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# ANTIGUA LIVESTOCK IMPROVEMENT PROJECT

USAID PROJECT 538-0112  
1984-1987

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FINAL REPORT  
AUGUST 1987

WINROCK INTERNATIONAL  
INSTITUTE FOR AGRICULTURAL DEVELOPMENT

**ANTIGUA LIVESTOCK IMPROVEMENT PROJECT**

(Project 538-0112)

1984 to 1987

Final Report

to the

U.S. Agency for International  
Development, Barbados

Ministry of Agriculture,  
Lands and Fisheries  
Government of Antigua and Barbuda

by

Winrock International Institute for Agricultural Development

Morrilton, Arkansas, U.S.A.

August 1987

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## PREFACE

Since the 1960s, there has been a major decline in crop production and abandonment of crop land in Antigua and Barbuda. Less than 5% of the agricultural land is currently used for crop production. The remaining arable area is used mostly as common pasture with uncontrolled grazing of cattle, sheep and goats. Less than 4,000 acres have been developed as fenced, "organized" livestock farms that could potentially be used for improved livestock production. The common pasture area utilized by "landless farmers" cannot currently be used for improved livestock production as breeding is not controlled and the native pastures are overgrazed. As a result of the lack of organized management and generally poor nutrition, the national livestock population has a low offtake rate and poor carcass quality. The country depends on livestock product imports to meet requirements of the hotel/tourist sector and higher income consumers due to the problem of poor quality in local livestock production.

The Antigua Livestock Improvement Project, initiated in 1984, had the objectives of increasing livestock production and improving quality of products from organized livestock farms in Antigua. In addition to this final report, other findings are contained in separate reports entitled "Lamb Feeding Trial to Improve Meat Quality and Returns for Livestock Producers of Antigua and Barbuda 1986" and "Economic Analysis of the Antigua/Barbuda Livestock Sector" in 1986.

## ACKNOWLEDGMENTS

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### **USAID/Barbados**

William B. Baucom  
Andrew M. Maxey  
Darwin Clarke

### **Caribbean Agricultural Research and Development Institute**

G. Proverbs - Barbados  
V. A. L. Sargeant - Antigua  
R. Paterson  
P. Philips  
P. Maynard

### **Ministry of Agriculture, Lands and Fisheries**

Ministers -- The Honorable Robin Yearwood  
                  The Honorable Hilroy Humphries  
Permanent Secretary -- Ernest S. Benjamin  
Director of Agriculture -- Frank Henry  
Agricultural Economist -- L. Weston

### **Livestock Division**

Dr. Joseph Robinson -- Chief Veterinary and Livestock Officer  
Dr. Jose Mathew -- Veterinary Officer  
R. T. Kentish -- Livestock Officer

### **Animal Health Assistants**

David Lewis -- Animal Health Assistant and Counterpart for Project  
                  Coordinator  
Astley Joseph -- Animal Health Assistant and Replacement Counterpart for  
                  Project Coordinator  
Joseph Daley -- Agricultural Assistant and Manager of Paynters Livestock  
                  Station  
Ickford Emmanuel -- Agricultural Assistant and Assistant Manager of  
                  Paynters

### **Registrar of Cooperatives**

George Jonas

**Officers of Antigua Livestock Improvement Cooperative Society Ltd.**

President -- Lazman Webson

Vice President -- Raymond Raeburn (died March 25, 1987).

Secretary -- Dandridge Joseph

Treasurer -- Theophane Samuel

**Management Committee -- Antigua Livestock Improvement Cooperative Society Ltd.**

Ashley Joseph

Dandridge Joseph

Patrick Maynard

Psalter Millwood

Raymond Raeburn

Theophane Samuel

Lazman Webson

**Other Cooperating Farmers**

Albert Fredericks

Allan Brown

Alwyn Aaron

Archibald Butler

Ashley Joseph

Astley Joseph

Aubrey Lake

Brodie Wycliffe

Charlesworth Edwards

Cheryl Edwards

Cordelle Daniel

Dandridge Joseph

Douglas Forde

Egbert Thwaites

Eston Charles

Eton Emmanuel

Eugenie Richards

George Jonas

George Walter

Georgette Webson

Hilroy Humphries

Hudson Simon

Ivan Wiltshire

J. L. Robinson

John Marshall

Joseph Dailey

Joseph Samuel

Keith Edwards

Keithroy Browne

Lawrence Broodie

Lazman Webson

Leonard Solomon

Leopold Jarvis

Leroy Southwell

McKenzie Edwards

Neville Jeremy

Patrick Maynard

Phillip Payne

Psalter Millwood

R. T. Kentish

Raymond Raeburn

Ruben Richards

Samuel James

Samuel Joseph

Stephen Joseph

Stuart Pigott

Sydney Samuel

Theophane Samuel

Wilson Kentish

**Caribbean Agricultural, Rural Development and Advisory Training Service (CARDATS)**

Dr. Ameen

**Danish Rural Development Consultants (DARUDEC)**

K. I. Talks, Livestock Economist

Dr. E. H. Andersen, Veterinarian

**European Development Fund (EDF)**

E. A. Dixon, Agricultural Adviser, Delegation of the Commission of the European Communities in Barbados and the Eastern Caribbean

**Antigua Sugar industry Corporation (ASIC)**

N. Abbot -- Manager

L. Webson -- Assistant Manager

**Organization of American States (OAS)**

Dr. J. Campbell

## ABBREVIATIONS AND ACRONYMS

ABMDC	Antigua and Barbuda Meat Development Company
AHA	Animal Health Assistant
AI	Artificial Insemination
ALIP	Antigua Livestock Improvement Project
ASIC	Antigua Sugar Industry Corporation
CARDATS	Caribbean Agricultural, Rural Development and Advisory Training Service
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Community
CDB	Caribbean Development Bank
CGA	Communal Grazing Area
CIDA	Canadian International Development Agency
CIF	Cost, Insurance, and Freight
Cooperative	Antigua Livestock Improvement Cooperative Society Ltd.
CVO	Chief Veterinary Officer
DARUDEC	Danish Rural Development Consultants
DA	Director of Agriculture
ECS	Eastern Caribbean Dollar: (Currency Equivalent: US\$1.00 = EC\$2.70, since 1976)
EDF	European Development Fund
EEC	European Economic Community
EOPS	End of Project Status
FAO	Food and Agriculture Organization of the UN
FOB	Free on Board
GDP	Gross Domestic Product
GOAB	Government of Antigua/Barbuda
HPI	Heifer Project International
LDU	Livestock Development Unit
MALF	Ministry of Agriculture, Land and Fisheries
MOU	Memo of Understanding
OAS	Organization of American States
PACD	Project Activity Completion Date
PVO	Private Voluntary Organization
TA	Technical Assistance
WINROCK	Winrock International Institute for Agricultural Development
USAID	U.S. Agency for International Development
USDA	U.S. Department of Agriculture

WINROCK INTERNATIONAL TECHNICAL ASSISTANCE TEAM

Name	Title	Project Activity
Charles Burwell	Livestock Specialist	Long-term project coordinator
Dr. H. A. Fitzhugh	Director, Planning and Analysis	Training in livestock management and home office administration of project
Dr. Clarence Mannasmith	Veterinarian	Animal health training and planning sheep feeding trials and home office support
Richard Newton	Facilities Specialist	Construction of handling facilities
Paul Schumacher	Livestock Specialist	Training in artificial insemination
Dr. Kenneth B. Young	Agricultural Economist	Training in record- keeping, conducting economic studies, and home office support
Dr. Will Getz	Livestock Specialist	Home office support
Tom Capehart	Computer Specialist	Home office support

## EXECUTIVE SUMMARY

This final report of the Antigua Livestock Improvement Project (ALIP) documents achievements of the project from 1984 to 1987 under terms of the original grant agreement of U.S. Agency for International Development (USAID) project 538-01120. Institutions cooperating in ALIP included the Ministry of Agriculture, Land, and Fisheries (MALF) of the Government of Antigua and Barbuda (GOAB); Caribbean Agricultural Research and Development Institute (CARDI) and other development organizations; Antiguan livestock producers; and Winrock International with financial support from USAID. Winrock placed a project coordinator in Antigua for 3 years and technical assistance was supplied by Winrock staff on an interim, short-term basis.

Discussion is keyed to project objectives dealing with institutional strengthening, policy, procurement, and training, demonstration of technology application, and farm planning and organization. Other components such as "productivity examples - case studies" cut across several major components.

Some modification of the original objectives specified in the grant agreement were made after the project was initiated. These modifications were based on experience in working with farmer cooperators and were designed to take into account the effects of a major drought in the first year of the project, the problems of land tenure, and a need for study of marketing factors.

### GOALS AND OBJECTIVES

Project goals included: 1) assisting Antigua and Barbuda livestock producers to increase productivity and profitability of their livestock holdings and 2) increasing production of meat and milk for Antigua's local and tourist trade, so that Antigua could become more self-sufficient and develop significant export trade to nearby countries.

Specific project objectives were to help design a strategy that would demonstrate increases of 1) 50% or more in production of meat and milk from cattle, sheep, and goat herds of selected Antiguan cooperators; 2) assess technical feasibility of appropriate production and management interventions; 3) improve and preserve quality and quantity of livestock feed derived from pasture and feed crop by-products; and 4) train Antiguan in livestock and pasture management, herd health, and special skills such as artificial insemination (AI).

### PROJECT STRATEGY

The initial project strategy included 1) identifying a core group of cooperating farmers with organized livestock production facilities and 2) working with this group in the demonstration of benefits from improved production practices. Major emphasis was placed on identifying farmers who would work together and who would be receptive to technical

assistance. Technical assistance activities included procurement of farm equipment and organization of an equipment maintenance and management pool; establishment of improved pasture and harvesting forage; importation of improved breeding stock and semen to improve animal production performance; and establishment and demonstration of other on-farm improvements such as electric fencing and livestock handling facilities. Subject matter for short-term training included AI, animal health and management, livestock feeding, pasture management, general farm management and record-keeping. Training methods included cooperative field days, on-farm demonstrations, farm tours, and assistance in establishing a long-term academic training program for the project coordinator's counterpart in the United States.

ALIP worked with the group to obtain long-term leases that could provide a secure basis for continuing practices that would contribute to livestock development activity after the project ended.

Early in the project, it was recognized that there was a special need for policy analysis, production-cost analysis, and market analysis to assist livestock producers in organized farm development and to support the government in making policy changes. USAID provided additional funding in 1985 to support the economic studies that were begun in 1984 as part of ALIP.

A sheep-feeding trial was conducted in 1986 to evaluate performance of local sheep when fed a concentrate ration and to assess the economic potential of sheep production and its relation to the hotel/tourist trade.

Specific project activities included:

- Placing of a permanent Winrock project coordinator in Antigua.
- Selecting 25 cooperating farmers.
- Organizing a farm record-keeping program to provide baseline data and to improve management.
- Providing of short-term technical assistance (TA) in Antigua to organize baseline data and to design specific training programs and training materials for farmers and MALF personnel.
- Importing and operating hay- and silage-making farm equipment.
- Providing assistance in forming an association of the participating farmers to operate and maintain the equipment. (Equipment is to be used primarily for preservation of feed, and also for custom hire outside the association.)
- Importing AI semen and equipment and training selected groups of farmers in AI, where appropriate.
- Importing breeding stock to begin genetic improvement of local livestock by crossbreeding.
- Designing techniques to transfer technology to the participating group of farmers, including AI demonstrations, record keeping, pasture improvement, hay and silage production, livestock management, and marketing practices. Training included 5 one-day courses in the first year and 10 one-day courses in the second and third years.
- Continuing support for short-term technical assistance in Antigua throughout the Project.

- Collaborating with Caribbean Agricultural Research and Development Institute (CARDI) and Ministry of Agriculture, Lands, and Fisheries (MALF).
- Providing assistance in training extension personnel through farm demonstration programs and by identifying MALF trainees for academic programs funded from regional training funds.
- Identifying target dairy farmers in the demonstration group.
- Importing equipment and supplies to complement the local producers' health programs.
- Developing a supply contract with Antigua Dairy and working with selected producers to provide a constant supply of milk for the local market.

A core group of farmer cooperators was identified in 1984, and this group later negotiated 10-year land leases, renewable after 10 years. The group organized as Antigua Livestock Improvement Cooperative Society Ltd. in 1986 and has assumed control of the farm-equipment pool and imported breeding stock. Technological changes and improved production practices introduced in the project include use of electric fencing, improved pasture establishment, forage harvesting for hay, animal handling facilities, establishment of a small organized dairy operation, and increased use of farm plans.

All proposed training has been completed. The project coordinator's counterpart is receiving long-term academic training in the U.S. Barbados farm tours for groups of the Antiguan farmer cooperators were conducted in May 1986 and May 1987. The newly-organized Cooperative is following an approved plan for controlled use of the farm equipment pool and is collecting revenue from the membership for a reserve operating fund.

Special analyses were made of production costs, policy, and marketing. The government has been responsive to suggestions for policy changes, as exemplified by the recently removed control prices on livestock and the provision of import protection for local livestock producers. Part of the tariff revenue will be used to provide direct incentives for quality livestock production. The government has adopted the policy of providing increased security of tenure to organized livestock farmers by extending lease agreements from 1 to 10 years.

As the project entered its last phases, provision was made to organize the cooperator group on a formal basis to carry on farm development activity. CARDI and the Livestock Division, MALF, will continue to provide technical assistance for individual farm planning based on prototypes established in this project. The proposed European Development Fund (EDF) project will help to establish a new group of organized farmers. This project will include support for the agricultural extension service and Livestock Division of the Ministry to expand livestock production extension and animal health support capability.

ALIP's successful strategy can be attributed to 1) the long-term in-country assistance of the project coordinator in Antigua, who worked daily with farmer cooperators and functioned as a fellow staff member in

the Livestock Division of the Ministry; 2) strategic use of other Winrock specialists to work on a short-term basis as backup to the project coordinator's program of activity; 3) identification of a core group of cooperating farmers who are prepared to accept responsibility and challenge; 4) identification of a project coordinator's counterpart with leadership capability; and 5) development of program flexibility to respond to emerging problems and new issues of concern (e.g., changes in government policy).

Constraints and problems limiting project success included a severe drought in the first year of the project; dependence on producers cooperators to accommodate imported animals with facilities that were often inadequate; lack of willingness to pay for equipment services (because these services were provided free or at subsidized rates by other organizations); difficulties in supervising farm development activities and in using AI (because most cooperators do not live on the farm); and problems associated with the system of landless livestock production that exists alongside the organized system. Landless farmers currently have a definite economic advantage over organized producers as they are not required to pay a grazing fee and have no expenses for on-farm improvements or maintenance of facilities. The wandering livestock of landless farmers also are responsible for damage to crops and to new pasture plantings. Wandering animals frequently break through fences on organized farms and interbreed with improved animals.

Infrastructure constraints included the lack of local livestock-production specialist capability in the extension service, lack of transport for animal health assistants, lack of a milk-processing plant or sanitary abattoir to establish a market outlet to the hotel/tourist trade, and controlled livestock prices and insecure tenure on leased land (at the start of the project).

#### **SPECIFIC RECOMMENDATIONS**

1. Increased infrastructure support for organized livestock production. Sub-recommendations included:
  - 1.1 Providing marketing assistance, in particular for construction of a sanitary abattoir to provide an improved market outlet to the hotel/tourist trade.
  - 1.2 Supporting a tick control program for Antigua.
  - 1.3 Improving the system of collecting and reporting agricultural trade data to more closely monitor supply/demand relationships.
  - 1.4 Evaluating feasibility of commercial dairy development.
  - 1.5 Improving local meat processing capability for cured ham, bacon, sausages, and corned beef.

- 1.6 Supporting development of Antigua Sugarcane Industry Corporation (ASIC) as a major producer of animal feed to assist the livestock industry.
- 1.7 Providing controls or restrictions on landless livestock production to fairly take into account the present disadvantages of organized production and to protect against damage from wandering animals.

Sub-recommendation 1.2 is suggested because ticks are spread by wandering livestock in the landless system, which has no general community control program. Evaluation of the proposed new abattoir and feedlot and commercial dairy development would require an economic feasibility study to determine if these facilities are economically justified. A detailed project proposal for sub-recommendation 1.3 was submitted to USAID in 1986. Increased meat processing capability proposed in recommendation 1.5 would increase market demand for local livestock and help Antigua become more self-sufficient. Support for ASIC is based on the need for increased animal feed production in Antigua, which should be more efficient if done on a large-scale mechanized farm.

2. Continued support for the newly-organized Cooperative. Sub-recommendations included:
  - 2.1 Providing support for expansion of present cooperative activities to include marketing assistance to membership and, possible, input supply service.
  - 2.2 Investigating the use of Antigua/Barbuda Meats Development Corporation (ABMDC) meat processing facilities for cooperative-owned cattle and sheep and to establish a market outlet with the hotel/tourist trade.
  - 2.3 Evaluating the potential for merger of Antigua/Barbuda Livestock Farmers Association with Antigua/Barbuda Livestock Improvement Cooperative Society Ltd. to combine both production and marketing functions in one organization.
  - 2.4 Providing periodic short-term technical assistance to Antigua/Barbuda Livestock Improvement Cooperative Society Ltd., thus providing a continued stimulus for further development of the Cooperative and further technological applications on membership farms.

