
Moxos	Puerto Yura	Mamoré

The ports of embarkation listed above have habitually supplied the market for cattle on the hoof in the Department of Cochabamba and to a lesser degree the mines of the Altiplano. The other ports situated down river from San Miguel de Gasser, for reasons of freight, have always supplied the Brazilian market in the Territory of Rondonia and the State of Acre. From time to time, when meat prices are attractive in Brazil, the ports of San Miguel, San Antonio, Habana and Buenos Aires supply this market with young or mature steers.

2.1.2. Infrastructure for loading

The annual floods suffered in the Department of the Beni and to a greater degree along the banks of its rivers, have decreed that the loading facilities in the different ports are deficient. In fact, they are reduced to a receiving pen with a capacity for about 300 head and a chute for loading onto the barges. The material used for

construction is white wood, bamboo and vines or thatching wire.

This system could be improved by making some divisions in the reception pen, nevertheless, it is not worth while making heavy investments for them only to be destroyed by the river when it floods its banks every year. The loading of cattle under present conditions will continue to function in the same way, as it is in the interests of the landowners along the river banks to make the necessary repairs so that they can charge $150 per head of cattle loaded in their ports.

2.4.3. Purchase and loading of cattle.

The purchase of cattle can only be done during six months of the year, from June to November. During the rest of the year, from December to May, the lands are under water and it is difficult and risky to drive the cattle from the buying centers to the ports of embarkation.

The number of cattle to be loaded must not exceed the capacity of the port, that is to say 500 head, the number which can be carried on two barges. Should the needs of the Project demand a higher loading capacity, it would be necessary to negotiate with the proprietors to enlarge the receiving pens and to construct three divisions to make it easier to handle the cattle.

For the purposes of the Project, the following ports of embarkation could be used:-

a) San Miguel: For cattle acquired in the Province of Mamoré.

b) Habana and Buenos Aires: For cattle acquired in the Provinces of Mamoré and Cercado.

c) Montevideo, Lomita and Puerto Machiro: For cattle acquired in the Province of Moxos.

d) Concepción and Gundonovia: For cattle acquired in the Province of Moxos and the ranches near the Securé River.

The ports listed below cannot be considered for the purposes of the Project:-

a) Puerto Ganadero: Because it is very near the highway between Trinidad and San Ignacio and the movement of vehicles makes the reception and loading of cattle difficult.

b) Villa Nata: Because a sawmill is situated 100 meters away which makes the reception and loading of cattle difficult.

c) Camiaco: Because the trail entails risk of loss of

cattle as in order to reach the port, they must pass through large tracts of forest.

d) Barraco and Puerto Yura: Because the number of head available in the surrounding area is insignificant.

2.1.4. Cost of river transport.

The cost of transport and days of passage, taking a day as 24 hours, from the different ports of embarkation to Puerto Villarroel is as follows:-

2. COST OF TRANSPORT AND DAYS OF PASSAGE

Port	Days of Passage	Cost per head $b
San Miguel	5 days	2,571
Habana	4.5 days	2,491
Buenos Aires	4.5 days	2,491
Montevideo	4 days	2,205
Puerto Ganadero	4 days	2,205
Lomita	3.5 days	2,205
Puerto Nachiro	3.5 days	2,205
Villa Nata	3.5 days	2,205
Concepción	3.5 days	2,205
Gundonovia	3.5 days	2,205
Barranco Colorado	3 days	2,205
Camiaco	3 days	2,205
Puerto Yura	3 days	2,205

As can be seen from the above list, except for Montevideo and above, the freight to Puerto Villarroel is the same i.e. $b2,205 per head. This freight has nothing to do with the time taken for the voyage. The reason given by the carriers is that the barges on their journey to Puerto Villarroel have to leave from Trinidad.

2.1.5. Fleet and capacity of transport.

The fleet for the transport of cattle destined for Puerto Villarroel is as follows:-

3. BARGES AND THEIR CAPACITY

N A M E	Cap.Head	N a m e	Cap.Head
Concepción	170	Trinidad	150
Padrino	150	Estrella	150
San Luis	140	Berlín	130
Miguel Roberto	130	Caribe	130
Monte Carlo	130	Loreto	130
Primavera	130	Cruz del Sur	130
San Aurelio	130	María del Carmen	130
Yara	130	Marco Hernán	130
Luis Alberto	120	Kelita	120
Yanet	120	Copacabana	120
Corsario	120	Adelita	120
Bélgica	120	Jose Alberto	120
Progreso	120	San Martín	120
Boldito	120	Virgen Asunción	120
San Francisco	120	Stalingrado	120
Total capacity in number of head			3,870

2.1.6. Number of days journey to ports of embarkation.

The number of days required to walk the cattle from the different centers of production to the ports of embarkation are as follows:-

4. LENGTH OF DRIVE TO PORTS OF EMBARKATION.

L o c a l i t y	P o r t s	Days drive
Holanda, San Juan	Buenos Aires, Habana	3 days
San Francisco	Montevideo	3 days
San Francisco	Lomita, Puerto Nachiro	3 days
San Francisco	Concepción, Gundonovia	2 days
San Lorenzo	Lomita, Puerto Nachiro	3 days
San Lorenzo	Concepción, Gundonovia	2.5 days

2.1.7. Taxes on extraction of cattle.

All cattle produced in the Beni to be sold on the hoof to supply other parts of the country are subject to the following tax obligations:-

Cattlemen's Association of the Beni and Pando	$b 800
University of Mariscal Jóse Ballivian	$b 100
Municipalities	$b 130
Total tax per head	$b1,030

2.2. Availability of cattle in Moxos, Cercado and Mamoré

2.2.1. Locality

The cattle producing provinces of the Department of the Beni in which animals can be bought for the Project are as follows:-

a) Province of Cercado
b) Province of Moxos
c) Province of Mamoré

The Province of Marbán should not be included in the cattle on offer because, as has been stated previously, the trails offer many risks.

2.2.2. Type of animal recommended

The type of animal recommended for the Project would be young steers 18 to 24 months old, at least half-bred Cebú and weighing an average of 240 kg. The advantages of this type of beast are as follows:-

a) More weight gain owing to the oseo-muscular growth of the animal.

b) Better able to stand up to the trail and river transport.

c) Less time needed for fattening on pastures.

2.2.3. Cattle population in Cercado, Moxos and Mamoré.

The Provinces of Cercado, Moxos and Mamoré are those indicated as having on offer the cattle required by the Project. These provinces have at present a cattle population as listed below:-

5. CATTLE POPULATION IN CERCADO, MOXOS AND MAMORE

Description	Cercado	Moxos	Mamoré	Total
Bulls	16,700	9,416	8,800	24,916
Cows	220,000	117,700	110,000	447,700
Male calves	99,000	52,965	49,500	201,465
Heifers 1 yr	44,550	23,834	22,275	90,659
Bulls 1 yr	44,550	23,834	22,275	90,659
Heifers 2 yrs	42,323	22,642	21,161	86,126
Bulls 2 yrs	42,323	22,642	21,161	86,126
Steers 3 yrs	40,207	21,510	20,103	81,820
T o t a l	549,653	294,543	275,275	1,119,471

Sources: Regional office of Statistics and personal investigation.

As can be seen from the above table, there is a possibility of cattle on offer for the Project to the extent of 86,126 2 year old steers, a number of which would normally more than fulfill the needs of the Fattening Center and its plans for future growth.

2.2.4. Cattle requirements for the Project.

The initial number of cattle required for the Project is in direct relation to availability of forage on hand in the Chapare. Equally, plans for future growth depend upon the interest shown by the peasants in becoming part of the Project and the extension and instruction programmes which must be developed in order to educate them technically.

Without knowing what forage resources exist in the Chapare at present, an initial requirement of 1,200 2 year old steers annually has been laid down. Of this number, 1000 young steers will be fattened by the Center and 200 by the peasants in the area.

2.2.5. Present prices of cattle in the Beni.

The cattle prices per kg liveweight in the Beni, from 1981, have been fixed in direct relation to the price per kg on the hook, as stipulated by the Cattlemen's Association of

the Beni. That is to say that future increases per kg liveweight are laid down in relation to the percentage rise in meat prices per kg on the hook.

Present prices in the Beni for males are as follows:-

	Steer 1 yr	Steer 2 yrs
Liveweight	140 kg	240 kg
Price	95.5 $b	95.5 $b
Weight on the hook	70 kg	120 kg
Price	191.0 $b	191.0 $b
Total Price	13,370 $b	22,920 $b

2.2.6 Purchase of cattle in the Beni.

For the purchase of cattle in the Beni there are the following alternatives:-

a) Direct Purchase. In this case an official from the company will make the necessary purchases for the Project in the districts supplying cattle and will co-ordinate the drives to the ports of embarkation. Obviously he will need to know cattle and the ranchers who operate in the districts.

The selection of cattle will be effected personally and the number chosen paid for once vaccinated and branded with the company brand. As soon as the buying and selling operation has been completed, the drove will be walked to a neighbouring property or to the port of embarkation itself for transfer to Puerto Villarroel as soon as possible.

b) Indirect Purchase. In this case the company will carry out its transactions with the ranchers directly. These people will act as buyers for the company and once their purchases have been completed, they will notify the company's personnel and hand over the cattle to them to be driven to the ports of embarkation.

2.2.7. Cost of driving the cattle to ports of embarkation.

The different droves to be walked to the ports of embarkation should not exceed 300 head as a larger number makes for difficulties on the drive and increases the risk of loss of animals. For this number of head the following costs obtain:-

a) Daily pay for cowboy: Including the use of horse and equipment, the price is $b2,000 per day. For a drove of 300 head 6 cowboys are needed and the days worked

are calculated to include those required for leaving and returning to base. This system has the defect that no responsibility is undertaken for loss or death of stock.

b) Payment per head driven: The present cost of driving cattle in this way is $1,000 per head. This includes the provision of equipment, cowboys and horses and the commitment to write off against the contract possible losses and deaths of stock incurred during the drive.

For the purposes of this Study the second alternative will be employed.

2.4. Availability of cattle in the principal ranches.

2.3.1. San Juan de Fribal: Contact was made with Mr. Carlos Schenstrom who indicated that even if he could not sell the Project his produce owing to the fact that he is involved in a fattening program in Santa Cruz, he would offer his complete co-operation and the use of his installations for the reception and loading of cattle purchased in the Province of Mamoré.

He stated that it would be possible to buy 1,000 2 year old steers annually in the area.

2.3.2. San Miguel (ex-Gasser): The new owners do not know the district and do not have the necessary experience. We are speaking of the Chaves brothers, dealers from the City of Montero. They indicated that they have a fattening operation in Okinawa for the cattle produced on their ranches. It is recommended that the Center eliminates San Miguel as a possible source of cattle.

2.3.3. La Habana: The administrator of the ranch was not to be found at the ranch nor the owner in Trinidad. It was not possible to obtain any useful information.

2.3.4. San Ignacio: Contact was made with Mr. Andres Vaca, a partner in the establishment 'Santiago de Bowles'. He showed interest in selling 500 2-year old males annually end in providing a further 500 young steers from the area.

2.3.5. San Francisco: Contact was made with Mr. Gilfredo Soleto, a small rancher in the district. He indicated that it was possible to buy 300 to 500 2 year old males annually using his services.

2.3.6. San Lorenzo: Contact was made with Mr. Leonardo Justiniano, a small rancher in the district. He indicated that it was possible to buy 500 2 year old steers in his district annually.

2.3.7. El Carmen: Contact was made with Mr. J. Villar. He indicated that he could provide 300 animals annually.

2.3.8. Trinidad: Contact was made with Mr. J. Cortez and Mr. Fernando Velasco, both big ranchers in the Province of Moxos. They indicated that if the conditions of sale were favorable, they could each supply 500 males annually.

2.3.9. Summary: According to the different interviews mentioned above, it can be concluded that the Center could easily buy around 3,000 2 year old steers annually.

2.4. Animals that should not be acquired.

It is recommended that the following types of animal should not be bought:-

2.4.1. Yearling steers: Animals of this age carry the following disadvantages:-

a) As they have recently been weaned, they are not in condition to be driven.

b) They are nervous and difficult to handle.

c) They suffer a high mortality rate due to the 'stress' of the drive and the river transport.

c) They require a longer time to reach a suitable slaughter weight.

2.4.2. Three year old males: Animals of this age carry the following disadvantages:-

a) They do not show a weight increase due to oseo-muscular growth.

b) The average purchase weight is 360 kg, the same as the slaughter weight and therefore the cost of the recovery of approximately 20 kg weight lost on the drive and river transport would have to be borne by the Fattening Center.

2.4.3. Heifers and cows.

These animals carry the following disadvantages:-

a) They do not have the weight yield that can be reached with males.

b) They would cause handling difficulties in the Center.

c) They are not milk animals which could be exploited as such in the zone of the Chapare.

d) It is considered that the young would not be profitable in the Chapare.

3. CHARACTERISTICS OF THE CHAPARE

3.1. Comparative data of livestock production in Bolivia.

3.1.1. Cattle production.

Livestock production represents 23.4% of the total farm production, made up of 8.9% beef production, 5.3% pork production, 2.8% mutton production and 6.4% production in other fields.

The exact livestock population of Bolivia is unknown due to the lack of periodical censuses. In 1975 it was estimated that there were 2.8 million cattle, 1.2 million hogs, 7.7 whole hoofed animals (horses etc.), and 2.4 million South American cameloids (2).

According to the Junta del Acuerdo de Cartagena, growth of the production of meat in the categories mentioned is as follows:-

6. PRODUCTION OF MEAT (THOUSANDS OF TONS) (3)

	1970	1975	1980
Beef	53.7	65.2	87.8
Pork	16.5	24.7	32.2
Mutton	13.7	16.9	20.3
T o t a l	83.9	106.8	140.3

3.1.2. Regions of cattle production

The chief regions producing meat in the country are as follows:-

-The tropical plains: Beni, Santa Cruz and Pando.
-The Altiplano: La Paz, Oruro and Potosí.
-The Valleys: Cochabamba, Valle Grande, etc.

75% of the cattle destined for meat are to be found in the tropical plains and 25% is distributed between the Altiplano and the valleys (5).

Of all the areas where meat is produced, the Beni is the most important because of the 260,000 beasts slaughtered in 1975, 49% originated in the Beni and 29% in Santa Cruz (8).

The total production of beef reached 70,800 tons in 1977, with an annual rythm of growth of 3.9%.

3.1.3. Consumption of beef.

The production of meat meets the demand of the national market where the average consumption is 13.7 kg per head per year, with an annual rate of increase of 1.2%. The distribution of this consumption is as follows:- 49.6% beef, 18% pork, 16.6% mutton and goat, 5% poultry and 10.8% fish and other meats (9).

Cattle in Bolivia have an index of growth of 4.2% per year. These cattle are made up of the following species:- (6)

Cebú	75.0%
Native cattle	22.0%
Milk breeds	2.0%
Others	1.0%

T o t a l	100.0%

3.1.4. Animal husbandry data.

The following animal husbandry data are estimated for the Beni:-

Birthrate	40 - 50%
Deathrate calves	12 - 15%
Deathrate adults	5%
Extraction weight	350 - 400 kg
Extraction rate	13.5%
Dressed weight	180 kg on hook

These estimates are based on comparative data from Santa Cruz where the matter has been studied in depth. According to FEGASACRUZ (7) the animal husbandry data and yield for Santa Cruz are as follows:-

Birthrate	49.7%
Deathrate calves	11.5%
Deathrate adults	4.2%
Extraction weight	362 kg
Extraction rate	12.2%
Dressed weight	180.5 kg on hook

3.2 The Chapare

3.2.1. Locality.

The Chapare is a sub-tropical region in the Department of Cochabamba, comprising the area between the parallels 16o - 10' and 17o latitude South and 64o - 50' longitude West. Its size is approximately 2.5 million hectares which includes the Province of Chapare and part of the Provinces of Carrasco and Arani in the Department of Cochabamba (See Map in Annex II).

3.2.2. Ecological system.

The sub-region of the Chapare is generally wooded and damp; the temperature oscillates between 29 and 27 degrees centigrade on average.

The main rains, between 2,500 and 7,000 millimeters annually, fall in December and January. The vegetation consists of dense, tropical forest on the slopes of the mountains and foothills and of open woodland. The variety and wealth of the forest is very great. Species of great economic value are found such as Mara, Cedar, Verdolago, Almendrillo, Ochoó and others (10).

