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BARBADOS INTEGRATED LIVESTOCK PROJECT

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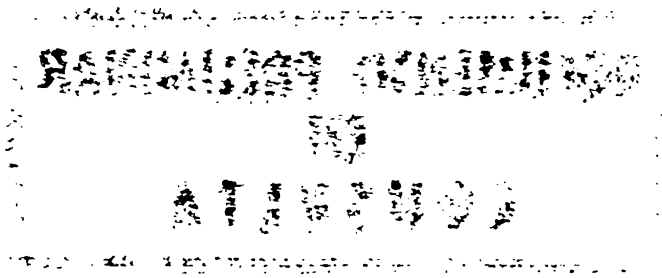

MINISTRY OF AGRICULTURE
AND NATURAL RESOURCES

INTERAMERICAN INSTITUTE FOR
COOPERATION ON AGRICULTURE

INTEGRATED LIVESTOCK PROJECT

VOLUME 2

CHAPTER III

Barbados, March, 1986

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THE PROJECT

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LIST OF TABLES

III. THE PROJECT

3.1. PROJECT RATIONALE

3.1.1. General Objective

To reduce the import bill of milk, beef, mutton and animal by-product through the increase of local production of milk, beef and mutton and simultaneously direct into productive use increasing underused resources of land, agricultural skills and labour.

3.1.2. Specific Objectives

The specific objectives of this project which are expected to contribute to the ultimate goal are the following:

3.1.2.1 Increased Production of Meat and Milk

Substantial increases in the domestic production and consumption of fresh milk, and quality beef and mutton, so as to substitute for imports and reduce the drain on foreign exchange.

3.1.2.2. Increased Productivity of Dairy/Beef and sheep Producers.

A marked improvement in the efficiency of production of dairy farmers and small holders sheep rearers.

3.1.2.3. Efficient and Effective Marketing Systems for Meat and Milk

Substantial improvements in the physical and service infrastructure for the marketing processing and distribution of the domestic livestock product.

3.1.3. Projects Outputs

The project is so designed that, at maturity, it will have produced the following results:

3.1.3.1. Marketing and Processing

the essential physical and service infrastructure for the orderly and efficient marketing and distribution of locally produced beef and mutton would be in place including in the main:

- a modern slaughtering and meat processing facility.

- an effective and efficient marketing system for live animals and locally produced meat.

3.1.3.2. Animal Health

Improved animal health services for the cattle and sheep farmers, with special emphasis on small producers will be in place, along with improved veterinary laboratory services.

3.1.3.3. Research

Introduction of new technologies appropriate to a land-scarce agricultural sector.

3.1.3.4. Supportive Services

Outputs of this component can be summarized as follows:

a. Financial support (credit line) to large cattle farmers and small sheep producers to implement proposed changes.

b. Improved artificial insemination services.

c Delivery of livestock technology recommendations to farmers through a better extension service.

3.1.3.5. Technical Cooperation

The Physical, Human and Research Infrastructure of the Ministry of Agriculture and Natural Resources will have been strengthened and will be supporting accelerated development of the livestock subsector.

3.1.4. Project Location and Beneficiaries

The island of Barbados has no distinct urban/rural boundaries. The two so-called 'towns' have very little life of their own apart from being convenient concentrations of commerce. By reason of the nature of the distribution of its fairly dense population and of its agriculture, a project of this type necessarily embraces the entire island.

The potential beneficiaries of the project are small- to medium- scale dairy farmers, plantations and some 9000 small holders who keep one or two sheep.

More specifically the project aims to develop new dairy/calf farms in the Scotland District area, and develop in plantations existing in the rest of the island, small dry-lot systems to fatten the calf production of the dairy. Sheep farmers who will directly benefit from the project are in the parishes of St. Philip, Christ Church and St. Lucy.

3.1.5. Time Frame and Targets

In the peculiar context of the Barbados Agricultural Sector, no domestic beef or mutton industry now exists inspite of the fact that all the ingredients are there: good farmers, good soils and basic cattle and sheep herds of satisfactory to excellent genetic quality. Therefore, it may safely be said that what the project aims to do, is to build an industry, albeit a modest one, from scratch. However, the presence of the essential resources may create a delusion of a relatively easy implementation. Unfortunately, some constraints which may hamper its development are present. Farmer conservatism, a trading and consumption economy locked

into sophisticated taste patterns, and the availibility of low-cost meat and milk imports are a few of them..

For all these reasons while in ordinary circumstances the production and productivity targets are within reach, even a moderately successful effort at implementation, it could not be considered a failure even if only 50% of the targets were achieved in the tenth year of project life.

By year 7 of implementation of the Project it is expected will be producing some 782.4 tones of beef, 210 tons of mutton, 3 thousand hides and economic use of 1201 tons of offals.

3.2 REVIEW OF CURRENT LIVESTOCK INITIATIVES

The Government of Barbados has taken a few initiatives specifically geared towards the livestock sector as such. One of them is within the World Bank financed Diversification Project. It has focussed on the expansion and up-grading of the dairy industry through the services of an extension specialists, who is focussing on:

1. Livestock management and extension
2. Calf rearing
3. Improved breeding

4. Improved feeding and forage production

5. Sialage making

6. Improved beef and mutton production.

This programme will be ending in 1986.

The other initiative has to do in the hiring a consultant for a year to support the research on feedings that the MANR is currently carrying on.

3.3 PRODUCTION UNITS

Cattle and sheep are the two areas of the livestock sub-sector, with a potential to contribute to development of the meat production and increase its availability. Production Unit Models in these two area were generated to estimate their production and their financial and economic feasibility.

In the process of identification of the best possible strategy a number of models were tested. Initially, beef cow-calf models using pasture-grazing system were studied as a feasible area of the beef production. Dairy herds as a source of calves to provide for the feed lot operations was another alternative considered.

3.3.1. Beef Models

Pasture as a means of forage production for beef cow-calf operations seemed feasible as the first approach.

Several models of cow-calf herds (1, 2, 3, 4 and 5) and a feed lot (Model 6) were tested for their productive and economic feasibility. The description of the models and their economic results are shown in Annex III-1.

These models were proposed as new operations, since most of the current herd is in the hand of landless holders or in holdings with less than two acres, this preventing their inclusion in a best result strategy as the one proposed in the project.

Models for 100, 25 and 10 beef cow-calf operation (Nos.1,3, and 4 in Appendix III-1) were developed. In these models calves were sold to a feedlot (Model No. 6), at 400lbs liveweight. A model for beef cow-calf operation where calves grown out to market weight on pasture was also generated (Model No. 5).

All these models were built around an initial calf-crop of 72%, increasing it to 74, 76 and 78% in the first 5 years of the project. An additional Beef Model (No. 2) was tested for an 85% calf crop rate. The Models were built based on the following assumptions: the importation of all heifers needed, planting grass for grazing and building some basic production facilities. (Detail description of them in Annex III-1).

None of these Models showed a return, sufficient to warrant their further consideration. In fact most of them were negative throughout the 20 year period considered even before including financial charges. It is obvious from then that the cost of maintaining 100 cows for one year to produce 72, or even 85 calves at birth was not economically feasible under the price structure for land, labour, meet and developmental instruments that currently exist in Barbados.

3.3.2 Dairy/Beef Models

As a result of the analysis of the beef cow-calf Models, it was clear that the only other potential source to produce calves for meat production would be through the expansion of the Dairy Herd.

Models No. 7, 8, 9, 10, 11, 12 and 13 (Annex III-2) were run for dairy cattle as a source of both calves for meat and for milk. Model No. 14 (Annex III-1) was generated for a feed lot operation to grow out calves from 3 days old to market weight (1050lb). Model 13 was run to represent the current commercial Dairy Farms existing in Barbados, showing a 10% increase in the number of animals in year 2 of the project. A description of these Models are as follows:

3.3.2.1. Description of the Models

MODELS 7 AND 10*

TYPE OF SYSTEM:	100 Cow dairy herd.
PRODUCTION:	78% Calf crop and 20 lbs of milk/cow/day. 305 days milking period.
MANAGEMENT:	Feeding silage and concentrates according to production and maintained in loafing sheds. Selling bull calves and unneeded heifers at 3 days of age. Females calves kept only for replacements.

MODELS 8 AND 11*

TYPE OF SYSTEM:	100 cow Dairy Herd.
PRODUCTION:	78% Calf crop and 40 lbs of milk/cow/day. 305 days milking period..
MANAGEMENT:	Feeding silage and concentrate according to production and maintained in loafing sheds. Selling bull calves and unneeded heifers at 3 days of age. Female calves kept only for replacements.

MODELS 9 AND 12*

TYPE OF SYSTEM:	100 Cow Dairy Herd.
PRODUCTION:	78% Calf crop and 20 lbs of milk/cow/day. 305 days milking period.
MANAGEMENT:	Grazing pastures and feeding concentrates according to production. Selling bull calves and unneeded heifers at 3 days of age. Keep female calves only for replacements.

MODEL 13

TYPE OF SYSTEM:	50 Cow Dairy Herd. (existing Dairy Farm) with 10% expansion in year 2 of the project.
PRODUCTION:	72-78% Calf crop and 20lbs of milk/cow/day. 305 days milking period..
MANAGEMENT:	Feeding: grazing, silage or hay and concentrates according to production. Selling bull calves and unneeded heifers at 3 days of age. Keep female calves only for replacements.

MODEL 14

TYPE OF SYSTEM	100 head FeedLot Operation.
PRODUCTION:	100 fat animals (450kg) market weight a year.
MANAGEMENT:	Weaning, growing and fatting ration. Buys animal at 3 days of age and sells them at market weight.

Two Dairy Models of choice were picked from those described above. These were Model 7 and 8. The selection of these two models was based on the feasibility of their production and the economic returns (See Annex III.2) Model 7 was for cows producing an average of 201bs of milk per/cow/day for 305 days a year, or 6100 lbs. of milk/cow/per year. The proposed expansion of beef production is expected to come from this model as well as from the current 1300 cow commercial dairy herds. Model 8 was used to show the potential for increasing the returns when milk production increase to an average of 40 lbs of milk/cow/day for 305 days or an annual production per cow of only 12,200 lbs of milk. This can be a realistic easily achievable future goal for dairy in Barbados, since there are a number of cows that do produce 80 lbs of milk/day at peak lactation. This goal could be reached if appropriate technology is used on feeding, health, management and of the selection in better breeding stock.

Since the large increase in beef production is to come from the new operations, (Model 7) the efficient use of labour in relation to land area available on any of the sugar plantations or holdings that might enter the scheme dictated that the herd size be 100

cows. This would require 26.3 ha (65 acres) of land capable for producing forage that could be harvested for silage, plus approximately 2.8 ha. (7 acres) for animals'holding and production facilities.

The feeding program for the dairy cattle would require 13130 metric tonnes of silage. In addition, 54 metric tonnes of molasses and 43 tonnes of 22% dairy ration would be required per 100 head. These totals 702 and 559 metric tonnes molasses and 22% dairy ration, respectively, for the 13 new 100 cows dairy herds. In order to raise the replacement heifers, additional concentrate must be purchased from commercial feed companies. A total of 170 lbs of milk replacer, 3 tonnes of 20 calf starter and 27 tonnes of calf grower are needed in addition to the silage included in the dairy cow requirement described before.

To obtain the 1625 dairy cows needed for the new dairy units and for the expansion of the existing commercial dairy farms, high quality heifers should be imported from dams that produce at least 18,000 lbs of milk per 305 days lactation.

The capital inputs for Model 7 are high ($640,700 per model) but the financial returns are also high (Annex III.2). The financial rate of return for Model 7 is approximately 20%. Except in those years when additional investments are made to replace machinery, the return after financial charges on this Model is about $83,000 a year and is approximately $100,000 more after financial changes has been finished in year 15 No opportunity cost of land was considered because it is assumed this operation will go on lither unused land or very marginal sugar-cane land at Scotland District where negative returns have been reported.

Model 7 described above would sell calves at 3 days of age at $150.00 per calf. The basic support for the calf production, of course, comes from milk sales, thus making it economic to produce young animals for rearing as meat animals. Model 14 was run for a feedlot of 100 head to grow out calves (3 days old to market weight) from dairy herds.

In order to provide forage for the cattle in these feedlots it, would be necessary to utilize 15 acres (6.1 HA) of crop land for forage grass production for ensiling. Minimal housing for the calves, covered feed bunks, a silo and handling equipment (squeeze chute, a loading chute, a sprayer and sick pen) will be the major housing costs, (See Annex III-1)

The feeding program for the feedlot operation was formulated around the use of silage as a forage source. The estimated usage of silage would be 183 metric tons/100 head of cattle fed out to market. The grain portion of the ration, 147 metric tons, would come from commercial feed-company products produced in pellet form, with the exception of milk replacer and cracked corn. In addition, 43 tons of molasses would be used by each 100 head of cattle fed out to market. This feeding program will give a feed efficiency on a dry matter basis of about 6.20 lb of feed/lb of gain. The gain is projected to be at 2.6lbs/day. When calves going into the model were priced at $150 per head and the sale price was $3.00/lb of carcass meat produced, the return before financing was negative. When the meat price was adjusted upward to $3.50/lb of carcass, the return became positive yielding approximately $17,800/year before financing charges and showed a financial rate of return of about 20%. The debt service reached its peak ($13,700) in year 5 and was finished at year 14. During this period (year 1-14) thc return after financing was bout $4,100. After year 14, the return was again at $17,800 (Annex III-1).

3.3.2.2. Main Activities and Proposed Technology Changes

As mentioned, above one of the main purposes of the project is to increase meat availability in Barbados. In order to improve meat production some changes will have to occur at the production level and specific actions will have to be undertaken:

- The commercial dairy herd will be expanded from 1300 cows to 2925 cows as a result of the importation of 1625 bred heifers.

- An increase of beef animals production by 2900 head/year from the expanded dairy herds.

- The establishment of feed lot operations to grow out calves to market weight.

- An increase (actually a duplication) in milk production as result of the establishment of new farms and the expansion of 10% of the existing dairy herds as a result of importation of the bred heifer.

No major changes will be introduced in terms of technology, except for the feedlot operations that can be considered as a new livestock industry and the introduction of ensiling practices.

i Milk Production

In milk production, emphasis will be made on:

- Zero grazing and housing in loafing sheds for efficient land use while reducing the environmental stress to the animal.

- Planting grass and making silage from the forage as main source roughage for the cattle, Commercial concentrates will be used according to the production milk level of the cows.

- The use of animals with better genetic material. Bred heifers from dams that produce at least 18000 lb of milk per 305 day lactation will be imported.

- Better tick and disease control under dry lot conditions.

ii. Feed lot operation proposed technology:

- Intensive fattening of calves in feed lots from 3 days old to market weight (400-450kg).

- Planting grass and making silage from the forage the as main source of feeding and to supplement of commercial concentrates will be used according to the age and weight of the animals.

3.3.2.3. Aggregation

It is anticipated that at least, 13 new dairy farms of 100 dairy cows each, will be developed over a period of 4 years. Concommitant with this, it is expected that there will be the development of a comparable number of feedlot operations each year. During the development of the project the 10% expansion of the existing dairy herds in the country is also shown in Table III- 1.

3.3.3 Sheep Production Models

Some 9000 plus "landless" and small farmers in Barbados own over 25 thousand head of sheep or about 90% of the total. These farmers are part-time farmers with the following production systems:

- Pasture and roughage for feeding the animals come from land other than that owned by them.
- Lambs are fed on low levels of supplementation (0.5 to 0.75 lb/day)
- 3 lambs per ewe/year.
- Carcass weight = 15kg.
- Period to market 10-11 months
- Meat price received = BDS$7.00/kg
- This low production is a result of the very low, and uneven, feeding of animals.