Continued support of the Cooperative is recommended because it was not formally organized until near the end of ALIP, thus the members have had only limited experience with using the newly introduced technology. Also, the agricultural extension service is poorly equipped to help livestock producers. The Cooperative membership also will require marketing assistance when they improve the quality of their livestock.

3. Proposed changes in GOAB policy.

3.1 GOAB has made substantial and desirable policy changes to support organized livestock production since ALIP started. However, further action is needed in the form of direct controls or strong incentives to encourage current landless farmers to become organized livestock producers

4. Support for improved livestock feeding systems. Sub-recommendations to improve the quality of livestock production and to increase utilization of local feedstuffs include:

4.1 Providing technical assistance in formulating economical feed rations for cattle and sheep, including utilization of local feedstuffs.

4.2 Investigating the economic feasibility of a large-scale feedlot operation using silage and other feed production from ASIC.

4.3 Conducting more detailed economic analysis of improved pasture versus native pasture with alternative management strategies.

Current livestock production performance is constrained by the relatively poor quality and unreliable supply of forage available in Antigua. Large-scale production operations would tend to make use of more local feedstuffs than do small-farm production operations. It is recommended that ASIC be developed as an agricultural development company to grow grain, silage, hay, etc., for cooperative members and other limited-resource livestock producers. ASIC has a relatively large area of cultivated land and experience with the use of farm equipment to produce animal-feed crops on a large-scale basis.

To conduct economic analyses beyond simple cost budget comparisons, additional information is needed on the costs and benefits of using improved pasture versus native pasture. Benefits of improved pasture include increased animal performance as well as increased carrying capacity. Strategies should be explored to enhance the value of native pastures. For estimating the annual amortization cost of pasture establishment, there is some question about the expected life of the improved pastures.

## INTRODUCTION

### ANTIGUA AND BARBUDA: THE ECONOMY

#### Relationship of Agriculture and Tourism

In the 1960s, tourism replaced agriculture as the most important activity and main contribution to the economy. Although originally the plantation colonies depended mainly on sugar and cotton production, the economies of Antigua and Barbuda have undergone major structural changes in recent decades. Agriculture declined from 15% of gross domestic product (GDP) in 1964 to 7.5% in 1983. Estimated 1984 GDP at factor cost was EC\$207 million (1977 dollars) to which agriculture contributed only 6.5%, mining and manufacturing 6%, government services 11.5%, and hotels and restaurants 15.8% (World Bank, 1985). The hotel/tourist industry, the leading national industry, generated a gross revenue of about \$76 million in 1984 compared with \$42.5 million in 1980, in nominal dollars. The number of tourists totaled 143,427 in 1984, compared to 97,901 in 1930. The peak tourist season is December through March. About 47% of the tourists come from the United States. Other important tourist markets for Antigua and Barbuda are Canada, United Kingdom, and other Caribbean countries.

The current marketing system for livestock products in Antigua and Barbuda is segmented into two distinct classes, because product-quality requirements for the local market differ greatly from those for the tourist market. Few locally-produced livestock products are now purchased by the hotel/tourist sector, because of the lack of sanitary slaughter facilities in Antigua and relatively strict product-quality specifications. In measuring self-sufficiency as a measure of current need, livestock production now stands at about 47% for beef, 25% for pigs, 69% for sheep and goats, 6% for milk, 2% for poultry meat, and 78% for eggs. The average market value per pound of domestic beef and lamb production is much less than that for average import meats, because the cuts imported by the hotel/tourist sector are usually higher priced. Prices of imported choice beef steaks and some lamb cuts are two to three times the price charged in local meat shops for similar domestic cuts.

The trend towards increased tourism and urban development has markedly increased the national demand for high-quality food items. There is potential for local producers to sell animals at substantially higher prices to the hotel/tourist sector, if they have access to a sanitary slaughter house and the animals are of acceptable quality.

Crop agriculture has declined because of the loss of sugar and cotton production. Livestock production has been restricted due to relatively slow progress in the development of organized production systems and the continued dominance of the landless system of production. There is currently only partial self-sufficiency in livestock production at the national level, with major dependence on food imports other than livestock products and some fruits and vegetables in season. The hotel/tourist industry imports nearly all the food requirements of tourists.

Imports of livestock products in 1984 included EC\$5.5 million for beef, EC\$0.6 million for lamb, EC\$4.9 million for milk products, EC\$1.3 million for pork, and EC\$7.9 million for poultry meat. Food imports in 1983 totaled EC\$55 million. Increasing expenditures for food imports are a burden to the economy: the external public debt has doubled from 1978 to 1981, reaching EC\$216.8 million at the beginning of 1984, about 61% of GDP. A major part of the increased public debt has been incurred for new capital projects. Although there is a problem of a growing imbalance between national food production and demand (in particular, for the hotel/tourist market), most families continue to be involved in animal agriculture and in small-plot production of fruits and vegetables on a part-time basis. The decline in agriculture is attributed primarily to a sharp cutback in large-scale cotton and sugarcane production.

### Importance of Livestock

The livestock sector contribution to the agricultural sector, about EC\$9 million, is double that of crops. Of about 50,000 acres of usable land and 32,000 acres of potentially arable land, only about 2500 acres are currently cropped, mainly with sugarcane, vegetables, root and tree crops, corn and cotton. The remainder of the land, including a large area formerly in sugarcane, is used mostly as a common pasture, with uncontrolled grazing of livestock by a large number of individual "landless farmers", including some urban dwellers. Only about 3,000 to 4,000 acres are currently developed as fenced, "organized" livestock farms accounting for about 20% of the cattle production and only 5% to 10% of sheep and goat production. Most of the private owners and other livestock farm employees do not live on the farm. Organized livestock-production operations include:

- 4 large privately-owned farms or estates with approximately 1,500 total acres in pasture and 800-900 cattle, plus goats and sheep
- about 20 medium-sized leased farms (called Livestock Development Unit farms) with a total of 1,000 acres in pasture and about 500 cattle, plus goats and sheep
- small and medium, privately-owned or -leased farms, with a total of about 300 cattle
- 2 Government of Antigua and Barbuda breeding farms with 460 acres and a total of about 300 cattle
- 4 government-operated communal grazing areas (CGA) with 440 acres and about 300 cattle

Estimated national livestock inventory, level of offtake, level of imports, and level of self-sufficiency in 1985 (the second year of ALIP after the drought ended) are shown in table 1. The current low livestock offtake rates in Antigua and Barbuda can be attributed to the lack of organized management and generally poor nutrition. Offtake rates in 1985 were estimated at 27% for cattle, 164% for pigs, and 50% for sheep and goats based on the number slaughtered or output compared with the inventory of animals in 1985. The average slaughter weights are also relatively low. Estimated average carcass weights in 1985 were 334 lb for cattle, 104 lb for pigs, and 25 lb for sheep and goats. Milk production was only 134 lb per cow milked. On the other hand, national egg

production has been comparable to that of many developed countries; a major part of national production is based on modern factory-type production systems. The average estimated egg offtake was 28 lb or 214 eggs per layer in 1985 (table 1).

Animal inventory numbers in table 1 are based on a national survey conducted by the Organization of American States (OAS) in 1985 and they differ from previous estimates, e.g., as reported by Danish Rural Development Consultants (DARUDEC) in 1985.

The self-sufficiency level in egg production is much higher than those for other livestock products: egg imports are restricted and local egg prices are approximately 50% above the import cost of eggs. Only a few quality pigs and broilers are produced and the former dairy processing plant is not acceptable for processing milk; therefore, the level of self-sufficiency is very low for these products. Up to 20% of the cattle inventory and an unknown number of sheep and goats were lost during the severe drought of 1983-1984.

Table 1. Livestock Supply and Utilization, Antigua and Barbuda, 1985.

Item	Animal Inventory Number*	Animal Slaughter Number	Production (1000 lb)	Product Imports (1000 lb)	Product Self-Sufficiency %
Beef	11,074	3,008	1,006	1,140	47
Pigs	2,437	4,000	414	1,219	25
Sheep & goats	15,640	7,820	198	87	69
Milk	4,238	-	568	9,417	6
Poultry Meat	-	44,812	157	7,531	2
Eggs	41,583	-	1,160	329	78

\*Source: Animal inventory numbers were obtained from Dr. Joseph Campbell, OAS, personal communication November 1985. Other data are Winrock estimates and the import data are from OECS.

Government estimates of local livestock production are subject to error, because slaughter data are recorded only at the St. John's public abattoir and at some key villages. No public facilities are currently available for slaughtering poultry or for processing milk and eggs. Most of the milk produced is obtained by hand-milking in the pasture, once-a-day, calf at side. Milk is commonly sold to private customers in raw form in 26 oz rum bottles. Few livestock farmers feed concentrates or put up hay and silage for the dry season. Most of the pastures contain Seymour or Native Antiguan hay grass of relatively low quality. The spread of Acacia thorn bush is a continuing problem and has seriously reduced pasture carrying capacity in some regions of the country.

## **Demand/Production Trends**

Local livestock production, except for eggs, has continually lagged behind domestic demand in recent years. Cattle production suffered a major setback, with about a 20% loss in inventory, during the 1983-84 drought. Demand is increasing rapidly as a result of population growth, improved per capita income and increased tourism. The population was 70,134 in 1984 (OAS, 1984 Census) and is projected to grow at 1.3% per year (World Bank, 1985). Real per capita gross domestic product increased at an average rate of 4% per year between 1977 and 1983. The World Bank estimates that the number of Antigua/Barbuda tourists will increase 54% from 1983 to 1990, providing further stimulus to the economy. Increased tourism, along with growing proportion of higher income Antiguans, has stimulated demand for high-quality livestock products that are not currently produced locally.

Lagging livestock production is attributed to continued deterioration of the pastures; government-controlled prices for livestock, with no incentive for quality production; problems in securing long-term leases on Government land for private livestock development; and the continuation of the "landless system" of production that allows cost-free, public use of government-owned land. Other constraints include the high cost of imported concentrate feed; limited availability of by-products for livestock feed; the lack of an approved milk processing plant and a sanitary slaughter plant; and weak technical support from the national extension service, which is poorly equipped to assist livestock farmers.

## **GOAB POLICIES AFFECTING LIVESTOCK DEVELOPMENT**

### **Land Resources**

National land resources include 69,000 acres on the island of Antigua, with about 50,000 acres usable for agriculture and 32,000 arable acres. Barbuda has 39,000 acres that have a relatively shallow soil covering but are generally usable for grazing. Most of Barbuda and about 25% to 30% of Antigua is covered with brush. Only about 2500 acres in Antigua and less than 300 acres in Barbuda are in crop production. The country experiences annual dry seasons and periodic severe droughts. There is limited opportunity for irrigation.

The Organization of American States is conducting studies of national land uses and resource development for policy analysis that should result in improved land use planning and more effective use of national land resources.

### **Land Tenure**

The government acquired ownership of about 60 percent of the land in Antigua when the former large sugarcane estates ceased operation. Nearly 100% of the land in Barbuda is owned jointly by all Barbudans. A government leasing system was developed to provide easy access to small plots for cultivation of vegetables and other crops; however, there have been some restrictions on leasing GOAB land for livestock development.

In 1972, land was provided for a project funded by the Caribbean Development Bank (CDB) to develop 20 new 100-acre tenant cattle farms (LDU farms). These farms later were divided into about forty 50-acre private livestock farms that continue to be leased from government. Land also was provided to establish a CGA, entailing a total of 440 acres rented for cattle grazing. Only a few private livestock owners have obtained leases to develop GOAB land for other small livestock farms outside of the LDU and CGA projects.

The EDF proposal for livestock development completed by DARUDEC in 1985 included development of about 40 new 10-acre livestock breeding farms and 40 4-acre farms for livestock fattening. The government has been asked to provide a long-term lease on these 560 acres so that landless farmers might participate in the project. Prior to the EDF study the government and ALIP had agreed to provide long-term leases for LDU farms. Previously, the LDU farmers had been operating with annual leases and no security of tenure. Given the recent examples of new policy in providing long-term leases for livestock development, it appears that the government is now supportive of the need for providing long-term leases to foster improvement of livestock farms. Another problem reported in obtaining long-term leases from the government is the requirement for a legal survey of each property before a lease is granted. The survey process has been extremely slow in the past; however, change has been planned to speed this process.

### Price Policy

Prior to ALIP, the government, for many years, had set control prices for all cattle, sheep, goats and pigs slaughtered in the St. John's public abattoir. When ALIP began, the price structure for livestock was: bulls, steers and heifers (ECS1.10/lb); cows (ECS0.80/lb); sheep and goats (ECS1.00/lb); and pigs (ECS1.20/lb). The quality of the livestock was not taken into account in setting the price structure. The meat prices set for animals slaughtered at the abattoir were: beef steak (ECS3.00/lb), other beef (ECS2.50/lb); goat and sheep meat (ECS3.00/lb); pork (ECS3.00/lb); all lungs, liver and hearts (ECS2.00/lb); and all heads, feet and tails (ECS1.50/lb).

The price controls were intended to maintain lower meat prices for local Antiguan residents. Prices were not controlled for meat processed outside of the public abattoir.

Few sheep and goats had been slaughtered at the abattoir in recent years, because the free-market price for live animals was about double the set price. Many of the cattle and pigs handled at the abattoir were of relatively low quality. The better-quality animals evidently were slaughtered on the farm for private sale to meat shops and supermarkets. Although the set public-market prices were low, private traders also imported low-quality meat, sometimes at a lower price than the controlled price, as there were no tariffs or grades and standards imposed on imported frozen meat. The periodic availability of cheap meat imports has caused some disruption in the local market, e.g., some

frozen boneless beef was imported in 1985 for about EC\$1.20 per pound and was used to substitute for local beef in the ground-meat trade.

Although the system of controlled prices has been at least partially bypassed by on-farm slaughter, the butchers have used control prices as a general guideline in purchasing livestock from farmers. Controlled prices and the lack of price differentiation for quality differences has been viewed as a constraint to development of improved livestock production.

Inequities are found in the price policies used in leasing land for various operations. The annual lease cost for fenced and partially developed LDU farms is currently EC\$30/acre/year, but this cost is scheduled to increase to EC\$70 over the next 7 years. The annual lease cost is about EC\$15 per acre for other private livestock farms that were developed directly by the lessee. On the other hand, high-quality land is rented for crop production at only EC\$7 to \$10 per acre. The dominant group of landless livestock producers graze animals on government land at no cost. Producers with cattle in CGAs are required to pay a monthly grazing fee per head that varies with the age of the animal.

Only a small portion of the better-quality agricultural land held by the government is currently leased. Of a total of about 32,000 arable acres, privately owned estates account for about 2,000 acres (6%), about 1,000 acres (3%) are rented by the government for small cultivated plots of 1 to 2 acres, and about 1,500 acres (5%) are leased for medium-size LDU farms and a few other private livestock farms. The CGAs account for 440 acres (1%), the government livestock-breeding stations (Olivers and Paynters) include 460 acres (1%), ASIC, a government statutory body, controls 2,000 acres (6%), and the remaining 24,600 GOAB-owned acres, about 77% of the total arable area, are used for common grazing by landless farmers.

### Trade Policy

Antigua and Barbuda have followed a relatively free trade policy for most agricultural commodities. There are minor tariffs of 5% to 10% on processed meat imports, including bacon, ham, and corn beef. Other fresh and frozen meat imports traditionally have been duty free. The country relied heavily on the export sale of primary products, sugar and cotton, and on growth of the tourist industry for foreign exchange earnings and became increasingly dependent on imports of food. The situation changed in 1982 when Government adopted a new policy stance of providing protection for domestic production. This policy stated that:

"The Ministry of Agriculture, Lands and Fisheries will proceed on a course of self-sufficiency in beef, poultry, eggs, milk, mutton, lamb, pork and rabbit meat. Government will assure protection for the livestock industry by restricting imports of meat and meat products when local packing and marketing of meat have begun industrially. Dairy will also be protected."

Sunshine Egg Company was provided exclusive import license control in 1984 to start a new large-scale egg production operation. The retail price of eggs increased from about EC\$4.00 or less per dozen prior to the import restriction to about EC\$5.50 to EC\$6.00 in 1985. Other new production projects being considered that will require protection from imports include broiler production and improved pig production. Participation in the Caribbean Community (CARICOM) will also entail increased protection from imports for a wide range of livestock products from outside the CARICOM region.

## CONSTRAINTS TO LIVESTOCK PRODUCTION

### INFRASTRUCTURE PROBLEMS

The lack of development in the livestock industry can be attributed to a number of infrastructure problems, as well as other problems of price policy and land tenure discussed earlier. Principal infrastructure problems include the absence of a sanitary slaughter plant for livestock that would be acceptable to the hotel/tourist industry, the absence of an approved milk processing plant, and a generally unorganized livestock production system, (most of the livestock are allowed to roam freely with almost no management except for minimal health care). The availability of free range has probably hindered development of organized livestock farms, because the landless farmers have almost no cost in production other than providing their own labor and transport. On the other hand, organized producers have costs for improvements such as fencing and maintaining the pastures, as well as an annual lease cost. Animals wandering from the landless system also damage organized farms by breaking down fences, destroying pasture plantings, and breeding with improved animals.