The prevailing winds from May to August are light and humid and in a South-Easterly direction (coming from Argentina and Paraguay). The prevailing winds during the rest of the year are those which determine the system of rainfall and come from a North-Easterly direction (coming from the Amazon). During the winter the temperature habitually drops to 10oC.

The high rainfall in the Chapare has caused, by the leaching or washing of the contour, the formation of extremely acid soils in the majority of areas (PH 3 to 6). The dissolving of the iron and especially the aluminium leads to toxicity and also fixes the phosphorous available in forms that cannot be made use of by the plants.

On the other hand, the extreme acidity makes various micro-nutrients, indispensable for plant development, impossible to assimilate. As a result of these processes, the soils are poor in nutrients and with a high incidence of aluminium toxicity. This situation chiefly affects the cultivation of crops which are not adapted, reducing agricultural yield and the useful life of the soils under intense cultivation, to a maximum of 3 to 5 years. This is the chief cause of the migratory agriculture.

Within the ecological system of the Chapare, the vegetation has sustained a highly balanced cycle. It retains in its cellular composition a volume of nutrients available indefinitely as the vegetable and animal wastes on the surface of the land are oxidized. This process is hastened by the high temperatures and humidity, making the nutrients available once more through the same bio-system.

Once the land is cleared, this dynamic balance is rapidly destroyed unless compensatory systems of fertilization and soil conservation for agricultural purposes are inculcated. The Chapare has a frail ecosystem and in order to preserve it, farming must be developed by means of cultivation suited to the zone and by means of animals which can furnish a good yield.

3.3. Cattle in the Chapare.

Complete statistics on the livestock situation in the Chapare do not exist. It was estimated in 1979 that 16,200 head of cattle were in existence there, according to an investigation by SENARB (11). Of these animals, 7,614 head were native cows. From Chimoré to Puerto Villarroed there are roughly 1,000 head of cattle in existance belonging to 233 owners, an average of 4.5 head per owner.

A private property, 'Los Majos', belonging to Mr. Roberto Vásquez can be cited. In 1982 this place carried 74 head, of which 39 were cows over 3 years old, 3 bulls (over 3 years old), 1 heifer (2 - 3 years), 8 steers (1 - 2 years), and 16 yearling calves, all the stock of native and Cebú breeds.

The Institute of Colonization on the other hand, has 82 head of buffalo which were handed over to the Experimental Station at Chipiriri, to the Station 'La Jota' and to the University of San Simon. The last-named institution also owns 119 head of cattle of native and Cebú breeds originating from the Beni.

3.3.1. Agrological planning in the Chapare.

The mission MASI-PRODES has divided the district of the Chapare into sections comprising 9 micro-regions (see Map in Annex III), which do not represent the whole extent and are agrologically heterogeneous. Of the zones identified by MASI-PRODES, only some have conditions suitable for the establishment of pastures and the fattening of cattle. These zones are described below:-

a) Chipiriri (3): This zone is classified as humid, tropical forest. The topography is mainly flat, with

elevated terraces with eroded slopes. The altitude ranges from 250 to 300 m above sea level. The average annual rainfall oscillates between 4,500 and 7,000 mm and the average temperature is 26oC. The soils are soggy and acid, 1 to 1.5 m in depth and requiring lime for agricultural exploitation.

According to MASI-PRODES, in the area 5,990 ha have been distributed to colonists of which 2,280 ha are to be found under cultivation. The acreage distributed has been divided into 587 production units and mainly enjoys a good road infrastructure.

b) Litoral-Isiboro (4): This zone stretches along the road to the Beni, from the district of Litoral to the Isiboro river. It has been classified as humid, tropical forest and its topography is irregular with moderate declivities. The elevation varies from 250 to 350 m above sea level. The average annual rainfall is 3,500 to 4,000 mm. and the average temperature is 25oC.

Apparently the soils offer a good agricultural potential with depth of 1½ m. The texture is medium but the soils are acid and poor in nutrients. They require competent management and applications of lime and fertilizers. According to MASI-PRODES, 18,740 ha have been distributed in the area of which 2,100 ha are in production. There are about 2,100 colonists in the district organized into 25 syndicates and 4 nucleuses.

The road link is good from Litoral to Bolivar, but there are no access roads to the different production units. Between Bolivar and the district of Isiboro transit is difficult because of the crossing of deep and wide rivers which means that the area is isolated in the rainy season.

c) Ibuelo-Lauca (7): This zone is classified as humid, tropical forest and its topography is almost flat, with low hills which show some erosion. The elevation varies between 50 to 350 m above sea level. The average annual rainfall is 4,000 mm and the average temperature is 23oC. The soils are deep and vary in texture from soggy to sandy. They are poorly drained and need fertilizing.

Of the 15,900 ha distributed in this region, it is estimated that 8,250 ha are under cultivation consisting of 1,637 farms. The road connection is good on the main road, although many side roads have limitations for part of the year.

d) Chimoré-Mariposas-Nelga (8): This zone is classified as humid, tropical forest; the predominating vegetation being low brush. The topography is mainly flat with a few low hills and high terraces. The elevation varies between 250 to 350 m above sea level, the average annual

rainfall is 3,250 mm and the average temperature is 24oC. The soils are clay, soggy and sandy, very poorly drained. They need competent management and a great deal of fertilizers. MASI-PRODES calculates 23,020 ha have been distributed in settlements of which 1,547 are under cultivation.

The road connection is fair, with some deficiencies. This situation is more critical in the zone of influence of puerto Alegre and Mariposas, transport being very lacking in the rainy season.

e) Valle Ivirza-Ivirgarzama-Puerto Villarroel (9): This zone, also classified as humid,tropical forest, the predominating vegetation being low brush, the secondary vegetation virgin forest. The topography is uneven in Valle Ivirza and flat in Puerto Villarroel. The elevation varies from 250 to 500 m above sea level. The average annual rainfall is 3,500 mm and the soils are of varied textures requiring drainage. Of the 44,800 ha of settlements, it is estimated that 7,385 ha are under cultivation. The trunk roads are good.

For the purposes of the present Study, it is considered that this district is the most suitable for the situation of the Fattening Center.

3.3.2. Regions visited.

With the purpose of bringing up to date certain data and witnessing conditions, the zones described below were visited:-

a) Villa Tunari: The property of Mr. Sinforiano Vargas was visited; he is a small farmer in the region who possesses 8 ha of which 5 ha are down to grass and the remainder under coca. It can be seen that the pastures have greatly deteriorated for lack of competent management and owing to the unfavorable soil conditions such as being acid and water-logged.

b) Valle Ivirza: The property of Romero and Associates was visited; this consists of approximately 200 ha of which 120 ha are down to grass. The pastures were laid down 6 years ago (Yaraguá colonial and recently Brachiaria). These grasses have virtually disappeared due to an invasion of sour grass, due to the poor soil fertility and bad management of the pastures.

c) Ivirgarzama: The installations of the Buffalo Breeding Center were visited (dependent on the National Institute of Colonization). In this center, a herd of about 60 buffalos were seen in good health and under the best management conditions. Due to the absence of the person responsible for the project, it was not possible to obtain further information on the set up. Nevertheless, judging from the state of the installations, one can deduce that the administration cannot count on the necessary resources.

d) Mariposas: The property 'Aurora' was visited. This place has roughly 100 ha down to grass, mainly Brachiaria. The soils are water-logged which means that large areas of pasture are badly trampled and are disappearing, only to be replaced by sour grasses. Equally, it would seem that the soil itself has limitations, such as acidity and lack of fertility.

e) Puerto Villarroel: In this port it can be seen that the corrals, property of the Municipality of Puerto Villarroel, have serious deficiencies, e.g. posts fallen and rotten, driftwood piled up in the corrals, the floor of the corrals with deep mud holes, logs for sawmill stored 40 m away.

3.3.3. Cattle enterprises in Chimoré.

a) Codex Ltd. They have a farm down to natural grasses and 17 ha under cultivation to Kudzú, a legume widely grown in the district. They carry 110 head of breeding cattle.

b) Olmos Brothers of Cochabamba: This property has 40 ha of cultivated pasture consisting of a type of Brachiaria and star grass. It carries 25 heifers and a bull brought from the Beni two years ago.

3.3.4. Production of Forage and Feed.

The production of forage in the exploitation of livestock is probably the most important factor. For this reason, the characteristics of the zone and the investigation of forage resources are analyzed below.

In the shallow but floodable valleys of the Chapare, there are zones where there is abundant pasture, but they are not found in the areas that have been colonized. In the shallow valleys not subject to flooding (or at least partially) and more densely populated, the thick forest does not permit natural grasses to grow. Where the land has been cleared, native grasses are to be found which have nutritive value, such as Panicum conjugatum or Desmodium intortum.

The only entities which are dedicated to the investigation of forage resources consist of the Experimental Station at Chipiriri, belonging to the Bolivian Institute of Agricultural Investigation (IBIA) of MACA and the Forage Investigation Center (CIF) of the University of San Simón.

The Experimental Station at Chipiriri has carried out investigations on the forage species most suited to the ecology of the zone. Those which are outstanding are

the species Brachiaria decumbens, Brachiaria humidicola and Brachiaria mutica classified as grasses and Stylosanthes guyanensis, Desmodium, Ovalifolium and Kudzú (Pueroria phaseoloides) classified as legumes.

Of all these species, Brachiaria decumbens is that which most readily adapts to the zone with yields of 10 to 14 tons of dry matter per year (13).

With Brachiaria humidicola a yield of 10 tons of dry matter per ha per year was obtained.

On the other hand, in experimental plots, the Forage Investigation Center (CIF) obtained the following results (14):-

7. AVERAGE YIELDS OF FORAGES 1980

Species	No. of cuts	Yield No Fertil.	Tons dry matter per yr w 20 kg/ha
Brachiaria decumbens	4	14.19	18.77
" plicatulum	3	13.96	17.46
Panicum maximum makueni	4	12.41	14.96
" " trichoglume	3	9.72	9.98
Brachiaria ruziziencis	2	7.26	8.78
Melinis minutiflora	3	6.75	8.50

3.3.5. Stocking capacity and weight gain.

The only data on stocking capacity at an exploitation level are those indicated by the companies Aurora and Los Majos, with 1.06 and 1.05 AU (animal units) per ha.

In order to discover the meat yields with the different types of forage adapted to the zone, the Experimantal Station at Chipiriri has carried out a number of investigations. In 1979 a study on fattening on Brachiaria decumbens showed the following results (15):-

8. RESULT OF FATTENING STEERS FROM THE BENI

Treatment (145 days)	Total gain	Daily gain
Brachiaria decumbens, grazing only	63.6 kg	435 gr
Grazing + mineral salts	69.6 kg	475 gr
Grazing + banana & vit.ADE	87.9 kg	601 gr
Grazing+banana+vit.ADE+Pecutron	96.1 kg	657 gr

In the years 1978-80 another test was carried out with 20 native heifers on pastures of Brachiaria decumbens and Stylosanthes guyanensis with the following field results:-

9. PRODUCTION YIELDS ON CUT PASTURES OF BRACHIARIA DECUMBENS & STYLOSANTHES GUYANENSIS & BALANCED FEED 1979-1980 (16)

Treatment (90 days)	Total gain	Daily gain
Grass+Balanced Feed 6% PA	54.5 kg	604 gr
" " " 9% PA	60.7 kg	674 gr
" " " 12% PA	61.3 kg	680 gr
Grass only	36.8 kg	407 gr

Another interesting work on fattening yields was carried out in 1980 (17) comparing direct grazing on Brachiaria decumbens and Stylosanthes guyanensis using 14 native heifers, achieving the following results:-

10. COMPARISON OF FATTENING NATIVE HEIFERS ON DIRECT GRAZING 1980

Treatment (25 days)	Total gain	Daily gain
Direct grazing B.decumbens	11.91 kg	476 gr
" " S.guyanensis	3.24 kg	129.3 gr

It is interesting to note that the yields obtained with the legume Stylosanthes guyanensis are low because the test animals for time lost weight due to lack of nutrition owing to the fact that the said legume is not very palatable. This obviously influenced the consumption of dry material by the test animals.

From the trials carried out, one can deduce that on the grass Brachiaria decumbens under direct grazing, the weight gain of each animal is about 400 to 476 gr per day. These figures increase when another type of feed is added, such as balanced rations, bananas, mineral salts etc.

During the visit made to the Experimental Station Chipiriri it could be proved that the pastures of Brachiaria decumbens lasted 6 years when treated with fertilizers and subjected to controlled rotational grazing. The farmers in the area when consulted on this point indicated that this fodder lasts 2 to 3 years under normal conditions of use on a field level, without fertilizers and competent grazing control.

In other experiments, the results obtained at a commercial exploitation level on the ELSNER ranches can be cited. For these tests native cattle were employed on grazing and a weight increase of 325 gr per day was obtained. By comparison, this result is less than that obtained employing Cebú/native cross animals which showed a weight increase of 360 gr per day (18).

In the cattle ranching areas of Santa Cruz (Experimental Station Saavedra), a weight increase of 290 gr per day was observed with native stock on pastures of Panicum maximum and an increase of 430 gr per day on the same pasture where the legume Glycine sp. had been included.

In the Experimental Station of Abapó weight increases of 329 gr per day were obtained with native male animals and 345 gr per day with Nellore males on pastures of cultivated grasses like Buffel (Cenchrus ciliare) and Green Panic (Panicum maximum) together with legumes (Glycine sp.) (19)

With young steers and heifers from 12 to 18 months, weight increases of 606 to 673 gr per day using Nellore were obtained and 521 to 526 gr per day using native cattle on mixed pastures under irrigation. On the other hand with animals over 18 months old weight increases of 307 gr per day using Nellore and 462 gr per day using native cattle were obtained on feed of cut grass and silage.

For the purposes of the present Study an increase of 450 gr per day for 2 year old steers on pastures of Brachiaria decumbens, under controlled and rotational grazing, will be used.

3.3.6. Survey

In accordance with what was laid down in the Terms of Reference for the Study of Fattening Cattle in the Chapare, a census was carried out in the zones of influence along the highway between Puerto Villarroel and Villa Tunari.

Although these investigations were planned simply, the investigators were obstructed by a number of problems beyond their control such as the lack of receptivity on the part of the colonists to this kind of work. From this angle, the numerous investigations conducted by different institutions (more than 54 according to PRODES) have had a similar experience. These enquiries have engendered in the peasant a rejection of 'an invasion of his private life without practical ends' - a colonist's remark.

Anticipating this well-know problem, students from the Faculty of Agronomy of the University of San Simón

who speak Quechua were contracted as censors.

Another problem that had to be faced was that due to the rains, the deterioration of the roads and destruction of the bridge over the River Cesarzama made it impossible for the vehicle employed for the census to reach any of the zone of influence of Puerto Villarroel and Valle Ivirza. For this reason the censors had no option but to tranship and to utilize other means of transport to reach the district indicated.

For the above reasons only 35 enquiries could be made, 5 had to be abandoned for various reasons.

a) Districts censored: Taking the transversal axis Villa Tunari-Puerto Villarroel as the base for the enquiry (as it is the ecological belt most colonized), the places visited are listed below:-

1. Sub-zone A: Paraíso, Mariposas and Sendas I, II, III and Iv.
2. Sub-zone B: Chimoré, Victoria, Santa Rosa and Sendas A,B,C,D,E and F.
3. Sub-zone C: Loma Eñe, Tachaval and Senda 2 and 3.
3. Villa Tunari, Dorada, Ivuelo, Río Vinchuta, Río Coni and Tropical.

b) Model forms for the Census: In order to carry out the enquiry, the form which figures in Annex VII was designed.

c) Results: The object of the enquiry was to investigate the state of cattle exploitation and the results obtained were as follows:-

1. Origin of the colonist: Most of the colonists censored come from the interior of the country (mainly Potosí and Cochabamba) as is shown below:-

Origin	%
Department of Potosí	43
" " Cochabamba	34
" " Chuquisaca	9
" " Oruro	6
" " Santa Cruz	3
" " Otros	5
Total	100

2. Landownership: The majority of the colonists have endowments of land authorized through the Institute of Colonization (69%); others have bought their land (11%), others have received it from the University of San Simón (3%) and others do not reveal how they got it. (17%)

3. Extent: The cencus established that 629 ha was held by 35 colonists which signifies an average of 17.97 ha per colonist. The tracts of land held have been divided by percentage as follows:- 28% hold less than 10 ha and 71.4% hold 10 to 60 ha.

4. Method of administration: In most of the properties (85.7%), the colonist assumes the entire responsibility of administration; few have employees (11.4%) and only one is managed in partnership.