3.3.3.1 Sheep Model Description

The model that has been generated for the small sheep farmers is based mainly on improving the feeding of ewes and lambs in order to reduce the fattening period of the lambs, improve their carcass weight and increase the lamb crop/ewe/year.

The Model proposed is for a small farmer with two ewes and will have two main thrusts:

- Increased feed supplementation for ewes and lamb (from an average of 0.75 to 1.5 kg of commercial concentrate).

- Improve animal health by increasing the availability of veterinary services and drugs to the farmers.

For this purpose, three service centers will be established in the project area, where farmers will have available credit and the other inputs needed for better production..

In table I Annex III-3 is shown the estimated cash flow for a farmer with two ewes. Without project

and during the first two years of the project implementation the cash flow shows negative values. It should be borned in mind that because of financial and marketing constraints small (or landless) sheep farmer keep their animals as a "savings box", without special considerations to real return. Under the actual situation the main constraint for the farmer is the cash needed for purchasing feed. The improvement of the production system is reflected after year four when full lambing and growth potential are achieved, and when the estimated income per holding has increased.

In table 2 Annex III-3, it can be seen, for the 20 year period, that a positive cash flow can be generated without financial burden to the farmer if the proposed strategy to improve the sheep feeding system is applied. The improvement of sheep the production system is going to be directly dependent on the performance of the market and on the availability of funds and of the inputs at the service centers (See description in 3.4.1.3)

3.3.3.2 Main Activities and Proposed Technology Changes

As a result of the availability of credit through, the service centers, for improving the sheep production system, the following changes are expected will occur in the project area and at the holder's level:

i. Increase from 3 to 5 lambs/ewe/year.

ii. Reduction of the lamb fattening period from 10 to 6 months.

iii. Increase the carcass weight from 15 to 23kg.

iv. Increase production of mutton and lamb meat in the project area (1500 farmers) from 5.4 to 210.0 tons in 10 years.

v Credit, under the form of production inputs, will be available for farmers through the three service centers to be established.

In order to produce these changes improvement in the feeding system and in animal health services will be the main technology to be used.

3.3.3.3 Aggregation

During the development of the project it is expected that, after the second year and before the sixth year 1500 small farmers will be using the service centers. The result of the availability and the proper use of inputs will result in an increase of mutton and lamb meat production of 210 thousand tons with an incremental value of B'dos $819 thousand by year 8 of the project (Table III-2).

3.4 PROJECT COMPONENTS

3.4.1. MARKETING AND PROCESSING

The key element of the proposed marketing strategy, is the construction of a new abattoir at a new, more adequate location, description of which is in Annex III-4.

3.4.1.1. Central Abattoir and Meat Processing Facility

a. Role and Function of the Proposed Central Abattoir.

Not only will the abattoir occupy the central position in the product flow from

producers to consumers but it will be the central price-forming point of the marketing system. The supply conditions will be felt at the abattoir more accurately than at any other place in the local livestock market and with its strong position in the local meat distribution, the changes in demand will also be felt more accurately. Regardless of the system adopted to establish prices this agency will be the logical pricing point.

Although much can be said for the virtues of freely competitive pricing other alternatives are worth considering. The abattoir will hold certain monopsony/monopoly advantages in the markets for livestock and for meat. Administered prices for livestock entering and meat leaving may be the most rational. The bulk of meat entering the domestic market- the imports- is greatly affected by the public sector by means of import tariffs, constraints on imports and overall economic policies.

The abattoir will slaughter cattle, sheep and hogs. It should further process the carcasses to meet the demand. A buyer

should be able to obtain the full carcass or specific cuts as his clients require. Pricing should be adjusted to clear the market of all supplies yet cater to the specialized needs. Boxed, cut, wrapped and even frozen meat will be appealing to some. Deboning should be done as the demand requires.

The proposed abattoir will assume the wholesaling functions for all meat handled. This will require a special merchandizing and distributing department with capabilities to synchronize the distribution of meats with the livestock inflow. This department must be in close communication with all potential outlets. The expected output growth will increase the opportunity to compete effectively with meat imports.

While import controls would ensure that locally produced meat is absorbed by the internal demand, this places a burden on local distribution to assure the retail trade a dependable product flow.

The abattoir will improve confidence in local meat sanitation and health by using the most modern operational methods. Health

inspectors will examine the incoming animals, the carcasses and vital organs.

An appropriate level of training for management and skilled workers will be essential. Some training of key people before starting will be required. An inservice training program should be continual. Special consultants brought in at the inception of operations will be appropriate.

b. Restructuring of Meat Marketing Process

The proposed centralization of the purchasing of livestock and wholesaling of meats will undoubtedly have an impact on all marketing agencies, firms and individuals now engaged in the livestock and meat trade The new system would look as presented in figure III-4.

(i) Meat Producers

Livestock producers will have the opportunity if desired to market directly to the abattoir and avoid the costly transfer

through an intermediary, but this direct sale opportunity brings some responsibility. The producer must arrange for his/her own livestock transportation. Small producers will need to join with neighbours, at times, to solve this problem, when no Livestock service centers are close enough (see 3.4.1.3).

Small producers of sheep, will benefit particularly from proposed service centers. At present only a small fraction (about 3%) of the lamb turn off is being slaughtered at the BMC. A major reason is the inaccessibility of the abattoir to the small producers. Through the collection function of the service centers large numbers of sheep producers will have direct access to the abattoir and the numbers slaughtered at the approved facility are expected to increase substantially.

(ii) Speculators

Speculators who assemble livestock in the country on their own account have been performing a service for those unable or unwilling to do this for themselves. However, their function will be reduced and most speculators will be obliged to seek other employment.. Producers complain that speculators have failed to adequately serve their needs. The prices paid are too low and collusion among the speculators makes competitive offers unavailable.

Under the new marketing scheme producers will be able to perform the product assembly function for themselves.

(iii) Butchers

The functions of butchers will be modified. No longer will they buy directly from producers and arrange for

slaughter. Their function will be procurement from the abattoir, cutting and retailing at the public markets or at their own butcher shops.

(iv) Supermarkets

Supermarkets and other retail stores will change their buying customs very little at first but as local meats become available they are expected to shift more purchases to the abattoir and away from import wholesalers, install fresh meat display counters and do more fresh meat cutting and wrapping at the retail store.

(v) Wholesale Importers

Wholesale importers will not be affected by the new marketing structure until local supplies increase to the point where they effectively compete with imports. Official quotas on imports would affect their volume but the growth in total demand and

specifically the tourist and high income trade may mean that importers will not lose that much even when local production does expand.

(vi) Meat Processors

Meat processors should be favourably affected by the new market system proposed, which would afford a more stable and reliable source of raw products for their processing. They would be dealing with an assortment of suppliers rather than one source. They could be confident of the sanitation standards and meat cutting skills of trained workmen, and may work out supply and financial arrangements to the mutual benefit of the abattoir and themselves.

c. Construction and Organization

(i) Location

The abattoir is to be constructed at Lower Estate in St. Michael on a site purchased by Government for the purpose several years ago. There are several points in favor of the location, viz:

- Access for both producers and meat buyers. The site is on Highway 3 and close to the new Airport Highway. In addition, abattoir delivery would serve many buyers.

- Ample supplies of fresh water

- Good drainage - The site has a good slope but there is some concern regarding seepage. Treatment of the waste water will be required on any site.

- Electricity and natural gas energy sources are readily available.

- Labour is available in regular and adequate quantities for operations.

(ii) Size

The size of the proposed abattoir is critical to its operational costs and its services. The criteria followed in determining its size were to handle current production efficiently, allowing for a larger share of present production to enter the abattoir and a realistic 15 year growth estimate can be justified.

Table III-3 compares present slaughter at the BMC with expected slaughter at a new facility at the present production level and at the project projected level. For pigs a constant number was considered.

A minimum size modern abattoir would have through puts as follows:

Cattle line = 6-8 head per hr - 4 men

Sheep line = 40-60 " " " - 6 men

Pig line = 40-60 " " " - 6 men

If the project targets are achieved, the total hours per week that will be needed to process the expected number:

Cattle	2978/50/6	= 10hrs.
Sheep	29800/50/23	= 26hrs.
Pigs	30000/50/41	= 15hrs

Assuming 50 week year and the following slaughtering capacity

Beef heads 6 per hour

Sheep heads 23 per hour

Pork 41 heads per hour

Therefore from these estimates, only a minimum sized abattoir can be justified. In annex III-4 a general description, preliminary drawings and general layout of the abattoir is presented.

The total cost of the abattoir will be:

- Buildings B'ds $1900 thousand
- Machinery and Equipment B'ds $360 thousand

(iii) Ownership

In order to introduce incentives in the handling of animals, in the operation of the abattoir and at the same time allow government participation, it is proposed that the abattoir investment be a joint venture with 75% private investor ownership and 25% government ownership. Private investors should ideally include livestock producers meat processors and retailers. The abattoir should be managed to yield an appropriate annual profit. For the first year or two, however, some government support may be essential.

(iv) Use of By-Products

One of the major problems to solve with the construction of a new abattoir is that of waste disposal. Currently all offal and most hides are thrown into the sea or disposed by the sanitation authority at a nominal fee. These are then used, with trash, into filling areas. It is recognized that, for health reasons, this practice has to stop.

There are at least three alternative ways of selling hides and skins:

- sell green to a tannery
- salt and roll for sale and shipping
- dry and store for later sale

Very little equipment is required other than a simple treatment and storage facility.

It is proposed to sell all hides and skins to the tannery currently operating in Montserrat. The hides and skins will only have to be salted for shipment. Preliminary contacts with the tanery indicated that they would absorb without problem the production of solted hides

In the case of offals two options one possible render them for animal feed or shall them to processing plants for other uses most meat by-products can be used to make meat and bone meal for livestock feed. Because the operations of the by-product rendering plant are critical to the operation of the abattoir and the volume of raw waste material for processing is critical to the efficient operation of the rendering plant a few rough approximations are presented.

Under the assumption that waste material for rendering represents about 25% of the weight of live animals (or 45% of the weight of dressed carcasses

of cattle and sheep) and about 10% of the weight of pigs, the volume available with the 1984 slaughter volume would have been 208 tons (Table III-4). The specialized literature reports that 250 tons of raw material per year would be a minimal volume for rendering under normal circumstances. The volume produced in 1984 was actually not enough to meet the minimal requirements for producing meat and bone meal.

Since no hard-fact figures were available of the time of their study, the alternative consideration is analized in this proposal, that is to sell offals to processing plants in Trinidad and Tobago, who were also expressed their willingness to absorbed the offal output of the plant.

(v) Regulation and Control.

The critical relationship of volume to the efficiency of the proposed abattoir requires consideration of the alternative

methods of assuring the maximum volume possible. The present requirement that slaughter be permitted only at approved facilities could be enforced. This would reduce but probably not eliminate backyard and slab slaughter because of slaughter for home consumption. For practical reasons, slaughter of hogs by BARPAC would be difficult to transfer to the abattoir. Control of sanitation is not a debatable issue. Only the highest standards must be assured (See Annex III-5 for Regulation).

3.4.1.2. MARKETING OF INCREASED FRESH MILK SUPPLY

From the analysis of different models presented at the beginning of this chapter it is clear that no increase in beef could be expected, it is alto true that an increase in milk production in Barbados, given the present organization of the dairy industry, is problematic

Bearing in mind the problems already recounted which would accure from any substantial increase in the supply of fresh milk in Barbados, it is necessary that the project incorporate certain elements which will assist the industry

to expand without disastrous consequences. The following strategy is proposed:

a. Introduce and stimulate the use of UHT (Sterilised) milk to the Barbadian consumer. In other countries this has been a proven way of substantially improving distribution and consumption. Properly orchestrated and promoted such a product could also seriously compete with evaporated milk in terms of price per unit and shelf life without refrigeration. While the initial investment is appreciable the long-run saving in foreign exchange in addition to the improved profitability of the domestic production would be ample economic justification.

b. The reintroduction of fresh milk to the school system (primary schools in the first instance) would utilize annually between 1.94 million litres (at 0.25 l/child/day) and 3.89 million litres (at 0.50 l/child/day) for 37000 children over forty-two five-day school weeks. This programme would be greatly facilitated by the use of the plastic pack of the modern UHT

system. This scheme has the added advantage, apart from the obvious nutritional benefits, of introducing a whole generation of future adults to the usage and appreciation of fresh milk.

3.4.1.3. LIVESTOCK SERVICE CENTRES

To assist the small livestock farmers in Barbados to increase their production it will be necessary to create a mechanism which allows them to circumvent certain production and marketing constraints. The most important of these constraints are the following:

a. the lack of a commercial character in the sheep enterprise.

b. the inability to purchase adequate feed.

c. the lack of veterinary services (since it is uneconomical to call professional help for one sheep).

d. the difficulty of marketing - mainly the high cost of moving one or two sheep, which leaves the farmer at the mercy of the speculator.

It may be readily appreciated that much of the attitude which gives rise to a. is in fact a defensive posture which the farmer adopts who can do nothing to change b, c, and d.

The project answer to these constraints is to erect service centres in the areas of the highest concentration of sheep. St. Philip, St. Lucy and Christ Church, which would provide feed on credit, inexpensive veterinary medicines and services and would buy the finished lambs at acceptable rates at the farm gate. In addition these centres would serve as specialised extension facilities.

The service centers would be managed and operated by the Abattoir company and small fees would be charged on feeds in order to make the centers reasonably self-sufficient.

As these centres will be, in effect, extensions of the abattoir, they would be assured of sound and capable management, and, at the same time the abattoir would be possessed of a guaranteed throughput. Farmers who register with each centre would receive the feed necessary to fatten their lambs as an advance against their delivery of the finished lambs to the centre and the centres would provide - at nominal cost - technical advice and animal health services. The lambs would be assembled for slaughter and transported to the abattoir, in groups, at set intervals. At this time the farmer would be paid on the basis of the liveweight of each lamb less the cost of feed previously advanced to him plus a 10% service charge. In this way the farmer is motivated to develop the desirable commercial attitude to his enterprise without requiring him to invest anything more than the sheep he already owns. Service centers can also be used by the technicians in charge of inspecting animals for slaughter. In this way useless trips to the abattoir could be avoided.

Total costs of these centers are presented in Table III-5.

3.4.1.4 ADDITIONAL MARKET STRATEGIES

a. Organized Stock Auctions

Economically oriented production usually results in specialization, and in this case those best prepared to produce young breeding stock will use their resources to produce cows and calves or breeding ewes. Others better prepared to feed and fatten stock will so specialize and the need for an effective transfer of animals and ownership is required. The need for an organized market system will become more obvious as numbers increase. It is proposed that a regular auction be organized to sell livestock, mostly young stock, but adult breeding animals also when available. The frequency of the sales will depend upon volume and producer interest.

The market might be started and operated at first on a pilot basis by the extension services and be held at whatever facilities are available to start with. These sales might well be coordinated with

the functioning of service centers organized for other purposes.

b. Trade and Pricing Policies

Because existing constraints on supplies make free market pricing unrealistic, an administered pricing system is proposed. Furthermore, the establishment of a single abattoir occupying the central position in the market structure calls for a control plan similar to that used for public utilities.

However the danger of losing the incentive for operational efficiency when prices are administratively fixed is real, and deliberate arrangements need to be made to assure efficient operations. Savings from reduced operating costs must be retained by the firm, and individual worker bonuses and awards would be used to encourage good workmanship.