Other infrastructure problems of particular concern for dairy development include the relatively undependable supply of electric power, the lack of irrigation water for improved pastures, and poor road conditions in some areas. All livestock marketing is done by private agreements, based on per head, oral contracts, and there are no organized facilities to assist producers in marketing. However, such facilities probably have not been needed in the past because prices have been controlled.

Marketing facilities were improved to some degree in 1985 when the Antigua and Barbuda Meats Development Corporation, Ltd. (ABMDC) installed meat-processing facilities in a converted ice plant. From 1984 to 1986, a professional butcher was hired to train Antiguan in meat cutting, and the plant was used to process meat for the hotel/tourist trade. However, there has not yet been a replacement approved sanitary slaughter plant for the current poorly-equipped public abattoir to accommodate local animals. There are no central sanitary facilities for processing local poultry or milk.

### APPLICATION OF TECHNOLOGY

Use of power equipment is fairly commonplace in ASIC crop operations and for preparing small-plot, seed-beds of individual farmers. Both ASIC and the Small-Farmers Association have farm equipment to assist small farmers. The Paynters livestock station also has some farm equipment to bush-hog pastures and to bale hay for station livestock feed requirements and for sale to private livestock farmers. Backhoes and dozers are relatively plentiful to do custom on-farm brush clearing; however, few farmers own equipment.

In the livestock industry, applications of new technology are rare among landless farmers whose animals are allowed to roam freely. Technological advances remain at a relatively low level for other organized livestock farmers, aside from those used by a few pig and poultry producers. Organized cattle, sheep, and goat producers usually graze their animals on native pastures, feed little or no concentrates and mineral mixes, have relatively poor or no facilities for handling livestock, seek little breeding improvement through breeding, and seldom attempt to preserve hay or silage or practice pasture rotation. Productivity of their livestock is generally no better than that obtained by landless farmers. A subsidized government program for animal-health care is provided at Oliver's livestock station; however, the station is often short of veterinary supplies and there have been problems with the maintenance and care of animal dips. Animal-health assistants at Oliver's currently lack transportation and can provide only limited assistance to livestock farmers. Only two government veterinarians are available to assist the livestock industry.

Assistance in development of improved pastures is provided by CARDI. Demonstration plots are maintained at the CARDI field station and CARDI also provides planting material and other assistance in establishing improved pastures on private farms. Some of the MALF staff at Oliver's provide technical assistance in fence construction. Improved cattle are bred at the Paynters livestock station for distribution to farmers. These improved cattle are sold for breeding at prices below the cost of production (at regular slaughter price).

#### LIVESTOCK PRODUCTIVITY

Productivity levels are low for cattle, sheep, and goats, because they graze on relatively poor, native, privately-owned pastures or government surplus land and they receive little or no supplemental feed in the dry season. Breeding is indiscriminate, particularly for the free-ranging herds and flocks, and on some organized farms as well, since few animals are castrated. The national cattle herd has a relatively high proportion of bulls, and they are commonly retained in the herd for up to 4 or 5 years before slaughter at a live weight of 800 to 900 lbs. Sheep and goats are of relatively low quality, with a slaughter live weight of 50 to 60 lbs. Most animals lose weight during the dry season. Estimated cattle offtake in 1985 was 27%, based on a recorded slaughter of 3,008 head and an inventory level of 11,074 (see table 1). The typical offtake per year would be only 15% to 20%. Average cattle carcass weight in 1985 was 334 lbs. Recorded sheep and goat slaughter in 1985 was 7,820 head from an inventory of 15,640, indicating a 50% offtake rate. However, some of the sheep and goat slaughter is not recorded. Estimated offtake is less than 100% for sheep and goats, because of high predator losses and poor management conditions.

Poultry and pigs are raised under traditional extensive low-input backyard conditions (with minimal use of concentrate feed) as well as under relatively modern intensive conditions. Productivity is similar to that of most developed countries under intensive management conditions and relatively low under extensive backyard conditions. Sunshine Egg Co.,

the dominant egg producer in the country, has achieved an average laying rate of 70% to 75%.

Some improved pigs are slaughtered on local farms and marketed directly to hotels and supermarkets.

The quality of cattle, sheep and goats is generally of a utility grade, with a relatively low dressout. Local carcasses are currently not acceptable by the hotel/tourist trade except for feeding local Antiguan support staff. "Backyard" poultry and swine also are of low quality.

#### **MARKETING CONSTRAINTS**

Marketing constraints include the absence of a sanitary slaughter plant and a milk processing plant, and a general lack of organized linkage between the domestic livestock industry and the hotel/tourist sector. Only a few scattered livestock producers (mostly egg and improved swine growers) have established sales outlets to the hotel/tourist trade. The tourist hotels and restaurants continue to rely mainly on import of livestock products. The cattle, sheep and goats produced locally do not meet the quality requirements for the hotel/tourist trade and there are limited meat processing facilities to utilize low-quality meats.

#### **DROUGHT CONDITIONS**

The country's climate is characterized by annual dry seasons and periodic severe droughts. The 1983-1984 drought was so bad that some water had to be imported to supplement the municipal water supply. Rainfall records for 30 years (1922-1962) show an annual average of 37 inches or less in 20% of the years and 74 inches or more in 20% of the years. About 45% of the rainfall occurs in the wet season from August to November and about 12% in the dry season from February to April.

Although the periodic severe droughts are a constraint in livestock production, livestock farmers seldom produce hay or silage to prepare for drought. The risk of drought probably explains many of the farmers' decisions to minimize expenditures in livestock production.

#### **ECONOMIC ISSUES**

Organized livestock farmers are at a comparative disadvantage in competing with landless farmers, because the landless farmers have few production costs other than labor and transport. Landless farmers produce cattle, sheep, and goats of generally low quality, but at relatively low cost, by using cost-free government land. Production of high-quality animals is difficult in the landless system, because of indiscriminate breeding and variable pasture conditions. Organized livestock producers must be protected from import competition before they can produce high-quality animals acceptable to the hotel/tourist trade. These producers now have to pay the high cost of imported inputs (fencing, concentrate feed, fuel, and vehicles). Under organized

management, the potential for producing improved sheep and goats to replace hotel/tourist market imports of select meat cuts appears to be better than that for cattle, because the small ruminants do not require concentrate feed to produce a carcass that would meet U.S. Department of Agriculture (USDA) standards. Except where the hotel/tourist market specifically requires grain-fed beef cuts, there also is good potential for improved cattle production with a good forage feeding program. Antigua and Barbuda have a market for quality grass-fed beef as well as grain-fed beef that is currently being filled with imports from the European Economic Community (EEC) and Australia.

Although the absence of a sanitary slaughter plant and a milk processing plant are definite market constraints to improved linkages between the domestic livestock industry and the hotel/tourist sector, these facilities could not be justified economically without an assured supply of quality product to sustain processing. It is doubtful if current production would support operation of such plants. Improved facilities also are needed to process low-quality meats and to make products such as sausage and salami to increase the use of low-quality meats.

The current high cost of imported concentrate feed (about double the price in the U.S.) would not justify expansion of improved swine and poultry production, unless protected from imports.

## MODIFICATIONS TO OBJECTIVES

### DROUGHT-RELATED MODIFICATIONS

A severe drought during 1984, the first year of ALIP, caused delays in the startup of some activities -- particularly in the import of improved animals and development of improved pastures. These activities were deferred until the fall of 1984 and first months of 1985, when growing conditions improved. However, much of the short-term training, including that for AI, began during the drought. Construction of the improved livestock-handling facilities was actually ahead of schedule.

Most of the applications of technology did not begin until near the end of the first project year; thus by project activity completion date (PACD) the farmer cooperators had not obtained as much experience with the technology as had been anticipated at the outset of the project.

### DEFICIENCIES IN INFRASTRUCTURE SUPPORT

Training of extension service personnel was limited in ALIP because few extension service personnel were experienced in or assigned to the livestock production area. Extension service personnel were primarily interested in livestock production as an enterprise to supplement crop production.

A supply contract could not be arranged with Antigua Dairy, because the plant was not acceptable or functional for processing milk. Milk processing assistance to local producers was limited to the provision of small pasteurizers for home use. Centralized milk processing would require a new plant; however, a dairy-sector feasibility study is needed to determine if it would be financially viable.

Equipment cost is subsidized by the government for small crop farmers, e.g., through the extension service, thus some difficulty was experienced in collecting the estimated total cost of custom-hire of ALIP equipment from livestock farmers. However, a fee assessment based on the estimated total cost structure was enforced up to PACD. Some accounts remained unpaid for equipment use on livestock farms.

### RECOGNITION OF NEED FOR STUDY OF MARKET FACTORS

One project goal was to increase production of meat and milk for the tourist trade, as well as the local trade, so that Antigua and Barbuda could become self-sufficient and develop significant export trade to nearby countries. A separate study of the livestock sector, with major emphasis on marketing, was conducted in 1985 to evaluate the market potential for improved livestock production. Results appear in a Winrock final report "Economic Analysis of the Antigua/Barbuda Livestock Sector" completed in January 1986.

The sector study findings indicated that opportunities to export Antiguan cattle to Guadelupe and Martineque were limited because of EEC regulations and preference for higher-quality animals. Some control on the use of government land was needed to encourage organized production as a replacement to the current "landless system". Protection from imports was required to support organized production.

#### **EVALUATION OF LAND LEASE AND PRODUCTION COSTS**

In the fall of 1984, at the end of the drought, the LDU farmer cooperators were faced with a potential long-term increase in the annual lease cost for LDU farms -- from \$30 to \$70 per acre per year. The impact of this increased annual lease cost and the issue of comparative production costs in organized-versus-landless production were of interest to government policymakers in planning the future of organized production. This production-cost survey was begun in the fall of 1984 to develop livestock enterprise budgets, including the cost of technological improvements introduced in the ALIP.

Results of the production cost analysis were presented in the Winrock final report "Economic Analysis of the Antigua/Barbuda Livestock Sector" in January, 1986, and the cost data are summarized later in this report.

#### **EXPERIENCES WITH PRODUCER/COOPERATORS**

Producer/cooperators were receptive to making hay for dry-season feed, but were less interested in making ensilage, apparently because special handling and additional management were required (as compared with that needed for hay production). Only a few farmers expressed interest in milk production. As indicated earlier, some difficulties were experienced in collecting payment from farmers for use of equipment. This was attributed to the current practice of the extension service in subsidizing the cost of equipment for use by crop farmers. CARDI also has been developing 3- to 5-acre improved pasture plots at no cost to the farmer. For development above 5 acres, CARDI assistance was limited to the cost of seed material.

Cooperators expressed interest in record keeping as a means of negotiating the lease rate charged by the government for land, but were not easily convinced that record keeping was also an important management tool. Since they are mostly part-time farmers, they tended to view livestock production more as a way of life rather than as a strictly business enterprise. Many cooperators required continued technical assistance in making day-to-day decisions on questions such as: "When should I cut the hay?" "When should I feed supplement?" "How do I fix a short in my electric fence?" These questions can be attributed to the current lack of extension service support for livestock production and the farmers' 1) lack of experience with new technology applications. The sustainability of new technology applications will depend on the availability of continued follow-up technical assistance to guide producers on these types of decisions.

## **MID-TERM EVALUATION TEAM RECOMMENDATIONS**

The Interim Evaluation Team recommended only minor changes in ALIP objectives, including the following:

### **Training**

The team suggested the need for a more suitable record-keeping package to replace the one introduced by ALIP in 1984. However, the team also found that cooperators may be slow to begin keeping records on a systematic basis, or are hesitant to publicly share that information. The cooperators felt the training received in bookkeeping and pasture improvement had been appropriate (Interim Evaluation Report, p. 12).

Followup discussion on record-keeping with farmer cooperators in 1985 indicated that they did not want to have their records evaluated in a group meeting. They said they were not having any difficulty using the record-keeping system introduced in 1984, but that they would like to have individual assistance in overall farm planning, including development of enterprise budget data. Their motivation for wanting a farm plan included seeking credit assistance; a farm plan seems to be an effective tool in communicating with bankers.

Record-keeping and farm-management training during 1985 and 1986 emphasized responses for assistance in record-keeping and farm planning in response to individual requests.

The Interim Evaluation Team suggested that training include the operation and maintenance of field equipment. In the early phases of ALIP, the cooperators had agreed that all farm equipment work should be done on a custom-hire basis, with a hired tractor operator to perform all maintenance and to control the use of equipment. It seems unlikely that individual cooperators will purchase their own equipment for individual use, because their operations are relatively small. Individual cooperators use of the equipment pool was not considered advisable without the use of the driver. The current cooperative manager has extensive experience in equipment operation and maintenance and is capable of supervising the tractor operator.

### **Use of Technology**

The Evaluation Team suggested a de-emphasis of AI and replacement with natural breeding using improved bulls. It also was suggested that cooperators needed to provide a storage facility for hay to reduce field losses.

## ACTIVITIES AND RESULTS

The Antigua Livestock Improvement Project and related analyses by Winrock with financial support from USAID were concerned with most livestock-related programs and issues in Antigua from 1983 to 1986. This involvement provided opportunities to influence activities and decisions by GOAB officials and representatives of other agencies working in Antigua, as well as those of livestock farmers.

The following sections describe ALIP activities and achievements, which necessarily reflect the work of many others, thus there is no intent to imply that ALIP was solely responsible.

### POLICY-ORIENTED ACTIVITIES

#### Land Tenure

The Antigua/Barbuda Agricultural Sector Assessment by Midwest Universities in 1983 found that lack of long-term land tenure was a major constraint to investment in livestock farms. ALIP also considered assured land tenure to be a key to project success: farmer cooperators had little incentive to invest in farm improvements when they were operating on only a yearly-lease basis, with no security of tenure.

Correspondence between the Ministry of Agriculture and the USAID Mission Director preceding implementation of the ALIP also indicated the importance of land-tenure issues. Although the Regional Development Officer of USAID had stressed that the land-tenure issue should be resolved before project implementation, this had not been accomplished and much of the project activity in 1984 was devoted to land tenure questions. The Ministry was clearly committed to improved land-tenure arrangements; however, effective procedures had to be developed for implementation. Ministry of Agriculture, Land and Fisheries was in the process of completing farm surveys and the Organization of American States (OAS) was conducting a population and livestock census. ALIP funds could not be released until criteria were developed for selection of the cooperating farmers. A key component of these criteria was that farmers have a long-term lease. When the criteria were written and approved, the record again was established in support of land tenure. (Appendix 2-1)

The land-tenure issue was complicated by an anticipated increase in land-lease rates to cover development costs of the Livestock Development Units financed by the Caribbean Development Bank. Farmers saw two needs: to have 1) a long-term lease at 2) an affordable cost. Cooperating farmers held meetings weekly and sent petitions to the Ministry of Agriculture and the Chief Veterinary Officer (CVO). It soon became apparent that production costs would have to be calculated before a reasonable price could be set for a lease charge. ALIP funds provided technical assistance from Winrock International, and Dr. Kenneth Young, agricultural economist, collected data to determine the cost of producing livestock and livestock products for market from various

management systems. (See Vol. III Economic Analysis of the Antigua/Barbuda Livestock Sector - Livestock Production Cost Budget)

In the fall of 1984, agreement was reached with GOAB for LDU farmers to obtain a 10-year lease, renewable after 10 years. A few cooperators have begun, or are planning to build, a home on the leased farm. Since obtaining a long-term lease, they also have shown more interest in improving their farm facilities and in making long-term plans to increase income. No agreement or commitment from GOAB will be made to grant eventual ownership of the property to tenants until a national land-use plan is completed. However, cooperators seem confident that they would be reimbursed for farm improvements if the government were to cancel their lease in the future.

### Price Policy/Controls

When ALIP began, price controls for livestock slaughtered at the St. John's public abattoir and for meat processed at the abattoir were at the levels listed at the introduction of this report. The government also had a policy of margin control on the sale of all livestock products at both the wholesale and retail level. Enforcement of the margin-control policy has been difficult, particularly for imported products, because the government has relatively poor data on meat imports.

Local butchers generally followed the price-control policy set for cattle and pigs; however, many of the better-quality animals were slaughtered on the farm, apparently because of the price-control system. Sheep and goats have been in relatively short supply in recent years and they have been marketed at prices about double the control price, mostly outside the price-control system.

Price controls for livestock products were considered to be a major constraint to investment in the livestock sector. Completion of the livestock-production cost estimates by Dr. Young provided needed information for adjusting the lease payments to the LDU farmers; the data also showed that production costs exceeded livestock control prices. The Ministry of Agriculture needed this information to make the necessary adjustments to price controls and leases. The ministry requested further market and policy analyses, and project recommendations and USAID provided additional funds; these studies also were made by Dr. Young. (see Volume I Economic Analysis of the Antigua/Barbuda Livestock Sector Policy Analysis, Volume II Economics Analysis of the Antigua/Barbuda Livestock Sector Market Analysis, and Volume IV Economic Analysis of the Antigua/Barbuda Livestock Sector Project Recommendations)

As noted, long-term leases were made available to the livestock farmers for 10 years, renewable for 10 years. Lease costs per/acre are to remain stable for the first 3 to 4 years and will then increase gradually.