5. Feed: 94.2% feed their stock by direct grazing in their paddocks. Of the 629 ha in question, only 47 ha are cultivated pastures which represents only 7.4%.

According to replies given by the colonists, the scarcity of feed occurs especially in the winter, although a good percentage of the farmers disagree with this statement.

Of the known grasses cultivated, it can be deduced that 20% of the farms have their pastures down with Merkeron; 2.9% with Yaraguá; 2.9% with Guinea grass; 14.3% with Brachiaria; 34.3% with Kudzú; 8.6% have native grasses and 17% don't know.

As regards the quality of the fodder, 37.1% of the colonists indicated that the best is the legume Kudzú; 14.3% chose the grass Brachiaria and 2.9% Merkeron. Nevertheless, 45.7% of the peasants graze their animals on sour grasses.

It was not possible to obtain information regarding the yields of paddocks owing to the total ignorance on the part of the farmer as regards the number of cuts and the volume that can be obtained from the pastures; nor are they aware of the benefits of silage.

6. Herds: The 35 farms possess 192 animals which signifies an average of 5.5 head per property of 18 ha. It can be deduced that the stocking capacity averages 0.31 head per ha according to the following list:-

	No. of animals	%	Stocking Rate
Bulls	21	11	
Steers or young bulls (1-2yrs)	19	10	
Male calves (up to 12 months)	6	3	
Cows	101	53	
Heifers (1-2 yrs)	29	15	
Female calves (up to 12 months)	16	8	
Totals	192	100	0.31

7. Animal husbandry data: Selecting the most comprehensive replies, it can be deduced that the colonists are ignorant of the effectiveness of their herds. Going into the age at which the cows bear their first calf, 37.1% of the colonists asked stated that the best age was from 24 to 29 months; 14.3% stated that the best age was 36 months and 48.6% did not know.

Regarding the calving rate of the herd, 11.4% indicated that it was 25%: 8.6% that it was 50%; 5.7% that it was 90% and 74.3% did not know.

8. Provision of water: 66% of the farms used the river or some small stream near the property; 6% used well water; 3% used catchment water stored on the farm and 25% did not know where their animals drank.

9. Animal health: Some general ideas prevail such as vaccination against Foot and Mouth which is practised by 71% of the colonists, while 11% vaccinate against Rabies and Foot and Mouth disease; only one peasant vaccinated against Brucelosis and 29% of the farmers do not vaccinate at all.

Other data asked for in the census such as months of milking, cows in milk, average yields, sales weights, mortality etc. were not adequately given.

As a general conclusion, it can be deduced that none of the farms visited raises cattle for fattening, except for the males, which between steers and bull calves represent 13% of the total herd. The system of handling and feeding the cattle is very rudimentary and animal health care is deficient.

4. ANALYSIS AND RECOMMENDATIONS AT THE LEVEL OF THE SMALL FARMER

4.1. Size and locality

4.1.1. Size

The first endowment of land which the Government carried out in the Chapare occurred in Todos Santos in the year 1920 (21). This endowment gave the colonists a spread of 20 ha each. This extent of landed property served as a basis for the consideration of new applications for land in planned colonies. Nevertheless, in unplanned colonies the land was reduced by half as can be seen from the list below:-

11. EXTENT AND DISTRIBUTION OF FARMS IN THE CHAPARE (22)

Type of Colony	No. of Colonies	No. of Farms	No. of ha	Size of Farm
Unplanned	117	8,281	82,810	10.0 ha
Semi-directed	42	1,972	39,440	20.0 "
Directed	24	1,193	24,260	20.3 "
T o t a l	183	11,446	146,510	12.8 ha

On the other hand in the studies carried out by MASI, it is established that the present average extent of land held is 13.7 ha for the 11,039 properties. Of this average acreage, it is considered that only 4.3 ha per property is under cultivation, the rest remains undeveloped brush.

As a result, for the purposes of the present Study, 13.7 ha will be judged the average extent of land held, of which 10 ha would be destined for the fattening of cattle. It is also estimated that on the basis of this acreage and with a pasture management program, each peasant could fatten 20 head (AU) per year.

4.1.2. Locality

In the districts described in Para. 3.3.1. Agrolcgical planning in the Chapare, the most suitable district is the zone of Puerto Villarroel which for the peasant presents the following advantages:-

a) The topography is flat.
b) The land and river transport conditions are adequate.
c) Adequate climatic conditions also exist.
d) The Fattening Center would be situated in the

region as the nucleus of the Project.

4.2. Description of the process.

4.2.1. Selection of small farmers.

Once the project is approved, peasants who possess the necessary attributes and interest in taking part in the Program must be chosen.

The first attribute is that he possesses 10 ha of land suitable for fattening cattle. It must be clearly established that he is interested in participating and that he will have to give a great deal of his time to the Project.

Meetings will be held from time to time at the Fattening Center at which they will be given the necessary help to obtain credit and to build the infrastructure. Equally they will be given technical assistance in the management of cattle and pastures.

4.2.2. Land clearing and sowing of pastures.

The peasants chosen will receive a credit from the Banco Agricola or another institution of financial aid for the land clearing and other items as will be seen below.

Owing to the lack of technical experimental data on the most appropriate methods of land clearing, the recommendations of the colonists and officials of the Experimental Station have been taken. The heavy machinery, especially tractors, cause damage to the fertile top-soil, drawing nutrients from the land. Therefore it is recommended that the clearing be done by hand, although it means an additional cost for the farmer as he cannot do it alone due to the size of the operation.

As regards the type of pastures, it is recommended that grasses such as Brachiaria decumbens be sown as this is the species which has shown the best adaptability and the best yields in the Chapare.

In the planting of pastures, the cultivation of legumes has not been taken into account as the species which gave the best results, such as Stylosanthes guyanensis, lasted barely a year in the field and planting it considerably increases the cost. Another legume which is widespread in the Chapare is Kudzú (Pueraria phaseoloides). This was also eliminated as it is a fodder which has to be cut; it does not stand up to grazing and if used signifies a higher operational cost in labor for the peasant.

The pastures should preferably be laid down in the month of November and should grow for a period of 10 months. During this time, the small farmers would receive training in the Fattening Center from the practical angle in the rotation of pastures, handling of animals, building of fences, corrals, chutes etc.

4.2.3. Fencing.

Fencing should encompass the entire perimeter of the 10 ha cultivated. The area should also be divided into 6 paddocks of 1.66 ha each. This division is necessary for correct pasture rotation. (See Diagram in Annex IV). The rotation of paddocks is recommended because it is the system which has given the best results of yield per head and of pasture duration.

The justification for the installation of fences is as follows:-

a) The cattle from the Beni are used to direct grazing on the open range. In the Chapare they would have to be confined to smaller areas and on rotational grazing.

b) The cattle coming from the Beni are used to being controlled by horsemen with lassos. In the Chapare most of the colonists do not have horses and do not use the lasso. The fact that the cattle are confined in paddocks and the constant rotation of the same would make them easier to handle.

c) Fencing is essential in the organization of a system of rotation of paddocks and to obviate the animals fleeing into the forest.

4.2.4. Corral, chute and crush.

For the customary work involved in the management of cattle, vaccinations, curing etc. it is necessary to instal a minimal infrastructure consisting of corral, chute and crush. The material used for this purpose consists of wooden posts obtained in the clearing of the brush. (See Diagram in Annex V).

The construction of the corral, chute and crush must be carried out before the cattle are received.

4.2.5. Handling of cattle.

In the first stage the Fattening Center would distribute 20 steers to each of the interested peasants chosen in the region of Puerto Villarrool. These steers,

acquired in the Beni, would have a weight of approximately 240 kg each.

The purchase price of each steer would be fixed according to the price in the Beni plus the costs of transport to the Center, plus the costs of veterinary care and of recuperation incurred by the Center during approximately a week.

The 20 steers for fattening would graze and rotate between the paddocks of 1.66 ha each in accordance with the growth of the pastures and the state of the soil. On rainy days the cattle would have to be taken out of the paddocks to avoid damaging the pasture.

It is estimated that fattening the cattle on rotating pastures will be sufficient to obtain a weight gain of 450 gr per day per animal.

Once fat, after a period of 12 months, the cattle will be sold to the Fattening Center at the price prevailing in the Cochabamba market, less the cost of transport to Cochabamba and less the administration costs incurred by the Center.

It is contemplated that the Banco Agrícola or another credit institution would participate in this transaction so that the small farmer may put his obligations up to date and be able to start a new cycle.

4.2.6. Projection of number of small farms.

Taking into account the lack of experience of the small farmers in fattening cattle, that this is not a traditional activity in the zone and the economic and cultural problems, this Study puts forward the following projection of number of small farms.

12. PROJECTION OF NUMBER OF SMALL FARMS

Years	No. of Farms in Project	Total No. Farms (acc.)	AU to Market after 1 yr
1	10	10	190
2	15	25	475
3	20	45	855
4	30	75	1,425
5	40	115	2,185
6	60	175	3,325
7	90	265	5,035
8	130	395	7,505
9	180	575	10,925
10	250	825	15,675

4.3. Capital investment. (See Table 14).

4.3.1. Land.

The payment for the land on the part of the small farmer is regarded as an investment. The cost of 1 ha of land in the Chapare is around $50,000, therefore the value of the land is estimated at $500,000 for the 10 ha.

4.3.2. Land clearing.

Clearing the farm would require a total of 43 days' work per ha, which at $600 per day's work, would signify an investment of $258,000 for the 10 ha.

4.3.3. Sowing.

The sowing of pastures is based on the preparation of the soil at 5 days' work per ha and the sowing of the same at 1 day's work per ha. The quantity of seed required per ha would be 2 kg. Therefore 6 days' work at $600 per day ($3,600 per ha) would be required and 2 kg seed at $3,000 per kg ($6,000 per ha). The total cost per ha would be $9,600 and the cost for 10 ha would be $96,000.

4.3.4. Fencing.

The fences will be installed with hard wood posts. These posts will be placed 4 meters apart to hold 4 strands of wire with a space of 45 cm between each strand.

The cost of the labor is estimated at 40 days' work per kilometer of fence. As the fence has a total length of 2.3 km, 92 days' work would be required to build it. (40 days' work/km by 2.3 km).

The details of the costs pertaining to this item are made up as follows:-

13. COST OF INSTALLATION OF FENCING.

I t e m	Quantity	Price per Unit ($)	Total Price ($)
Posts (2,300 m/4)	575p	80	46,000
Wire (2,300 m/4)	9,200 m	20	184,000
Staples	23 kg	500	11,500
Labor	92 days' work	600	55,200
Total cost of fencing			296,700

It is felt that the small farmer would contribute

the labor or 92 days' work towards this cost. This contribution is considered feasible as the farmer could carry out this work during the 10 months it takes for the pastures to grow.

4.3.5. Corral, chute and crush.

a) Corral: In a place near or adjacent to the paddock, a corral should be built of cross-pieces and double posts, 1.80 to 2.00 m high. The extent of the corral should be 180 m2, enough to handle the 20 steers (9 m2 per animal unit). The cost would be $3,600 per meter or 6 working days at $600 per day. As can be seen in the the diagram in Annex V, the size of the corral will be 54 meters or 2 x 12 m x 15 m, which, multiplied by $3,600 per meter gives a total cost of $194,400.

b) Chute: The chute will be constructed outside the corral, parallel to one of the sides. It will be 12 m long and having a funnel at the entrance. This chute is crude with vertical posts. The cost will be $1,800 per meter i.e. 3 days' work at $600 per day. The total cost will be 12 m by $1,800 which equals $21,600.

c) Crush: A simple crush should be made at the end of the chute for the purpose of subduing the animals when they are being cured or vaccinated or other jobs are being done. The cost of the crush will be 3 days' work at $600 per day per meter by 2.5 m i.e. $4,500.

d) Total cost: In short, the total cost of corral, chute and crush would be $220,500.

4.3.6. Contingencies.

10% of the total cost of the fixed investments not counting the cost of the land has been laid down to cover contingencies to anticipate any sort of price variation, loss of material etc.

4.4. Working capital. (See Table 14).

4.4.1. Purchase of steers.

The peasant will buy the steers directly from the Fattening Center at a price laid down as follows:-

Per animal unit:		
Price in the Beni ($95.5/kg liveweight x 240 kg)		$ 22,920
Transport to Center		$ 4,385
Vaccination against foot and mouth	$ 40	
Vaccination against anthrax	$ 20	
Vaccination against rabies	$120	
Vermifuge injection	$187.5	
7 days recovery at $100/day	$700	
Administration costs (Center)	$427.5	
Recovery and veterinary care		$ 1,495
Purchase price for the farmer		$ 28,800
Total price (20 steers)		$ 576,000

4.4.2. Labor.

The project contemplates fattening cattle on the farms that have 13.7 ha or more of which 10 ha would be for livestock and the rest for agricultural exploitation.

It is customary in the Chapare for the landowner to carry out agricultural work, therefore one cannot expect him to tackle the cattle work as well by himself.

Nevertheless, in order to reduce the working costs of the program, it is felt that the small farmer could look after the cattle with the help of his family.

Therefore the cost of labor is estimated as a personal contribution valued at $600 per day for 365 days i.e. $219,000.

4.4.3. Animal health.

An overall sum of $12,000 per year for vaccination, curing and veterinary care is calculated. This service will be provided by some institution such as IBTA, the University etc. The estimate is laid down as follows:-

Per animal unit:	
Vaccination against foot and mouth every 4 months at $40 *	$ 80.00
Dosing for parasites every 6 months at $187.50 *	$ 187.50
Other veterinary products	$ 125.00
Total products	$ 392.50
Total cost (20 steers)	$ 7,850.00
Veterinary (5 visits at $830/visit	$ 4,150.00
Total	$12,000.00

* The first vaccination and de-worming will be administered by the Fattening Center (See Para 4.4.1.)

4.4.4. Pasture cleaning.

Pasture cleaning twice a year has been taken into account; 9 working days at $600 per day i.e. $10,800.

4.4.5. Fertilizing.

The reports put out by the Experimental Station at Chipirini advise fertilizing with lime in order to maintain uniform production in the pastures. The lime counteracts the high leaching of the soils as has been explained before. In this respect, the use of 10 quintals of lime every three years at a cost of $700 per quintal is estimated. The first application would be in the third year at a total cost of $80,000.

4.4.6. Drainage.

The task of drainage consists of making ditches to carry away the water in order to avoid the formation of pools of standing water in the pastures. 12 working days per year at $800 per day have been estimated for this task i.e. $7,200.

4.4.7. Depreciation/Amortization.

This has been estimated as follows:-

a) Depreciation

Sowing	$	96,000
Material for fencing	$	241,500
Corral, chute & crush	$	220,500
Contingencies	$	87,120
Total	$	645,120
Annual depreciation 20%	$	129,024

b) Amortization

Land clearing	$	258,000
Annual amortization 5%	$	12,900

c) Total Depreciation/Amortization $ 141,924

4.4.8. Contingencies

A minimum of 10% for contingencies has been estimated i.e. $87,120.

4.5. Financing.

The financial requirements have been calculated on the basis of the credit conditions for programs which prevail in the Banco Central de Bolivia. For the purposes of this Study, it is suggested that the Banco Agrícola be the intermediary bank which would assume the responsibility for evaluating, granting and supervising the credit through its Extension Service Department. Also the Program of Guarantees for Productive Credits (PGCP) which provides institutional credit to those persons or groups which do not have easy access to traditional sources of financing for lack of sufficient guarantees, should be considered.

Nevertheless, even though the conditions which obtain at present with respect to this kind of credit are harsh in terms of interest rates and due dates, it is necessary to have recourse to these sources of money as the only alternative for financing the requirements of the small farmer.

One aspect which is of prime importance to this Project, is the participation of the peasant in the structure of operational costs and in the investment costs. It is considered that the greater the personal contribution, the greater will be the likelihood of a successful program.

It is important to underline the fact that in terms of personal contribution, that of major importance is connected with his ownership of the land which would be devoted exclusively to the fattening of cattle; this means at the cost of lost opportunity for the peasant as regards the planting of coca. Nevertheless, the peasant realizes that the marketing of coca could be circumstantial and dangerous and that he could be obliged to think about more traditional activities.

4.5.1. Capital investment. (See Table 15).

a) Conditions.

	Particip.	Rate of Interest	Due Date	Grace
BCB	70%	38%	8 yrs	2 yrs
ICI	30%	48%	8 yrs	2 yrs

b) Participation.