Because imported meats hold the dominant position on the supply side of the market and pricing and supply are subject to

political and administrative whim, there is additional justification for central pricing schemes.

An administered price-making system places an extremely heavy burden upon the administrators to be fully informed of supply and demand conditions, and to reinforce every price fixing action by the appropriate counter actions relative to supply or demand. If efforts to expand internal production with high costs are successful then lower cost imports will have to be restrained.

The recent 30% increase in import tariffs on beef coming from non-Caricom countries has created considerable concern in the Barbados meat trade. This tariff plus the existing 12% tax is enough to generate an energetic search for supplies within the area.

Even with the higher prices resulting from the tariff, local production cannot benefit in the short run because supplies

are limited and expansion is a long term proposition. Even with the tariff it is believed that import prices may be lower than internal costs.

Overseas producers facing an inelastic domestic demand and an elastic foreign demand can deliberately divide the produce between the two markets and increase total revenue by restricting supplies on the domestic market and dumping supplies at lower prices on a foreign market. Barbados is now experiencing such a situation with the Irish Intervention beef and may be in the future vulnerable to similar trading malpractices. Local producers cannot compete with expanding imports at artificially low prices.

c. Market News and Information

Market news and information services are a logical function of the Government. Private firms gather information that relates to their own operations. Their scope is limited and resources are

inadequate for a total overall perspective. The government has a responsibility to all members of the society and must guard against partial, biased or inaccurate information being distributed.

The news and information collection system may be capable of dealing with more than one product and costs should be shared. It is then proposed that this service be carried out by the Barbados Agricultural Society Information Service (BASIS) of the Barbados Marketing Corporation.

Information to be collected include the following:

- Prices paid at key market points. Prices at the abattoir for each type and grade of livestock. Prices of meats of different types and the cuts at the abattoir wholesale division. Prices of selected cuts at retail. Import prices at wholesale. Processor prices of slaughtered hogs and products produced.

- Supply and volumes entering the abattoir, imports and utilization in different outlets.

- Information about changes in public policies, agreements and public activities. Relevant information about livestock and meat trade in other countries.

d. Grading Systems

Pricing according to quality makes a grading system mandatory. Visual inspection is replaced by verbal description. Ownership identity will be retained until the carcass has been graded.Purchases will be on a carcass grade and weight basis. Livestock grading permits pricing by quality and provides the incentive for production changes that increase supplies of the more desirable type of animal. A good grading system is simple, is understood by all handling the product, and is readily used.

Grades of live cattle, sheep and swine need to be selected, tested in the market and widely publicized. They will be the basis for prices established at the abattoir. The system need not be complete but include the most basic differences that are value oriented. Meat and livestock grades must be different but common terms are often beneficial.

An advisor with knowledge of grading systems will be helpful in the first step of selecting an appropriate grading system and testing its acceptability to the trade. After the system has been adopted trained graders must be provided to respond to the demand for the service. At the outset a livestock grader and a meat grader must be stationed at the abattoir. As volumes and the service demanded grow additional graders can be added.

e. Regulations and Controls

An essential element in the effective operation of a marketing system is an appropriate level of regulation and

control. Sometimes self-regulation from within the market is sufficient but generally official government regulation and control of market operations is required because producers, market intermediaries and consumers each are directly affected by the market performance, yet each has a divergent position and interest in how the market behaves.

Regulations must require adequate sanitation at all market points, and inspections must ensure that only healthy animals are slaughtered, and sound edible products passed on to consumers.

The new market system should make appropriate control easier. There may be deliberate control of entry into the abattoir business and permits for certain activities may be desirable, but the stream-lined marketing channels permit easier observation, evaluation and regulation. The abattoir will be the focal point for livestock and livestock product movement in the market and therefore the abattoir may also be the focus for market

influence by the government as its policy dictates. However, minimal regulation and control is recommended. Private investors will be attracted to invest in the abattoir only if it has the prospect of operating without excessive government intervention.

3.4.2. Animal Health

The role of the Animal Health Services in the Integrated Livestock Project necessarily extends from maintaining herd health and performance through regular inspection and veterinary maintenance to the protection of the consumers of milk, beef and mutton. While the veterinary services and facilities currently available are reasonably adequate for the current demand, the ILP must incorporate specific expansions and improvements in view of the greatly expanded production which is to be realised.

While Barbados is reasonably fortunate in respect of animal disease incidence, which is low, and in the absence of several important and damaging notifiable diseases the proposed expansion of beef and mutton production must be supported by a concommitant increase in animal health service.

The implementation of the Integrated Livestock Project will require an improvement of the veterinary services oriented towards the small farmers and an improvement of the services provided by the veterinary laboratory.

3.4.2.1. Veterinary Services

The main cost of professional service is in the "Call fee". Though the island is small a considerable amount of time is spent driving, thus limiting the number of professional calls an individual can make in any one day. If "Clinic centers" were available and smaller livestock, e.g. Calves, sheep, goats, young pigs etc. requiring individual treatment could be transported to such a centre, the overall delivery of Veterinary Service would be increased at a much lower cost to the farmer.

It is therefore proposed that the service centers be used as ambulatory clinics for small farmers.

Two days a week can be set up for these services. This will require a marginal investment on the service centers to take care of vet. services and will require an additional veterinarian and two health assistants at the ministry. In fact it is proposed that the ministry line veterinarians to perform these duties on homely basis instead of full-time employment that leads to heavy burdens on the ministry's budget and in many cases to inefficient use of the technicians.

3.4.2.2. Veterinary Lab

Any expansion of the beef and mutton industries will require an expansion of Veterinary Diagnostic Laboratory services. If modern meat packing standards are kept, then an increase in submissions from the slaughter house (now just a trickle) can also be expected.

In this respect, besides the increase in costs on reactions, it will be necessary to add/replace some equipment, to better perform its duty. These are:

- Automated Hematology counter.
- Ultra-violet Spectrophotometer.
- Revco low temperature freezer.
- Autoclave.
- Centrifuge.
- Low temperature centrifuge.
- Large cooler.
- Hydraulic post mortem table.

Total costs for this component are summarized on Table III-6.

3.4.3. SUPPORTIVE SERVICES

3.4.3.1. Credit

The implementation of the project at the requires the availability of credit in order to allow farmers to carry on with the required investments in the cattle farms and with the change in feeding patterns, in sheep production.

For the cattle component it is here proposed to open a special line of credit at the Barbados National Bank (BNB) which will cover the investments required in the first two years of

the development of the farm models selected, the total amount of credit required at the farm level ranges from BDS$1459.2 thousand to BDS$3446.9 thousand per year (See table III-7). The condition of this loan will be 9% in annual interest rate, 10 years with three years grace period in which only interests are paid.

For the sheep subsector, a revolving fund to the abattoir company would be opened at the BNB. This fund can be used to finance the feeds to be provided to the sheep farmer. (See Table III-8).

Since it is expected to have two lamb crops a year, only half of the total value of feeding will be needed. Therefore, only half of the total value of feed is the requirement per year. These requirements are presented in Table III-8.

3.4.3.2. Extension and Livestock Station Services

A major function of extension is the transfer of appropriate agricultural technology from technical people to the farmers. To be meaningful and of interest to the farmer, a potential innovation must be economically sound. The extension specialists and livestock researchers must work closely with the farm

management economist in assessing the economic feasibility of a production system or practices in order to allow the farmer the opportunity to assess its potential for his operation. In return, the economics of various farm operations should be assessed to assure that the innovations made by farmers themselves are not lost, but in fact, used by the stations and passed on to other farmers.

In the implementation of this project the objective of the extension component should be "to educate all those livestock farmers who have the potential for meaningful development of their enterprises, in the adoption and use of technologically sound and economically remunerative livestock production practices"

It is very necessary to develop a strategy that will, in fact, reach the population that must receive the attention of the extension service.

Table III-9 shows the estimated number of farms with cattle, sheep or pigs in 1971 and 1985 as well as showing the change in the number of farms from 1961-1971. These data show that there are many more farms that can possibly be covered

by a limited extension staff. Thus it will be necessary for the front line extension persons to be very selective in who they work with on a direct form basis. They will, in fact, have to utilize the full resources of printed material, group meetings in local rural areas at any time that fits the farmers' schedule, radio, etc.

This approach will be needed in order for these persons to reach those who could benefit from this knowledge. An additional technique to be used would be to work on a limited basis with selected farmers, who are respected in the area, as demonstration units for other farmers.

Such a front line program requires adequate support in terms of transportation, audio-visual aids, livestock scales and other items of a physical nature in addition to a well trained staff of experts to whom they can turn for technical help in the form of printed material, talks at the local meetings, radio and television presentations, etc. These extension specialists would in turn be backed up by the technical staff of the various stations. These stations would be expected to provide demonstration work and or research on feeding, disease and management of

programs that could lead the way to the use of new products, breeds etc.

This in depth approach, having back up resources providing support for the front line extension specialist, would require some reorganization, additions to staff and some upgrading of the stations in order for each segment to fulfill its assigned role within the total extension complex.

For the effective implementation of the project some changes in the structure and functioning of the Extension and Development department, described in Chapter II, needs to be effected. The objectives of these changes are:

- to provide adequate frontline extension services to farmers.

- to provide professional research and other technical back up support to ensure farmer interest and motivation for increased economic livestock production. It is mandatory that no extension persons be allowed to carry on technical duties for remunerations

any time outside of or during ordinary working hours while holding an extension assignment.

The organization proposed is as follows:

a) Extension Services

There will be four frontline livestock extension officers, one located in each of the four districts into which the island is to be divided, as stated in the 1983-1988 Barbados Agricultural Sector Plan. The four districts are as follows:

North West - St. Lucy, St. Peter, St. James

West Central - St. Michael, St. Thomas, St. George.

South - Christ Church, St. Philip

East - St. Andrew, St. Joseph, St. John.

The frontline extension officers (SAA/AA) will all be generalists with responsibility for all types of livestock in their respective districts. (See Figure III-2)

The frontline extensionists will be administratively responsible to the Senior Agricultural Officer (Livestock) (Figure III-3)

There will be three Extension Subject Matter Specialists appointed at the agricultural officer level, one in each of the following areas:

i. Dairy and beef

ii. Sheep, Goats and Rabbits

iii. Pigs and Poultry

A forage specialist (agronomist) will be appointed under the project and this post will be attached to the Animal Nutrition Unit. The post will be filled at the Agricultural Officer level.

A Farm Management Unit will be established, and the appointment of an economics specialists as head will be be made at the Agricultural Officer level.

The Head of Unit will be supported by two technicians, whose major functions will be field data collection, and a secretary/stenographer to manage the office. In addition to being provided with the basic necessary office furniture and equipment, the unit must be supplied with a personal computer with adequate storage capacity. It will also be necessary to provide one 4 wheel drive vehicle for field use by the technicians.

An animal nutritionist will be appointed at the SAO level to be directly responsible for advising the management of the animal and forage operations of the Animal Nutrition Unit, the Central Livestock Station

(exclusive of the AI frozen semen scheme) Greenland, Sedgepond and the Home.

The livestock subject matter specialists, the SAO nutrition, the forage specialist and the economics specialist will all have island wide responsibility for their specialities. Their functions will include the following:

i) Directly assisting the front line extension officer by being available for presentations to farmer groups during the day, in the evening or on saturdays.

ii) By assisting in extension work on the farm where the expertise needed is beyond the training and experience of the front line extension officer. This front line work should always be carried out with the front line extension specialist present in order that the visit may function to train not only the farmers, but

the extension officer as well. This latter is absolutely necessary if the front line officer is to be the farm contact man and not have farmers directly contacting the extension specialists. Such a practice would only lead to these specialists being busy in day to day extension work with no time for the other activities.

iii) Developing training materials, written literature, flip charts, slide presentations etc, for use in training the livestock extension officers and the farmers.

iv) Conducting specific training sessions, at least 4 per year, for the livestock officers. Each specialists' area would be covered. These could, of course, be combined into a day long meeting for practical handling of the training sessions. These meetings should be attended by the

DCAO-E/D and by the SAO livestock, SAO nutrition and all technical and or management personnel. This will assure that all people involved are presenting a unified program.

v) Working directly through the livestock officers set up farm demonstrations, keep the records needed, summarize the results or take pictures of the operation. These outputs will be utilized to show farmers in all parts of the islands the benefits derived from the demonstrations.

vi) Develop material for use on radio and television to augment the direct contact approach.

vii) Work with the economics unit to develop training materials relating to the best economic practices, as well as to provide simplified record keeping systems to be used by farmers.

viii) Provide input to the animal nutrition specialist on the programs that could be carried out at the stations to further the role of extension. These inputs would be used along with those from other technical and management personnel to develop a yearly plan of study for the stations. These plans would be written and would become the action plan to be used by the SAO nutrition and the respective station managers. A quarterly review for the SAO livestock and his technical and management staff would be made. Also written reports would be completed for each project as it was finished. These reports would be utilized by the extension group for farmer training.

Successful implementation of the project requires that the livestock extension department receives back-up support from the agricultural information unit in the preparation and production of radio and television programmes, and the production of audio-visual extension education aids.

It is recommended that under the project, one Information Officer (Livestock) be appointed and assigned to the information unit. His responsibility will be to work closely with the professional staff of the Department of Livestock Extension and Development in the preparation and production of livestock education materials and programmes. He will be administratively responsible to the Senior Information Officer. Total costs for the Extension Services component are presented in Table III-10, and Information Office in Table III-11.

b. Livestock Stations

The role of the livestock stations in the overall extension plan will be to serve the following functions:-

i. Animal Breeding

In the areas of swine and sheep to provide a constant supply

of high quality, purebred breeding animals to the livestock producers of Barbados.

The Blackbelly sheep flocks must maintain at least 4 lines of animals and conduct the breeding operations in such a way that high productivity of meat and offspring are attained. In addition these lines must be distributed so that serious inbreeding will not occur as the producers of the island get fewer and larger.

ii. Breeding and management studies

The operations and investments needed to conduct these studies, in addition to the breeding facilities referred to in i above would be:-

For sheep:

24 pens of 10 lambs each for grow out, 6 groups of breeding sheep (with the

appropriate pens for study throughout the breeding cycle).

For dairy:

4 groups of 20 lactating dairy cows, 2 groups of dry cows, 4 groups of 10 dairy heifers.

For beef cattle:

12 pens of 10 head each for growing and finishing studies along with appropriate calf starting facilities.

These facilities will be utilized initially to study the feasibility of utilization of locally produced feedstuff for the various species. This will lead to a lower requirement for foreign exchange used for importation of feedstuffs. At the same time it should lower production costs as well.

Later management studies and disease control studies could also be carried out.

With some modification, these facilities could be attained using the existing stations.

The stud services now provided by the stations should be replaced by the sale of quality breeding males at a breeding animal price and not at meat price, to individual farmers who could then provide the stud service directly to other individual farmers needing the service.

iii. Demonstration Areas

Utilization of the stations as live demonstration areas for specific projects, also using them as sources of pictures for slide presentations or Television clips for use as visual aids and for Television shows.

The total support for the stations, in terms of repairs and maintenance, feed purchases, miscellaneous supplies, drugs for animal treatment, etc would have to be revised and upgraded, in order, to provide for the animals on a continuous basis and not have repeated situations where it was necessary to wait for weeks for purchase orders to clear and supplies to be made available. The role of the station manager as a manager must be upgraded and must have sufficient monetary authority along with his responsibility to effectively carry out the station's role.