The Ministry of Agriculture removed price controls on livestock in 1986. In a comparison of current meat import costs and estimated local production costs, the study findings indicated that import protection was needed to enable organized livestock farmers to compete with imports. In 1986, the government initiated an import tariff on meats at the same time prices were decontrolled. Effects of these changes in import policy and the decontrolling of livestock prices on the local price structure are not yet known.

The government has made no response to study recommendations for controls on the use of government land and required payment of grazing fees by landless farmers. These recommendations were intended to help prevent overgrazing on government lands, to correct inequities in charging organized producers for land use, and to promote development of organized production systems by current landless producers.

The EDF project scheduled in 1987 is oriented to the landless farmer group and will provide assistance to them in establishing organized farm units. This project should help both the landless and organized farmers improve their methods of production.

### **Other Policy Changes**

New leases for LDU farms negotiated in 1984 shift more of the burden for farm maintenance to the farmer. Lease holders will be expected to uphold all lease agreements, pay lease charges on time, maintain the land, and adhere to acceptable management practices and stocking rates. A share of the tariff monies is to be allocated for extra payment to producers of quality beef, as recommended in the 1986 livestock sector study. Government policy will encourage the farmer who is part of the organized system and discourage expansion of the landless system.

## **INSTITUTIONAL STRENGTHENING**

The ALIP Steering Committee was composed of representatives from the Ministry of Agriculture, Lands and Fisheries, Caribbean Agricultural Research and Development Institute, United States Agency for International Development, and Winrock International, plus the chairman of the cooperating farmers groups. This committee met quarterly to review progress of the Project and management team. (Appendix 1-1)

### **The Cooperative**

Historically, Antiguan livestock farmers have not been successful in establishing farm organizations. Thus, it was decided to assemble an informal group of livestock farmers interested in working together to improve their farms. Officers were elected and eventually the group became an association. The project mid-term evaluation suggested that the group should become more formally organized. Thus, by-laws were developed, officers were elected, and a cooperative was formed. The lists of cooperating farmers for the years 1984, 1985, and 1986 indicate farmers who participated in project activities. (Appendix 1-2)

The 1986 listing designates those farmers who have paid dues and shares in full, and it depicts, to some degree, a shifting of interest. During 1984 much activity was devoted to long-term leases, but as this activity lessened, farmers interested only in leases no longer participated. The result has been the development of a dedicated "core group" of farmers who have worked for the cooperative from the beginning; they will determine the success of the cooperative. (Appendix 1-2)

The management committee members have been instrumental in providing leadership and decision-making. Examples of their work include development of the by-laws, the machinery-hire program, the breeding and pay-back plan, and the criteria for participation. (Appendix 1-3)

The Ministry of Agriculture's gift of a headquarters site to the cooperative gave to the group a sense of identity and a base of operations. The management committee set the required number of shares needed for membership and set relatively high dues to provide needed funds for development of the cooperative. Provision by USAID of significant project funds for a complete line of farm equipment gave the cooperating farmers needed machinery for farm development, and provided a cash flow for future development and a secure capital base (Appendix 1-4). The end-of-project bank account developed as a result of the equipment program and purchase of shares provides a firm financial base (Appendix 1-5). Animals distributed by the project and livestock owned by the cooperative also provide for an increased capital base and continued interest.

If the core group of members continues to support and expand the base, the cooperative can be a significant force in livestock development for the members and for Antigua.

The success of the cooperative depends upon the ability of the members to:

- work together for the common welfare
- manage the affairs of the organization as a business
- expand and develop the Cooperative
- receive continued encouragement from Government

#### **Government of Antigua and Barbuda**

**Extension service.** The extension service in Antigua is crop oriented. Animal health assistants from the livestock division usually provide extension to the livestock farmer. The extension service received quarterly and annual reports of the ALIP activities and collaborated when appropriate.

For example:

- Project staff participated in extension training programs.
- Extension personnel participated and(or) attended joint field days held by ALIP and CARDI.

- Extension personnel were included in TA programs and special programs such as -- Caribbean Commonwealth Veterinarian Program and Seminar and the livestock program sponsored by the Caribbean Feed Mills.

**Artificial insemination.** The Ministry of Agriculture strongly supported AI activities and Winrock International provided training in AI for farmers, extension personnel, animal health assistants, and livestock personnel. ALIP imported frozen semen from Jamaica and the United States and established an AI system. Farmers could phone the livestock station to arrange for AI services and a recording telephone handled calls when needed. This service is expensive to maintain and livestock production in Antigua does not lend itself to use of AI, in spite of the well-known advantages to breed improvement. For example: 1) the farmers' part-time involvement and residence off the farm are not conducive to their monitoring of their animals for proper timing of heat detection for good conception rates; and, 2) most farms lack facilities necessary to restrain animals for insemination.

The project mid-term evaluation recommended de-emphasis of AI, suggesting use of live sires for breed improvement. As a result of this recommendation, 10 Jamaica Red bulls were imported and distributed. (Appendix 1-6)

**Livestock station.** ALIP was designed to work with a cross-section of livestock farmers. An office was provided by the Livestock Division at Oliver's Station. The Chief Veterinary officer, Dr. J. Robinson, and the Veterinary Officer, Dr. J. Mathew, provided excellent support. Animal-health assistants, secretaries, and laboratory technicians were available and helpful when needed.

Personnel of ALIP and the Livestock Station collaborated closely. Training programs in AI, animal health, and management were held for herdsmen of the communal grazing area, as well as for agricultural assistants, animal health assistants, and herdsmen from the livestock stations. ALIP project staff collaborated with the veterinary officer, livestock officer, and animal health assistants in presenting videotapes, slide programs, and field demonstrations. Project field equipment was shared with the livestock stations and often station equipment was shared with the ALIP. Livestock stations regularly provided workers for special projects such as the sheep-feeding trials. The stations also provided hay for the sheep-feeding trials. The project provided two Jamaica Red bulls for use in the government herd, and project field equipment was used to prepare large acreages for seeding at both stations. Sudan and sorghum seed were provided by the project.

### **Peace Corps**

During 1984, the Peace Corps Regional Training Office was located in Antigua. ALIP periodically held tropical livestock husbandry training for Peace Corps volunteers. The Peace Corps office in Antigua collaborated with the project to provide business management expertise for the new cooperative; however, the volunteer left Antigua before these services were provided. The Peace Corps sponsored the president of the

cooperative on attending a business management training course for 2 weeks in Barbados.

### **Barbuda Council**

ALIP also worked closely with the Barbuda Council. Dr. Young and the project coordinator met with the Council to discuss livestock development Plans. Peace Corps volunteer Fritz Korthase and the Council submitted proposals to USAID/Barbados for special projects funding, including a project to develop livestock pasture beneath a coconut plantation that was being fenced and rejuvenated. Another proposed project was to reseed and fence an area for communal grazing. CARDI also collaborated on the coconut grazing scheme. The project coordinator later made trips to Barbuda to obtain more information for USAID, and to evaluate the request, figure fencing requirements, and estimate equipment needs.

### **Other Indirect and Collaborative Support**

Institutions collaborating with ALIP included:

- Caribbean Agricultural & Rural Development, Advisory & Training Service (CARDATS)
- Caribbean Agricultural Research and Development Institute
- United States Agency for International Development
- Organization of American States
- Antigua Sugar Industry Corporation
- Ministry of Agriculture, Lands and Fisheries
- Food and Agriculture Organization of the UN (FAO)
- European Development Fund
- Caribbean Project Development Facility
- Antigua/Barbuda Meats Development Corporation, Ltd.
- North Carolina Baptist Agricultural Missions

The project coordinator's work was facilitated through use of an office at Oliver's Livestock Station. Working with the chief veterinary officer as a colleague, the project coordinator was able to assist in many areas that would have otherwise been impossible. The opportunities to work alongside staff members of the livestock division and to be invited by the minister of agriculture to participate in periodic meetings at the ministry gave the project coordinator greater appreciation of the opportunities and constraints in livestock production.

As a result, much time was spent in the following areas:

- Collaboration with Danish Rural Development Consultants on the European Development Fund livestock study.
- Office and field visits with Caribbean Agricultural & Rural Development, Advisory & Training Service regarding the small farmer livestock fattening project.
- Collaboration with Caribbean Agricultural Research and Development Institute in joint educational and training meetings, field days, seminars, assistance with selection and importation of livestock

- from Barbados, as well as research and development of appropriate grass and legume seeds for the Caribbean. (Appendix 1-7)
- Helping with research requests from Antigua/Barbuda for small development grants for USAID Regional Development Office, Caribbean.
  - Resource person for consultants working for USAID in Antigua.
  - Involvement in activities with the Organization of American States in Antigua. Examples -- farm census, livestock census, review of price controls and(or) tariff on imported meats, land use surveys.
  - Consultation with Antigua Sugar Industry Corporation in the search for profitable alternatives to sugar production to utilize the large acreage of land under its jurisdiction. ASIC has been most supportive of ALIP and has shared both personnel and equipment.
  - Collaboration with Food and Agriculture Organization of the UN consultants in reviewing training material for the Caribbean. FAO provided a training course in small animals for one of the cooperating farmers and supplied self-teaching training manuals for sheep and goats to the cooperating farmers who received project animals.
  - Discussions in Antigua with the Caribbean Project Development Facility in the interest of funding a dairy operation. Further development is dependent upon a feasibility study of dairy potential in Antigua.
  - Collaboration with Antigua/Barbuda Meats Development Corporation, Ltd. on the market potential was useful for Project livestock producers. Personnel from Antigua/Barbuda Meats were participants in the project training meetings.
  - Discussions with representatives of the North Carolina Baptist Agricultural Missions, the Chief Veterinary Officer, and the Project Coordinator concerning areas of assistance with livestock improvement in Antigua.

## **PROCUREMENT**

### **Equipment and Supplies**

Improvement in the establishment, harvest, storage, and feeding of forage was a major project goal. Field equipment was not available to provide this service. Consequently, a complete line of essential farm equipment was imported to be used by the group of cooperating farmers. Mr. Webson, President of the cooperative and Field Manager for Antigua Sugar Industry Corporation, was helpful in determining soil types to be worked and matching appropriate equipment. Mr. Webson also developed the rate schedule of hourly charges for equipment hire based on depreciation and operating costs. Service and maintenance for the equipment was provided by ASIC and the equipment dealer. The planning committee of the cooperating farmers also was involved in the selection of farm equipment and the calculation of costs for equipment hire. (Appendix 3-1)

Most of the equipment was procured through the local Massey Ferguson dealer. Equipment was imported, assembled, and serviced by the dealer. (See lists of farm equipment.) Training equipment, purchased locally, included a television monitor, video cassette recorder, and tape

recorder. Winrock International procured and shipped other training equipment, including a slide projector, video tapes, slides, and books. (See lists of training equipment.) Livestock and crop supplies were purchased and shipped to the project by Winrock International, including 1,000 lbs sudan sorghum seed; electric fence supplies; livestock medicine and equipment; 6 small, milk pasteurizers; tools and tool box; and AI equipment. (See supply lists, appendix 3-2)

### **Breeding Livestock**

Initially, breeding improvement was to be accomplished through AI and the importation of a few select animals; however, the mid-term evaluation de-emphasized AI service. Ten Jamaica Red bulls were imported from Barbados, with assistance from CARDI. Two of the Jamaica Red bulls were placed on the government livestock farm, and eight bulls were placed with cooperating farmers. Forty Nubian and Alpine goats were selected, tested, and shipped to Antigua by Winrock International. The goats were placed with 13 of the cooperating farmers. Four Blackbelly rams were selected by CARDI in Barbados and shipped to Antigua, where they were placed with three sheep breeders. Sixteen Dorset sheep were brought to Antigua from Guiana Island and distributed to three cooperating sheep farmers. Six Jamaica Hope heifers were imported from Jamaica and placed on one farm. Six hundred straws of frozen bull semen were procured and shipped to the Project by Winrock International and two hundred straws of Jamaica Hope semen were shipped to the project by the Jamaica Livestock Association. (See lists of imported livestock, semen, and animal recipients, appendix 3-2)

The planning committee of the cooperating farmers (consisting of the four officers and three other members) considered all aspects of the dairy business, including effects of drought, part-time farming, and the lack of a milk processing plant. The committee decided to import dual-purpose cows that might be used for beef, but could be milked if a market became available, with one farm to be supplied with Jamaica Hope dairy cows. The criteria required for a farmer to receive animals and to participate in the breeding program were developed by the planning committee. Cooperating farmers are now responding to the pay-back plan and returning offspring for distribution to other cooperative members. The frozen bull semen has been placed with the AI program at the government livestock station for use by any farmer. One of the cooperating farmers has acquired a semen tank, which is used in a breeding program to artificially inseminate his cows. (Appendix 5-1)

## **TRAINING**

### **Training Materials**

Training was a key component of ALIP, which made extensive use of information produced by private voluntary organizations (PVO), the Cooperative Extension Service, Food and Agriculture Organization of the UN, the Peace Corps, and the U.S. organizations. ALIP also helped develop and test appropriate training materials for the Caribbean. Training manuals for farmers who received imported goats were developed

by FAO, Heifer Project International (HPI), and the Extension Service of the University of Arkansas.

Because of a need for livestock-training material specifically for the Caribbean area, Winrock International proposed a Caribbean training materials project as an activity of the Winrock/USAID Technical Assistance and Information Services Project. In 1984, Winrock capitalized on the regional agricultural experience of its staff and held a workshop in Antigua to study training needs and how to fill them. Winrock staff from headquarters in Arkansas, and from Antigua, Tobago, and Haiti plus a representative from the Caribbean Agricultural Research and Development Institute (CARDI) met to develop an outline for the training materials. A framework was designed to a system of training materials for trainees and livestock producers.

Video training tapes developed by Winrock for cattle, sheep, and goats were an important part of the basic training program of ALIP. In 1984, Winrock completed nine videotapes for dual-purpose goat management to be used in the training of limited-resource goat producers in the Caribbean. Winrock support staff at headquarters provided a constant flow of pertinent crop and livestock information to the Antigua Project and coordinated livestock shipments.

#### **Special Guests Participating in Meetings of the Cooperating Farmers**

Dr. E. H. Andersen -- Veterinarian, DARUDEC and Consultant to EDF  
Darwin Clarke -- Evaluation Officer, USAID  
Joseph Dailey -- AI Technician and Manager of Paynters Livestock Station  
R. Dry -- Manager, Antigua/Barbuda Meats Development Corporation, Ltd.  
Dr. H. A. Fitzhugh -- Director, Planning and Analysis, Winrock International  
Dr. E. Frazer -- Consultant, Antigua/Barbuda Meats Development Corporation, Ltd.  
Dr. W. Getz -- Animal Scientist, Winrock International  
J. Harris -- Asst. Manager, Antigua/Barbuda Meats Development Corporation, Ltd.  
Dr. R. D. Hart -- Agronomist, Winrock International  
George Jonas -- Registrar of Cooperatives, Antigua  
R. T. Kentish -- Livestock Officer, Antigua  
Dr. C. H. Mannasmith -- Veterinarian, Winrock International  
Dr. J. Mathew -- Veterinary Officer, Antigua  
Michael Maxey -- Grant Officer, USAID  
P. Maynard -- Forage Seed Project, CARDI  
Richard Newton -- Livestock Specialist, Winrock International  
Dr. J. F. Onim -- Agronomist, Winrock International  
R. T. Paterson -- Forage Seed Project, CARDI  
Perry Philip -- Forage Seed Project, CARDI  
Gerald Proverbs -- Livestock Specialist, CARDI  
E. Sarantino -- Forage Seed Project, CARDI  
V. A. L. Sargeant -- Coordinator of Forage Seed Project, CARDI  
Paul Schumacher -- Training Specialist, Winrock International  
Kenneth I. Talks -- Agricultural Economist, DARUDEC and Consultant to EDF  
Dr. Kenneth B. Young -- Agricultural Economist, Winrock International

### **Winrock Short-term Technical Assistance**

ALIP was specifically designed to provide technical assistance to the in-country coordinator for key project components such as AI, record keeping systems, livestock-handling facilities, and herd health. Winrock International personnel with special expertise provided training experiences for farmers, livestock workers, and extension personnel. Information on the short-term technical assistance, types of training activity, and persons participating in the training sessions is shown in attached data sheets on training activity 1984-1987, along with guests participating in meetings of the cooperating farmers.