Participation in the financing is as follows:-

Item	Pers. Contr.	B C B	I C I	TOTAL
Land 10 ha $50,000/ha	500,000			500,000
Clearing 10 ha		180,600	77,400	258,000
Sowing $9,600/ha		67,200	28,800	96,000
Fencing	55,200	169,050	72,450	296,700
Corral, chute & crush		154,350	66,150	220,500
Contingencies		60,984	26,136	87,120
Total	555,200	632,184	270,936	1,458,320
% Participation	38%	43%	19%	100%
% Financing		70%	30%	100%

4.5.2. Working capital (See Table 15, cont.)

a) Conditions.

The present conditions for financing are as follows:-

	Particip.	Rate of Interest	Due Date	Grace
BCB	70%	38%	1 yr	1 yr
ICI	30%	48%	1 yr	1 yr

Only a due date of one year has been taken into account, as the fattening is carried out in one year.

b) Participation.

Participation in the financing as as follows:-

Item	Pers. Contr.	B C B	I C I	TOTAL
Purchase steers		403,200	172,800	576,000
Labor	219,000			219,000
Animal health		9,600	2,400	12,000
Pasture cleaning		7,560	3,240	10,800
Drainage		5,040	2,160	7,200
Contingencies		56,550	25,950	82,500
Total	219,000	481,950	206,550	907,500
% Participation	24%	53%	23%	100%
% Financing		70%	30%	100%

4.6. Investment program.

The investment program has been laid down in the following manner:-

	Semester-2	Semester-1	Total yr 0
Land	500,000*		500,000
Clearing	258,000		258,000
Sowing	96,000		96,000
Fencing Mat.	241,500		421,500
Labor	27,600*	27,600*	55,200
Corral, chute & crush		220,500	220,500
Contingencies	62,310	24,810	87,120
Total	1,185,410	272,910	1,458,320
*Pers.Contr.	527,600	27,600	555,200
Financing	657,810	245,310	903,120
Total	1,185,410	272,910	1,458,320

From this program, it can be seen that Year 0 will require financing to the extent of $903,120. In the interests of simplicity, it is calculated that on average this financing will be granted half way through Year 0, that is in Semester-1, in accordance with Table 15.

4.7. Assessment of income.

The income is calculated in accordance with the sales

which the peasant will make to the Fattening Center where the cattle will be received and transported to Cochabamba.

The outlines for laying down the income per A.U. are as follows:-

Liveweight in the Beni	240 kg
Daily weight gain	450 gr/day
Minimum period of grazing	12 months
Weight gain on grazing in 12 months	164 kg
liveweight for sale	404 kg

The price per kg liveweight per A.U. which the small farmer will receive, will be calculated in the following manner:-

	kg live ($b)	Animal Unit ($b)
Price in Cochabamba	151.50	61,206
Less: Transport Chap-CBBC	8.66	3,500
Administration costs & technical assistance (Center)	4.46	1,800
Net income	138.38	55,906

Therefore the small farmer would receive $b55,906 per A.U. Nevertheless, it should be taken into account that a 5% deathrate is estimated i.e. one A.U. in 20. For this reason, he would receive only $b1,062.214 per year ($b55,906 x 19 steers).

4.8. Analysis and Financial Projections

4.8.1. Projection of Profit and Loss (See Table 16).

The projection of profit and loss for 8 years shows a very considerable loss from the first year ($b498,641) until the 8th year ($b18,076).

This negative profit is due chiefly to the high cost of financing the project. If these costs were lowered, the Program could be considered marginally viable.

In terms of the analysis of costs against sales, the following percentages can be established:-

	Yr 1	Yr 4	Yr 8
Cost of steers/sales	54%	54%	54%
Other working costs/sales	44%	44%	44%
Working profit/sales	2%	2%	2%
Financing costs/sales	48%	28%	3%
Net profit/sales	(46%)	(26%)	(1%)

It can be deduced that on top of the high costs of financing, caused by the investments in infrastructure, the working costs are also high since the working profit only has a margin of 2% against sales.

4.8.2. Cash Flow Projection (See Table 16).

The cash flow projection for 8 years presents, as can be expected, a negative cash flow during the first five years and a cash flow accumulatively negative during the 8 years.

As with the profit and loss, the determinating factor for the negative cash flow is the high cost of financing.

4.8.3. Conclusion.

From the financial statements, the fattening project for the small farmer can be easily qualified as not viable in the dimensions studied (20 steers per year) and under present conditions of prices and costs, even taking into account a considerable contribution on his part.

4.8.4. Recommendation.

Notwithstanding the negative results obtained, two recommendations are put forward:-

a) To analyze the cattle fattening operation more thoroughly but on a smaller scale i.e. 2 to 5 A.U. per farmer. In this way all the expensive infrastructure and its respective financing would not be necessary. The greater part of the investments could be made by the farmer himself with the help of his family.

To this end three possibilities have been elaborated of farms of 5 ha, 2.5 ha and 1 ha. In these cases it is clearly seen that that of 5 ha (10 steers) still requires a considerable infrastructure that the farmer himself cannot carry out. The financial result is negative, though on a smaller scale than that which figures in this study. The two smaller alternatives show a positive return and, as has been mentioned above, should be the subjects of a special study (See Tables 20, 21 and 22).

b) To organize experimental modules on a field level. These modules should follow the program as laid

out above.

The principal object of this recommendation is contingent on the fact that there is a genuine lack of technical, economic and cultural information about the practical fattening of cattle on a field level in the Chapare.

From this point of view, the modules would make it possible to collect information about:-

a) The yield of different pastures at field level.
b) Stocking rates per A.U. on the pastures.
c) Periods of fodder shortage.
d) Lifetime of pastures.
e) Best dimensions for paddocks for rotation.
f) Weight gain per A.U.
g) Deathrate.
h) Sickness.
i) Animal management problems etc.

The chief object of the modules would be to establish facts from a technical and economic angle, at field level. It is therefore recommended that they be carried out on an area of at least one hectare. In this way two A.U. could be fattened and the paddock divided in two.

The number of experimental modules, their location and financing would be the subjects of a later analysis outside the scope of the present Study.

5. ANALYSIS AND RECOMMENDATIONS AT THE LEVEL OF THE FATTENING CENTER.

5.1. Project in general.

5.1.1. Object.

The object of the present section is to determine the advantage (or disadvantage) of establishing a Cattle Fattening Center in the Chapare.

5.1.2. Aims of the Project

The Project's internal aim would be to establish the feasibility of the Fattening Center and the external aim to serve as a nucleus of influence for the development of cattle for fattening at the level of the small farmer. From this point of view, the aspects which affect the creation of the Center and the services which it could give the peasant will be considered. This Study is being carried out so that UNAG can evaluate it and, should they consider it feasible, invest in the Project and administer the Fattening Center.

5.2. Description of the UNAG company.

5.2.1. Antecedents. Background.

The company Unión Agrícola Ganadera S.A. (UNAG) is a corporation consisting of private individuals which was created on November 28th, 1974. Its chief objective is to carry out for its own account, another's or associated with third parties, agricultural and livestock activities to encourage, develop and improve agricultural production.

To date, UNAG has made various investments in livestock projects in both fattening and breeding cattle, which leads one to suppose that they have ample experience in this field. Their most important activities to date are:- San Roque, Rincón Chuchio, Guayacanes and Huanchaca, in all 10,000 head of cattle. Equally, UNAG has gone in for agriculture by virtue of the production of 1,000 ha of maize, soya, rice and cotton. They have a rice mill and a cotton gin amongst their multiple activities.

5.2.2. Administrative aspects.

The Project will be administrated by San Jorge Ltda., an independent company which specializes exclusively in the administration of UNAG'S livestock enterprises. The object of giving the administration contract to San Jorge Ltda. would be to make use of their personnel,

qualified both technically and in the field.

5.2.3. Legal aspects.

Once the project is decided upon (should it prove viable), a company will be formed with the name of Centro de Engorde Chapare whose scope and legal characteristics will then be defined.

5.3. Cochabamba market.

According to data from the Ministry of Industry & Commerce, the consumption of beef in the City of Cochabamba amounts to 45,000 head per year and the number supplied on the hoof (by river Beni-Chapare) amounts to 21,000 head per year which indicates that there is a high percentage of unsatisfied demand.

This information has been confirmed by the principal buyers of cattle i.e. the meat processing firms. These firms need to acquire around 7,300 head per year and are DILLMANN, FYSAL and HAAS. Together, in accordance with the capacity of their processing equipment, they require the above-mentioned number.

This question has not been gone into more thoroughly as AID has contracted a consulting firm to make a complete study of the market. For the purposes of this Study, it is enough to state that an adequate market for the Fattening Center exists.

5.3.1. Marketing system.

The steers bought in the Beni should have an average weight of 240 kg each. Furthermore, they should have been vaccinated against foot and mouth, anthrax and rabies. These vaccinations should be carried out before the journey when the cattle are branded. The cost of these vaccinations are for the buyer's account.

From the Beni, they will be transported to the Fattening Center in Puerto Villarroel. There they will be fed for a week and dosed for parasites. It is estimated that during this period, the animals will regain the weight lost on the over land and river journeys.

At the end of the week, the steers will be divided into 2 groups: those to be sold to the small farmers and those to be fattened at the Center.

The steers to be sold to the small farmers will be priced at $23,800 which includes the cost of the beast, plus the cost of transport, plus the cost of recovery and

veterinary care during one week (See Para. 4.4.1. Purchase of Steers).

These steers will be fattened for the period of one year and re-sold to the Center weighing approximately 404 kg each. The price that the peasants will receive for this sale will be $55,906 per head.

The price of the fat steer paid to the peasant by the Fattening Center will be determined by the current price obtaining in Cochabamba less the transport and administration costs.

The steers which remain in the Center will also be fattened for a year. At the end of that year and also weighing an average of 404 kg each, they will be transferred to Cochabamba and sold to the meat processing centers at a price of $61,206 per head (current price Cochabamba).

The transactions between the Center and the peasant will be carried out in cash, the exact weight having been ascertained beforehand and with the participation of the credit institution (Banco Agrícola or other).

The transactions carried out by the Center in the buying of animals in the Beni or selling in Cochabamba, for the purposes of this Study, will also be in cash.

5.3.2. Guarantee of Buying and Selling.

The Fattening Center will work out a buying and selling contract, under the conditions described, with the peasants who take part in the Project. This contract will specify the manner in which the prices of purchase and sale of the cattle will be determined. Furthermore, it will specify the type of assistance the small farmer will receive with the management of the cattle and pastures and the respective costs. Finally it will specify that the Center will guarantee the purchase of the fat cattle.

5.4. Size and its justification.

The size of the Fattening Center carrying 1,000 steers per year has been estimated. For this number of animals 500 ha of improved pastures will be required, calculating a stocking rate of 2 head per ha.

The above-mentioned size is justified owing to: a) the large unsatisfied demand in the Cochabamba market; b) the administrative capacity of San Jorge Ltda.; c) suitable road and river infrastructure in Puerto Villarroel; d) the availability of UNAG'S financial resources; e) the

size chosen is considered large enough to interest UNAG in the Project.

5.5. Locality.

Of the districts described in Para.3.3.1. Agrological Planning in the Chapare, the most indicated is the zone of Puerto Villarroel for the following advantages:-

a) Proximity to the port of disembarkation which lightens the degree of 'stress' upon the animals.
b) The price of land is less in this district.
c) Labor is easier to obtain in this district.
d) The topography is flat.
e) Conditions of land and river transport are good.
f) Climatic conditions are adequate.
g) Radio communication systems are adequate.
h) The supply of artefacts, foodstuffs, medicines and other services are also adequate.

5.6. Technical aspects of the Center.

5.6.1. Grasses.

According to the information detailed above, soils in Zone 6 i.e. around Puerto Villarroel are acid. Therefore the 500 ha required by the Center would need fertilizing and competent management. The first application of lime would be 3 years after the pastures are laid down.

The type of plant recommended for the pastures would be grasses of genus Brachiaria, varieties humidicola and decumbens.

5.6.2. Cattle.

a) Animal husbandry data.

The following animal husbandry data are taken into account:-

Deathrate:	3%
Fattening time:	12 months
Percentage of rejects:	none

b) Feeding program.

The feeding program will be direct grazing on rotating sown pastures of Brachiaria decumbens.

c) Animal health program.

The animal health program will take into account the following points:-

- In the Beni, the moment the cattle are taken over: vaccination against foot and mouth, anthrax and rabies.
- In the Center, the moment the cattle are received: de-worming and castration (only the young bulls to be fattened by the Center would be castrated).
- Every 4 months: vaccination against foot and mouth.
- After 6 months: de-worming.

5.7. Capital Investment (See Table 17).

The capital investment is made up of the following items:-

5.7.1. Land.

The cost of the land has been estimated at $50,000 per ha. Therefore the total cost of the land would be $25,000,000.

5.7.2. Machinery and equipment.

The machinery and equipment required by the Center is as follows:-

Cattle Balance	$ 1,160,000
Metal crush	$ 800,000
Australian tank	$ 942,000
Drinking troughs and piping	$ 600,000
Diesel motor 15 HP	$ 464,000
Saddles (8)	$ 80,000
Furniture and fixtures	$ 500,000
Tools	$ 400,000
Tractor 79 HP	$ 3,992,000
4 disc plough	$ 421,000
32 disc harrow	$ 435,000
Slasher 160 cm	$ 441,000
Ford pick-up	$ 2,232,000
Windmill	$ 560,000
Radio transmitter/receiver	$ 880,000
T o t a l	$13,907,000

The value of the imported machinery and equipment has been estimated in dollars multiplied by the official exchange rate of $200 to the U.S. dollar.

5.7.3. Constructions.

a) Housing and other constructions:

1 administration house, 100 m2 at $10,000/m2	$	1,000,000
2 houses for cowboys, 50 m2 at $6,000/m2	$	600,000
1 store-room and workshop, 80 m2 at $6,000/m2	$	480,000
2 bathrooms, at $70,000 each	$	140,000
1 well, 6 m deep, at $40,000/m	$	240,000
T o t a l	$	2,460,000

b) Fencing.

Cost per km:

400 m wire at $20/m	$	80,000
250 posts at $80 each	$	20,000
10 kg staples at $500 per kg	$	5,000
Labor: 40 days' work at $600/day	$	24,000
T o t a l	$	129,000
Total cost (33.3 km)	$	4,295,700

c) Corral and chute.

200 posts 3 x 15 x 15 at $300 each	$	600,000
800 planks 2.5 m x 5" & 2", at $840 each	$	672,000
40 kg 4" nails at $200/kg	$	8,000
Labor	$	220,000
T o t a l	$	1,500,000
d) Total constructions	$	8,255,700

5.7.4. Horses.

For the handling of 1,000 steers, 8 horses at $80,000 each are required	$	640,000

5.7.5. Land clearing.

Cost per ha:

Hand clearing, 43 days' work at $600/day	$	25,800
T o t a l	$	25,800
Total cost (500 ha)	$	12,900,000

5.7.6. Sowing

Cost per ha:		
Preparation of land, 5 days' work at $600/day	$	3,000
Sowing (Brachiaria), 2 kg at $3,000/kg	$	6,000
Sowing, 1 day's work at $600	$	600
T o t a l	$	9,600
Total cost (500 ha)	$	4,800,000

5.7.7. Contingencies.

A minimum of 10% for contingencies is calculated	$	6,550,000

5.7.8. Summary.

Land	$	25,000,000
Machinery and equipment	$	13,907,000
Constructions	$	8,255,700
Horses	$	640,000
Land clearing	$	12,900,000
Sowing	$	4,800,000
Contingencies	$	6,550,270
Total	$	72,052,970

5.8. Working capital (See Table 17).

The working capital is made up as follows:-

5.8.1. Purchase of steers.

1,000 2 year old bulls will be bought in the Beni weighing an average of 240 kg each.