The staff of the extension unit should be centrally housed. At the present time this could be accomplished either at the facilities of the Animal Nutrition Unit or at the Central Livestock Stations. The Animal Nutrition

Unit facilities would be preferable. Total costs for this component are sumarrized in tables III-12 , III-13 and III-14.

3.4.3.3. Artificial Insemination Service

The artificial insemination service is set up as a function of the Ministry of Agriculture and Natural Resources under the direction of The Head of the C.L.S.

Its functions as a direct service for insemination of all the cows of cattle producers on the island who call for the service. This function is carried out by 2 full-time inseminators paid by Government and one paid by the Barbados Agricultural Society, 2 part-time inseminators and one laboratory technician. All of these people are on temporary appointment and therefore do not have job security nor some of the same benefits that would be available if they were on a permanent appointment

. They are provided with vehicles and with cannisters for frozen semen but have to come to the Central Livestock Station for the vehicles, for information on where to go and for collection of any fresh semen needed.

The service maintains frozen semen from 2 Holstein bulls selected from Cemex Canada's line of bulls. These are selected from inexpensive bulls and the bulls are changed every two years. Also frozen semen from 1 Jersey and 1 Guernsey bull are maintained.

Fresh semen is collected from 3 locally produced bulls. A collection is made once each week from each bull and used that day or the next if its quality is deemed alright. The collections are made on Monday, Wednesday and Friday of each week. If the semen are not satisfactory, frozen semen are used.

A selection committee composed of the Chief Veterinary Officer, the Dairy Extensionman, the Head of the Dairy Committee of the Barbados Agricultural Society, a Dairyman and the Deputy Chief Agriculture Officer as chairman, select the bulls for use by the service based on advice from Cemex.

The artificial insemination specialists do provide some advice to the dairyman in regard to the bull he should use with his animals.

At the present time a charge of $6.00/straw with 1 free additional service is made for frozen semen and a charge of $4.00/straw with 2 free services is made for fresh semen from local bulls.

The following recommendations are made with the view of upgrading the service:-

a. The charge for insemination should be increased to $10, still allowing 1 additional free service.

b. Bulls should continue to be rotated each 2 years for general use.

c. Commercial dairymen should be allowed to specify that semen from specific bulls be brought in for his use. He would pay any charges beyond the $10/straw that these requests incurred in regard to the semen purchase only.

This latter procedure would allow any dairyman to build a line of cattle that fit his operations and it would also bring greater diversity of breeding to the island than the current system where everyone is limited to the same bulls.

Only frozen semen from Holstein bulls would be maintained for dairy farm use since this is the principal breed on the island. The exception to this would be to maintain frozen semen from 2 Jamaica Red bulls of very high quality to use for breeding heifers of potentially low milk production. These calves would be used for meat production.

No local bulls would be maintained at all, since the pool of females here is far too small to provide a continuous source of high quality bulls and the cost of maintaining the service is very expensive.

The selection committee should be expanded to include The Head of the C.L.S. as head of the artificial insemination unit.

The inseminators and the record keeper (now the laboratory technician) should be given permanent appointment and put under an incentive scheme whereby they are reimbursed at the rate of $5.00 for each successful 1st service, $2.00 for the second and they would lose $2.00 for each 3rd insemination required with no further penalty after this. Any

insemination beyond this point should only be done after a careful check of the animal by a veterinarian. The number of inseminations per month done by the various inseminators is approximately from 80-120.

The inseminators should be provided with a C B radio service so they can get the information on where to go without driving to the Central Livestock Station. An answering service should be set up to take calls at any time and these should be relayed to each inseminator by at least 6.30 AM each morning and later calls relayed by radio. This would allow him to leave promptly at 6:30 AM and get the insemination done before it get very hot in the day.

Records should be kept of all inseminations made and these records kept to identify the breeding of the female and her ancestry as well as of all bulls used on her. Each progeny kept as a replacement should have a similar record made when she is bred for the first time.

The vehicles used by the inseminators should be serviced on a bi-monthly schedule and any maintainence needed done at that time. An extra vehicle should be available for use during this time. One new vehicle per year should be scheduled in order to m maintain the fleet in a proper manner so that prompt, efficient service can be rendered.

3.4.4. Research

The objective of this project component is to support and where necessary, expand the actual research being carried out in the country in order to meet the needs of the present project.

3.4.4.1. Areas Selected

The areas of research selected for consideration are: (1) forage production (2) utilization of by-products (3) other crops with livestock feed potential (4) sheep management and feeding systems and (5) beef production systems. The support service of the Animal Nutrition Laboratory.

a. Forage Production

Forage research will cover four areas: (1) Evaluation of new accessions (2) agronomy (3) nutritive evaluation and (4) conservation.

Scurning of new accessions will be on going. In year I six (6) new species will be introduced and established in small plots for preliminary evaluation. Growth habits, response to cutting, chemical composition and in vitro nutritive evaluation will be studies. At the same time the material will be multiplies to allow for further expansion.

Agronomic studies in the form of fertilizer requirements and frequency of cutting trials will be rum on six grasses in Years 1 and 2 and on another six in Years 3 and 4.

Nutritive evaluation of the forages in vivo and in vitro will be done each year.

To carry out the in vivo studies it will be necessary to increase per space to have metabolic cages and the accessory equipment. Some additional pens will also be needed to facilitate the running of feeding studies.

To support and strengthen the nutritive evaluation, in vitro studies will have to be carried out in the laboratory, in addition to the chemical analysis that will be necessary to aid in the evaluation. It will be necessary to obtain laboratory equipment which will allow such analyses to be carried out.

In year 5, seven grasses and one legume will be studies. Harvested at three (3) different stages, each forage will be fed to six young Blackbelly rams per stage for a fourteen day preliminary period and a seven day collection period. In year 2 eight grasses will again be studies. These will include five from Year 1 which will be repeated.

In year 3 three from Year 2 and five new grasses will be studies. There are indicated below:

Year I	2	3
Coastal Bermuda	Coast Cross I	Dwarf Elephant
Coast Cross I	Transvale	Millet hybrid I
Likoni Guinea	Sugarcane	Millet hybrid II
Elephant grass	Sugarcane Top	Setaria grass
Sugarcane	Likoni Guinea	Bambatsi grass
Sugarcane Tops	Dwarf Elephant	Andropogan
Leucaena	Millet hybrid I	Chrysopogan
Transvale	Millet hybrid II	Bermuda.

A programme of pasture improvement with the establishment of large areas of improved grass will take the place at the Animal Nutrition Unit, the Central Livestock Station and Greenland is Yrs. 2, 3, and 4. The area (in hectares) to be planted will be as follows:

Years	1	2	3	4
ANU	3	10		
CLS		3	3	
Greenland		5	10	10
TOTAL (HA)	3	11	23	10

These areas will be used as nurseries from which to supply planting material to farmers and as forage supply to management and feeding studies being undertaken at the stations.

Forage conservation will have to be undertaken, not only to meet the dry season needs, but also to provide roughage for the feeding studies that will be carried out: Large quantities of silage will have to be put up each year at the three stations mentioned.

b. By-Products

By-products which are of greatest interest are the sugar cane by-products: Molasses, canetops and bagasse.

i. Molasses:

The utilization of high levels of molasses in feeds and factors influencing that utilization be studies. This should be done in Yrs. I and II using sheep as the experimental animals.

ii. Sugarcane Tops

The leafy top of the sugarcane represents a potential source of roughage. Its value in rations of cattle, both dairy and beef and sheep has been demonstrated. Canetops may be past as green chop or ensiled. However, the major draw back to the use of canetops is the absence of an economical method of collection. It is recommended that work

on the development of a system of collection be undertaken in Years 1 and 2.

iii. Bagasse

Sugarcane bagasse, when treated with caustic soda improves in nutritive value significantly. However, the level of sodium in the resulting product is believed to have a negative effect on the utilization of other feed ingredients such as mollasses. Work at Kansas State University suggests that the treatment of corn stover with a mixture of sodium hydroxide and calcium hydroxide has a significant positive effect on the improvemnt of the nutritive value of the stoves. It is recommended that the effect of that mixtures on bagasse be studies in feeding trials using sheep as the experimental animals.

iv. Single Pass Cane

Because of its comparatively high sucrose content, single pass cane may be considered to be a high energy roughage. It should therefore be of greater value than bagasse feeding trials to determine the value of single pass cane as a feed will be conducted in Years 2 and 3 using sheep as the experimental animals.

v. Peanut Meal

A by-product of peanut production, this meal is made by grinding the rejects from the peanut grading process. There are two possible products (1) made from the whole nut, and (2) made from the shelled nut. Both meals have value as energy rich protein sources. With the former having a higher fibre content. Information is available on this. A linear feed formulation programme could be used to determine the best composition..

c. Other Potential Crops

There are two energy crops that will be used in livestock feeds, these are Sorghum and cassava.

i. Sorghum

Sorghum has the potential to replace most of the maize in livestock rations. It may be used in two ways in ruminant feeds, as dry grain and as high moisture ensiled grain heads, panicles. In both cases equipment. ie a grain combine and a header, will have to be obtained. Work on the value of sorghum as a feed source is well documented. It is recommended that as in the case of peanut meal, a number of formulations containing different levels of sorghum, both as grain and as silage, will be developed. These can then be made available to farmers.

ii. Cassava

Cassava tubers, will be harvested mechanically, chopped and ensiled to be used as an energy feed for ruminants. The cassava silage will be fed along with molasses and a protein source in rations to sheep and cattle.

The effect of ensiling "bitter" cassava on the hydrogen cyanide content will have to be studied to determine whether these high cyanide varieties can be ensiled for livestock feed.

Ensiled cassava with leucaena, both fresh and ensiled to determine the effect of the presence of leucaena on intake. This cassava work will be done in Year 2 and 3

iii. Sugarcane

A comparison of chopped sugarcane with sugarcane silage will be done in a feeding trials with sheep and cattle. This sugarcane and the silage will be fed along with molasses and leucaena supplemented with a starch source, in an effort to develop a sugarcane based system. Metabolic stduies will also be carried out on these feeds. This will be done in Year 2.

d. Sheep Management and Feeding Systems

Studies on the effect of level of nutrition on the lambing and weaning rates and weights and on the rate of growth of Barbados Blackbelly sheep will be run in Years 1 and 2. A comparison of extensive, semi-intensive and intensive pasture systems and a dry lot system will also be done in Years 2 and 3. These should include economic analysis to determine the best possible system.

e. Beef Feeding systems

A comparison of an extensive, to semi-intensive and intensive pasture and a dry lot production systems will be carried out. This work will be done in Year 1, 2 and 3.

f. Laboratory Services

The Animal Nutrition Laboratory and the Veterinary Diagnostic Laboratories will offer services which will support research being done as well as after services which will support the development of the project.

g. Feed Testing Service

The Animal Nutrition Unit (ANU) laboratory will give support to the extension programme by offering a feed testing service to farmers. The staff and equipment used in this programme will also offer support to the research programme being carried out on the stations.

3.4.4.2 Estimated Research Costs

The research cost are shown in tables III-15 through III-18. Two main concepts, investments that cover machinery and equipment, structures and planting grasses and crops and the operational costs that include personnel materials and maintenance were considered.

3.4.5. Technical Cooperation

3.4.5.1. Training

To assist in the achievement of project objectives there needs to be an important training component built into the programme. The only two components requiring training are the Research and Extension and the abattoir component.

a. Research and Extension

Among the extension frontline staff there needs to be initial intensive and subsequent continuing training in the subject matter areas of cattle, sheep and pig production. The SAO livestock, the

subject matter specialists, the SAO nutrition, the economic specialist, the forage specialist and the station managers will all be required to play major roles in training.

Frontline extensionists and extension subject matter specialists as well as all supervisors will require training in extension administration and practice. For all supervisors management training will also be required.

All extension personnel from SAO livestock to the frontline officers will need to be exposed to the same training in and subsequent monitoring of the techniques which they should use in:

- Programme development, literature, visual aids etc.
- Organization of farmer group meetings.
- Conduct of a successful group meeting.
- Identification and use of farm leaders
- Organization of a successful farm demonstration.

- Use of individual farm visits.
- Collection and use of farm data and information.
- Use of station demonstration and information.
- Organization of farmer groups (formal and informal) and working through them.
- Evaluation.

The SAO (livestock) should be provided with a one year training attachment in livestock extension and in agricultural communication at a major university.

With this background training the SAO livestock could, in turn help train his people and the information officer (livestock) to the specific needs of livestock extension.

The technical staff in the Agricultural Information Unit are either new in the area of development support communication or have had no training in communication. They therefore all need some training to help them develop the confidence

and skills needed to make them efficient education communicators.

The volume and quality of output from a small agricultural communication unit depends very much on the management skills of the head of unit. The incumbent has had no previous experience in such management. He will benefit greatly from a training attachment to a well run agricultural information or communication Department from which he should also get training in developing educational radio programmes.

Based on the earlier mentioned training and experience limitations of staff of the Unit, the following special training experiences are recommended:

Information Officer (currently in post): Three months course to undertake training in publication layout and design and in writing for non-technical audiences.

Information Officer, Livestock (recommended): Three months course on training in writing for non-technical audiences and in radio.

Training in the production and use of audio-visual aids should be sought locally from the Audio-Visual Department of the Ministry of Education in which there are well qualified and highly capable staff. It is recommended that the A-V Department be asked to conduct for the Agricultural Information Unit staff an in-house training programme on the handling, use and maintenance of the audio-visual equipment now owned by the unit.

b. Abattoir

Training would be needed for personnel working in the killing floor at the abattoir.

These training should be carried on the spot by a consultant for three months.

It would cover the handling of animals, cutting of carcasses and other operations at that stage to assume an efficient operation.

Also training will be needed for personnel in the meat cutting, deboning and packaging area and on meat grading. It is also envisioned a 3 month on-th-job training by an expert, of the personnel of that department. Table III-19 presents the estimated training costs.

3.4.5.2. Consultants

Two long term consultants are recommended in the area of transfer of technology, two in the area of Research and one longterm consultant to the abattoir management. Two short term consultant for the operation for the abattoir are proposed, as well as one short term consultant on meat grading systems.

a. Extension Specialist

This consultant will be attached to the Senior Agricultural Officer (Livestock) He should have a proven successful track record in livestock extension and communication. He will assist with developing the extension program through:

- getting the recommended organisational structure established;

- developing operational procedures for programme planning and execution;

- developing administrative and supervisory procedures to motivate staff to better performance;

- helping subject-matter specialists in the planning and organisation of training programmes for frontline staff and farmers; and

- providing training in extension methodology for all extension staff.

Eighteen months of consultancy are recommended as follows:

Year 1	12 months, functioning as described above, followed by a six-month break.
Year 2	6 months - following the year I consultancy - to evaluate staff programme to date and providing further back up support.

b. Communication Specialist

A communication specialist with proven successful experience in managing an agricultural information unit will be required for 15 months. He will be assigned to the Agricultural Information Unit.

The first 3 months of consultancy will be spent working alongside the Senior Information Officer (head of the

unit) who should then proceed on a nine months training assignment. On the return from training of the Senior Information Officer there will be a further 3 months of the two working together before the consultancy ends.

The responsibilities of the communication specialist will be

- to develop operational procedures for the efficient and productive functioning of the unit;

- to manage the unit during the absence on training of the Senior Information Officer;

- to provide on the job training for staff of the unit; and

- to assist in the training of extension personnel in communication techniques.

c. Animal Nutrition Specialist

This consultant will be attached to the research unit. He should have a proven successful track record in the area of nutrition, particularly for sheep and beef cattle reared under both intensive and extensive systems.