### **CARDI Collaboration**

ALIP benefited greatly from the close working relationship and support provided by CARDI. The project was able to benefit from previous and current research and development carried out by CARDI in the Eastern Caribbean. CARDI staff were invaluable in providing forage programs to the cooperating farmers at their regular meetings, twilight meetings, field days, and seminars. The location of CARDI seed production facilities at Betty's Hope Field Station provided the project with a ready source of appropriate seeds adapted for the area. CARDI staff provided cooperation and technical advice with regular farm visits held jointly with the project coordinator, his counterpart, and cooperating farmers, and CARDI factsheets, booklets, and handouts were used regularly by ALIP. Highlights of the project were trips by the cooperating farmers to Barbados for a CARDI-sponsored field day followed by livestock farm visits during 1986 and 1987. (Appendix 4-1)

### **Long-term Training**

The Ministry of Agriculture, Land and Fisheries of Antigua provided the project coordinator with excellent counterparts. David Lewis, counterpart and animal health assistant with the Livestock Division is now studying for a B.S. degree in animal science at Tuskegee University, Alabama, U.S.A. His training is being funded by the USAID Regional Training Fund. Mr. Lewis will return to Antigua to fill a key role in the advancement of the livestock industry.

### **MALF Training**

ALIP was designed to work with a selected group of livestock farmers within the organizational framework of the Ministry of Agriculture and particularly the Livestock Division. Project personnel thus were able to become a part of the livestock division and to contribute widely whenever possible. This special relationship presented training opportunities for farmer members to attend events such as the Caribbean Commonwealth Veterinarian Association meeting, special training meetings held by and for the extension service, and livestock meetings presented by the Caribbean Feed Mills. The project also supported travel and training opportunities for the livestock division staff including travel to the United Kingdom, Puerto Rico, United States, Jamaica, and Barbados for participation in livestock meetings.

## **Special Training**

Special economic studies of livestock production and marketing costs were funded by USAID and coordinated with technical assistance from Winrock International. Collection of data and the testing of validity of information attained provided numerous opportunities for training for project personnel and the cooperating farmers. Participation in livestock-oriented meetings held by the livestock division and the ministry of agriculture provided the project coordination with a first-hand view of the system and its many constraints. This information in turn was shared with cooperating farmers. During 1986, many additional farmers requested assistance with the development of comprehensive farm plans to include feeding, breeding, and marketing. Often these plans were to diversify and reorganize the farm operation and a definite plan was needed for presentation when financial support was necessary.

ALIP participated in four training opportunities for the students of the Jennings High School in support of the government program to provide agricultural training for students. The project provided videotape equipment for the USAID Vegetable Irrigation Project at the Bethesda site. The Planning and Management Committee of the cooperating farmers was especially effective. Well-attended regular planning sessions were the focus for the development of the cooperative. By-laws were drafted, regular group meetings were planned including training, breeding programs developed, animal pay-back plans thought through, and decisions made for operating the field equipment hire program.

## **DEMONSTRATIONS OF TECHNICAL APPLICATION**

### **Pasture Improvement**

Pasture improvement is the key to a more organized productive livestock enterprise. The location of CARDI's seed production facility at Betty's Hope Station is an advantage for Antiguan farmers; the grass and legume seed varieties it has available produce well under the periodic dry conditions. Technical and practical expertise also are available through CARDI personnel. By-products for livestock feeding now are in short supply and few farmers supplement livestock feeding with expensive imported concentrate. The alternative is to properly use the ruminant's ability to transform Antigua's ample grasslands into profitable meat and milk.

Pasture improvement was a major project goal involving continued training and demonstration. The project imported 1,000 pounds of sudan/sorghum seed to be used as an emergency feed and as a nurse crop. The farmers responded well and requested the necessary field work from the cooperative equipment-hire program and paid for this service. Some farmers were reluctant to take land out of production for reseeding, because they were already over-stocked and short of feed. Legume/grass seedings establish slowly and provide little or no feed during reseeding. When seeded as the only crop, sudan/sorghum adapts to dry conditions well and grows quickly, providing pasture, silage, and hay. As a nurse crop, sudan/sorghum seeded at 50% of the rate of a pure stand

provides quick germination and shade for the new seeding, while conserving moisture and providing limited grazing. During the life of the project, over 100 acres were planted to new seedings of adapted legumes and grasses on 16 cooperating farms. Twenty acres of protein-energy banks were established for cut-and-carry feeding.

Project cooperators participated actively in the forage programs presented by project staff and CARDI personnel during the regular training sessions, field days, and farm demonstrations. (See training section.) The practices of cross fencing, rotational grazing, and the clipping of pastures improved the carrying capacity of cooperative farms, including:

- A. Joseph Farm -- where new seedings, cross fencing, rotational grazing, clipping of pastures, and hay making helped the producer carry 85 cattle on 63 acres of pasture, when the norm would be about 35 head. The cattle were in good condition and a project bull was placed on the farm.
- R. Richards Farm -- where new seedings, a protein/energy bank, cross fencing, rotational grazing, hay making, and clipping of pastures increased the carrying capacity to 1-cow/acre which is twice the norm. Cattle were in good condition and no cows were lost during the drought. A project bull was placed on the farm.
- Marshall Farm -- where permanent fencing and electric cross fence were used along with sudan/sorghum as sole crop and as nurse crop for new seedings. Cattle were in good condition and AI service in use. This farm lost many animals previous to use of project recommended practices.
- St. Clare Farm (Raeburn and Samuel) -- where electric and permanent fencing, hay making, rotational grazing, clipping of pastures, and sudan/sorghum seedings were used. A project bull, Jamaica Hope dairy cattle, and imported dairy goats were placed on the farm; cattle were in good condition and production is increasing. (Appendix 5; Also see letters and statistics from R. Raeburn and J. Samuel and summary of field equipment activity.)

### Livestock Health

**Interaction of livestock health and nutrition.** Herd health is strongly correlated with herd management; as the level of management rises, problems associated with disease and parasite infestation decrease. Nutrition and parasite control are management-related problems that affect the health of animals. External parasites are related to heart water, dermatophilosis, babesiosis, and anaplasmosis. These diseases and the general loss of physical condition are extremely costly. Internal parasites and coccidiosis are extremely damaging and require constant and routine treatment and observation.

After surveying the animal-health situation in Antigua, Dr. E. H. Andersen made the following observation.

"Most ruminants tend to lose weight or show slower growth towards the end of the dry season, when little nourishment is available on the often overgrazed fields. Generally their conditions improve following the onset of the rainy season. The goat is reported to be

the animal that suffers least during the dry season. The extent the animals are affected depends on the severity of the dry season and the amount of supplemental feed their owners are able to provide. The situation reaches extremes during drought years when many animals become emaciated and die from lack of nourishment and water. The Veterinary and Livestock Division made an island-wide survey of the losses incurred during the 1983-84 drought period. It was found that 917 cattle, 262 sheep and 222 goats had died. Total economic losses to the livestock sector caused by the drought were estimated at more than EC\$4 million." (Livestock Development Study, Danish Rural Development Consultants for the European Development Fund and the Ministry of Agriculture, Lands and Fisheries, Government of Antigua and Barbuda, November 1985).

The Ministry of Agriculture later revised these drought-related losses upward by 100%, indicating that about 3,000 animals had died with an estimated economic loss of about ECS8 million.

Animal-health care is under the direct supervision of the government veterinary officer, a livestock officer, and five animal-health assistants, all of whom were extremely cooperative. Office space for ALIP was provided by this section and most drugs were made available through this division of MALF. However, some items could be purchased from other sources. The European Development Fund Project has studied the animal-health-care delivery system and has proposed recommendations including transportation for the animal-health assistants.

The drought of 1983-84 emphasized the critical relationship of livestock health and the available forage and it is evident that some method of forage preservation and storage is needed to maintain the health of the animals and a successful livestock production program.

There are two systems of livestock production (cattle, sheep and goats) in Antigua (see Livestock Management Section): each presents unique advantages and constraints that affect the health of the animals. The organized system allows the farmer to manage his pastures, control the movement of livestock, and provide protection from predators. However, the system tends to concentrate livestock in limited areas and thus can aggravate parasite loads. Private farms and communal grazing are representative of this category.

In the unorganized system, the animals belong to farmers who have no land resources, thus the animals roam and graze freely. The free-grazing system allows for some forage selection by the animals, thus they have an opportunity to feed on a better forage. However, there is a keen competition for available feed.

Since the animals can move at will, there is a reduced chance for reinfestation with internal parasites. Some animals are tethered and taken to water daily, but these animals have to depend on their owners for the selection of forage. At times of severe shortage of feeds, the animals belonging to the unorganized farmers seem to fare better nutritionally than do those of the organized farmers. The government has been encouraging the private farm or organized system with a management program.

**Health problems of imported livestock.** As noted, goats, sheep, and cattle were imported by ALIP to improve livestock production.

The importation program met with limited success and the mortality rate was fairly high (table 2). Indigenous animals carry a certain degree of resistance to local disease and parasites, whereas imported animals are usually susceptible and must develop a resistance to these diseases and parasites. At the time of importation these animals could not easily be isolated and cared for during an acclimation period. This constraint might be partially overcome by having the animals held for a quarantine period at one location where they could be closely observed.

Table 2. Mortality Table -- Imported Animals

Species	Imports		Mortality		Reason for Death
	No.	Source	No.	%	
Barbados Blackbelly Sheep	4	Barbados	1	25%	grain overload
Jamaica Hope Cows	6	Jamaica	0	---	---
Jamaica Red Bulls	10	Jamaica	2	20%	dermatophilosis, heavy tick infestation (7 animals affected)
Dorset Sheep	16	Guiana Island	8	50%	ticks (4) dog attacks (4)
Dairy Goats	40	United States	15	37.5%	dog attacks (4) stolen (2) ticks (2) enterotoxemia (2) abomasal atony (1) gall sickness (1) hanged (1) poisoned (1) dystocia (1)

**Infectious diseases.** Few infectious animal diseases are found on the island of Antigua, except those directly related to parasite transmission. The tick-borne infections are heartwater, dermatophilosis, babesiosis and anaplasmosis. These diseases are due primarily to tick vectors, *Amblyoma variegatum* and *Boophilus microplus*. The ticks infest all species of ruminants and the diseases are found in cattle, sheep and goats, and they seem to be more prevalent during the dry season. This infestation may be due to the grazing habits of the animals. The ticks

are blood suckers and cause weight loss, anemia, skin irritation and general loss of production; mortality rates can be very high.

Although the diseases can be controlled by early treatment with antibiotics, the best control is by dipping or spraying which prevent the high levels of infestation. For heavily infested animals, dipping (complete submersion) with approved acaricides on a regular basis is most efficient.

Although complete eradication of the tick is possible, constant reinfection with a limited number of organisms introduced by the tick stimulates an immunity to the tick-born diseases in the host animals. Until there is a concerted effort to eradicate all the infective ticks, control of the ticks seems to be a more practical economic method.

The complete eradication of ticks in Antigua and Barbuda would require a high degree of coordination to include all animals that spread ticks and full nationwide participation by all producers. An eradication program is not likely to be successful until all animals are controlled in an organized system of production. There is a high risk of reinfestation if any animals are missed in the program. Animals rapidly lose their immunity to ticks after a period of nonexposure, and the potential losses from reinfestation can be catastrophic.

Thorny acacia bushes can damage the skin and provide an avenue of infection for dermatophilosis. Animals also may be reinfested with ticks that are harbored on the acacia. Because the heaviest incidence seems to be during the dry season when the animals are exposed to the thorns, controlling the acacia should reduce the chance of infection.

**Parasites.** Ticks (see above) and lice are found throughout the Cariblean region. Both can be controlled by routine dipping or spraying with approved acaricides.

Gastrointestinal parasites and coccidia are common and cause severe weight loss and diarrhea, if not treated. Prevention by the use of available anthelmintics and good pasture management usually controls the levels of infection. Tapeworms usually are not of economic importance, unless infestation is so great as to cause an actual blockage of the intestine.

Coccidia can severely damage and kill livestock, especially lambs and kids. The clinical symptoms are emaciation, extreme weight loss, and debilitation. Blood-stained feces may be present and may be observed in calves, but not usually in lambs and kids. Sanitation is the best method of control, and the animals can be treated with coccidiostats. However, if coccidiosis is diagnosed in one or two animals, the entire group should be treated.

Diseases are not a major constraint to the production of livestock on the island of Antigua, however, parasites are harmful and the major diseases are caused by, or carried by, parasites. These diseases are not epidemic in nature and do not spread rapidly. The policies of the

Livestock Division of the Ministry of Agriculture regarding the importation of livestock have probably played a large role in controlling the introduction of other infectious diseases.

### **Lamb-Feeding Trial**

In 1986 (June 23 to October 24), a lamb-feeding trial examined the effects of intensive feeding on growth rates and carcass characteristics of the local sheep. The objectives were to (1) determine if the local sheep could produce carcasses that would be acceptable to the local hotel/tourist industry, (2) determine consumer acceptability, as judged by local meat cutters and hotel personnel, (3) determine if production could be competitive with imported lamb carcasses, (4) provide baseline data for alternative feeding strategies, and (5) determine how parasite control might affect the quality of carcasses produced.

The 60 sheep were divided into 4 treatment groups of 15 animals each (7 males and 8 females). Group A received concentrate feed supplement, plus IVOMEC (Merck) to control parasites. Group B received concentrate feed supplement, but no IVOMEC (Merck). Group C received IVOMEC (Merck), and a limited feed supplement after week 11. Group D, the control group, received only a limited feed supplement after week 11. All groups were provided Antigua grass hay, salt and minerals, and water.

The trial data indicated that:

- local sheep responded to the feeding of supplement and produced a carcass that would be acceptable to the local hotel/tourist industry of Antigua
- local meat cutters found significant differences between carcasses of lambs fed supplement and those fed a control diet
- cost of production of fat lambs in Antigua would not be competitive with imported New Zealand lamb, but would be competitive with high-quality fat-lamb carcasses from the United States
- development and demonstration of alternative feeding strategies with locally-produced feeds require further investigation. Baseline data were provided using feeds (hay and concentrate) available in Antigua.
- performance of the lambs treated with anthelmintic at the beginning of the trial did not differ from that of the controls. However, all the lambs used in the trial had been treated just prior to the initiation of the trial.

More complete results of the sheep feeding trial appear in a separate report.

### **Livestock Management**

Most Antiguanians who keep livestock are not full-time farmers; rather livestock are kept almost exclusively by part-time farmers who live and work away from the farm. Only about 20% of livestock are kept under what is known as the "organized" system, which includes use of fenced, leased, or rented land over which the part-time farmer has some control.

The other 80% of livestock are kept under an "unorganized" system, which usually means animals are tethered or graze freely over government or private land that is not controlled by the owner of the livestock.

Extension services are difficult to provide for the "organized" system, with its absentee owners, and nearly impossible to provide for the "unorganized" system. ALIP concentrated on livestock practices that would be acceptable to the part-time absentee farmer in the "organized" system.

### **Feeding Supplements and Minerals**

Most livestock in Antigua receive their only nutrition from native pasture that consists of Antigua hay grass (Dichanthium aristatum) and Seymour grass (Bothriochloa pertusa). These grasses mature soon after the rains begin, and quickly lose quality. Regular dry weather and periodic devastating droughts provide a cycle of weight gain and weight loss for most livestock. At times, the farmer can purchase cracked corn and cottonseed available from ASIC. About one-third of the farmers cooperating with the ALIP use supplemental grain, salt and minerals, cracked corn, or cottonseed on a regular basis. ALIP imported salt and minerals and distributed these products to the cooperating farmers. Most of the cooperating farmers feeding minerals and supplements have special markets for their products.

### **Breeding - AI**

In general, Antigua has some good types of individual animals, but most livestock are seriously in-bred. Artificial insemination is an accepted method to introduce the needed improved genetics. In 1984, Winrock International provided training in AI for animal health assistants, agricultural assistants, extension personnel, and farmers. At the same time, Winrock assisted Government staff and farmers in learning how to use cattle-handling facilities designed for AI procedures. Two sample corrals and headgates were built. (See Plans, Appendix 5-2) ALIP later imported frozen semen from the United States and Jamaica. (See lists of imported semen.) A recording telephone was established at Paynters Livestock Station and an agricultural assistant was designated AI technician. The project kept the liquid nitrogen and semen replenished during the life of the program. Heat synchronization also was attempted, but to little avail because of bulls roaming on the island.

The use of the AI service was limited; about 25% of the cooperating farmers had holding facilities for cattle and used the AI service. The systems for keeping cattle did not allow for good observation and timely heat detection. Cattle restraining facilities were not available on most of the farms.

### **Livestock Handling/Confinement**

Livestock are not kept in confinement on the island of Antigua; however, ALIP conducted sheep-feeding trials on confined animals. (See sheep feeding trials.) As a result of these trials, it is expected that more

farmers will be feeding animals in confinement to capture some of the hotel/tourist market.

Livestock handling facilities are lacking on most farms, but the government operates regional dip facilities for farmers who have no dipping facility. To supplement these government facilities, ALIP imported back-pack sprayers and helped to design and build five handling facilities.

### **Fencing**

Fencing is critical to farm improvement; most new seedings are threatened by premature and overgrazing by stray sheep and goats. Genetic improvement of livestock is impossible unless roaming, uncastrated livestock are controlled. ALIP sought legal approval to erect electric fencing (see rulings in Appendix 5-3) and 10 farms were later equipped with electric fencing using solar power. Several types of fencing were demonstrated (Appendix 5-3) including: perimeter fencing - electric only; combination electric and barbed wire; barbed wire and electric "stand off"; wires alternating electric and barbed; and dividing fence - electric with fiber-glass posts.