Purchase price per steer:		
Price in the Beni $95.5/kg x 240 kg	$	22,920
Transport to Center	$	4,385
T o t a l	$	27,305
Total purchase (1,000 steers)	$	27,305,000

5.8.2. Direct labor.

1 Foreman $19,000 x 15	$ 285,000
2 Cowboys $12,000 x 15 x 2	$ 360,000
1 Administrator $40,000 x 15	$ 600,000
1 Tractor-driver $15,000 x 15	$ 225,000
Sub-total	$ 1,470,000
Social benefits 30%	$ 441,000
	$ 1,911,000
5 Day laborers $600/day x 300 days	$ 900,000
T o t a l	$ 2,811,000

5.8.3. Animal health.

Cost per head:	
Vaccination against foot and mouth: every 4 months x $40	$ 120
Vaccination against anthrax:	$ 20
Vaccination against rabies:	$ 120
De-worming: every 6 months x $187.50	$ 375
Other veterinary products, antibiotics, etc.	$ 125
T o t a l	$ 760
Total cost (1,000)	$ 760,000

5.8.4. Pasture maintenance.

For the maintenance of the pastures, 2 cleanings per year will be necessary. The cost per ha hour is $1,400 i.e. the annual cost will be (500 ha x 2 x 1,400/ha) $ 1,400,000

Fertilizers will be applied every 3 years at a cost of $5,000 per ha (10 qq lime at $500/qq). The total cost for the 500 ha will be $ 2,500,000

5.8.5. Administration.

This would be for the account of the administrating company in both the technical and financial fields. They would include costs of a veterinarian, travel costs, medical attention and general administration costs. Estimated at $ 1,950,000

5.8.6. Transport to Cochabamba.

The cost of transport from the Center

to the meat processors is $3,500/ head. The number of steers to be transported will be 970 as 3% mortality during the period of fattening is estimated.
Total cost $3,500 x 970 — $ 3,395,000

5.8.7. Contingencies.

A minimum of 10% is estimated for contingencies i.e. — $ 3,762,000

5.8.8. Summary.

Cost of steers.	$	27,305,000
Direct labor	$	2,811,000
Animal health	$	760,000
Pasture maintenance	$	1,400,000
Administration	$	1,950,000
Transport to Cochabamba	$	3,395,000
Contingencies	$	3,762,000
T o t a l	$	41,383,000

5.8.9. Depreciation/Amortization.

The depreciation is estimated in the following manner:-

a) Depreciation.

Machinery and equipment $13,907,000 x 20%	$	2,781,400
Fencing $4,295,700 x 20%	$	859,140
Corral & chute $1,500,000 x 20%	$	300,000
Housing and other Constructions $2,460,000 x 10%	$	246,000
Sowing $4,800,000 x 2)%	$	960,000
Total	$	5,146,540

b) Amortization.

Land clearing $12,900,000 x 5%	$	645,000

c) Total — $ 5,791,540

5.9. Financing.

5.9.1. Capital investment.

a) Participation.

	Pers. Contr.	B C B	I C I	TOTAL
% participation	10	63	27	100
% financing		70	30	100

c) Conditions

	Interest	Due Date	Grace
B.C.B.	38%	8 yrs	2 yrs
I.C.I.	48%	8 yrs	2 yrs

5.9.2. Working capital

a) Participation

	Pers. Contr.	B C B	I C I	TOTAL
% participation	10	63	27	100
% financing		70	30	100

b) Conditions

	Interest	Due Date	Grace
B.C.B.	38%	1 yr	1 yr
I.C.I.	48%	1 yr	1 yr

5.10. Investment program.

The investment program has been calculated in the following manner:-

Year 0 ($b 000)

	Semester 2	Semester 1	Total
Land	25,000		25,000
Land clearing	12,900		12,900
Sowing	4,800		4,800
Fencing		4,296	4,296
Corral and Chute		1,500	1,500
Machinery and Equipment		13,907	13,907
Constructions		2,460	2,460
Horses		640	640
Contingencies	4,270	2,280	6,550
TOTAL	46,970	25,083	72,053
Personal contribution 10%	4,697	2,508	7,205
Financing 90%	42,273	22,575	64,848

This program shows that in the year 0 financing to the tune of $b64,848,000 is required. For purposes of simplicity it is calculated that on average this financing will be granted in the middle of year 0 i.e. in Semester 1 in accordance with Table 18.

5.11. Assessment of income.

The income from sales has been calculated on the basis of prices regulated and controlled by the Government.

In accordance with Decreto Supremo No. 19462, passed March 15th 1983, the price of meat on the hook was established at $b30% per kg wholesale and $b325 per kg retail, in Cochabamba. The wholesale price works out at $b151.50 per kg liveweight (giving a 50% profit).

Once fat, the cattle will be sold in Cochabamba to the meat processors under the following conditions:-

Liveweight (A.U.)	404	kg
Price per kg/live	151.50	$b
Total price	61,206.00	$b

Therefore the Fattening Center will receive $b61,206 for each fat steer. For the annual income a mortality of 3% is taken into account i.e. 30 A.U. per 1,000 A.U. In this instance, the annual income of the Center would be $b59,369,820 (970 x 61,206).

5.12. Analysis and Financial Projections.

5.12.1. Projection of profit and loss (See Table 19).

The projection of profit and loss for 8 years shows a considerable loss from the first year (-22 millions) to the sixth year (-2.5 millions). Only after the 7th year is a positive balance of 14.4 millions shown. The negative viability of the Project is due mainly to the high costs of financing.

In terms of an analysis of costs the following percentages can be established:-

	Year 1	Year 4	Year 8
Cost steers/sales	46%	46%	46%
Other working costs/sales	33%	33%	33%
Working profit/sales	21%	21%	21%
Financing costs/sales	58%	35%	4%
Net profit/sales	(37%)	(14%)	17%

It can be seen that the working profit is reasonable, but the cost of financing is very high. This cost absorbs more than 50% of the sales in the first years.

Even a much larger personal contribution would not be enough to compensate for it.

5.12.2. Cash flow projection. (See Table 19)

The cash flow projection for 8 years also shows a negative flow during the first 6 years. The accumulated cash flow is negative for the whole period studied.

As with the profit and loss, the determinating negative factor is the large amount of financing required and its respective high cost.

5.12.3. Conclusion.

The two financial statements clearly show that the Project is not viable under present conditions of prices and costs. The high cost of the investments necessary and their financing give a negative result very difficult to overcome.

Even if UNAG was prepared to make a much larger investment, the viability of the Project would be marginal. This possibility was analyzed, increasing the investment from 10 to 25%. The profit and loss and projected cash flow gave negative figures as can be seen in Tables 23 and 24.

5.12.4. Recommendation.

It is recommended that no investment be made in the Fattening Center under the economic and financial conditions at present prevailing.

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SPECIFICATIONS:

10 HECTARES OF SOWN PASTURES
20 STEERS FOR FATTENING FROM THE BENI

INVESTMENT CAPITAL ($B)

LAND:	10 HA AT	$B	50000/HA	500000*
LAND CLEAR'G	10 HA AT	$B	25800/HA	258000
SOWING:	10 HA AT	$B	9600/HA	96000
FENCING: MATER.	:2.3KM AT	$B	105000/KM	241500
LABOR	:2.3KM X 40 D/W X	$B	600/D.W.	55200*
CORRAL, CHUTE&CRUSH	367.5 D/W A T	$B	600,D.W.	220500
10% CONTINGENCIES(EXCEPT LAND)				87120
TOTAL				1458320

* PERSONAL CONTRIBUTION: 92 DAYS WORK (APPROX. 3 MONTHS WORK)

WORKING CAPITAL ($B)

20 STEERS: WEIGHT	240 KG AT	$B	95.50 KG	458400
TRANSPORT TO CENTER	20 ST AT		4385 $B/STEER	87700
RECOVERY/ VET. CARE	20 ST AT		1495 $B/STEER	29900
TOTAL PURCHASE PRICE				576000
LABOR	365 D.W. A T		600 $B/ D.W.	219000*
ANIMAL HEALTH				12000
PASTURE CLEANING	18 D.W. A		600 $B/D.W.	10800
DRANAIGE	12 D.W. A		600 $B/D.W.	7200
10% CONTINGENCIES				82500
TOTAL				907500

* PERSONAL CONTRIBUTION (SMALL FARMER HIMSELF OR A MEMBER OF HIS FAMILY)

FINANCING ($B)

	PERS. CONTRIB.	BANCO CENTRAL	I.C.I.	TOTAL
INVESTMENT CAPITAL	555200	632184	270936	1458320
WORKING CAPITAL	219000	481950	206550	907500
TOTAL INV&WORKING CAPITAL	774200	1114134	477486	2365820
% PARTICIPATION	33	47	20	100
% FINANCING		70	30	100

AESA 1-IV-83

LOAN REPAYMENT SCHEDULE ($B)

	BALANCE PRINCIP.	PMT. PRINCIP.	PMT. INTEREST	PMT. PRIN/YR	PMT. INT/YR	TOTAL PRIN+INT.
B.C.B.(INV.CAP)%= 38						
SEM -1	632184					
SEM 1	632184		120115			
SEM 2	632184		120115	0	240230	240230
SEM 3	632184		120115			
SEM 4	632184	52682	120115	52682	240230	292912
SEM 5	579502	52682	120115			
SEM 6	526820	52682	110105	105364	230220	335584
SEM 7	474138	52682	100096			
SEM 8	421456	52682	90086	105364	190182	295546
SEM 9	368774	52682	80077			
SEM 10	316092	52682	70067	105364	150144	255508
SEM 11	263410	52682	60057			
SEM 12	210728	52682	50048	105364	110105	215469
SEM 13	158046	52682	40038			
SEM 14	105364	52682	30029	105364	70067	175431
SEM 15	52682	52682	20019	52682	20019	72701
TOTAL		632184	1251198	632184	1251198	1883382
I.C.I.(INV.CAP)%= 48						
SEM -1	270936					
SEM 1	270936		65025			
SEM 2	270936		65025	0	130049	130049
SEM 3	270936		65025			
SEM 4	270936	22578	65025	22578	130049	152627
SEM 5	248358	22578	65025			
SEM 6	225780	22578	59506	45156	124631	169787
SEM 7	203202	22578	54187			
SEM 8	180624	22578	48768	45156	102956	148112
SEM 9	158046	22578	43350			
SEM 10	135468	22578	37931	45156	81281	126437
SEM 11	112890	22578	32512			
SEM 12	90312	22578	27094	45156	59506	104762
SEM 13	67734	22578	21675			
SEM 14	45156	22578	16256	45156	37931	83087
SEM 15	22578	22578	10837	22578	10837	33415
TOTAL		270936	677340	270936	677340	948276

TABLE 15-AESA 1-IV-83

LOAN REPAYMENT SCHEDULE ($B) CONT.

	BALANCE PRINCIPAL	PMT. PRINC.	PMT. INTEREST	PMT. PRIN/YR	PMT. INT/YR	TOTAL PRIN+INT
B.C.B.(W.CAP)%= 38						
SEM 1	481950					
SEM 2	481950	481950	91571	481950	91571	573521
TOTAL		481950	91571	481950	91571	573521
I.C.I.(W.CAP.)%= 48						
SEM 1	206550					
SEM 2	206550	206550	49572	206550	49572	256122
TOTAL		206550	49572	206550	49572	256122

TABLE 15 Cont. - AESA 1-IV-83

MODULE FOR THE SMALL FARMER

PROJECTION OF PROFIT AND LOSS ($B)

	YR 0	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8
INCOME									
SALE OF 19 STEERS WEIGHT: 404 KG/ST $3/KG: 135.35		1062205	1062205	1062205	1062205	1062205	1062205	1062205	1062205
EXPENDITURE									
PURCHASE STEERS		576000	576000	576000	576000	576000	576000	576000	576000
LABOR		219000	219000	219000	219000	219000	219000	219000	219000
ANIMAL HEALTH		12000	12000	12000	12000	12000	12000	12000	12000
PASTURE CLEANING		10800	10800	10800	10800	10800	10800	10800	10800
DRAINAGE		7200	7200	7200	7200	7200	7200	7200	7200
FERTILIZERS (EVERY 3 years)				50000			50000		
10% CONTINGENCIES		82500	82500	82500	82500	82500	82500	82500	82500
DEPRECIATION / AMORTIZATION *		141924	141924	141924	141924	141924	141924	141924	141924
FINANCIAL EXPENSES		511422	370279	354851	293138	231425	169711	107998	30857
TOTAL		1560846	1419703	1454275	1342562	1280849	1269135	1157422	1080231
INCOME		-498641	-357498	-392070	-280357	-218644	-206930	-95217	-18076
ACCUMULATED INCOME		-498641	-856139	-1248209	-1528566	-1747210	-1954140	-2049357	-2067433

* 20% SOWING, FENCING MATERIAL, CORRAL-CHUTE-CRUSH, CONTINGENCIES. 5% LAND CLEARING

CASH FLOW PROJECTION ($B)

INCOME									
SALE OF 19 STEERS		1062205	1062205	1062205	1062205	1062205	1062205	1062205	1062205
LOANS	903120	688500							
PERSONAL CONTRIBUTION	555200	219000	219000	219000	219000	219000	219000	219000	219000
TOTAL	1458320	1969705	1281205	1281205	1281205	1281205	1281205	1281205	1281205
EXPENDITURE									
INVESTMENTS	1458320								
PURCHASE STEERS		576000	576000	576000	576000	576000	576000	576000	576000
LABOR		219000	219000	219000	219000	219000	219000	219000	219000
ANIMAL HEALTH		12000	12000	12000	12000	12000	12000	12000	12000
PASTURE CLEANING		10800	10800	10800	10800	10800	10800	10800	10800
DRAINAGE		7200	7200	7200	7200	7200	7200	7200	7200
FERTILIZERS (EVERY 3 YEARS)				50000			50000		
CONTINGENCIES		82500	82500	82500	82500	82500	82500	82500	82500
FINANCIAL EXPENSES		511422	370279	354851	293138	231425	169711	107998	30857
LOAN REPAYMENTS		688500	75260	150520	150520	150520	150520	150520	75260
TOTAL	1458320	2107422	1353039	1462871	1351158	1289445	1277731	1166018	1013617
CASH FLOW	0	-137717	-71834	-181666	-69953	-8240	3474	115187	267588
ACCUMULATED CASH FLOW	0	-137717	-209551	-391217	-461170	-469410	-465936	-350749	-83161

TABLE 16-AESA 1-IV-83

FATTENING CENTER

SPECIFICATIONS

500 HECTARES OF SOWN PASTURES
1000 STEERS FOR FATTENING FROM THE BENI

INVESTMENT CAPITAL

($B 000)

LAND	500 HA AT	$B	50000/HA	25000
LAND CLEARING	500 HA AT	$B	25800/HA	12900
SOWING	500 HA AT	$B	9600/HA	4800
FENCING:	33.30 KM AT	$B	129000/KM	4296
CORRAL AND CHUTE				1500
MACHINERY AND EQUIPMENT				13907
CONSTRUCTIONS				2460
HORSES	8 AT	$B	80000	640
10% CONTINGENCIES (EXCEPT LAND)				6550
TOTAL				72053

WORKING CAPITAL

($B 000)

1000 STEERS WEIGHT	240 KG AT $B	95.50 KG	22920
TRANSPORT TO CENTER	1000 NOV AT	4335 / STEER	4335
TOTAL PURCHASE PRICE			27305
MANUAL LABOR			2811
ANIMAL HEALTH			760
PASTURE AMINTENANCE	500 HA AT $B	2800 $B/HA	1400
ADMINISTRATION			1950
TRANSPORT TO COCHABAMBA	970 STEERS AT	3500 $B / STEER	3395
10% CONTINGENCIES			3762
TOTAL			41383

FINANCING

($B 000)

	PERS. CONTRIB.	BANCO CENTRAL	I.C.I.	TOTAL
INVESTMENT CAPITAL	7205	45393	19454	72053
WORKING CAPITAL	4138	26071	11173	41383
TOTAL INV+WORKING CAPITAL	11344	71465	30628	113436
% PARTICIPATION	10	63	27	100
% FINANCING		70	30	100

TABLE 17 ATOA 15-IV-83

LOAN REPAYMENT SCHEDULE

($B 000)

	BALANCE PRINCIPAL	PMT. PRIN.	PMT. INT.	PMT. PRIN/YR	PMT. INT/YR	TOTAL PRIN+INT
B.C.B.(INV.CAP)%= 38						
SEM -1	45393					
SEM 1	45393		8625			
SEM 2	45393		8625	0	17249	17249
SEM 3	45393		8625			
SEM 4	45393	3783	8625	3783	17249	21032
SEM 5	41611	3783	8625			
SEM 6	37828	3783	7906	7566	16531	24096
SEM 7	34045	3783	7187			
SEM 8	30262	3783	6469	7566	13656	21221
SEM 9	26479	3783	5750			
SEM 10	22697	3783	5031	7566	10781	18346
SEM 11	18914	3783	4312			
SEM 12	15131	3783	3594	7566	7906	15472
SEM 13	11348	3783	2875			
SEM 14	7566	3783	2156	7566	5031	12597
SEM 15	3783	3783	1437	3783	1437	5220
TOTAL		45393	89841	45393	89841	135234
I.C.I.(INV.CAP)%= 48						
SEM -1	19454					
SEM 1	19454		4669			
SEM 2	19454		4669	0	9338	9338
SEM 3	19454		4669			
SEM 4	19454	1621	4669	1621	9338	10959
SEM 5	17833	1621	4669			
SEM 6	16212	1621	4280	3242	8949	12191
SEM 7	14591	1621	3891			
SEM 8	12970	1621	3502	3242	7393	10635
SEM 9	11348	1621	3113			
SEM 10	9727	1621	2724	3242	5836	9079
SEM 11	8106	1621	2335			
SEM 12	6485	1621	1946	3242	4280	7522
SEM 13	4864	1621	1556			
SEM 14	3242	1621	1167	3242	2724	5966
SEM 15	1621	1621	778	1621	778	2399
TOTAL		19454	45636	19454	45636	65090

TABLE 18 AESA 18-IV-83

LOAN REPAYMENT SCHEDULE (CONT.)