He will assist with the operations of the research unit as follows:

- Function as the officer in charge while the nutrition officer is receiving training at the masters degree level at a recognized foreign University.

- Assist in the orderly transfer of the research unit to the nutrition officer on his return.

- Work with extension in providing material, talks, etc., eighteen months of consultancy are recommended as it is shown on table III-20.

d. Forage Production Specialist

This consultant will be attached to the research unit. He should have a proven successful track record in the area of temperature and tropical forage agronomy, forage preservation and forage evaluation.

He will assist with the operation of the forage section under the direction of the head, or consultant head, of the Research Unit in the following areas:

- manage the existing forage plots in an acceptable research manner.

- establish new research plots or pasture areas in accordance with the overall research plan.

- work on systems of preservation of the forage i.e., the best time for sutting, the best moisture for ensiling etc.

- coordinate forage production at the various stations to attain the research needs, the extension needs and the forage needed for maintenance of the stations breeding herds.

- work with extension in providing material, talks etc.

Eighteen months of consultancy are recommended.

c. Abattoir Manager

Given the fact that the proposed operation is quite complicated and there exists no tradition on livestock processing in Barbados. It is suggested that an experienced manager be brought in for 18 months to start the operation and train a local manager.

In general, this expert should oversee the final stages of construction of the plant, help oorganize the operational structure and start the commercial operation of the plant.

The expert should work with the local manager all the time so that there would be smooth transition at the departure time. He/she would come for the last 3 months of the construction period and stay there thecomplete 18 months of operation.

f. Slaughter Systems

To train the people at the killing floor and help organize its operation, a short term consultant would be needed. It would be and experience person on these aspects and will stay for three months at the beginning of the operations.

g. Cutting and Packaging

As in the previous case, a short term (three months) expert will be needed at the beginning of the operations of the new plant to:

- organize the meat cutting and packaging department.

- train personnel as needed.

h. Meat Grading Systems

In experienced person on meat grading will be required for 3 months at the beginning of the second year of the project in order to:

- develop a simple yet useful meat grading system and,

- train personnel on grading systems.

3.4.5.3. Costs

Total costs for consultants are BDS$1116 thousands, and will concentrate mainly in the first three years of the project, Table III-20 details them.

3.5. TOTAL COSTS AND FINANCIAL PLAN

3.5.1. Total costs

Table III-21 summarizes the estimated total costs of the project, detailed by project component. Four years have been considered for the project disbursement period.

The marketing and processing component will demand some 2.2 million Barbados dollars for the construction and equipment of the abattoir complex (see details of costs and operation in annex III-4). The service centers will demand a minor investment of some B'dos 285 thousand. The rest of the costs are due to operational expenditures, as detailed in annex III-4. In all, it represents some 16.6% of the total costs for the investment period.

The animal Health Component will demand only a marginal investment of B'dos $ 460 thousands (some 1.1% of total) while the research and investment component will demand a little over B'dos $ 2.9 million or 7.0% of the total.

Tecnical cooperation costs add to 1.3 million (3.2%), of which the consultants' bill adds up to B'dos $ 1.1 million.

At the farm level, is where the bulk of the costs for the investment period lie, 72.1% of the total. The reason being the heavy investment required for the development of the beef/dairy industry. It should be borned in mind that the strategy of the project calls for the creation of new farms, and the importation of breeding animals for building up the stock.

3.5.2. Financial plan

It is proposed that the project be financed in the following way: 50% by the IADB, 15.7% by the Government of Barbados and 33.8% by the farmers. Table III-22 presents the details of financing sources, by year.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-1
BEEF PRODUCTION EXPANSION

CONCEPT	0	YEARS 1	2	3	4	TOTAL
IMPORTED NEW COWS/YEAR*		365	410	460	390	1625**
PLUS EXISTING COWS	1300	1665	2075	2535	2925	2925
FEEDLOT/100 NEW COWS		3	3	4	3	13

SOURCE: IICA/MANR - I.L.P.
* 55 COWS EACH YEAR FOR THE EXISTING HERD
** 15 EXTRA COWS/100 COW/INITIAL CULLING AND DEATHS

BARBADOS
INTEGRATED LIVESTOCK
TABLE III-2
ESTIMATED TOTAL INCOME OF PROJECT - SHEEP

CONCEPT	1	2	3	4	5	6	7	8-10
number of farms incorporating		300	300	600	300			
I. MEAT PRODUCTION								
incremental volume (kg)		5400	26400	60000	117600	161400	196200	210000
incremental value('000 B'dos$)		21.1	103.0	234.0	458.6	629.5	765.2	819.0
II. OFFALS								
current number of sheep		17500	17500	17500	17500	17500	17500	17500
incremental # of sheep			2400	4800	9600	12000	12000	12000
value offals ('000 B'dos$)	0	262.5	298.5	334.5	406.5	442.5	442.5	442.5
III. SKINS								
value ('000 B'dos $)		52.5	59.7	66.9	81.3	88.5	88.5	88.5
IV. TOTAL ('000 B'dos$)		336.1	461.2	635.4	946.4	1160.5	1296.2	1350.0

SOURCE: IICA/MANR-I.L.P.
ASSUMPTIONS:
- 7.5 Kg offals per animal
- B'dos $ 3.9 per kg carcass meat
- B'dos $ 2.0 per kg offals
- B'dos $ 3.0 per skin

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-3
ESTIMATE POTENTIAL SLAUGHTER
(# OF HEADS)

	Present BMC Slaughter. 1985	Potential Prod. 1/ no change in basic stock and basic technology	Potential Abattoir Number 2/	Project Targets
Cattle	901	2260	2100	2978
Sheep	1163	3500	17500	27100
Swine	9672	40000	30000	30000

SOURCE: IICA/MANR - I.L.P.

1/ 1985 based on farm number estimated as follows:
- Cattle - 8000 head (3500 cows)
- Sheep - 30000 head (18000 ewes)
- Swine - 26000 head (4500 sows)

Assume technology level that yields calf crops = 70%, lamb turn-off = 2 per ewe per year, and pig turn-off at 9 per sow per year.

2/ Assume that some back yard slaughter and some processor slaughters will continue, therefore numbers available for slaughter at the abattoir are estimated to be 93% of the cattle, 50% of the sheep and 75% of the pigs.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-4
ESTIMATE OF TOTAL AMOUNT OF OFFALS FROM ABATTOIR
(Kg.)

	NUMBER PROJECTED	LIVEWEIGHT PER ANIMAL	TOTAL LIVEWEIGHT	PERCENT	OFFALS AVAILABLE
CATTLE	2100	347.5	729750	25%	182438
SHEEP	17500	26.2	458500	25%	114625
PIGS	30000	84.56	2536800	10%	253680
TOTAL					550743

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-5
SERVICE CENTERS
ESTIMATED INVESTMENT AND OPERATIONAL COSTS
('000 B'dos $)

	1		2		3		4		TOTAL		GRAND
CONCEPT	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	TOTAL
I. INVESTMENTS	190.0	95.0	0.0	0.0	0.0	0.0	0.0	0.0	190.0	95.0	285.0
Construction & equipt.	150.0	75.0							150.0	75.0	225.0
Vehicles	40.0	20.0							40.0	20.0	60.0
II. OPERATIONAL COSTS	0.4	39.6	0.9	368.6	0.9	368.6	0.9	368.6	3.1	1145.4	1148.5
Personnel		35.0		333.0		333.0		333.0	0.0	1034.0	1034.0
Vehicle operation	0.4	1.0	0.8	2.1	0.8	2.1	0.8	2.1	2.8	7.3	10.1
Miscellaneous	0.0	3.6	0.1	33.5	0.1	33.5	0.1	33.5	0.3	104.1	104.4
III. TOTAL	190.4	134.6	0.9	368.6	0.9	368.6	0.9	368.6	193.1	1240.4	1433.5

SOURCE: IICA/MANR-I.L.P.

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BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-6
ANIMAL HEALTH SERVICES
ESTIMATED INVESTMENT AND OPERATIONAL COSTS
('000 B'dos $)

	1		2		3		4		TOTAL		
CONCEPT	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	GRAND TOTAL
I. INVESTMENTS	113.3	0.0	52.0	0.0	0.0	0.0	0.0	0.0	165.3	0.0	165.3
Veterinary lab equipt.	104.3								104.3	0.0	104.3
Furniture & equip.			52.0						52.0	0.0	52.0
Vehicles	9.0								9.0	0.0	9.0
II. OPERATIONAL COSTS	5.8	68.6	5.8	68.6	5.8	68.6	5.8	68.6	23.2	274.4	297.6
Personnel									0.0	0.0	0.0
- veterinarian		33.0		33.0		33.0		33.0	0.0	132.0	132.0
- animal health asst.		32.0		32.0		32.0		32.0	0.0	128.0	128.0
vehicle maint.	0.8	2.1	0.8	2.1	0.8	2.1	0.8	2.1	3.2	8.4	11.6
lab specifics	5.0	1.5	5.0	1.5	5.0	1.5	5.0	1.5	20.0	6.0	26.0
III. TOTAL	119.1	68.6	57.8	68.6	5.8	68.6	5.8	68.6	188.5	274.4	462.9

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-7
DAIRY/BEEF COMPONENT
ESTIMATED TOTAL CREDIT NEEDS
('000 B'$)

YEAR	NUMBER OF FARMS	NUMBER OF FEEDLOTS	TOTAL CREDIT NEEDS	ACUMMULATED
1	3	4	1459.2	1459.2
2	3	4	2959.2	4418.4
3	4	4	3349.2	7767.6
4	3	3	3446.9	11214.5

SOURCE:IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-8
SHEEP COMPONENT
ESTIMATED TOTAL CREDIT NEEDS
('000 B'$)

YEAR	TOTAL AMOUNT NEEDED	NEEDED CONT. TO REVOLVING FUND	
		TOTAL	CUMULATIVE
1	607.2	303.6	303.6
2	1247.7	320.3	623.9
3	3091.5	921.9	1545.8
4	4361.7	635.1	2180.9
5	5263.2	450.7	2631.6

SOURCE:IICA/MANR-I.L.P.
NOTE:CONTRIBUTION TO REVOLVING FUND WAS ESTIMATED AS HALF THE ANNUAL NEEDS MINUS THE ACCUMULATED AMOUNT IN THE FUND THE PREVIOUS YEAR

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III- 9
ESTIMATED NUMBER OF HOLDINGS WITH CATTLE AND SHEEP, 1985
BY FARM SIZE CATEGORIES

Holding size (Acres)	% Annual Change in NO. Holdings 1961-1971	No. Holdings 1971 with			Estimated No. Holdings 1985 with		
		Cattle	Sheep	Pigs	Cattle	Sheep	Pigs
0 - 5	-3.65	1123	2685		549	1313	
1 - 5	-1.37	805	1065	10941	651	861	5835
5 - 10	-1.9	64	52		47	38	
10 - 25	4.47	24	16		39	26	
25 - 50	-2.07	10	8	521	7	6	430
50 - 100	-0.59	8	5		6	5	
100 & Over	-1.87	89	56		66	44	

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-10
RESEARCH & EXTENSION
ESTIMATED INVESTMENT AND OPERATIONAL COSTS
('000 B'dos $)

	1		2		3		4		TOTAL		
CONCEPT	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	GRAND TOTAL
I. INVESTMENTS	36.0	0.0	0.0	0.0	18.0	0.0	18.0	0.0	72.0	0.0	72.0
Vehicles	36.0				18.0		18.0		72.0	0.0	72.0
II. OPERATIONAL COSTS	4.4	71.2	4.4	72.4	4.4	73.6	4.4	74.8	17.6	292.0	309.6
Personnel									0.0	0.0	0.0
- extension spec.(4)		64.0		65.2		66.4		67.6	0.0	263.2	263.2
Vehcle maintenance	4.4	7.2	4.4	7.2	4.4	7.2	4.4	7.2	17.6	28.8	46.4
III. TOTAL	40.4	71.2	4.4	72.4	22.4	73.6	22.4	74.8	89.6	292.0	381.6

SOURCE:IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-11
INFORMATION OFFICE
ESTIMATED COSTS
('000 B'do

CONCEPT	1		2		3		4		TOTAL		GRAND TOTAL
	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	
I. INVESTMENTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
									0.0	0.0	0.0
									0.0	0.0	0.0
II. OPERATIONAL COSTS	2.0	22.0	2.2	22.6	2.4	23.0	2.5	23.5	9.1	91.1	100.2
- information officer-									0.0	0.0	0.0
livestock		20.0		20.3		20.6		20.9	0.0	81.8	81.8
- photo supplies	2.0	2.0	2.2	2.3	2.4	2.4	2.5	2.6	9.1	9.3	18.4
III. TOTAL	2.0	22.0	2.2	22.6	2.4	23.0	2.5	23.5	9.1	91.1	100.2

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-12
ESTIMATED COSTS
EXTENSION AND LIVESTOCK STATIONS-FARM MANAGEMENT
('000 Bds$)

CONCEPT	1		2		3		4		TOTAL		GRAND TOTAL
	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	
I. INVESTMENTS	11.9	3.8	4.0	0.0	0.0	0.0	18.0	0.0	33.9	3.8	37.7
-Furniture and equipment	2.9	3.8							2.9	3.8	6.7
-Vehicle	9.0						18.0		27.0	0.0	27.0
-Microcomputer			4.0						4.0	0.0	4.0
II. OPERATIONAL COSTS	0.7	53.2	0.7	70.1	0.7	71.3	0.7	72.5	2.8	267.1	269.9
Personnel											
-Economics specialist		25.0		25.3		25.6		25.9	0.0	101.8	101.8
-technicians (1)		16.0		32.3		32.9		33.5	0.0	114.7	114.7
-Stenographer/typist		10.0		10.3		10.6		10.9	0.0	41.8	41.8
Vehicles	0.7	2.2	0.7	2.2	0.7	2.2	0.7	2.2	2.8	8.8	11.6
Miscellaneous											0.0
III. TOTAL	12.6	57.0	4.7	70.1	0.7	71.3	18.7	72.5	36.7	270.9	307.6

SOURCE: IICA/MANR-I.L.P.
(1) Two after the second year

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-13
ESTIMATED COSTS
SENIOR AGRICULTURAL OFFICE-LIVESTOCK
('000 BDS$)

	1		2		3		4		TOTAL		GRAND
CONCEPT	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	TOTAL
I. INVESTMENTS	3.5	4.2	83.9	0.0	0.0	0.0	0.0	0.0	87.4	4.2	91.6
-Furniture and equipment	1.3	4.2							1.3	4.2	5.5
-Electronic typewriter	2.2								2.2	0.0	2.2
-Photocopier			10.0						10.0	0.0	10.0
-Compugraphic computer			50.0						50.0	0.0	50.0
typsetter									0.0	0.0	0.0
-CB Stations Radio			23.9						23.9	0.0	23.9
II. OPERATIONAL COSTS	0.0	87.4	0.0	91.0	0.0	91.9	0.0	94.0	0.0	364.3	364.3
Personnel											
-Subject matter specialist		75.0		75.9		76.2		77.7	0.0	304.8	304.8
-Typist for compugraphic		10.0		10.3		10.6		10.9	0.0	41.8	41.8
-Office supplies		2.4		4.8		5.1		5.4	0.0	17.7	17.7
Vehicles											0.0
Miscellaneous											0.0
III. TOTAL	3.5	91.6	83.9	91.0	0.0	91.9	0.0	94.0	87.4	368.5	455.9