The cost of electric fence versus standard barbed wire and wallaba posts was competitive, but farmers usually did not provide proper maintenance. Electric fencing must be checked daily for breaks, grounds, or overgrowth. The roaming livestock, particularly sheep and goats, often destroyed electric fencing; however, electric fence worked well to divide fields inside a perimeter fence. The erection of perimeter fence with stock (woven) wire and steel or treated wood posts ensures control over roaming livestock.

### **Dairy Production and Milk Handling**

Although Antigua had a milk plant when ALIP began in January 1984, the island was into the second year of a severe drought. The Antigua Dairy was no longer purchasing milk from farmers and the devastating drought had left farmers without feed for their starving cattle. The dairy industry was practically eliminated by the combination of these two factors, plus increasing consumer interest in purchasing dairy products in convenient packages processed under sanitary standards.

Taking these negative factors into account, the Planning Committee of the Cooperating Farmers decided to set up one small dairy to study the existing constraints. Six bred Jamaica Hope cows were imported from Jamaica and placed on the St. Clare Estate. The cows adapted satisfactorily; all calved (4 bulls and 2 heifers). Production of milk has been adequate. (See comments and production figures by Mr. Raeburn, Appendix 5-1) The raw-milk market is very limited and the project imported six small-capacity home pasteurizers for farmers who wished to market pasteurized milk.

Milk production on a larger scale must be accompanied by adequate processing facilities. The project coordinator held meetings with the

representative of the Caribbean Project Development Facility, Washington, D.C. relative to establishing a dairy plan for Antigua. A detailed study of dairy production and processing potential is needed along with a market survey to justify major investment in commercial dairy production.

### **Processing and Preserving Feed**

Processing and preserving feed for livestock feeding during the prolonged dry season is crucial for Antigua producers, but few farmers preserve feed. ALIP helped make a complete line of farm equipment available to the cooperating farmers. Over the life of the project, more than 8,000 bales of hay were made on 10 farms. Green fodder (green chop) for four farms was cut and hauled from the airport, the West Indies Oil acreage, and the CARDI Field Station at Betty's Hope. Five farmers established protein energy banks for cut-and-carry feeding. No silage was made.

Three factors influenced the farmers' adoption of stored feed: style of farming (part-time absentee farmers); controlled price of farm products; and cost of equipment hire.

Silage is not popular because of the cost and the time and effort necessary to move the silage from storage to the cattle site. Most farmers do not have the time or equipment to feed silage. Hay is easy to handle but expensive to harvest. Farmers also lack storage facilities, and hay stored in the fields is wasted. Green chop has limited application, because it must be fed within a day or two to prevent spoilage and equipment cost for the daily harvest of green chop would be prohibitive. As ASIC diversifies, such crops could be grown on a regular basis for farmers and large amounts of silage and hay could be stored economically for future sale. This would allow the farmers to concentrate on pasture improvement and to increase the stocking rates. At present, livestock farmers rely on pasture, protein/energy banks, and sudan sorghum for pasture, hay, and green chop -- in the rank order as listed.

### **Equipment Use/Maintenance**

ALIP made available a complete line of farm equipment similar to that used on a medium-sized farm in the United States (see list of equipment, Appendix 3-2).

Importation of farm equipment was completed near the end of 1984, and the Farmers Cooperative now houses the equipment at the new headquarters. The equipment is serviced, repaired, and maintained by ASIC and the Massey Ferguson dealer in Antigua. Operating and depreciating costs are covered by hourly charges. Individual farmers do not use the equipment -- a competent driver is hired by the cooperative to operate the equipment, and to provide simple maintenance. The equipment service provides for a capital base and cash flow for the cooperative, as well as timely use on member farms. (Appendix 5-5)

Costs of equipment hire greatly increases the cost of producing livestock for market. Early in the project, it became evident that the

addition of any extra production costs would not be accepted unless the meat-price controls were removed. This concern led to additional funding from USAID for production costs and marketing studies carried out by Dr. Young, Agricultural Economist, from Winrock International.

Table 3. Summary of field equipment activity.

Activity	Number of farms			Summary		
	1984	1985	1986	1984	1985	1986
Plowing	5	18	8	20	46	40 acres
Seeding	5	5	6	20	27	40 acres
Hay baled (including mowing & raking)		11	4		4,632	2,600 bales
Post holes dug		10	7		876	1,000 post holes
Livestock transport		15	12		75	64 animals
Rental of equipment		1				
Forage harvested (green chop)		2	3		20	30 acres
Brush cutting		4	5		30	44 acres

## FARM PLANNING AND ORGANIZATION

### Farm Records/Production Cost Analysis

In 1984, farmer cooperators received short-term training dealing with on-farm records and the use of records to estimate production cost. Each participant was given a farm-account book to begin record keeping and private tutorial training was provided, as well as group training.

A small survey of farmers was conducted in 1984 to estimate livestock production costs for both organized and landless farmers. Representative budget estimates were developed and were reviewed by different groups in Antigua to obtain general agreement on the accuracy of the data. Groups evaluating the data included the farmer cooperators, the EDF study team, MALF, and CARDI.

Methods of estimating livestock enterprise production costs were reviewed with the group of farm cooperators in 1985, and they evaluated estimates of representative production costs for Antigua. Two of the cooperators requested assistance in developing individual farm plans in 1986, which included the preparation of production-cost data and an overall financial analysis of the farm operation. The plans were completed at Winrock headquarters and returned to Antigua. Other farmers also have requested assistance in developing individual farm plans and currently are being assisted by CARDI and Livestock Division staff in Antigua.

A summary of production cost data estimated in 1985 is shown in Table 4. Enterprises evaluated include improved pasture establishment, hay from

native grass, hay from improved grass, silage from improved grass, cattle, sheep, goats, improved pigs, broilers and layers.

Farm equipment costs were budgeted in terms of operator labor cost (with a hired tractor operator), other variable cost, and overhead cost; these costs then were merged as a total custom cost per acre. The costs of establishing improved pasture, cutting and baling hay, and producing silage in Table 4 were based on the use of farm equipment at a custom rate per hour. Costs of establishing improved pasture was estimated with three alternative methods: direct over-drilling, minimum tillage, and conventional tillage. The total cost of ECS357.07 per acre was based on use of conventional tillage. A major component was EC\$200.00 per acre for seed and fertilizer, a cost based on data obtained from CARDI. Hay-production cost per acre was based on one cutting (1.5 tons) of native grass and two cuttings (totaling 3.0 tons) of improved grass. Costs per ton of hay were ECS136.93 for native grass and EC\$157.39 for improved grass. The amortized annual cost of improved pasture establishment was included in the cost of hay and silage production using improved grass. The silage production cost (including labor) for feeding from a trench silo was EC\$739.82 per acre (EC\$73.98 per ton with a yield of 10 tons per acre).

For organized farms, cattle-production costs were estimated 1) by including income from milk (cows milked once a day), and 2) without income from milk. Production cost per pound of beef on a live weight basis was estimated at EC\$1.88 when milk income was included and EC\$2.14 without milk income (table 4).

Producer cost for beef production on a CGA was estimated at EC\$2.02 per pound; however, these areas are subsidized by the government and all overhead costs were not included. Cattle-production cost for the landless system was estimated at EC\$1.56 per pound, using a farm-labor cost of EC\$3.75 per hour. The same farm labor cost was used in all livestock budgets, because it is a common rate for hired agricultural labor. This cost may not apply to some farm operations, if there is no opportunity cost for family labor (particularly if women and children are able to care for livestock). Estimated cattle production cost per pound excluding labor cost is only ECS0.77 in the landless system.

On organized fenced farms, the estimated production cost for sheep was EC\$1.96 per pound and for goats, EC\$1.79 per pound. This cost for the landless system was estimated at EC\$2.37 for sheep and EC\$2.16 for goats; however, this included 75% to 77% labor cost input (priced at EC\$3.75 per hour). Estimates of labor cost for cattle, sheep, and goats in the landless system was based on the expected time requirements to control the movement of animals, with tethering or herding as stipulated by law. Many landless producers operate illegally, however, and do not control animal movement; thus do not incur this high cost of labor.

Table 4 shows that estimated costs for providing improved pigs, broilers, and eggs were higher on a meat- or egg-equivalent basis than were the costs of importing such products. All of these enterprises depend on the use of imported concentrate feed, that ranged in cost from about EC\$0.48 per lb for a sow ration to EC\$0.61 per lb for a grower

ration for poultry. These estimated production costs are based on relatively small, family-run operations, i.e., a 6-sow unit, a 200-bird broiler operation and a 500-bird layer operation. Costs might be reduced with larger-scale operations, but the major cost component will continue to be imported concentrate feed.

Results of the production-cost analysis and a comparison with estimated production costs for imported meat prices indicated that organized livestock farm development would not be sustainable without some protection from imports. A proposal was made to MALF suggesting import protection, and use of tariff revenue collected from meat imports to provide direct producer incentives for quality production. (More detailed information on the proposal can be found in the Winrock report on "Economic Analysis of the Antigua/Barbuda Livestock Sector," January 1986.)

An evaluation of meat import data available for Antigua indicated that the data were far outdated and aggregated at too high a level to be of much value for government policy analysis. A proposal for improving the system of collecting and reporting agricultural trade data was submitted to USAID in 1986. Improved trade data would help government to enforce its margin control policy and to more closely monitor supply-demand relationships of all agricultural products.

Table 4. Summary of production cost data for improved pasture, hay, silage and alternative livestock systems in Antigua, 1985 (\$EC).

Enterprise	Unit	Labor Cost	Cash Cost	Overhead Cost	Total Cost
Improved pasture establishment	\$/acre	<u>1/</u>	<u>1/</u>	<u>1/</u>	\$357.07
Hay (native grass)	\$/acre	\$15.00	<u>1/</u>	<u>1/</u>	205.40
Hay (improved grass)	\$/acre	30.00	<u>1/</u>	<u>1/</u>	472.17
Silage (improved grass)	\$/acre	99.50	<u>1/</u>	<u>1/</u>	739.82
Cattle (org. mgmt., partial milking)	\$/lb L.W.	0.24	\$0.69	\$0.95	1.88
Cattle (org. mgmt., native p.)	\$/lb L.W.	0.25	0.75	1.14	2.14
Cattle (CGA pasture)	\$/lb L.W.	0.44	1.39	0.19	2.02
Cattle (landless system)	\$/lb L.W.	0.79	0.33	0.44	1.56
Sheep (org. mgmt.)	\$/lb L.W.	0.24	1.15	0.57	1.96
Sheep (landless system)	\$/lb L.W.	1.77	0.28	0.32	2.37
Goats (org. mgmt.)	\$/lb L.W.	0.23	0.87	0.69	1.79
Goats (landless system)	\$/lb L.W.	1.66	0.23	0.27	2.16
Improved pigs	\$/lb L.W.	0.18	2.77	0.09	3.04
Broilers	\$/lb C.W.	0.35	2.92	0.46	3.73
Layers	\$/doz eggs	0.47	3.62	0.44	4.53

1/ Operator labor, cash and overhead costs are combined in custom equipment charges for these production operations.

## Market Strategy

Livestock producers currently have difficulty establishing a linkage or market outlet with the hotel/tourist trade, because no acceptable central slaughter facility or milk processing plant is available. Some enterprising individual farmers have begun processing at their own farms and have developed a private trade with local consumers and hotels. For example, these farmers produce fresh pork cuts, slaughtered lambs, processed broilers, packaged eggs, raw milk, and some beef cuts. Some farmers operate their own meat shop as a market outlet for their products. A few producers even own their own hotels and restaurants, but the trade is mostly with other Antiguan consumers or Antiguan staff employed in hotels. Some local sheep and goats are periodically sold for consumption by tourists from other Caribbean countries, particularly during festive occasions such as carnival. However, the only local livestock products regularly supplied for the high-income North American/European tourist market are some eggs, pork from improved pigs, a few broilers, and some beef mixed with imported, fed-beef trimmings for hamburger.

Infrastructure problems, in production as well as in marketing, are constraints to increased import substitution in the hotel/tourist trade. Meat quality of local sheep, goats, and cattle is not acceptable to the hotel/tourist trade, particularly for the high-income visitors. Sheep and cattle are slaughtered at widely ranging ages, are finished inadequately, and do not provide the uniform portion-controlled cuts that the local hotel chefs are accustomed to using. This issue of quality cannot be resolved without a major change in livestock production practices.

The marketing constraints for meat include differences in professional meat cutting skills for many butchers; in refrigerated storage for hanging carcasses; in meat-curing facilities for hams, bacon, sausage, and corn beef; and in grading standards -- plus a general belief, even among Antiguans, that imported meats are better than local meats.

The Antigua and Barbuda Meats Development Corporation, Ltd. has partially filled the gap in market infrastructure by installing meat-processing facilities in a converted ice plant near St. Johns. ABMDC also has imported a small prefabricated slaughter plant that has not yet been assembled for use. Unfortunately, ABMDC has reportedly incurred a financial problem in continuing development of additional planned facilities. Plans of ABMDC had included construction of the sanitary abattoir facility on a 120-acre site at Betty's Hope, as well as construction of a cattle feedlot to finish animals purchased from local farmers. ABMDC has planned to obtain feedstuffs by contract with ASIC, which has cultivated land and farm equipment located near the proposed cattle feedlot.

The ABMDC strategy to finish cattle in a large feedlot and use ABMDC facilities for slaughter has several advantages. Organized livestock producers have the potential for improving their stock by taking advantage of momentum provided by ALIP efforts. However, they are not well equipped to complete finishing operations, because they have relatively

small farms and generally do not live on the farm. A large-scale feedlot offers better opportunity for increased use of by-products and mechanized feeding (e.g., of silage), plus more orderly marketing, reduced marketing cost, and better quality control (particularly if the feedlot is located near the abattoir). Feeding of imported concentrates is expensive, thus a silage-feeding program may be more economical if it is done on a relatively large scale. Some by-products and wastes could be utilized for feed, including cage layer manure, molasses and cotton seed in a large-scale operation.

Table 5 lists the wholesale and retail prices of meat from the U.S.A. and New Zealand, as well as local high-quality cuts. The weighted-average price of retail steak prices for imports from the U.S.A. is ECS14.40/lb; from New Zealand, ECS8.44/lb; and for local steak, ECS6.06/lb. The U.S. CIF (cost, insurance, and freight) import price of steak is ECS9.67/lb; New Zealand, CIF ECS5.54/lb; and local wholesale, ECS4.50/lb. The difference between the retail price and the wholesale or CIF import price is a gross margin of ECS4.73 on U.S. steaks (32.85%), ECS3.25 on New Zealand steaks (38.51%), and ECS1.56 on local steaks (25.74%).

This analysis shows that local steaks could increase by ECS1.04/lb at wholesale before reaching the price of New Zealand steaks; they could increase ECS5.17/lb before reaching the price of imported U.S. steaks.

The estimated gross retail margin on local steaks was 28% on t-bone, 28% on sirloin, and 24% on round. The gross margins between CIF import cost and retail price on imported New Zealand-type steaks was 34% on t-bone, 33% on sirloin, and 35% on round. The gross margins between CIF import cost and retail price on imported U.S. quality steak were similar at 35% on T-bone, 30% on sirloin, and 34% on round. These margins on imported meats were estimated to be within the maximum allowed under price controls of 15% on wholesale and 22.5% on retail prices. Local retail margins appeared to be somewhat above the limit.

The estimated markup on imported meats, other than beef, also was within the controlled-margin limits. The current import duties are relatively low and are primarily applied to processed meat products (table 6).

Price data in table 5 provide comparisons of wholesale and retail prices of local beef steaks, New Zealand grass-fed steaks, and US grain-fed steaks, indicating the potential benefits to Antigua producers if they were able to produce better-quality beef to substitute for current imports. The weighted average wholesale beef-steak prices for those three qualities of meat are locals, ECS4.50; New Zealand, ECS5.54; and U.S., ECS9.67. Therefore, Antigua beef-steak producers potentially could earn almost double the current market price if their meat product was of quality similar to that imported from the U.S.

The market infrastructure in Antigua could be improved if meat processors had the equipment and training to process products such as bacon, ham, corn beef and sausages that are major import items in the hotel/tourist trade. Increased processing capability also might expand the market outlet for low-quality meats, if they were incorporated in products like salami and sausages. Only one local meat processor --

Caripackers -- is currently producing cured and pickled products, including pickled pig snouts, pickled pig tails, chicken backs, and pickled beef. Some corned beef also is produced, but the firm does not currently have cooking or canning equipment to make a table-ready corn-beef product. Caripackers sells only to the local Antiguan market and most of the raw material is imported.

Table 5. Comparison of wholesale and retail prices of steaks (EC\$).