($3 000)

	BALANCE PRINCIPAL	PMT. PRIN.	PMT INTEREST	PMT. PRIN/YR	PMT. INT/YR	TOTAL PRIN+INT
B.C.B.(W. CAP)%= 38						
SEM 1	26071					
SEM 2	26071	26071	4954	26071	4954	31025
TOTAL		26071	4954	26071	4954	31025
I.C.I.(W.CAP.)%= 48						
SEM 1	11173					
SEM 2	11173	11173	2582	11173	2582	13755
TOTAL		11173	2582	11173	2582	13755

TABLE 13 (CONT.) AESA 13-IV-93

(US 000)

'ATTENING CENTER

PROJECTION OF PROFIT AND LOSS

	YR 0	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	TOTAL
INCOME										
SALE OF 370 STEERS WEIGHT 404 KG/ST PRICE: 151.5		59370	59370	59370	59370	59370	59370	59370	59370	474959
EXPENDITURE										
PURCHASE OF STEERS		27305	27305	27305	27305	27305	27305	27305	27305	218440
LABOR		2811	2811	2811	2811	2811	2811	2811	2811	22488
ANIMAL HEALTH		760	760	760	760	760	760	760	760	6080
PASTURE MAINTENANCE		1400	1400	1400	1400	1400	1400	1400	1400	11200
ADMINISTRATION		1950	1950	1950	1950	1950	1950	1950	1950	15600
FERTILIZERS (EVERY 3 YEARS)				2500			2500			5000
TRANSPORT TO COCHABAMBA		3395	3395	3395	3395	3395	3395	3395	3395	27160
CONTINGENCIES 10%		3762	3762	3762	3762	3762	3762	3762	3762	30097
DEPRECIATION/AMORTIZATION*		5792	5792	5792	5792	5792	5792	5792	5792	46332
FINANCIAL EXPENSES		34223	26583	25480	21048	16617	12186	7755	2216	146112
TOTAL		81397	73762	75154	68223	63792	61861	54929	49390	528509
NET INCOME		-22028	-14392	-15785	-3853	-4422	-2491	4440	9980	-53551
ACCUMULATED INCOME		-22028	-35420	-52204	-51053	-65480	-67971	-63530	-53551	

*MACHINERY AND EQUIPMENT, FENCING, CORRAL, CHUTE AND SOWING: 20%
CONSTRUCTIONS: 10%
LAND CLEARING: 5%

CASH FLOW PROJECTION

INCOME										
SALE OF 370 steers		59370	59370	59370	59370	59370	59370	59370	59370	474959
LOANS	64848	37245								102092
PERSONAL CONTRIBUTION	7205	4138	4138	4138	4138	4138	4138	4138	4138	40312
TOTAL	72053	100753	63508	63508	63508	63508	63508	63508	63508	617363
EXPENDITURE										
INVESTMENTS	72053									
PURCHASE STEERS		27305	27305	27305	27305	27305	27305	27305	27305	218440
LABOR		2811	2811	2811	2811	2811	2811	2811	2811	22488
ANIMAL HEALTH		760	760	760	760	760	760	760	760	6080
PASTURE MAINTENANCE		1400	1400	1400	1400	1400	1400	1400	1400	11200
ADMINISTRATION		1950	1950	1950	1950	1950	1950	1950	1950	15600
FERTILIZERS (EVERY 3 YEARS)				2500			2500			5000
TRANSPORT TO COCHABAMBA		3395	3395	3395	3395	3395	3395	3395	3395	27160
CONTINGENCIES 10%		3762	3762	3762	3762	3762	3762	3762	3762	30097
FINANCIAL EXPENSES		34223	26583	25480	21048	16617	12186	7755	2216	146112
LOAN REPAYMENT		37245	5404	10808	10808	10808	10808	10808	5404	102092
TOTAL	72053	112851	73375	80171	73240	68808	66877	59946	49003	656322
CASH FLOW	0	-12098	-9866	-16663	-9731	-5300	-3369	3562	14505	-38959
ACCUMULATED CASH FLOW	0	-12098	-21964	-38527	-48358	-53658	-57027	-53465	-38959	

TABLE 19 AESA 18-IV-83

MODULE FOR THE SMALL FARMER

SPECIFICATIONS;
5 HECTARES OF SOWN PASTURES
10 STEERS FOR FATTENING FROM THE BENI

INVESTMENT CAPITAL ($B)

LAND		$B	50000/HA X	5.00 HA	250000 *
LAND CLEARING	43 D.W/HA	$B	600/D.W. X	5.00 HA	129000
SOWING:SEED..	2 KG/HA	$B	3000/KG X	5.00 HA	30000
LABOR:	6 D.W./HA	$B	600/D.W. X	5.00 HA	18000 *
FENCING;POSTS	250 P/KM	$B	80/POSTS X	0.89 KM	17889 *
WIRE:	4 KM/KM	$B	20000/KM X	0.89 KM	71554
STAPLES:	8 KG/KM	$B	500/KG X	0.89 KM	3578
LABOR:	40 D.W./K	$B	600/D.W. X	0.89 KM	21466
CORRAL & CRUSH	36.94 M	$B	600/D.W. X	5D.W./M	113173 *
10% CONTINGENCIES(EXCLUDING PERSONAL CONTRIBUTION)					25560
TOTAL					660219

* PERSONAL CONTRIBUTION: FOR POSTS, CORRAL AND CRUSH WOOD CUT IN CLEARING IS USED.

WORKING CAPITAL ($B)

STEERS 240 kg/STEERS	10 ST AT $B		95.50 KG		229200
TRANSPORT TO CENTER	10 ST AT $B		4335	$B/STEER	43350
RECOVERY/VET. CARE	10 ST AT $B		1495	$B/STEER	14950
TOTAL COST OF PURCHASE					287500
LABOR D.W./STEER 18.25	10 ST AT $B		600	$B/STEER	109500 *
ANIMAL HEALTH	10 ST AT		170	$B/STEER	1700 *
PASTURE CLEANING	0 D.W.	AT	600	$B/D.W.	0 *
DRAINAGE	0 D.W.	AT	600	$B/D.W.	0 *
10% CONTINGENCIES					11120
TOTAL					410320

* PERSONAL CONTRIBUTION

FINANCING ($B)

	PERSONAL CONTRIB.	BANCO CAPITAL	I.C.I.	TOTAL
INVESTMENT CAPITAL	[illegible]	[illegible]	[illegible]	660219
WORKING CAPITAL	111200	[illegible]	[illegible]	410320
TOTAL INV + WORKING CAPITAL	[illegible]	[illegible]	[illegible]	[illegible]
% PARTICIPATION	45	[illegible]	[illegible]	100
% FINANCING		79	[illegible]	[illegible]

TABLE 20. [illegible] [illegible]

MODULE FOR THE SMALL FARMER

5 HECTARES
10 STEERS

PROJECTION OF PROFIT AND LOSS ($3)

INCOME	YR 0	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	TOTAL
SALE OF 10 STEERS										
404 kg x $B 138.38 $b/KG		559055	559055	559055	559055	559055	559055	559055	559055	4472442
EXPENDITURES										
PURCHASE OF STEERS		288000	288000	288000	288000	288000	288000	288000	288000	2304000
LABOR		109500	109500	109500	109500	109500	109500	109500	109500	876000
ANIMAL HEALTH		1700	1700	1700	1700	1700	1700	1700	1700	13600
PASTURE CLEANING		0	0	0	0	0	0	0	0	0
DRAINAGE		0	0	0	0	0	0	0	0	0
FERTILIZERS 5 HECTARES X $B 5000			0	25000	0	0	25000	0	0	50000
CONTINGENCIES 10%		11120	11120	11120	11120	11120	11120	11120	11120	88960
DEPRECIATION/AMORTIZATION*		36882	36882	36882	36882	36882	36882	36882	36882	295053
FINANCIAL EXPENSES		179423	179423	174502	159369	139685	120001	100318	73437	1126160
TOTAL		626625	626625	646704	606571	586887	592203	547519	520639	4753773
NET INCOME		-67570	-67570	-37649	-47516	-27832	-33148	11536	38417	-281331
ACCUMULATED NET INCOME		-67570	-135139	-222788	-270304	-298136	-331284	-319748	-281331	

* 20% SEED, WIRE , STAPLES, LABOR(FENCING), CONTINGENCIES, - 5% LAND CLEARING

CASH FLOW PROJECTION ($B)

INCOME										
SALES		559055	559055	559055	559055	559055	559055	559055	559055	4472442
LOANS	299158	299120	299120	299120	299120	299120	299120	299120	299120	2692118
PERSONAL CONTRIBUTION	381061	111200	111200	111200	111200	129200	111200	111200	111200	1288661
TOTAL	680219	969375	969375	969375	969375	987375	969375	969375	969375	8453221
EXPENDITURES										
INVESTMENTS	680219					48000				728219
PURCHASE OF STEERS		288000	288000	288000	288000	288000	288000	288000	288000	2304000
LABOR		109500	109500	109500	109500	109500	109500	109500	109500	876000
ANIMAL HEALTH		1700	1700	1700	1700	1700	1700	1700	1700	13600
PASTURE CLEANING		0	0	0	0	0	0	0	0	0
DRAINAGE		0	0	0	0	0	0	0	0	0
FERTILIZERS(EVERY 3 YEARS)				25000			25000			50000
CONTINGENCIES		11120	11120	11120	11120	11120	11120	11120	11120	88960
FINANCIAL EXPENSES		179423	179423	174502	159369	139685	98621	100318	73437	1104779
LOAN REPAYMENT		299120	323125	348980	348980	348980	348980	348980	324050	2691193
TOTAL	680219	888863	912868	953802	918669	946985	882921	859617	807807	7856752
CASH FLOW	0	80512	56507	10573	50706	40390	86455	109758	161568	596469
ACCUMULATED CASH FLOW	0	80512	137019	147592	198298	238688	325143	434901	596469	

TABLE 20 (Cont). AESA 6-IV-83

MODULE FOR SMALL FARMER

SPECIFICATIONS:
2.50 HECTARES OF SOWN PASTURES
5 STEERS FOR FATTENING FROM BENI

INVESTMENT CAPITAL ($B)

LAND		$B	50000/HA X	2.50 HA	125000 *
LAND CLEARING:	43 J/HA	$B	600/ D.W.X	2.50 HA	64500 **
SOWING:SEED :	2 KG/HA	$B	3000/KG X	2.50 HA	15000 *
LABOR	6 D.W./HA	$B	600D.W. X	2.50 HA	9000 *
ENCLOSURE:MATERIAL:	250 P/KM	$B	80/POSTS X	0.63 KM	12649 *
LABOR:	40 D.W/KM	$B	600D.W. X	0.63 KM	15179 *
CORRAL,CHUTE&CRUSH	26.22 M	$B	600/ D.W.X	50 D.W./M	81343 *
CONTINGENCIES 0%					0
TOTAL					322671

**THE S.F. CLEARS 2.5 HA AND SOWS RICE. WHEN HE DOES THE LAST CLEANING HE SOWS BRACHIARIA BETWEEN THE ROWS OF RICE (DEC) , THE GRASS IS ESTABLISHED BY MAY/JUNE. THE SALE OF THE RICE COMPENSATES FOR THE COST OF THE LAND CLEARING.
* PERSONAL CONTRIBUTION: FOR THE ENCLOSURE, CORRAL AND CRUSH , WOOD FROM THE CLEARING AND PERSONAL LABOR ARE USED. THE SEED IS ALSO A PERSONAL CONTRIBUTION.

WORKING CAPITAL ($B)

STEERS 240 KG/STEER	5 ST AT $B	95.50 KG		114600
TRANSPORT TO CENTER	5 ST AT $B	4385	$B/STEER	21925
RECUPERATION/VET CARE	5 ST AT $B	1495	$B/STEER	7475
TOTAL PURCHASE PRICE				144000
LABOR D.W./STEER 18.25	5 ST AT $B	600	$B/D.W.	54750 *
ANIMAL HEALTH	5 ST AT A	170	$B/ STEER	850 *
PASTURE CLEANING	0 D.W. AT	600	$B/D.W.	0 *
DRAINAGE	0 D.W. AT	600	$B/D.W.	0 *
CONTINGENCIES 0%				0
TOTAL				199600

FINANCING ($B)

	PERSONAL CONTRIB.	BANCO CENTRAL	I.C.I.	TOTAL
INVESTMENT CAPITAL	322671	0	0	322671
WORKING CAPITAL	55600	100800	43200	199600
INV. + WORKING CAPITAL	378271	100800	43200	522271
% PARTICIPATION	72	19	8	100
% FINANCING		70	30	100

TABLE 21. 4ESL 5-IV-83

MODULE FOR THE SMALL FARMER

2.5 HECTARES
5 TORILLOS

PROJECTION OF PROFIT AND LOSS ($B)

INCOME	YR 0	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	TOTAL
SALE OF 5 STEERS 404 kg x $b 138.38 $b/KG		279528	279528	279528	279528	279528	279528	279528	279528	2236221
EXPENDITURES										
PURCHASE OF STEERS		144000	144000	144000	144000	144000	144000	144000	144000	1152000
LABOR		54750	54750	54750	54750	54750	54750	54750	54750	438000
ANIMAL HEALTH		850	850	850	850	850	850	850	850	6800
LAND CLEANING		0	0	0	0	0	0	0	0	0
DRAINAGE		0	0	0	0	0	0	0	0	0
FERTILIZER 2.5 ha X $b 5000			0	12500	0	0	12500	0	0	25000
CONTINGENCIES 10%		0	0	0	0	0	0	0	0	0
DEPRECIATION/ AMORTIZATION*		3000	3000	3000	3000	3000	3000	3000	3000	24000
FINANCIAL EXPENSES		29520	29520	29520	29520	29520	29520	29520	29520	236160
TOTAL		232120	232120	244620	232120	232120	244620	232120	232120	1881960
NET INCOME		47408	47408	34908	47408	47408	34908	47408	47408	354261
ACCUMULATED NET INCOME		47408	94815	129723	177130	224538	259446	306853	354261	

* 20% SEED

PROJECTED CASH FLOW ($B)

SALE OF 5 STEERS		279528	279528	279528	279528	279528	279528	279528	279528	2236221
LOANS	0	144000	144000	144000	144000	144000	144000	144000	144000	1152000
PERSONAL CONTRIBUTION	322671	55600	55600	55600	55600	55600	55600	55600	55600	767471
TOTAL	322671	479128	479128	479128	479128	479128	479128	479128	479128	4155692
EXPENDITURE										
INVESTMENTS	322671					24000				346671
PURCHASE OF STEER		144000	144000	144000	144000	144000	144000	144000	144000	1152000
LABOR		54750	54750	54750	54750	54750	54750	54750	54750	438000
ANIMAL HEALTH		850	850	850	850	850	850	850	850	6800
LAND CLEANING		0	0	0	0	0	0	0	0	0
DRAINAGE		0	0	0	0	0	0	0	0	0
FERTILIZERS (EVERY 3 YEARS)				12500			12500			25000
CONTINGENCIES		0	0	0	0	0	0	0	0	0
FINANCIAL EXPENSES		29520	29520	29520	29520	29520	29520	29520	29520	236160
LOAN REPAYMENT		144000	144000	144000	144000	144000	144000	144000	144000	1152000
TOTAL	322671	373120	373120	385620	373120	397120	385620	373120	373120	3356631
CASH FLOW	0	106008	106008	93508	106008	82008	93508	106008	106008	799061
ACCUMULATED CASH FLOW	0	106008	212015	305523	411530	493538	587046	693053	799061	

TABLE 21 Cont. AESA 6-IV-93

MODULE FOR THE SMALL FARMER

SPECIFICATIONS:
1 hectare of sown pastures
2 steers for fattening from Beni

INVESTMENT CAPITAL ($B)

LAND		$B	50000/HA X	1 HA	50000 *
LAND CLEARING	43DW/HA	$B	600/D.W. X	1 HA	25800 **
SOWING:SEED	2 KG/HA	$B	3000/KG X	1 HA	6000 *
LABOR:	6 D.W./H	$B	600/D.W. X	1 HA	3600 *
ENCLOSURE:MATERIAL:	250 P/KM	$B	80/POST S X	0.40 KM	8000 *
LABOR:	40D.W./KM	$B	600/D.W. X	0.40 KM	9600 *
CORRAL, CHUTE&CRUSH	17.50 M	$B	600/D.W. X	5D.W./M	53100 *
CONTINGENCIES 0%					0
TOTAL					156100

**THE S.F. CLEARS 1 ha AND SOWS RICE, WHEN HE DOES THE LAST CLEANING HE SOWS BRACHIARIA BETWEEN THE ROWS OF RICE.(DEC). THE GRASS IS ESTABLISHED BY MAY-JUNE. THE SALE OF THE RICE COMPENSATES FOR THE COST OF THE LAND CLEARING.
* PERSONAL CONTRIBUTION: FOR THE ENCLOSURE, CORRAL AND CRUSH, WOOD FROM THE CLEARING AND PERSONAL LABOR ARE USED. THE SEED IS ALSO A PERSONAL CONTRIBUTION.