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-14
ANIMAL NUTRITION UNIT
ESTIMATED COSTS
('000 B'dos $)

	1		2		3		4		TOTAL		GRAND
CONCEPT	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	TOTAL
I. INVESTMENTS	9.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	9.0	1.1	10.1
-Furniture and equipment		1.1							0.0	1.1	1.1
-Vehicle	9.0								9.0	0.0	9.0
II. OPERATIONAL COSTS	0.0	43.9	0.0	44.5	0.0	45.1	0.0	45.7	0.0	179.2	179.2
Personnel											
-Forage agronomist		25.0		25.3		25.6		25.9	0.0	101.8	101.8
-Agronomy Assistant		16.0		16.3		16.6		16.9	0.0	65.8	65.8
Vehicles		2.9		2.9		2.9		2.9	0.0	11.6	11.6
Miscellaneous											0.0
III. TOTAL	9.0	45.0	0.0	44.5	0.0	45.1	0.0	45.7	9.0	180.3	189.3

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-15
CENTRAL LIVESTOCK STATION
ESTIMATED INVESTMENT AND OPERATIONAL COSTS
('000 B'do

CONCEPT	1		2		3		4		TOTAL		GRAND TOTAL
	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	
I. INVESTMENTS	144.4	60.9	13.6	5.6	1.6	5.6	0.0	0.0	159.6	72.1	231.7
Forage wagon	12.0		12.0						24.0	0.0	24.0
Forage harvester	12.0								12.0	0.0	12.0
Front end toothed bucket	7.0								7.0	0.0	7.0
Water cart		3.0							0.0	3.0	3.0
3 water tanks		1.2							0.0	1.2	1.2
Re-surfacing yard and subdivisions		42.3							0.0	42.3	42.3
Pasture establishment			1.6	5.6	1.6	5.6			3.2	11.2	14.4
Fencing	1.4	12.8							1.4	12.8	14.2
Feeders		1.6							0.0	1.6	1.6
Atomic abs. spectroph.	40.0								40.0	0.0	40.0
HPLC	40.0								40.0	0.0	40.0
Adiabatic bomb colorimeter	17.0								17.0	0.0	17.0
Hobart mixer	15.0								15.0	0.0	15.0
II. OPERATIONAL COSTS	0.2	0.6	0.4	0.7	0.4	0.7	0.4	0.7	1.5	2.5	4.1
Vehicle operation	0.2	0.5	0.4	0.6	0.4	0.6	0.4	0.6	1.4	2.3	3.7
Forage production									0.0	0.0	0.0
Beef prod. studies									0.0	0.0	0.0
Miscellaneous	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.2	0.4
III. TOTAL	144.6	61.5	14.0	6.3	2.0	6.3	0.4	0.7	161.1	74.6	235.8

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-16
ANIMAL NUTRITION UNIT
ESTIMATED INVESTMENT AND OPERATIONAL COSTS
('000 B'dos $)

	1		2		3		4		TOTAL		
CONCEPT	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	GRAND TOTAL
I. INVESTMENTS	150.4	60.3	14.6	17.1	5.2	18.3	0.0	0.0	170.2	95.7	265.9
-Furniture and equipt.									0.0	0.0	0.0
1 Harrow	2.4	0.6							2.4	0.6	3.0
1 Toothed bucket	5.6	1.4							5.6	1.4	7.0
graphics board	1.0								1.0	0.0	1.0
software	2.0								2.0	0.0	2.0
-Vehicles									0.0	0.0	0.0
1 90-HP Tractor	40.0								40.0	0.0	40.0
1 Mixer Wagon	22.4	5.6							22.4	5.6	28.0
1 Sledge Pump	14.4	3.6							14.4	3.6	18.0
2 Silos	12.0	8.0	12.0	8.0					24.0	16.0	40.0
512 sq.m. pen space	48.0	32.0							48.0	32.0	80.0
-Pasture establisheaent	2.6	9.1	2.6	9.1	5.2	18.3			10.4	36.5	46.9
II. OPERATIONAL COSTS	21.3	32.4	59.5	89.5	15.3	23.1	14.4	17.8	110.5	162.8	273.3
									0.0	0.0	0.0
Vehicle operation	1.3	2.0	1.5	2.5	1.7	2.7	1.8	2.9	6.3	10.1	16.4
Crop maintenance	20.0	30.4	58.0	87.0	13.6	20.4	12.6	14.9	104.2	152.7	256.9
III. TOTAL	171.7	92.7	74.1	106.6	20.5	41.4	14.4	17.8	280.7	258.5	539.2

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-17
ESTIMATED COSTS
ANIMAL NUTRITION LABORATORY
('000 US$)

CONCEPT	1		2		3		4		TOTAL		GRAND TOTAL
	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	
I. INVESTMENTS											
-machinery/equipment	45.0	12.0							45.0	12.0	57.0
-structures		20.0		40.0		20.0			0.0	80.0	80.0
-forage establishment									0.0	0.0	0.0
-crops											
II. OPERATIONAL COSTS											
Personnel											
-animal nutritionist		15.0		15.0		15.0		15.0	0.0	60.0	60.0
-forage specialist		15.0		15.0		15.0		15.0	0.0	60.0	60.0
Laboratory materials	2.0		5.0		3.0				10.0	0.0	10.0
Vehicles	1.0	2.5	2.7	6.3	5.9	13.1	5.9	13.1	15.5	35.0	50.5
Miscellaneous									0.0	0.0	0.0
III. TOTAL	48.0	64.5	7.7	76.3	8.9	63.1	5.9	43.1	70.5	247.0	317.5

SOURCE: IICA/MANR-I.L.P.

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BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-18
ESTIMATED COSTS
GREENLAND STATION
('000 BDS$)

CONCEPT	1		2		3		4		TOTAL		GRAND TOTAL
	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	
I. INVESTMENTS	136.0	48.7	24.0	31.5	0.0	23.5	0.0	0.0	160.0	103.7	263.7
-Equipment									0.0	0.0	0.0
Front end toothed bucket	7.0								7.0	0.0	7.0
3 Water tanks	0.5	0.5							0.5	0.5	1.0
-Vehicle									0.0	0.0	0.0
1 90 HP Tractor	40.0								40.0	0.0	40.0
2 Forage Wagons	12.0		12.0						24.0	0.0	24.0
1 Mixer Wagon	28.0								28.0	0.0	28.0
1 Forage Harvester	12.0								12.0	0.0	12.0
1 Molasses Tank	6.0	6.0							6.0	6.0	12.0
1 Water Cart	1.5	1.5							1.5	1.5	3.0
-Structures									0.0	0.0	0.0
Modification of existing sheep pens	14.4	9.6							14.4	9.6	24.0
2 Silos	12.0	8.0	12.0	8.0					24.0	16.0	40.0
Fencing		11.8							0.0	11.8	11.8
Feeders		2.2							0.0	2.2	2.2
-Fields									0.0	0.0	0.0
Forage Establishment	2.6	9.1		23.5		23.5			2.6	56.1	58.7
									0.0	0.0	0.0
II. OPERATIONAL COSTS	1.5	15.3	1.9	28.0	1.9	40.1	1.9	31.2	7.2	114.6	121.8
-Vehicles	1.5	2.4	1.9	3.1	1.9	3.1	1.9	3.1	7.2	11.7	18.9
-Forage Production		5.6		16.8		28.1		28.1	0.0	78.6	79.6
-Sheep Production		7.3		8.1		8.9			0.0	24.3	24.3
											0.0
III. TOTAL	137.5	64.0	25.9	59.5	1.9	63.6	1.9	31.2	167.2	218.3	385.5

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-19
ESTIMATED TRAINING COSTS
('000 B'dos $)

CONCEPT	1	2	3	4	TOTAL
LONG TERM					
ANIMAL NUTRITION	30.0	30.0			60.0
(months)	12.0	12.0			24.0
FORAGE PRODUCTION		15.0	30.0	15.0	60.0
(months)		6.0	12.0	6.0	24.0
LIVESTOCK EXT. & AG. COMM.	30.0				30.0
(months)	12.0				12.0
INFORMATION OFFICER	30.0				30.0
(months)	12.0				12.0
SHORT TERM					
INFORMATION OFFICERS		9.0			9.0
(months)		3.0			3.0
INFORMATION LIVESTOCK	9.0				9.0
(months)	3.0				3.0
SAA TO CI&T			9.0		9.0
(months)			1.5		1.5
SAA FORAGE/LEG. TO ANTIGUA	4.0				4.0
(months)	0.5				0.5
TOTAL					
COST('000 B$)	103.0	54.0	39.0	15.0	211.0
(person-month)	39.5	21.0	13.5	6.0	80.0

SOURCE:IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-20
ESTIMATED TECHNICAL COOPERATION COSTS
('000 BDS$)

CONCEPT	1	2	3	4	5	TOTAL
I. EXTENSION UNIT						
-Communications specialist	144.0	36.0				180.0
person-month/year	12	3				15
-Extension specialist	144.0	72.0				216.0
person-month/year	12	6				18
TOTAL	288.0	108.0				396.0
II. RESEARCH						
-Animal nutritionist	144.0	36.0	36.0			216.0
person-month/year	12	3	3			18
-Forage production	144.0	72.0				216.0
person-month/year	12	6				18
TOTAL	288.0	108.0	36.0	0.0	0.0	432.0
III. MARKETING & PROCESSING						
-Abattoir Manager		144.0	72.0	0.0	0.0	216.0
person-month/year		12	6			18
-Slaughter Systems		36.0				36.0
person-month/year		3				3
-Cutting & Packaging		18.0				18.0
person-month/year		3				3
-Meat grading		18.0				18.0
person-month/year		3				3
TOTAL		216.0	72.0	0.0	0.0	288.0
IV. GRAND TOTAL	576.0	432.0	108.0	0.0	0.0	1,116.0

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-21
ESTIMATED TOTAL PROJECT COSTS
('000 B'dos $)

PROJECT COMPONENT	1		2		3		4		TOTAL		GRAND TOTAL	RELATIVE PART.
	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local		
I. MARKETING & PROCESSING	1643.4	969.6	43.9	1380.6	54.4	1386.3	56.6	1389.1	1800.3	5145.6	6945.9	16.7%
Abattoir									0.0	0.0	0.0	
-design		125.0							0.0	125.0	125.0	
-construction	1095.0	730.0							1095.0	730.0	1825.0	
-equipment	360.0								360.0	0.0	360.0	
-operation	0.0	0.0	43.0	1012.0	53.5	1017.7	55.7	1020.5	152.2	3050.2	3202.4	
Service Centers	190.4	134.6	0.9	368.6	0.9	368.6	0.9	368.6	193.1	1240.4	1433.5	
II. ANIMAL HEALTH	119.1	68.6	57.8	68.6	5.8	68.6	5.8	68.6	188.5	274.4	462.9	1.1%
III. RESEARCH & EXTENSION	569.3	569.5	216.9	549.3	58.8	479.3	66.2	403.3	911.2	2001.4	2912.6	7.0%
Research	40.4	71.2	4.4	72.4	22.4	73.6	22.4	74.8	89.6	292.0	381.6	
Information office	2.0	22.0	2.2	22.6	2.4	23.0	2.5	23.5	9.1	91.1	100.2	
Farm Management Unit	12.6	57.0	4.7	70.1	0.7	71.3	18.7	72.5	36.7	270.9	307.6	
Senior Agr.Off. Livestock	3.5	91.6	83.9	91.0	0.0	91.9	0.0	94.0	87.4	368.5	455.9	
Animal Nutrition Unit	9.0	45.0	0.0	44.5	0.0	45.1	0.0	45.7	9.0	180.3	189.3	
Central Livestock Station	144.6	61.5	14.0	6.3	2.0	6.3	0.4	0.7	161.0	74.8	235.8	
Animal Nut. Unit (research)	171.7	92.7	74.1	106.6	20.5	41.4	14.4	17.8	280.7	258.5	539.2	
Animal Nutrition Laboratory	48.0	64.5	7.7	76.3	8.9	63.1	5.9	43.1	70.5	247.0	317.5	
Greenland	137.5	64.0	25.9	59.5	1.9	63.6	1.9	31.2	167.2	218.3	385.5	
IV. TECHNICAL COOPERATION	679.0	0.0	486.0	0.0	147.0	0.0	15.0	0.0	1327.0	0.0	1327.0	3.2%
Training	103.0		54.0		39.0		15.0		211.0	0.0	211.0	
Consultants	576.0		432.0		108.0				1116.0	0.0	1116.0	
V. FARM LEVEL	2590.4	1189.1	3668.3	2437.4	5129.9	4377.5	5097.9	5411.1	16486.5	13415.1	29901.6	72.0%
Beef/Dairy	2449.6	922.3	3386.7	1903.9	4511.9	3059.0	4284.1	3869.0	14632.3	9754.2	24386.5	
Sheep	140.8	266.8	281.6	533.5	618.0	1318.5	813.8	1542.1	1854.2	3660.9	5515.1	
VI. TOTAL	5603.2	2816.8	4472.9	4435.9	5395.9	6311.7	5241.5	7272.1	20713.5	20836.5	41550.0	100.0%
VII. COST ESCALATION ALLOWANCE												
Coefficents (1)	4.1	4.1	5.3	5.3	4.8	4.8	5.0	5.0				
TOTAL COSTS	5832.9	2932.3	4710.0	4671.0	5654.9	6614.7	5503.6	7635.7	21701.4	21853.7	43555.1	

SOURCE: IICA/MANR-I.L.P.
(1) According to information provided by IDB, internal memo LO6-Rev. 12

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-22
FINANCING BY SOURCES
('000 B'dos $)