	<u>Local meat (steaks)</u>		<u>New Zealand (steaks)</u>		<u>USA (steaks)</u>	
		Local retail		Supermarket New Zealand retail		Prices paid by hotels
	Weights	price/#	Weights	price/#	Weights	price/#
<u>Retail Level</u>						
High quality	44.16%	6.25	44.16%	9.00	53.57%	19.62
Round	55.84%	5.91	55.84%	8.00	46.43%	8.37
Weighted average retail price		6.06		8.44		14.40
	<u>Local market</u>		<u>New Zealand</u>		<u>USA</u>	
		Sale to		CIF		CIF
	Weights	Supermarkets	Weights	price/#	Weights	price/#
<u>Wholesale Level</u>						
High quality	44.16%	4.50	44.16%	6.005	53.57%	13.23
Round	55.84%	4.50	55.84%	5.19	46.43%	5.53
Weighted average wholesale/ import (CIF) <sup>1/</sup>		4.50		5.54		9.67
Margins (weighted for steaks)		1.56		3.25		4.73
% of selling price		25.74% <sup>2/</sup>		38.51% <sup>3/</sup>		32.85% <sup>3/</sup>
Margins on separate cuts						
T-bones		28.0% <sup>2/</sup>		34.0% <sup>3/</sup>		34.9% <sup>3/</sup>
Sirloin		28.0% <sup>2/</sup>		32.6% <sup>3/</sup>		30.3% <sup>3/</sup>
Round		23.9% <sup>2/</sup>		35.1% <sup>3/</sup>		33.9% <sup>3/</sup>

<sup>1/</sup> CIF charges include the cost of insurance and freight plus other miscellaneous charges from the port of shipment added to the FOB cost. Most of the imported meats shipped to Antigua are in 20-ft refrigerated containers.

<sup>2/</sup> Margin of retail minus wholesale price.

<sup>3/</sup> Margin of retail minus CIF import price.

Development of increased meat-processing capacity would enhance import substitution by adding value to imported raw material, while increasing the local awareness of meat-quality requirements and demand pull for local-quality meat. For example, a recent USAID project in Belize included meat processing training and it has had good success in stimulating producer interest in production of quality animals and increasing processor demand for local meat.

Table 6. Antigua tariffs on imported meats, 1984.

Item	Rate of duty (percentage)
Sausages (canned)	15
Sausages (other)	10
Other prepared meats or offals	
Corned beef	5
Canned ham or bacon	10
Other ham or bacon	10
Fresh milk or cream	10
Milk (preserved, concentrated, or sweetened)	Free
Butter	5
Poultry liver	15
Edible meat offals	5
Salt pork and beef	3

Source: Mr. Abbott, Customs Officer, Antigua.

The current outlook for expanded dairy development is uncertain because of production problems associated with unreliable rainfall, the lack of irrigation capacity, and relatively low producer interest in specialized dairying. Most livestock producers do not currently live on the farm. There are likely to be major technical problems in maintaining a steady year round milk supply to support a dairy processing plant. A feasibility study is needed to evaluate the potential of a major dairy industry in Antigua before investing in a new processing plant.

### Feed Supply

An irregular feed supply constrains production of quality livestock in Antigua because of unreliable rainfall and periodic severe droughts. Grain production is highly variable from year to year and the economic feasibility of either corn or sorghum production for grain is questionable. Potential seems to be better for silage production -- in particular for sorghum-sudan or sorghum, as this crop will ratoon several times after harvesting. Sorghum-sudan trials established by ALIP have performed quite well for use as green chop to supplement pasture grazing.

Few by-products are available for animal feed, e.g., no wet grains, citrus pulp, etc. However, cotton seed and molasses have been available

at a relatively low price, and a daily output of 2 tons per day of fresh cage-layer poultry manure can be obtained at little or no cost from Sunshine Egg Co. Relatively low-cost feed rations based on silage, cotton seed, molasses, chicken manure, and limited concentrate could be developed as a feed for fattening cattle or sheep.

ALIP activities included hay production as well as greenchop production to provide supplemental feed during the dry season. This was a good strategy, but a new concept for livestock producers. Previously, they were little concerned about the problem of periodic weight loss in the dry season -- being more concerned about severe drought death losses. Livestock producers have been reluctant to produce silage as an alternative to hay, because they think it is more troublesome for a small farm operation. Native pastures in Antigua mature relatively quickly before the end of the wet season and lose nutritional value. Cutting for hay or silage before the seed heads mature seems to prolong the vegetative state of growth. This practice may be beneficial for pasture management, as well as for providing a supplemental dry-season feed supply.

Establishment of improved pasture entails relatively high costs (estimated to be ECS357 per acre in 1985; this cost includes ECS200 per acre for seed that has been supplied at no cost from CARDI). It is doubtful if many organized producers would convert their native pastures to improved pastures without further technical assistance. With increased livestock prices stemming from removal of price controls in 1986, and with increased protection from livestock product imports, there should be greater incentive for better-quality animal production and thus greater interest in improved pastures. The benefits of improved pasture include improved animal weight gain stemming from better nutrition, as well as increased forage production. However, the benefits of increased animal performance have not been quantified or documented under farm-level conditions in Antigua. In previous test trials of improved grasses at the CARDI field station in Antigua, the potential forage yield of the improved grasses was shown to be double that of native Antiguan grasses. The problem is that the maintenance of improved pasture stands requires extra management and care; otherwise, the pasture will quickly revert to native grasses. Much of the improved pasture established at Paynters Livestock Station has been lost because of management deficiencies. On the other hand, a stand of improved grass was established at the Barbuda airport over 20 years ago and it is still in good condition because it has been mowed frequently.

Additional farm-level testing of production benefits is required to determine current economic feasibility of improved pasture production. A general stocking rate of 2 acres of native pasture per animal unit has been used in the past for cattle; however, it is possible to modify the stocking rate on native pasture with a change in management, e.g., cutting hay before the grass matures. The native legume population on native pastures also may be modified by management.

## PRODUCTIVITY EXAMPLES -- CASE STUDIES

### Milk Production

The number of dairy cattle and volume of milk production recorded in Antigua from 1979 to 1984, calculated from OAS data, vividly show the drop in local milk production prior to the beginning of ALIP. The starting date for the project, January 1984, was mid-way into a 2-year drought. Many farmers had abandoned milking cows because of poor milk production caused by insufficient feed. At this critical period for the dairy industry, the Antigua Dairy stopped purchasing local milk. The drought continued for another year and many cows died from malnutrition and lack of water further damaging the local dairy business.

During this period, local and tourist/hotel trade became accustomed to top-quality imported milk that was readily available in convenient containers. Despite this bleak background, several cooperating farmers wanted to have animals for milk production. The livestock production-cost study completed in 1986 indicates that it might be feasible for farmers to milk a limited number of cows. The planning committee of the cooperating farmers decided to import six bred Jamaica Hope dairy heifers from Jamaica and establish a small dairy at St. Clare's Estate. Mr. Raeburn, owner of St. Clare's Estate, was experienced with the production, processing, and marketing of milk, and had participated in the AI training offered by Winrock International. The project supplied semen and supplies for Mr. Raeburn to breed his cows by AI.

At the St. Clare Estate, pastures were being cleared and fenced. During this field preparation, the dairy animals were kept in confinement and fed hay, grain, and green chop. The forage was of poor quality, emphasizing the need for the feeding of grain for maintenance and production. (See production information furnished by Mr. Raeburn, Appendix 5-1) The production figures are from cows that were first-calf heifers and usually milked only once a day.

The need for an adequate milk processing and marketing system is evident. It has been established that a limited market exists for un-pasteurized milk. Joseph Samuel, a cooperating farmer, rents land from Mr. Raeburn at the St. Clare Estate. ALIP used this location to test dairy production constraints using both goats and cows. Both farmers have received imported goats and cows from the project, and both have good-quality animals of their own. Purebreds and crossbreds are being developed. Six 2-gallon pasteurizers were imported by the project and distributed to cooperating farmers. The small pasteurizers have proved to be very successful and users are selling milk at an increased price.

Assessment of the future of the dairy business in Antigua requires an in-depth study of the potential for production, processing, and marketing of milk. Many of the cooperative members indicate an interest in producing milk because of the advantage of regular cash flow. Imported dairy products have made severe inroads on the milk market that will be difficult to overcome. The complete absence of modern processing and marketing facilities will necessitate large capital investment. Outside

funding sources seem to be interested in supporting a local dairy enterprise, if feasible.

ALIP's limited involvement with dairying has clearly shown producers the need for quality animals, for improved feeding, and for careful attention to sanitary procedures.

### **Farm Carrying Capacity (Wet/Dry Season)**

In analyzing the carrying capacity of a farm under Antiguan conditions, discussion is limited to the "organized" system of farming. In this system, the land is usually leased and fenced as a livestock development unit or communal grazing area. Many of these farms are overstocked and marketing livestock is usually not a "business" decision.

Farmers have developed techniques for extending their acreage, such as letting the animals feed along the highway or cutting green grass along the road to hand-carry to the animals for supplemental feed. A few farmers purchase concentrate to supplement nutrient deficiencies.

The ALIP equipment-hire program has given farmers other options of extending acreage by seeding adapted productive legumes and grasses, cutting excess forage during the rainy season and feeding it green, or making hay for dry season feeding. Carrying capacity has been increased by clipping pastures between rotational grazing and planting sudan/sorghum for supplemental feed. Other management strategies are discussed in Appendix 5-6.

The recommended carrying capacity for cattle on Antigua pastures is about 2 acres for each animal. The Ashley Joseph farm is an excellent example of a low-cost management system that has allowed this farmer to carry 85 head of cattle on 63 acres. Improved practices include cross fencing, rotating pastures, clipping of pasture after rotational grazing, and making of hay. The Richard's Farm has been a participant in forage improvement programs with ALIP and with CARDI. Seedings of legumes and grasses have been established and hay-making is practiced. Cross fencing with rotational grazing is in place and an accurate stocking rate is observed. The Joseph and Richard Farms lost no animals as a result of the severe drought, whereas some farmers lost up to 50% of their herds.

### **Livestock Off-Take/Growth Rates**

Valid information regarding livestock off-take growth rates assume that: 1) a system has been formulated that generates useful data, including weight at abattoir and age of animals, records on most livestock slaughtered, and accurate regular census of livestock, 2) individual farm records are kept to compare numbers and weights of animals sold one year against another, and 3) a regular marketing system is in place at the farm, rather than making a random decision to sell cattle when money is needed.

None of the above are in place in Antigua. The droughts of 1983 and 1984 and again in 1986 greatly distort the data. Also, introduction of improved genetics and forage programs requires longer-term analysis.

## CONCLUSIONS/SUGGESTIONS FOR FUTURE ACTIONS

### GENERAL CONCLUSIONS

#### Returns for Low-input Versus Medium-input Systems (short-term versus long-term)

Antigua is developing rapidly; during the life of the ALIP the individual standards of living improved substantially. Agriculture is going through the same changes that effect most developing countries. As opportunities outside agriculture become more attractive (mostly tourism related), fewer Antiguan will be engaged in agriculture as a business. Major factors contributing to Antigua's potential for livestock development include the following:

- Antigua is one of the few islands of the Eastern Caribbean that has rainfall, climate, and land suitable for the livestock production.
- Livestock production "fits" the part-time absentee farmer.
- A good local market is available that can readily absorb products not destined for the tourist industry.
- The tourist industry is a ready-made market for more sophisticated production and marketing.
- The government is making long-term leases available to livestock farmers and has removed price controls on livestock and livestock products as well as imposing tariffs on imported livestock products.
- The Land-use Assessment and Agricultural census will provide valuable information for long-range agricultural planning.
- Some projects are already underway to capitalize on the meat marketing opportunities.
- The small size of the country, the road system, radio and television coverage all contribute to the ease of getting farm products to market and to disseminate information and advertising to farmers and to the public.
- ALIP and the forthcoming European Development Fund Livestock Projects have increased the awareness of farmers and government regarding opportunities in livestock production.
- Recent ALIP studies of livestock production costs and marketing opportunities completed by Winrock/USAID provide important information needed by government and farmers to formulate policies for the development of the livestock sector.

The success of the national livestock policy will be dependent upon the "organized" system accepting proven technologies that ultimately produce a better product for the consumer. The livestock producer must get a premium price for better quality to justify his extra effort and investment, but the premium price cannot be much out of line with the cost to import the same attractively-packaged product.

If the government allows the "unorganized" system to continue to grow, its cost advantage will tend to hold down local prices to the consumer but would tend to discourage acceptance of technology and investment in the "organized" system.

For the long-term, farms must increase in size and be managed as a business, e.g., producing quality products that are attractively and conveniently packaged at a competitive price. ASIC could well be situated to fit this role; it has the quality land, buildings, and expertise to become the nucleus of a production and marketing organization with satellite farms supplying quality products.

The success of livestock development depends on the ruminant's (cattle, sheep, and goats) ability to convert Antigua grasslands to quality protein. An intensive program for converting the fields now overgrown with acacia to productive well-managed legume/grass pastures will provide most of the nutrients needed to support the livestock industry. Livestock farming can be profitable, if the basic animal nutrition is supplied through quality forage harvested in a timely and appropriate manner (pasture, hay, green-chop or silage) and stored for dry weather feeding. Use of improved pasture for grazing is the least costly method of using improved forage. With good management, stands of improved pasture can be maintained for extended periods.

#### **Infrastructure Support (Production/Marketing)**

ALIP has provided technical assistance to producer cooperators in improved fencing, in establishment of improved pasture, in procurement of improved breeding stock, in preservation of hay and silage, in individual farm management and planning, and in assisting the group of cooperating farmers to manage a farm equipment pool and to work together as an organized livestock producer association. The project also has helped to resolve problems of land tenure and price control policy.

The newly organized group of livestock producers in the Cooperative has good potential to continue development of their livestock farms and to make further technological advancements. The EDF project should continue to benefit the group by providing demonstrations of livestock production technology on new farm sites and by enhancing livestock production support capability of the agricultural extension service in Antigua. CARDI also is continuing to provide technical assistance in improved pasture establishment and in farm planning.

There will be a definite need for follow-up marketing assistance, provided that organized producers continue to improve their production systems and the quality of their animals. A new abattoir is a crucial element in market strategy to establish a market outlet with the hotel/tourist trade. Facilities for processing meat as currently available by ABMDC should be adequate for handling the meat after slaughter.

The financial feasibility of establishing a new abattoir and other central meat processing facilities should be assessed carefully to determine the impact of import competition. GOAB has recently imposed a tariff on meat imports and the economic feasibility of local meat processing should have greatly improved. Economic feasibility of a large-scale dairy development project has not been determined.

## **GOAB (Policy, Trade, Use of Public Land)**

GOAB policy changes since ALIP began have been strongly supportive of improved livestock production. Security of tenure on leased government land has been assured by the granting of 10-year leases renewable after 10 years. This increased security of tenure provides a strong incentive for livestock producers to invest in leased property and to establish residence on the farm -- important factors in farm management. Although the granting of 10-year leases is a great improvement over the previous policy of providing only one-year leases, provision for eventually conveying ownership of the property to the tenant would be desirable.

The removal of price controls and provision of import protection also is supportive of improved livestock production. The Winrock economist assisting ALIP recommended that part of the import tariff proceeds could be used to pay a premium for quality livestock production. This policy has been used in some countries very effectively, e.g., to promote the production of "lean bacon" pigs in Canada. In the past, GOAB has preferred use of general subsidies for production, rather than subsidies dependent upon quality. Since tariffs on meat imports were imposed in 1986, the government has agreed to use some of the revenue for direct subsidies for quality meat.

Current government policy in setting the land-lease rates seems to be inequitable, because the LDU livestock farmers are required to pay ECS30 per acre per year (scheduled to go up to ECS70 over the next 10 years) whereas crop farmers only have to pay ECS7 to ECS10 per acre per year on selected higher-quality cropland. Crop farmers also are eligible to have custom equipment work done at a subsidized cost by government.

No changes in trade policy have occurred since the ALIP began, except for the imposition of an import tariff on meat in 1986. The new tariff revenue is understood to be used primarily for tourist development, but will provide some support for livestock producers as indicated above.

Suggestions for use of public land for livestock production are presented in a Winrock report on "Economic Analysis of the Antigua/Barbuda Livestock Sector" in January 1986. It is proposed that there should be some controls placed on the use of public land for grazing to prevent further abuses and that the landless farmers should pay a grazing fee for administration and maintenance of public grazing land. Other tenants are currently required to pay a yearly fee for using public land to grow crops and for organized livestock production, e.g., on LDU farms. The policy followed on most public land has been to let anyone graze animals free of charge and with no restrictions. Land that was formerly used for sugar cane production has been allowed to degenerate due to overgrazing and lack of maintenance. The spread of acacia is a major problem on this land. A major investment will be required to reclear the land and restore carrying capacity.

## **SPECIFIC ACCOMPLISHMENTS**

### **Review of Logframe Accomplishments**

Planned project outputs in the logframe included:

1. Packages of technology/strategies for improved pasture-based live-stock production, pasture improvement, hay and silage production, utilization of crop by-products, improved herd health improvements, profitable marketing/processing strategies.
2. Demonstrations of technical and economic feasibility of packages by cooperating farmers.
3. Trained extension personnel and trained producers.
4. Improved breeding stock and programs to increase productivity and profitability of Antiguan cattle, sheep, and goats.