WORKING CAPITAL ($B)

STEERS	2 ST AT $B	95.50 KG		45340
TRANSPORT TO CENTER	2 ST AT $B	4385 $B/STEER		8770
RECUPERATION/VET.CARE	2 ST AT $B	1495 $B/STEER		2990
TOTAL PRICE OF PURCHASE				57600
LABOR D.W./STEER 18.25	2 ST AT $B	600 $B/STEER		21900 *
ANIMAL HEALTH	2 ST AT AT	170 $B/STEER		340 *
PASTURE CLEANING	0 D.W. AT	600 $B/D.W.		0 *
DRAINAGE	0 D.W. AT	600 $B/D.W.		0 *
CONTINGENCIES 0%				0
TOTAL				79340

FINANCING ($B)

	PERSONAL CONTRIB.	BANCO CENTRAL	I.C.I.	TOTAL
INVESTMENT CAPITAL	156100	0	0	156100
WORKING CAPITAL	22240	40320	17280	79340
INV + WORKING CAPITAL	178340	40320	17280	235440
% PARTICIPATION	76	17	7	100
% FINANCING		70	30	100

TABLE 22- [illegible] 6-IV-93

DULE FOR THE SMALL FARMER

Hectare

steers

PROJECTED PROFIT AND LOSS ($B)

INCOME	YR 0	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	TOTAL
ALE OF 2 STEERS										
04 KG X $ B 138.38 $B/KG		111811	111811	111811	111811	111811	111811	111811	111811	894488
XPENDITURE										
URCHASE OF STEERS		57600	57600	57600	57600	57600	57600	57600	57600	460800
ABOR		21900	21900	21900	21900	21900	21900	21900	21900	175200
NIMAL HEALTH		340	340	340	340	340	340	340	340	2720
ASTURE CLEANING		0	0	0	0	0	0	0	0	0
RAINAGE		0	0	0	0	0	0	0	0	0
ERTILIZERS(1 ha X $B	5000)		0	5000	0	0	5000	0	0	10000
ONTINGENCIES 10%		0	0	0	0	0	0	0	0	0
EPRECIATION/AMORTIZATION*		1200	1200	1200	1200	1200	1200	1200	1200	9600
INANCIAL EXPENSES		11808	11808	11808	11808	11808	11808	11808	11808	94464
OTAL		92848	92848	97848	92848	92848	97848	92848	92848	752784
NCOME		18963	18963	13963	18963	18963	13963	18963	18963	141704
CCUMULATED INCOME		18963	37926	51889	70852	89815	103778	122741	141704	

20% SEED, WIRE, STAPLES, LABOR(FENCING), CONTINGENCIES. 5% LAND CLEARING

PROJECTED CASH FLOW ($B)

NCOME										
ALES		111811	111811	111811	111811	111811	111811	111811	111811	894488
OANS	0	57600	57600	57600	57600	57600	57600	57600	57600	460800
ERSONAL CONTRIBUTION	156100	22240	22240	22240	22240	22240	22240	22240	22240	334020
OTAL	156100	191651	191651	191651	191651	191651	191651	191651	191651	1689308
XPENDITURES										
NVESTMENTS	156100					9600				165700
URCHASE OF STEERS		57600	57600	57600	57600	57600	57600	57600	57600	460800
ABOR		21900	21900	21900	21900	21900	21900	21900	21900	175200
NIMAL HEALTH		340	340	340	340	340	340	340	340	2720
ASTURE CLEANING		0	0	0	0	0	0	0	0	0
RAINAGE		0	0	0	0	0	0	0	0	0
ERTILIZERS(EVERY 3 YEARS)				5000			5000			10000
ONTINGENCIES		0	0	0	0	0	0	0	0	0
INANCIAL EXPENSES		11808	11808	11808	11808	11808	11808	11808	11808	94464
OAN REPAYMENTS		57600	57600	57600	57600	57600	57600	57600	57600	460800
OTAL	156100	149248	149248	154248	149248	158848	154248	149248	149248	1369684
ASH FLOW	0	42403	42403	37403	42403	32803	37403	42403	42403	319524
CCUMULATED CASH FLOW	0	42403	84806	122209	164612	197415	234818	277221	319524	

TABLE 22-AESA 6-IV-83

FATTENING CENTER(25% PERSONAL CONTRIBUTION)

SPECIFICATIONS:
500 hectares
1000 Steers for fattening from Beni

INVESTMENT CAPITAL

				($B 000)
LAND	500 HA AT	$B	50000/HA	25000
LAND CLEARING	500 HA AT	$B	25800/HA	12900
SOWING	500 HA AT	$B	9600/HA	4800
FENCING	33.30 KM AT	$B	129000/KM	4296
CORRAL AND CHUTE				1500
EQUIPMENT AND MACHINERY				13907
CONSTRUCTIONS				2460
HORSES	8 AT	$B	80000	640
CONTINGENCIES (10%, EXCLUDING LAND)				6550
TOTAL				72053

WORKING CAPITAL

			($B 000)
1000 STEERS	240 KG AT $B	95.50 KG	22920
TRANSPORT TO CENTER	1000 ST AT $B	4385 /STEER	4385
TOTAL PURCHASE PRICE			27305
MANUAL LABOR			2811
ANIMAL HEALTH			760
PASTURE MAINTENANCE	500 HA AT $B	2800 $B/HA	1400
ADMINISTRATION			1950
TRANSPORT TO COCHABAMBA	970ST AT $B	3500 $B / STEER	3395
CONTINGENCIES 10%			3762
TOTAL			41383

FINANCING

($B 000)

	PERSONAL CONTRIB.	BANCO CENTRAL	I.C.I.	TOTAL
INVESTMENT CAPITAL	18013	37823	16212	72053
WORKING CAPITAL	10346	21726	9311	41383
TOTAL INV+WORKING CAPITAL	28359	59554	25523	113436
% PARTICIPATION	25	53	22	100
% FINANCING		70	30	100

TABLE 23 AMBA 15-17-83

ATTENING CENTER (25% PERSONAL CONTRIBUTION)

PROJECTION OF PROFIT AND LOSS

($B 000)

	YR 0	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	TOTAL
NCOME										
ALE OF 970 STEERS 04 KG/ST $B/KG 151.50		59370	59370	59370	59370	59370	59370	59370	59370	474959
XPENDITURE										
URCHASE STEERS		27305	27305	27305	27305	27305	27305	27305	27305	218440
ABOR		2811	2811	2811	2811	2811	2811	2811	2811	22488
ETINAL HEALTH		760	760	760	760	760	760	760	760	6080
ASTURE MAINTENANCE		1400	1400	1400	1400	1400	1400	1400	1400	11200
DMINISTRATION		1950	1950	1950	1950	1950	1950	1950	1950	15600
ERTILIZATION(EVERY 3 YEARS)				2500			2500			5000
RANSPORT TO COCHABAMBA		3395	3395	3395	3395	3395	3395	3395	3395	27160
NTINGENCIES 10%		3762	3762	3762	3762	3762	3762	3762	3762	30097
EPRECIATION AND AMORTIZATION*		5792	5792	5792	5792	5792	5792	5792	5792	46332
INANCIAL EXPENSES		28519	22156	21233	17540	13848	10155	6462	1846	121760
OTAL		75694	69331	70908	64715	61022	59830	53637	49021	504157
ET INCOME		-16324	-9961	-11538	-5345	-1653	-460	5733	10349	-29199
CCUMULATED NET INCOME		-16324	-26285	-37823	-43168	-44821	-45280	-39547	-29199	

ACHINERY AND EQUIPMENT, FENCING, CORRAL, CHUTE AND SOWING 20%
ONSTRUCTIONS 10%
AND CLEARING 5%

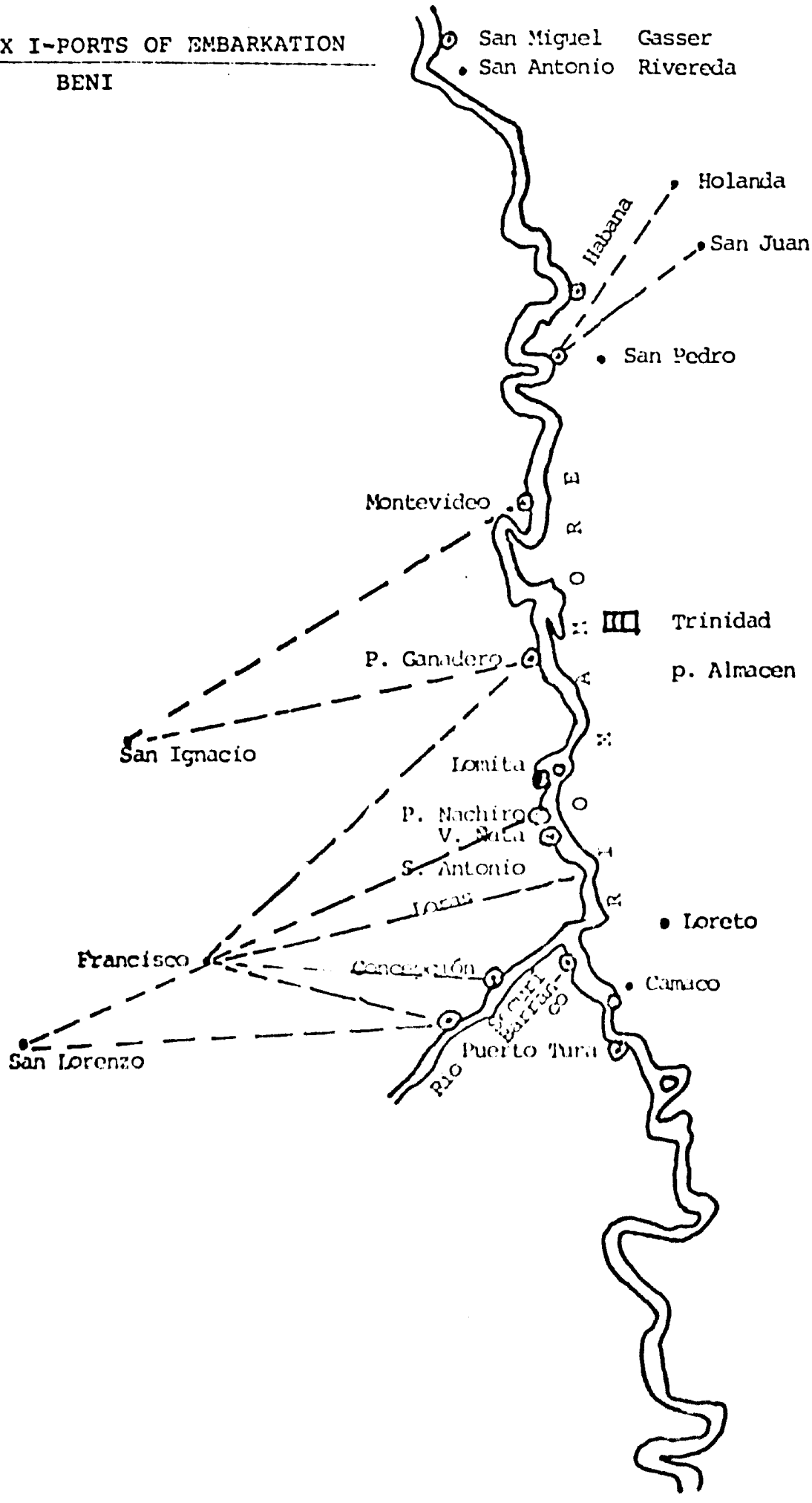
CASH FLOW PROJECTION

COME.										
LE 970 STEERS		59370	59370	59370	59370	59370	59370	59370	59370	474959
ANS	54040	31037								85077
RSONAL CONTRIBUTION	18013	10346	10346	10346	10346	10346	10346	10346	10346	100779
OTAL	72053	100753	59716	69716	69716	69716	69716	69716	69716	660815
XPENDITURE										
VESTMENTS	72053									
RCHASE STEERS		27305	27305	27305	27305	27305	27305	27305	27305	218440
BOR		2811	2811	2811	2811	2811	2811	2811	2811	22488
TINAL HEALTH		760	760	760	760	760	760	760	760	6080
STURE MAINTENANCE		1400	1400	1400	1400	1400	1400	1400	1400	11200
MINISTRATION		1950	1950	1950	1950	1950	1950	1950	1950	15600
RTILIZATION(EVERY 3 YEARS)				2500			2500			5000
ANSPORT TO COCHABAMBA		3395	3395	3395	3395	3395	3395	3395	3395	27160
NTINGENCIES 10%		3762	3762	3762	3762	3762	3762	3762	3762	30097
NANCIAL EXPENSES		28519	22156	21233	17540	13848	10155	6462	1846	121760
AN REPAYMENT		31037	4503	9007	9007	9007	9007	9007	4503	85077
OTAL	72053	100939	68043	74123	67930	64237	63045	56852	47733	614955
SH FLOW	0	-186	1673	-4407	1785	5478	6671	12864	21983	45860
CUMULATED CASH FLOW	0	-186	1436	-2921	-1135	4343	11014	23877	45860	