CONCEPT	1			2			3			4			TOTAL			GRAND TOTAL
	IADB	GOB	FARMERS	IADB	GOB	FARMERS	IADB	GOB	FARMERS	IADB	GOB	FARMERS	IADB	GOB	FARMERS	
I. MARKETING & PROCESSING	2500.4	134.6	0.0	43.9	1380.6	0.0	54.4	1386.3	0.0	56.6	1389.1	0.0	2655.3	4290.6	0.0	6945.9
Abattoir																
-design	125.0												125.0	0.0	0.0	125.0
-construction	1825.0												1825.0	0.0	0.0	1825.0
-equipment	360.0												360.0	0.0	0.0	360.0
-operation				43.0	1012.0		53.5	1017.7		55.7	1020.5		152.2	3050.2	0.0	3202.4
Service Centers	190.4	134.6		0.9	368.6		0.9	368.6		0.9	368.6		193.1	1240.4	0.0	1433.5
II. ANIMAL HEALTH	119.1	68.6		57.8	68.6		5.8	68.6		5.8	68.6		188.5	274.4	0.0	462.9
III. RESEARCH & EXTENSION	569.3	569.5	0.0	216.9	549.3	0.0	58.8	479.3	0.0	66.2	403.3	0.0	911.2	2001.4	0.0	2912.6
Research	40.4	71.2		4.4	72.4		22.4	73.6		22.4	74.8		89.6	292.0	0.0	381.6
Information office	2.0	22.0		2.2	22.6		2.4	23.0		2.5	23.5		9.1	91.1	0.0	100.2
Farm Management Unit	12.6	57.0		4.7	70.1		0.7	71.3		18.7	72.5		36.7	270.9	0.0	307.6
Senior Agr.Off. Livestock	3.5	91.6		83.9	91.0		0.0	91.9		0.0	94.0		87.4	368.5	0.0	455.9
Animal Nutrition Unit	9.0	45.0		0.0	44.5		0.0	45.1		0.0	45.7		9.0	180.3	0.0	189.3
Central Livestock Station	144.6	61.5		14.0	6.3		2.0	6.3		0.4	0.7		161.0	74.8	0.0	235.8
Animal Nut. Unit (research)	171.7	92.7		74.1	106.6		20.5	41.4		14.4	17.8		280.7	258.5	0.0	539.2
Animal Nutrition Laboratory	48.0	64.5		7.7	76.3		8.9	63.1		5.9	43.1		70.5	247.0	0.0	317.5
Greenland	137.5	64.0		25.9	59.5		1.9	63.6		1.9	31.2		167.2	218.3	0.0	385.5
IV. TECHNICAL COOPERATION	679.0	0.0	0.0	486.0	0.0	0.0	147.0	0.0	0.0	15.0	0.0	0.0	1327.0	0.0	0.0	1327.0
Training	103.0			54.0			39.0			15.0			211.0	0.0	0.0	211.0
Consultants	576.0			432.0			108.0						1116.0	0.0	0.0	1116.0
V. FARM LEVEL	1762.8	0.0	2016.7	3583.1	0.0	2522.6	4895.0	0.0	4612.4	5627.8	0.0	4881.2	15868.7	0.0	14032.9	29901.6
Beef/Dairy	1459.2		1912.7	2959.2		2331.4	3349.2		4221.7	3446.9		4706.2	11214.5	0.0	13172.0	24396.5
Sheep	303.6		104.0	623.9		191.2	1545.8		390.7	2180.9		175.0	4654.2	0.0	860.9	5515.1
VI. TOTAL	5630.6	772.7	2016.7	4387.7	1998.5	2522.6	5161.0	1934.2	4612.4	5771.4	1861.0	4881.2	20950.7	6566.4	14032.9	41550.0
VII. COST ESCALATION ALLOWANCE																
Coefficient(1)	4.1	4.1	4.1	5.3	5.3	5.3	4.8	4.8	4.8	5.0	5.0	5.0				
TOTAL	5861.5	804.4	2099.4	4620.2	2104.4	2656.3	5408.7	2027.0	4833.8	6060.0	1954.1	5125.3	21950.4	6889.9	14714.7	43555.0

SOURCE: IICA/MANR-I.L.P.
(1) According to information provided by IDB, internal memo L06-Rev. 12

Fig. III-1

MARKETING CHANNELS FOR LIVESTOCK AND MEATS
AFTER IMPLEMENTATION OF PROJET, BARBADOS

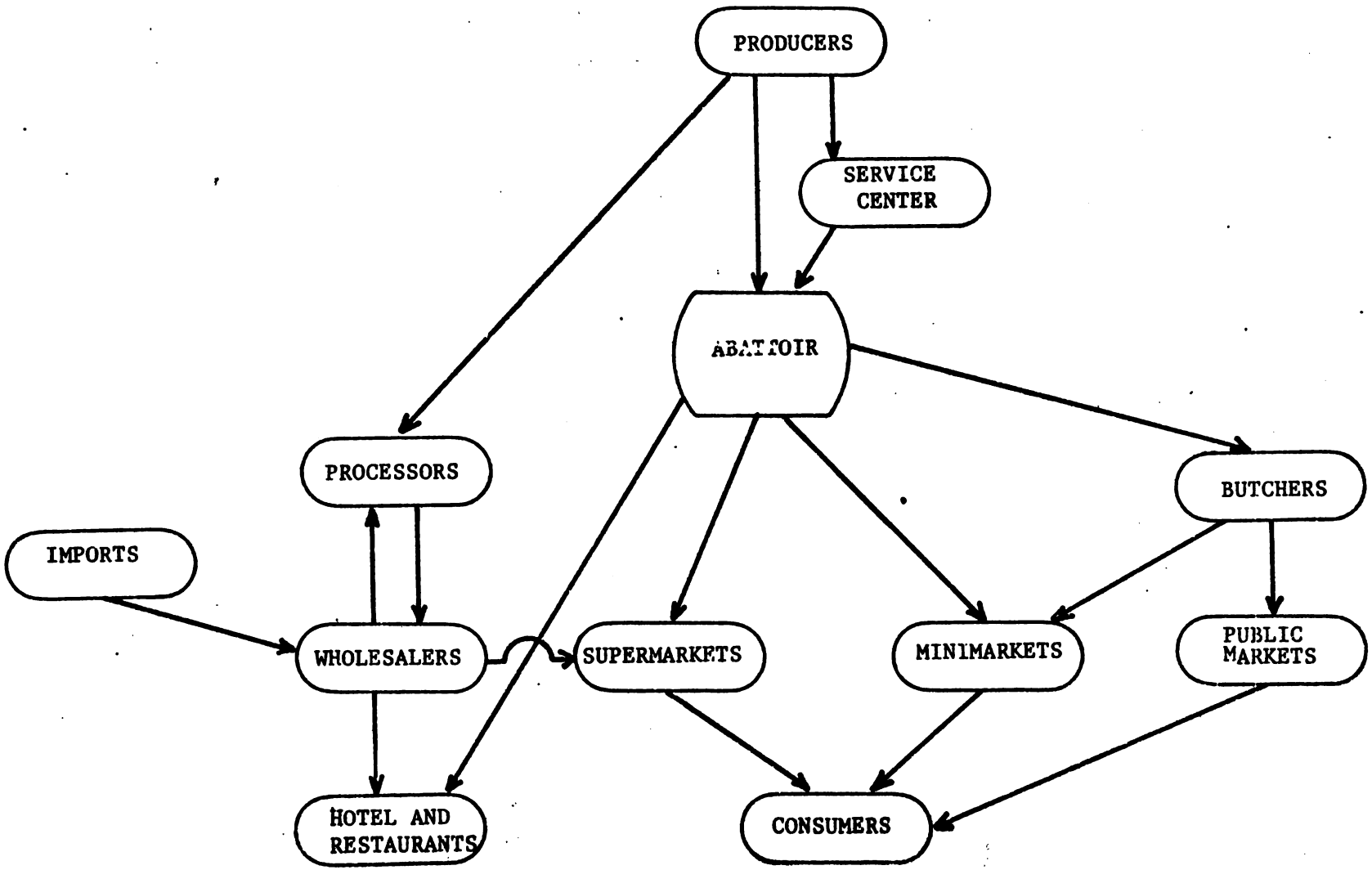
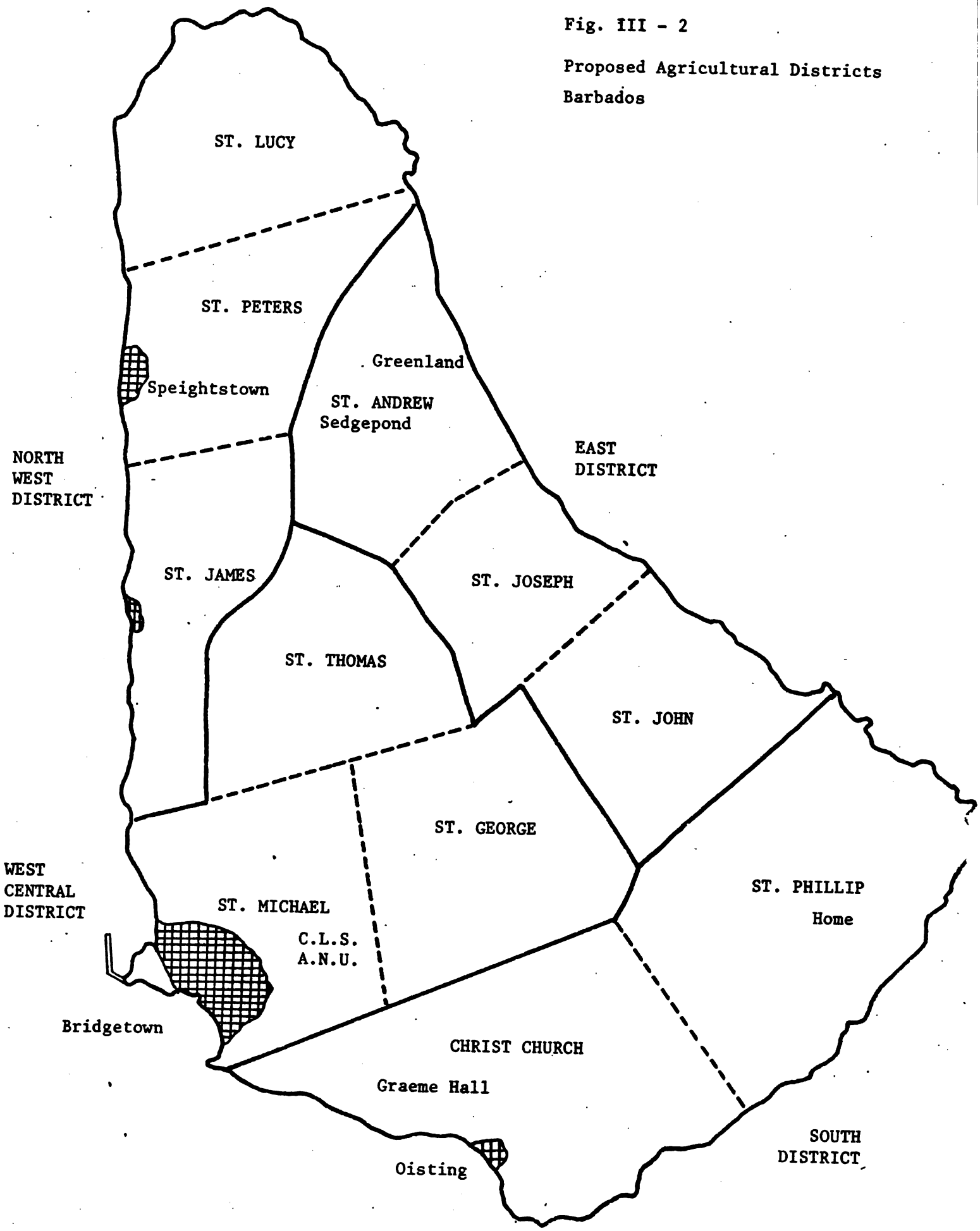


Fig. III - 2

Proposed Agricultural Districts
Barbados



BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-20
ESTIMATED TECHNICAL COOPERATION COSTS
('000 BDS$)

CONCEPT	1	2	3	4	5	TOTAL
I. EXTENSION UNIT						
-Communications specialist	144.0	36.0				180.0
person-month/year	12	3				15
-Extension specialist	144.0	72.0				216.0
person-month/year	12	6				18
TOTAL	288.0	108.0				396.0
II. RESEARCH						
-Animal nutritionist	144.0	36.0	36.0			216.0
person-month/year	12	3	3			18
-Forage production	144.0	72.0				216.0
person-month/year	12	6				18
TOTAL	288.0	108.0	36.0	0.0	0.0	432.0
III. MARKETING & PROCESSING						
-Abattoir Manager		144.0	72.0	0.0	0.0	216.0
person-month/year		12	6			18
-Slaughter Systems		36.0				36.0
person-month/year		3				3
-Cutting & Packaging		18.0				18.0
person-month/year		3				3
-Meat grading		18.0				18.0
person-month/year		3				3
TOTAL		216.0	72.0	0.0	0.0	288.0
IV. GRAND TOTAL	576.0	432.0	108.0	0.0	0.0	1,116.0

SOURCE: IICA/MANR-I.L.P.

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-21
ESTIMATED TOTAL PROJECT COSTS
('000 B'dos $)

PROJECT COMPONENT	1		2		3		4		TOTAL		GRAND TOTAL	RELATIVE PART.
	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local		
I. MARKETING & PROCESSING	1643.4	969.6	43.9	1380.6	54.4	1386.3	56.6	1389.1	1800.3	5145.6	6945.9	16.7%
Abattoir									0.0	0.0	0.0	
-design		125.0							0.0	125.0	125.0	
-construction	1095.0	730.0							1095.0	730.0	1825.0	
-equipment	360.0								360.0	0.0	360.0	
-operation	0.0	0.0	43.0	1012.0	53.5	1017.7	55.7	1020.5	152.2	3050.2	3202.4	
Service Centers	190.4	134.6	0.9	368.6	0.9	366.6	0.9	368.6	193.1	1240.4	1433.5	
II. ANIMAL HEALTH	119.1	68.6	57.8	68.6	5.8	68.6	5.8	68.6	188.5	274.4	462.9	1.1%
III. RESEARCH & EXTENSION	569.3	569.5	216.9	549.3	59.8	479.3	66.2	403.3	911.2	2001.4	2912.6	7.0%
Research	40.4	71.2	4.4	72.4	22.4	73.6	22.4	74.8	89.6	292.0	381.6	
Information office	2.0	22.0	2.2	22.6	2.4	23.0	2.5	23.5	9.1	91.1	100.2	
Farm Management Unit	12.6	57.0	4.7	70.1	0.7	71.3	18.7	72.5	36.7	270.9	307.6	
Senior Agr.Off. Livestock	3.5	91.6	83.9	91.0	0.0	91.9	0.0	94.0	87.4	368.5	455.9	
Animal Nutrition Unit	9.0	45.0	0.0	44.5	0.0	45.1	0.0	45.7	9.0	180.3	189.3	
Central Livestock Station	144.6	61.5	14.0	6.3	2.0	6.3	0.4	0.7	161.0	74.8	235.8	
Animal Nut. Unit (research)	171.7	92.7	74.1	106.6	20.5	41.4	14.4	17.8	280.7	258.5	539.2	
Animal Nutrition Laboratory	48.0	64.5	7.7	76.3	8.9	63.1	5.9	43.1	70.5	247.0	317.5	
Greenland	137.5	64.0	25.9	59.5	1.9	63.6	1.9	31.2	167.2	218.3	385.5	
IV. TECHNICAL COOPERATION	679.0	0.0	486.0	0.0	147.0	0.0	15.0	0.0	1327.0	0.0	1327.0	3.2%
Training	103.0		54.0		39.0		15.0		211.0	0.0	211.0	
Consultants	576.0		432.0		108.0				1116.0	0.0	1116.0	
V. FARM LEVEL	2590.4	1189.1	3668.3	2437.4	5129.9	4377.5	5097.9	5411.1	16486.5	13415.1	29901.6	72.0%
Beef/Dairy	2449.6	922.3	3386.7	1903.9	4511.9	3059.0	4284.1	3869.0	14632.3	9754.2	24386.5	
Sheep	140.8	266.8	281.6	533.5	618.0	1318.5	813.8	1542.1	1854.2	3660.9	5515.1	
VI. TOTAL	5603.2	2816.8	4472.9	4435.9	5395.9	6311.7	5241.5	7272.1	20713.5	20836.5	41550.0	100.0%
VII. COST ESCALATION ALLOWANCE												
Coefficents (1)	4.1	4.1	5.3	5.3	4.8	4.8	5.0	5.0				
TOTAL COSTS	5832.9	2932.3	4710.0	4671.0	5654.9	6614.7	5503.6	7635.7	21701.4	21853.7	43555.1	

SOURCE:IICA/MANR-I.L.P.
(1) According to information provided by IDB, internal memo LO6-Rev. 12

BARBADOS
INTEGRATED LIVESTOCK PROJECT
TABLE III-22
FINANCING BY SOURCES
('000 B'dos $)