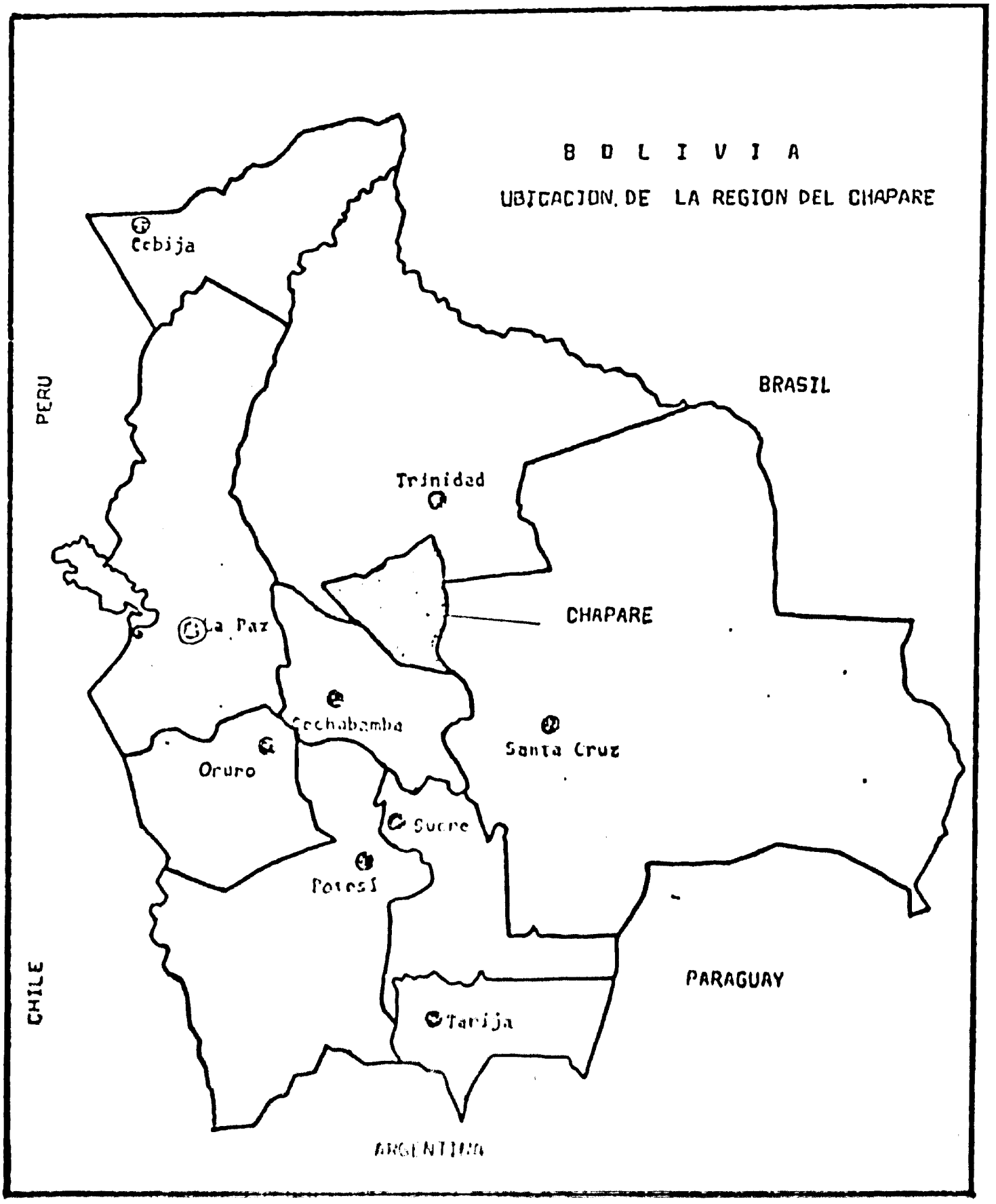
TABLE 24 AESA 18-IV-83

ANNEX I-PORTS OF EMBARKATION

BENI



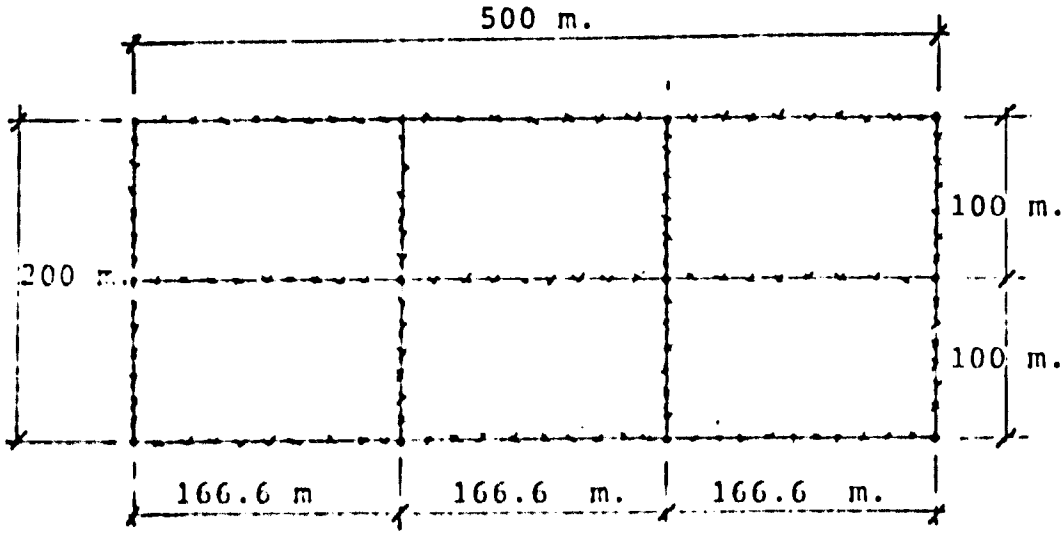
ANNEX II

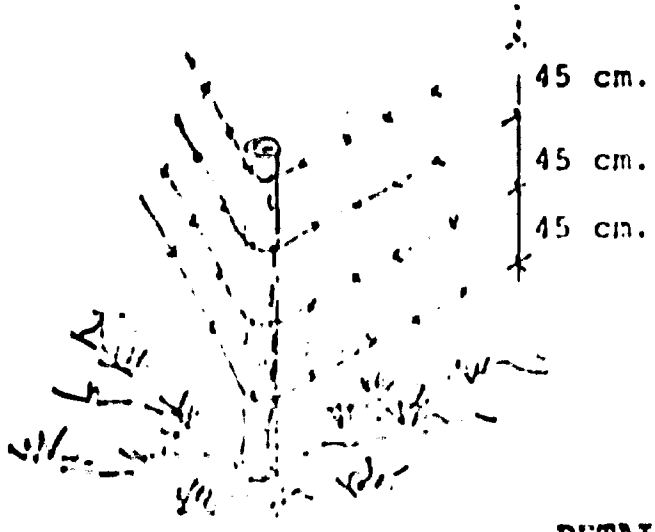

B O L I V I A
UBICACION DE LA REGION DEL CHAPARE
Cobija
PERU
BRASIL
Trinidad
CHAPARE
La Paz
Cochabamba
Santa Cruz
Oruro
Sucre
Potosi
CHILE
PARAGUAY
Tarija
ARGENTINA

ANNEX III

ANNEX IV

PADDOCK DESIGN FOR SMALL FARMER

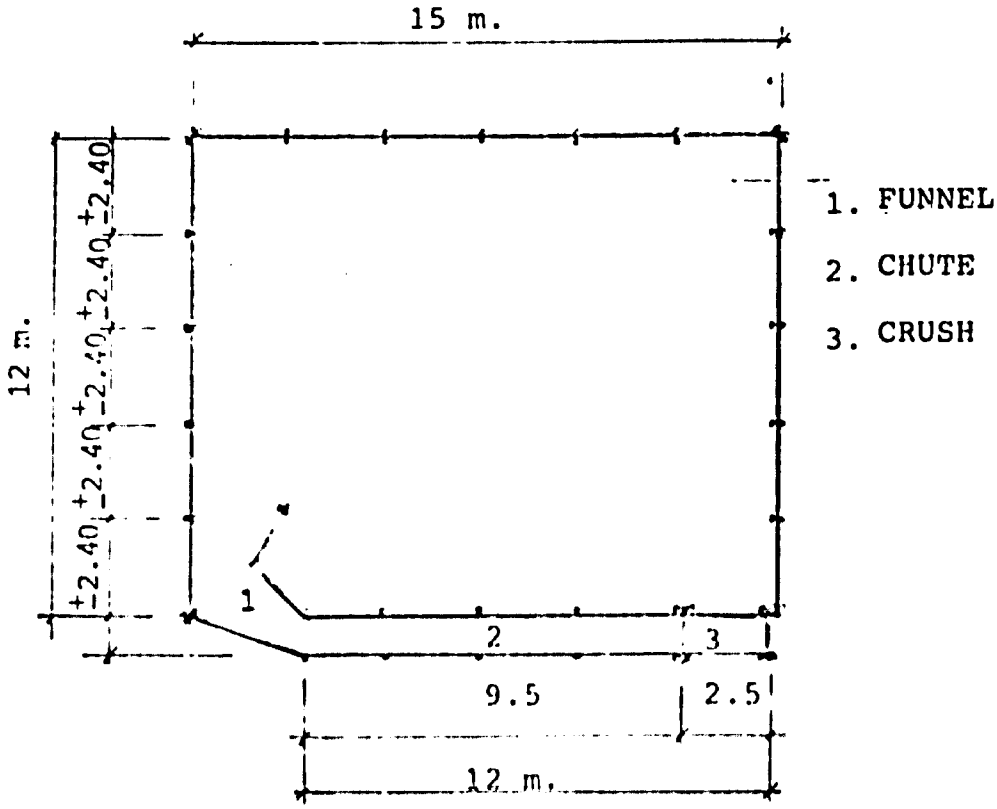


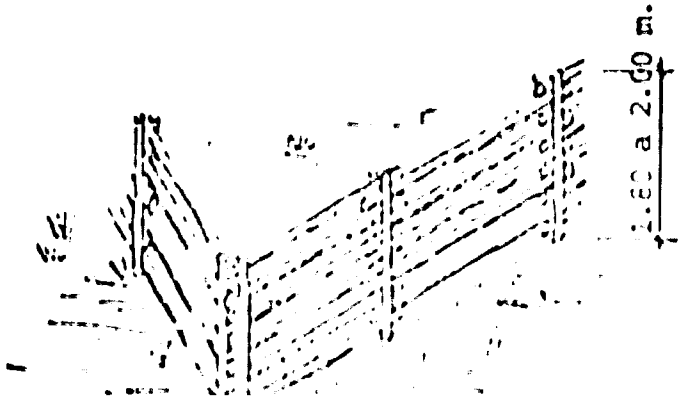


DETAIL OF FENCE

ANNEX V

DESIGN OF CORRAL, CHUTE AND CRUSH





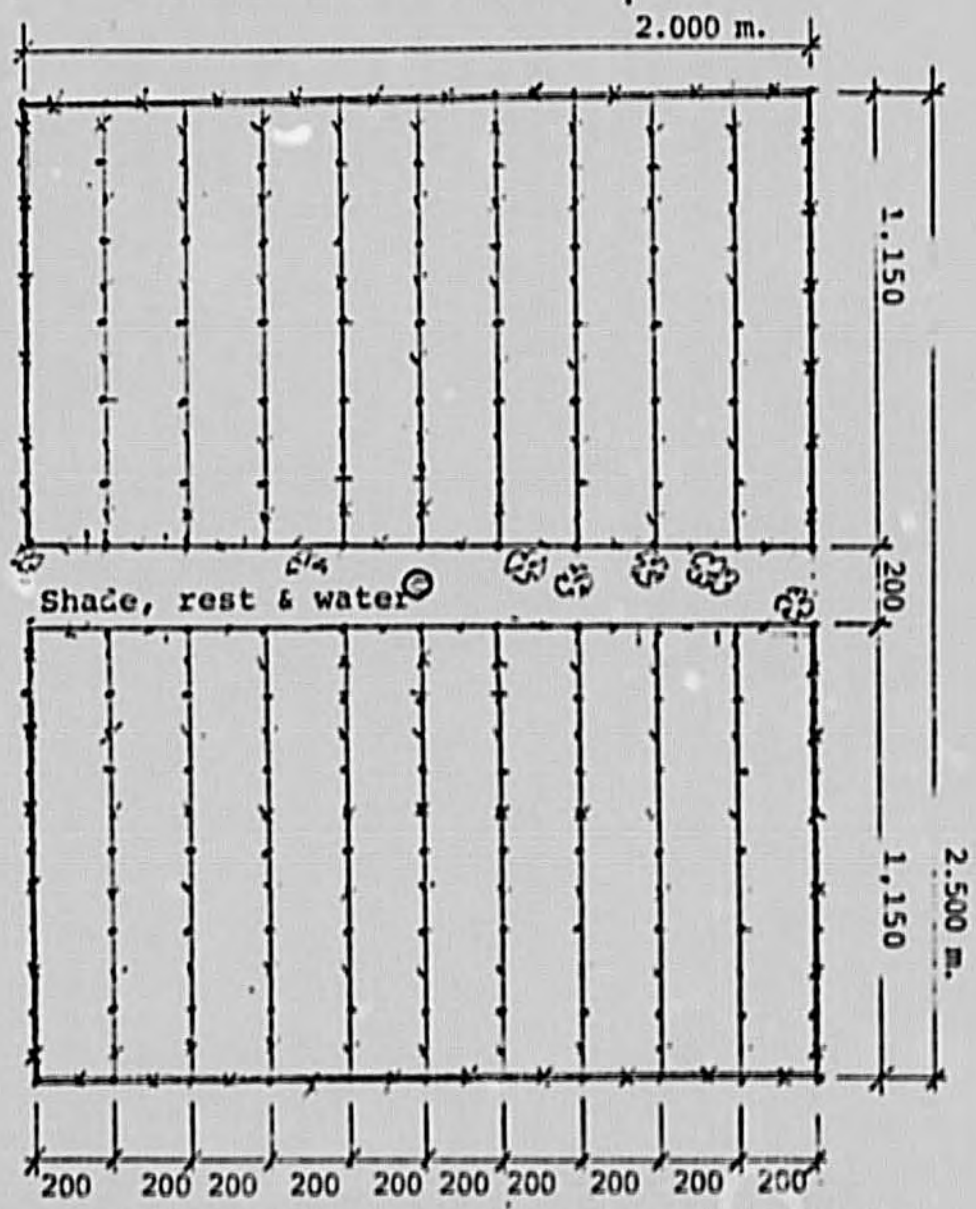
DETAIL OF ENCLOSURE

ANNEX VI

PADDOCK DESIGN FOR FATTENING CENTER

500 HA OF SOWN PASTURES

20 PADDOCK OF 23 HA EACH



FENCING: Wooden posts every 4 meters with 4 rows of barbed wire every 45 cm.

PERIMETER OF FENCING: : 4 x 2,000 m + 2 x 11 x 1,150m. = 33,300 m = 33.3 Km.

AREA OF EACH PADDOCK : 200 m = 230.000 m^2 = 23 ha.

FORM FOR CENSUS OF LIVESTOCK FARMERS

1. GENERAL ASPECTS:

1.1. Name of Farmer----------
1.2. Place and date of birth:----------
1.3. Present place of residence:----------
1.4. No. of children-----living children, where living--------
----------age----------

2. LANDOWNERSHIP:

2.1. How many livestock properties do you have?----------
2.2. Name of the property----------
2.3. Origin of ownership----------
2.4. Declared area owned----------ha
2.5. Documents proving ownership----------
2.6. Situation of the farm in the project (co-ordinated in relation to the existing paths through the forest):------
---
2.7. Way to reach the property:----------
----

2. ADMINISTRATION AND MANAGEMENT:

3.1. Do you administrate personally or do you have employees?

3.2. If you have employees, how many? a) fixed salary--------
b) on shares----------
c) others:----------
3.3. What method do you use to feed the cattle?----------
a) winter----------
b) summer----------
3.4. What is the season when there is most feed?----------

3.5. Do you have cultivated pastures?--------Where & how many ha?----------
3.6. What species or varieties?
a)----------
b)----------
c)----------
3.7. What grasses do you think are best for the zone?--------
---
3.8. What species of native trees do the cattle prefer to eat on your property?----------
3.9. What species of native forrage do the cattle eat on your property?----------
---
3.10. Do you know the yield given by your paddocks of cultivated pastures?----------or how many animals there are in the paddock?----------for how long?----------
---
3.11. How many times do you cut these grasses?----------
3.12. How many cattle sections do you have?----------
where are they situated?----------
3.13. Do you have corrals in each section?----------
cultivated pastures?----------
----------ha.
3.14. Do you make silage or hay?----------
or other concantrated feed?----------

4. CATTLE MANAGEMENT AND PROBLEMS

4.1. Indicate the total number of head and how it is made up:

	QUANTITY	BREED
Bulls		
Steers or young bulls (1 - 2 years)		
Calves (0 - 12 months) male		
Cows		
Heifers (1 - 2 years)		
Calves (0 - 12 months) female		
T O T A L:		

4.2. In what months do your cows calve?----------

4.3. Every how often do the cows calve?----------

4.4. At what age do they have their first calf?----------
4.5. What percentage of cows have calves in the year?--------
4.6. At what age should cows be culled?----------
4.7. At what time do you let the bulls in with the cows?-----
---

4.8. Do you brand or register your animals?----------
4.9. How do you provide water for your animals?----------

4.10. Indicate the health problems amongst your animals
a)----------
b)----------
c)----------
d)----------

4.11. Indicate if you have your animals professionally revised
----------if so how often?----------
4.12. Do you vaccinate your cattle?----------
4.13. What vaccines do you use and how often?----------

4.14. Do you milk your cows?----------
If so state:
Months of milking----------
Number of cows milked per year (average)----------
Liters of milk per day:----------
4.15. Do you make cheese from the milk?----------
If so, state No. liters milk required to produce a cheese

4.16. Do you sell your animals for meat?----------
If so detail:

	Age	Live weight	Male %
Bulls sold per year			
Steers or bulls sold per year			
Male calves sold per year			
Cows sold per year			
Female calves sold per year			
T O T A L:			

4.17 Do you select your cattle?----------
If so how?----------
4.18. How many animals die each year?
Bulls:----------
Cows:----------
Heifers:----------
Female calves:----------
4.19. What do you consider the chief problems in the exploitation of your herd?----------
---

5. OTHER ANIMALS

a) Horses
b) Goats
c) Swine
d) Others