CONCEPT	1			2			3			4			TOTAL			GRAND TOTAL
	IADB	GOB	FARMERS	IADB	GOB	FARMERS	IADB	GOB	FARMERS	IADB	GOB	FARMERS	IADB	GOB	FARMERS	
I. MARKETING & PROCESSING	2500.4	134.6	0.0	43.9	1380.6	0.0	54.4	1386.3	0.0	56.6	1389.1	0.0	2655.3	4290.6	0.0	6945.9
Abattoir																
-design	125.0												125.0	0.0	0.0	125.0
-construction	1825.0												1825.0	0.0	0.0	1825.0
-equipment	360.0												360.0	0.0	0.0	360.0
-operation				43.0	1012.0		53.5	1017.7		55.7	1020.5		152.2	3050.2	0.0	3202.4
Service Centers	190.4	134.6		0.9	368.6		0.9	368.6		0.9	368.6		193.1	1240.4	0.0	1433.5
II. ANIMAL HEALTH	119.1	68.6		57.8	68.6		5.8	68.6		5.8	68.6		188.5	274.4	0.0	462.9
III. RESEARCH & EXTENSION	569.3	569.5	0.0	216.9	549.3	0.0	58.8	479.3	0.0	66.2	403.3	0.0	911.2	2001.4	0.0	2912.6
Research	40.4	71.2		4.4	72.4		22.4	73.6		22.4	74.8		89.6	292.0	0.0	381.6
Information office	2.0	22.0		2.2	22.6		2.4	23.0		2.5	23.5		9.1	91.1	0.0	100.2
Farm Management Unit	12.6	57.0		4.7	70.1		0.7	71.3		18.7	72.5		36.7	270.9	0.0	307.6
Senior Agr.Off. Livestock	3.5	91.6		83.9	91.0		0.0	91.9		0.0	94.0		87.4	368.5	0.0	455.9
Animal Nutrition Unit	9.0	45.0		0.0	44.5		0.0	45.1		0.0	45.7		9.0	180.3	0.0	189.3
Central Livestock Station	144.6	61.5		14.0	6.3		2.0	6.3		0.4	0.7		161.0	74.8	0.0	235.8
Animal Nut. Unit (research)	171.7	92.7		74.1	106.6		20.5	41.4		14.4	17.8		280.7	258.5	0.0	539.2
Animal Nutrition Laboratory	48.0	64.5		7.7	76.3		8.9	63.1		5.9	43.1		70.5	247.0	0.0	317.5
Greenland	137.5	64.0		25.9	59.5		1.9	63.6		1.9	31.2		167.2	218.3	0.0	385.5
IV. TECHNICAL COOPERATION	679.0	0.0	0.0	486.0	0.0	0.0	147.0	0.0	0.0	15.0	0.0	0.0	1327.0	0.0	0.0	1327.0
Training	103.0			54.0			39.0			15.0			211.0	0.0	0.0	211.0
Consultants	576.0			432.0			108.0						1116.0	0.0	0.0	1116.0
V. FARM LEVEL	1762.8	0.0	2016.7	3583.1	0.0	2522.6	4895.0	0.0	4612.4	5627.8	0.0	4881.2	15868.7	0.0	14032.9	29901.6
Beef/Dairy	1459.2		1912.7	2959.2		2331.4	3349.2		4221.7	3446.9		4706.2	11214.5	0.0	13172.0	24386.5
Sheep	303.6		104.0	623.9		191.2	1545.8		390.7	2180.9		175.0	4654.2	0.0	860.9	5515.1
VI. TOTAL	5630.6	772.7	2016.7	4387.7	1998.5	2522.6	5161.0	1934.2	4612.4	5771.4	1861.0	4881.2	20950.7	6566.4	14032.9	41550.0
VII. COST ESCALATION ALLOWANCE																
Coefficient(1)	4.1	4.1	4.1	5.3	5.3	5.3	4.8	4.8	4.8	5.0	5.0	5.0				
TOTAL	5861.5	804.4	2099.4	4620.2	2104.4	2656.3	5408.7	2027.0	4833.8	6060.0	1954.1	5125.3	21950.4	6889.9	14714.7	43555.0

SOURCE: IICA/MANR-I.L.P.
(1) According to information provided by IDB, internal memo LO6-Rev. 12

Fig. III-1

MARKETING CHANNELS FOR LIVESTOCK AND MEATS
AFTER IMPLEMENTATION OF PROJET, BARBADOS

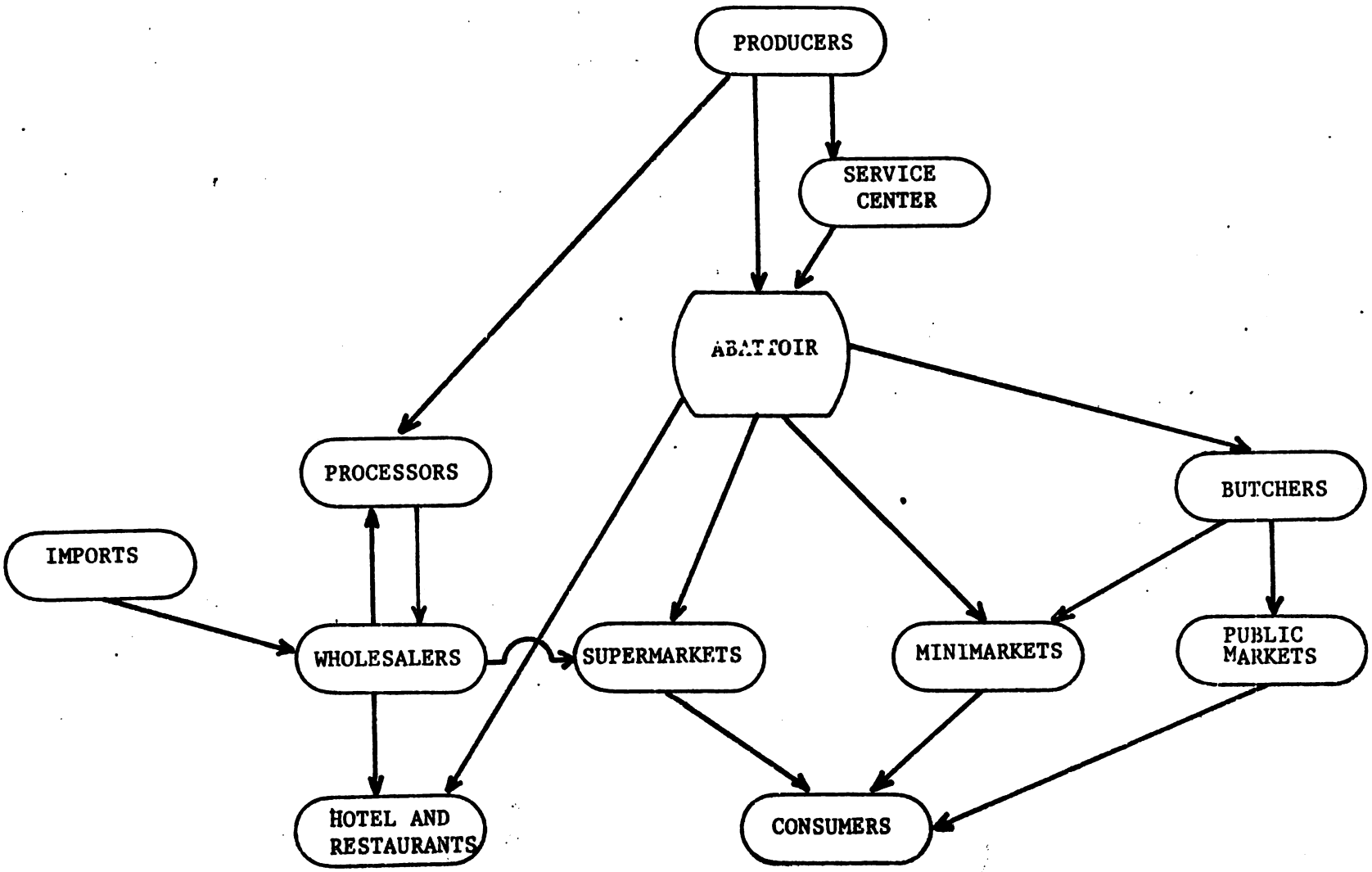


Fig. III - 2

Proposed Agricultural Districts
Barbados

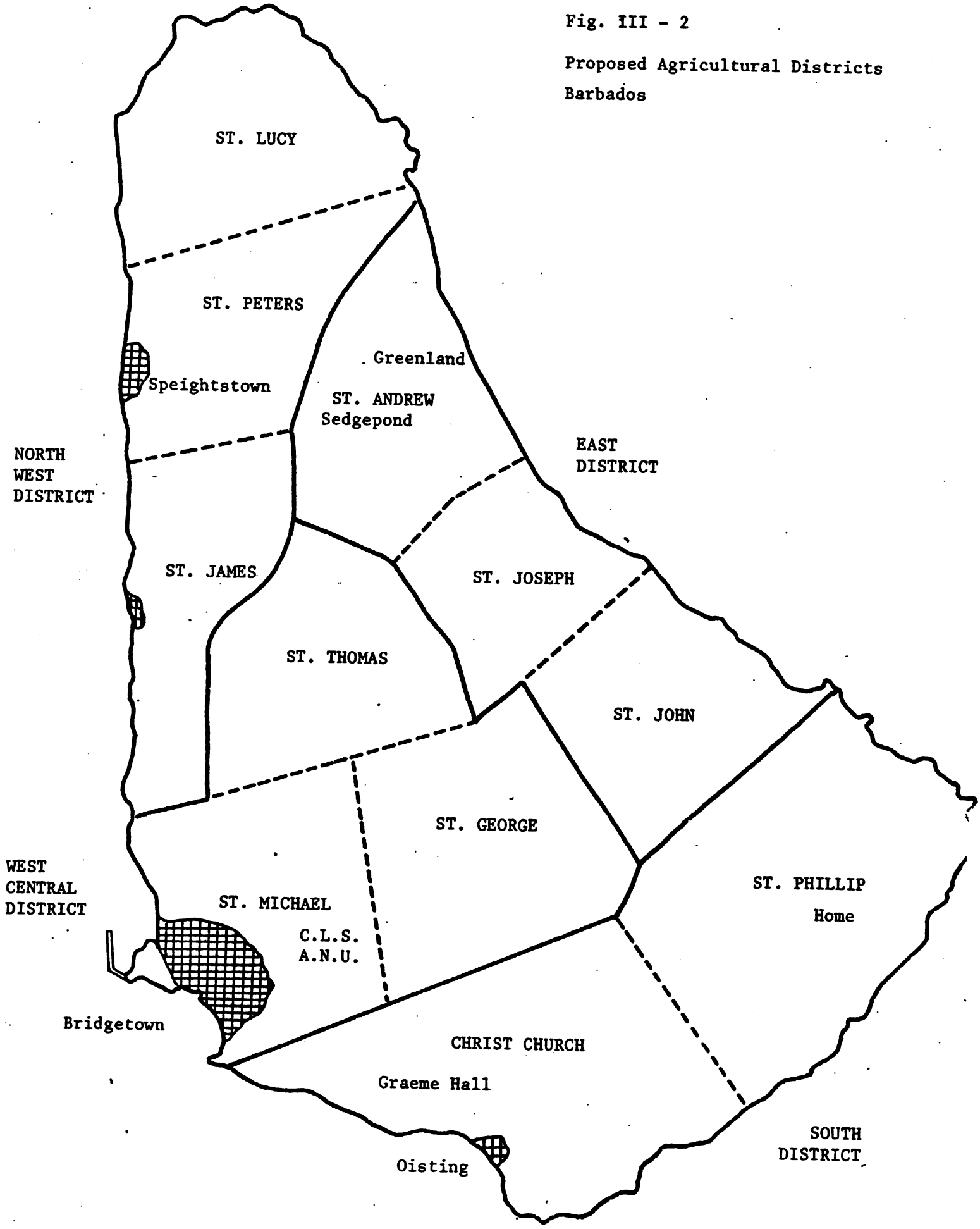


Fig. III-3

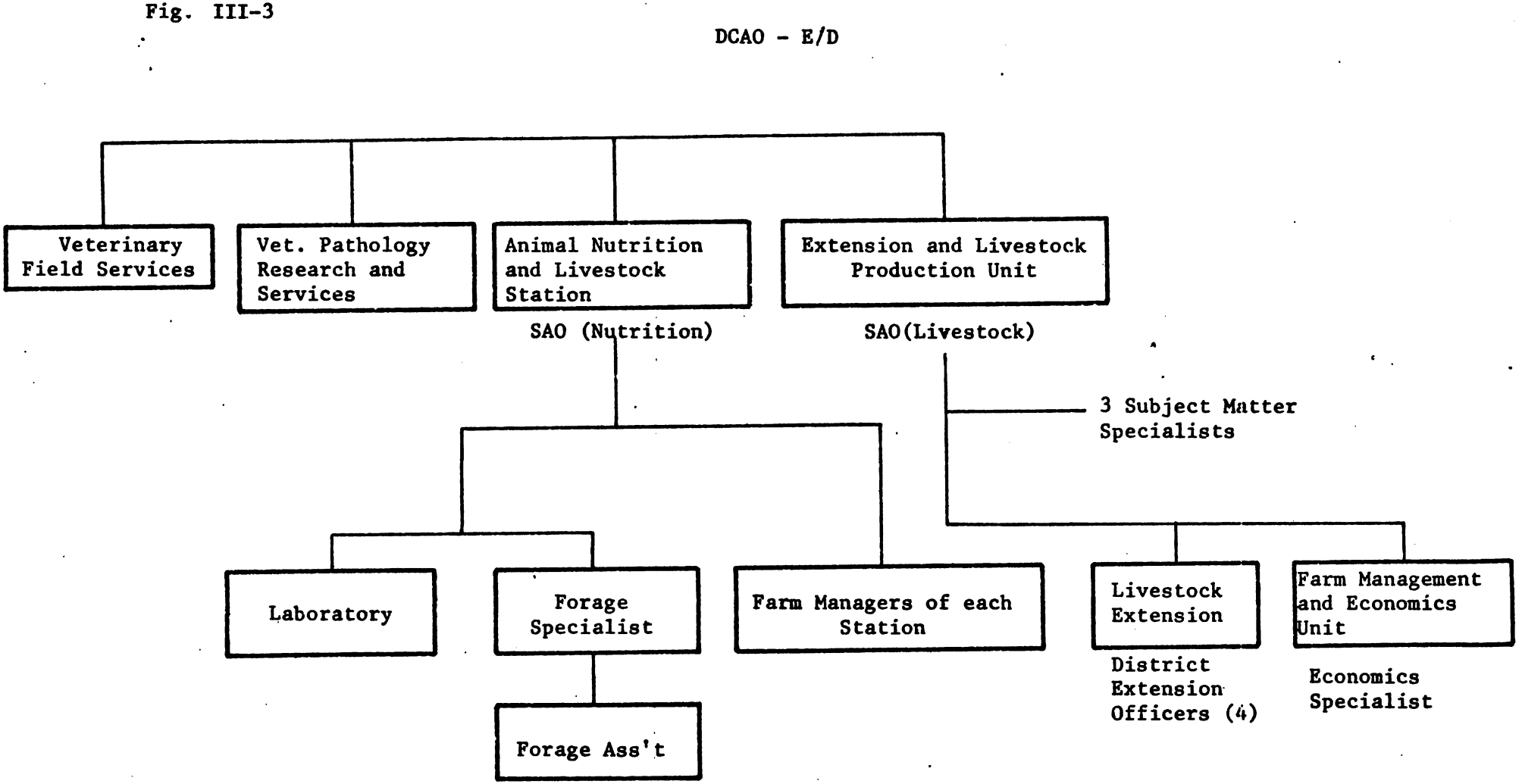


Figure III-3 Proposed Organisational Structure, Departament of Livestock Extension and Development, Barbados.