ALIP placed major emphasis on the selection of technology applications and strategies for improved livestock production, including most of the items identified in category 1 above. Strategies for pasture improvement included establishment of energy and protein banks to supplement pasture grazing, as well as the establishment of mixed grass-legume permanent pastures to replace native pastures using seed stock recommended by CARDI. The planting of a short-term "catch crop" such as sorghum-sudan was found to be very beneficial in providing a continued supply of forage while the improved pasture was being established. Future projects should emphasize the economic benefit of using improved pastures.

Hay production was introduced successfully as a method of conserving feed for emergency dry season use. However, there was little interest in silage production, as it was considered too troublesome for a small farm operation as there were more management problems entailed in processing and handling of the product. There was little opportunity to utilize crop by-products because few farmers grow crops except for some vegetables. Some farmers purchased cotton seed and molasses from ASIC for supplemental feed.

Electric fencing was introduced as an economic substitute for conventional woven-wire fencing. This proved to be acceptable for paddock divisions, but was not sufficient for perimeter fencing to prevent entry of animals wandering from the "landless system." Management problems were encountered in maintaining electric fencing and in preventing "shorts." A secure perimeter fence was considered mandatory to support an improved breeding program on an "organized" farm and to protect new pasture plantings. The farmer cooperators also needed facilities to constrain animals in the pasture while administering medication and AI. Several improved animal handling facilities were introduced on cooperator farms and were of particular benefit for the health care of animals.

ALIP introduced an AI training program and technical support for AI use. AI use was limited, as most cooperators did not live on the farm and few milked cows. Improved breeding stock were imported in the project and cooperators improved the quality of their livestock through natural

breeding. Facilities on cooperator farms were often not adequate for the proper care of new imports and a central facility with control provisions is needed for future animal imports. Tick control for imported livestock was especially difficult.

In negotiations with ABMDC, cooperators were assisted in securing a better price for improved cattle. They also were encouraged to develop alternative market outlets for their livestock products through direct sales to hotels and to private meat shops. Producers have become more cognizant of the importance of improved breeding and nutrition as a result of the training and demonstrations provided in ALIP. Some additional work on alternative feeding systems would be a useful follow-up to ALIP.

The training goals set in the logframe generally were met, except that agricultural extension service participation was relatively low. The upcoming EDF Project will provide funding for livestock specialist positions in the extension service, a component that was lacking in ALIP. Cooperator training included the use of farm recordkeeping and farm business analysis and there is good evidence that the cooperators have taken a more responsible, business outlook towards livestock production and are seeking new ways to improve farm income. Incentives for farm investment also have improved as a result of changes in the livestock price structure and increased security in land leases introduced after the ALIP was initiated.

Farmer cooperators were provided a pool of farm equipment in the project and were encouraged to operate the pool on a sustainable commercial basis. The cooperators were also assisted in forming an organized cooperative entity to continue operating the equipment pool and to carry on livestock development activity after the ALIP was terminated. Suggested follow-up development activity for the cooperative is included in this report.

## **SPECIFIC RECOMMENDATIONS**

### **Cooperative (Operations, Organization)**

#### **Short-term:**

- The cooperative must have a reason for being other than evolving from a development project.
- The membership must feel that this group of cooperating farmers can accomplish together what each could not do alone.
- The group must refocus for themselves what that mission is to be: questions to ask include:
  - Will it be a livestock improvement group? -- If so, what activities are necessary?
  - Will it be a production and marketing cooperative? -- If so, what direction is needed?
  - After the reason for being is determined, what financial base is needed?

- Will the equipment hire program provide the capital base and cash flow?
- Is the breeding/animal pay-back program important? -- Will it be continued?
- Will all members work together for the common welfare?

Action/organization:

- A mature, knowledgeable, and motivated person must be found to act as the full-time manager of the cooperative.
- The manager should be responsible for the day to day operation of the office, machinery program, and breeding and animal pay-back program. He should be reportable to the management committee.
- The manager must be paid regularly, and in line with his responsibilities.
- Means must be found to pay the manager and for ongoing expenses of the cooperative.
- A membership campaign should be held to enlist more farmers to join the cooperative -- increasing strength, membership dues, and purchased shares.
- Income generating activities need to be expanded -- the machinery hire program, breeding services, AI, etc.
- Overdue bills should be collected.
- Ultimately, the cooperative must be profitable (at least pay its bills).
- On a temporary basis, methods of funding for a manager and(or) training for cooperative personnel should be explored with funding agencies -- Barclays Bank, Caribbean International Development Agency (CIDA).

Undoubtedly, there will be some problems in maintaining continuity of development following curtailment of technical assistance in ALIP. Cooperatives, in general, have not had a good track record in Antigua. The major pitfalls envisioned in maintaining the production cooperative include:

- loss of interest in maintaining the cooperative as a viable institution by the management and(or) members
- not collecting enough money for equipment replacement
- not following the operating rules regarding the use of a hired tractor operator and the maintenance program for equipment, causing possible misuse of equipment
- not collecting membership fees and controlling spending

The new cooperative might merge eventually with another existing marketing association (Antigua/Barbuda Livestock Farmers Association) that was organized during the recent major drought to increase sales of livestock. The marketing association was given a refrigerator container by USAID to store processed meat and it currently sells some meat processed by its membership through an association-owned retail store in St. Johns. The association has not, however, been very active since the drought and has reportedly experienced problems in management and in membership support. The current retail store operation of the marketing association is poorly financed and facilities are no better than some other private meat shops.

### Long-term:

If the cooperative continues to grow and develop its "mission" and is able to establish a sound financial base, assessment should be made of the strategy of incorporating the Antigua/Barbuda Livestock Farmers Association into the Antigua/Barbuda Livestock Improvement Cooperative Society Ltd. The cooperative would then have the option of marketing animals for its members. The refrigerated trailer supplied to the Livestock Association could be moved to the headquarters of the Antigua/Barbuda Livestock Improvement Cooperative Society Ltd. to be a part of the marketing plan. Meat processing equipment also would be available. Eventually, the cooperative could become a purchasing cooperative for its members -- buying seed, fertilizer, and supplies.

### USAID (Model for East Caribbean)

The concept of using ALIP as a possible model for other Eastern Caribbean countries is valid. It is important to have an initial request for assistance originate from the host country, rather than from the development organization. A preliminary study involving key host personnel is necessary. Following the preliminary study as to project feasibility, a tentative implementation plan should be developed for host country approval and submission for funding. Technical assistance is an important project component because it expands the impact of the in-country coordinator and gives him flexibility in designing a variety of training experiences. Evaluation of the progress of the project at mid-term is valuable, allowing for a re-ordering of priorities as necessary. The project should have final evaluation at completion with provision for follow-up for a period of 1 year -- particularly for technical information support as most livestock development programs have an inadequate timeframe.

Often small independent nations of the Caribbean do not have the infrastructure for large-scale development projects. ALIP focused a moderate budget on some very specific targets for optimal use of project funds. A well-focused pilot project selects specific areas in need of funding; for example, the degree-level training for the counterpart assigned to the project coordinator, and the livestock production cost budgets that led to the request from the Government of Antigua for an Economic Analysis of the Antigua/Barbuda Livestock Sector. USAID provided extra funding and studies were made in market and policy analysis and project recommendations. Information from these studies contributed to removal of control prices, tariff percentage payments for premium-quality animals, and a foundation for setting lease payments for rented land. These activities not only help to accomplish project objectives but also have a long-term positive influence on the livestock sector.

ALIP provided an opportunity for the project coordinator to work with the whole spectrum of livestock-improvement activities -- from the Minister of Agriculture to the recipient farmer. Close involvement with daily activities of the Livestock Division within the Ministry established a trust and rapport with other institutions engaged in related activities, such as CARDI, Extension Service, Peace Corps, EDF, and CARDATS. Long-term, in-country residence allowed the project personnel

to better understand the cultural, political, and financial constraints that the project implementation must work to overcome. The government's provision of a qualified and respected counterpart not only provided assistance for the coordinator but also allowed more open access to farmers and government personnel, providing a bridge for accomplishing project activities.

Funding procedures for ALIP were not complex; monies were supplied to the implementing organization through a letter of credit, allowing for a smooth flow of funds to the project in the field as needed.

The cooperative approach provided the coordinator with an opportunity to work directly with the cooperating farmers in helping them to think through their problems of organization, genetic improvement, equipment use and maintenance, and livestock pay-back plans. This experience is a learning process for the coordinator as well as for the group of cooperating farmers.

#### **Follow-up Projects: EDF and Other Funding Agencies**

ALIP concentrated much of its activity with the livestock development unit farmer because: 1) the LDU was an ongoing government-sponsored program consisting of organized farmers; 2) technology accepted would have greater impact on the national market because of the larger size of the herds in the LDU program. Project personnel collaborated with the DARUDEC team during the feasibility study for EDF.

The proposed thrust of the EDF Program reaches into other sectors of the livestock community. Project activity will support the two livestock stations and provide training, travel, and support for the animal health assistants, who will work with small farmers in the unorganized system and help in maintaining cattle dip and communal grazing operations.

CARDATS cattle-feeding program is currently targeted to the small farmer in the unorganized system. EDF and CARDATS will each reach segments of the livestock sector considered to be in the unorganized system. Hopefully, project activity by these two organizations will develop techniques for farmers who now keep animals without any control of land or resources that would allow them to become a part of some organized system.

Most importantly, all organizations working in livestock development in Antigua should coordinate activities with the Ministry of Agriculture, the Livestock Division, and among their individual operations.

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|       | 7. | Management at calving time              |
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|       | 3. | Feeding the farm flock                  |
|       | 4. | Maximizing ewe production               |
|       | 5. | Sheep obstetrics                        |
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|       | 2. | Caring for newborn kids                 |
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# ANTIGUA LIVESTOCK IMPROVEMENT PROJECT

USAID PROJECT 538-0112  
1984-1987

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FINAL REPORT  
AUGUST 1987

APPENDICES

WINROCK INTERNATIONAL  
INSTITUTE FOR AGRICULTURAL DEVELOPMENT

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
(Project 538-0112)  
1984 to 1987

Appendices to the  
Final Report  
to the

U.S. Agency for International  
Development, Barbados

Ministry of Agriculture,  
Lands and Fisheries  
Government of Antigua and Barbuda

by

Winrock International Institute for Agricultural Development

Morrilton, Arkansas, U.S.A.

August 1987

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APPENDIX 1-1

**Representatives of Ministry of Agriculture, Lands and Fisheries  
Associated with Antigua Livestock Improvement Project**

The Honorable Hilroy Humphries -- Minister  
Ernest S. Benjamin -- Permanent Secretary  
Frank Henry -- Director of Agriculture  
Dr. Joseph Robinson -- Chief Veterinary and Livestock Officer  
Dr. Jose Mathew -- Veterinary Officer  
David Lewis -- Animal Health Assistant and Counterpart for Project  
Coordinator  
Astley Joseph -- Animal Health Assistant and Replacement Counterpart for  
Project Coordinator

**\*Coordinating Committee -- Antigua Livestock Improvement Project**

MALF	Ministry of Agriculture, Lands, and Fisheries Director of Agriculture -- Frank Henry Chief Veterinary Officer -- Dr. Joseph Robinson
CARDI	Caribbean Agricultural Research and Development Institute Project Coordinator -- Forage Seed Project -- V.A.L. Sargeant Agronomist -- R. T. Paterson
AID	U.S. Agency for International Development Grant Officer -- Michael Maxey
Winrock	Winrock International Institute for Agricultural Development Project Coordinator -- Charles Burwell
Farmers	Cooperating Farmers -- Antigua Livestock Improvement Project President -- Antigua/Barbuda Livestock Improvement Cooperative Society, Ltd. -- Lazman Webson

\*The Coordinating Committee has been composed of the same members since the beginning of the project with the exception of the addition of R. T. Paterson as a CARDI representative in 1986.

APPENDIX 1-2

A. \*Cooperating Farmers -- Antigua Livestock Improvement Project (1984)

Lawrence Broodie  
Wycliffe Brodie  
Keithroy Browne  
Archibald Butler  
Cordelle Daniel  
Charlesworth Edwards  
Eton Emanuel  
Douglas Forde  
Albert Fredericks  
Hilroy Humphries, Minister of Public Works  
Samuel James  
Leopold Jarvis  
Neville Jeremy  
Ashley Joseph  
Stephen Joseph  
Wilson Kentish  
Aubrey Lake  
J. R. Marshall  
Psalter Millwood  
Stuart Pigott  
Raymond Raeburn  
Ruben Richards and wife,  
Eugenie Richards, Secretary, Cooperating Farmers  
Phillip Payne and Mrs. Payne  
Joseph Samuel, chairman  
Sydney Samuel  
Theophane Samuel  
Hudson Simon  
Leonard Solomon  
Egbert M. Thwaites  
George H. Walter  
Lazman Webson, Vice Chairman Cooperating Farmers, and wife,  
Georgette Webson

Partnership, Albert Gore and Graham

Partnership, George Jones, Ivan Wiltshire, and Allan Brown

Montpelier Estate, William Melanson, Manager  
Boys' Training School, Dennis Bowers, Representative

Officers -- Cooperating Farmers

Chairman -- Joseph W. Samuel  
Vice Chairman and Acting Chairman -- Lazman Webson  
Secretary -- Eugenie Richards

\*The names listed indicate some form of participation in the project during 1984. -- Attendance of business and training meetings.  
Recipient of project animals.  
Participation in the field equipment program.

**B. \*Cooperating Farmers -- Antigua Livestock Improvement Project (1985)**

Lawrence Broodie  
Keithroy Browne  
Archibald Butler  
Cordelle Daniel  
Charlesworth Edwards  
Cheryl Edwards  
Eton Emanuel  
Douglas Forde  
Albert Fredericks  
Samuel James  
Ashley Joseph  
Astley Joseph  
Dandridge Joseph  
Stephen Joseph  
Roland Kentish  
Aubrey Lake  
John Marshall  
Patrick Maynard  
Psalter Millwood  
Phillip Payne  
Stuart Pigott  
Raymond Raeburn  
Ruben Richards  
Joseph Robinson, DVM  
Joseph Samuel  
Sydney Samuel  
Theophane Samuel  
Hudson Simon  
Leonard Solomon  
Leroy Southwell  
Egbert M. Thwaites  
George H. Walter  
Lazman Webson  
Partnership, Albert Gore and Graham  
Partnership, George Jones, Ivan Wiltshire, and Allan Brown  
Montpelier Estate, William Melanson, Manager  
Boys' Training School, Dennis Bowers, Representative

Officers -- Cooperating Farmers

Chairman -- Lazman Webson  
Vice Chairman -- Raymond Raeburn  
Secretary -- Leroy Southwell  
Treasurer -- Theophane Samuel  
Planning Committee -- George Jonas  
Charlesworth Edwards  
Psalter Millwood

\*The names listed indicate some form of participation in the project during 1984. -- Attendance of business and training meetings.  
Recipient of project animals.  
Participation in the field equipment program.

C. Antigua/Barbuda Livestock Improvement Cooperative Society, Ltd.  
(1986)

Original Members

Alwyn Aaron  
\*Ashley Joseph  
\*Dandridge Joseph  
\*Patrick Maynard  
Psalter Millwood  
\*Raymond Raeburn  
\*Ruben Richards  
\*J. L. Robinson, DVM  
\*Joseph Samuel  
\*Theophone Samuel  
Leroy Southwell  
\*Lazman Webson

Officers -- Cooperative

President -- Lazman Webson  
Vice President -- Raymond Raeburn  
Secretary -- Dandridge Joseph  
Treasurer -- Theophone Samuel

Management Committee -- Cooperative

Ashley Joseph  
Dandridge Joseph  
Patrick Maynard  
Psalter Millwood  
Raymond Raeburn  
Theophone Samuel  
Lazman Webson

Additional Members Completing the Membership Process

\*Lawrence Brodie  
\*Cheryl Edwards  
George Jonas  
\*Aubrey Lake  
John Marshall  
Ivan Wiltshire

\*Recipient of Imported Livestock

Cooperating Farmers (Not formal members of the cooperative at this time.)

Allan Brown  
\*Keithroy Browne  
Archibald Butler  
Eston Charles  
\*Joseph Dailey  
Cordelle Daniel  
Keith Edwards  
McKenzie Edwards  
\*Eton Emmanuel  
Samuel James  
Astley Joseph  
Samuel Joseph  
Stephen Joseph  
\*R. T. Kentish  
Phillip Payne  
Stuart Pigott  
\*Sydney Samuel  
Hudson Simon  
Leonard Solomon  
Egbert Thwaites  
  
\*Boys' Training School  
Montpelier Estate

\*Recipient of Imported Livestock

## APPENDIX 1-3

### ANTIGUA LIVESTOCK IMPROVEMENT PROJECT

AID Project No. 538-0112

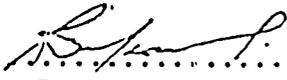
#### Approved Criteria for Selection of Demonstration Farms

The following criteria have evolved from a series of meetings with Ministry of Agriculture, Lands & Fisheries and Farm groups, for the selection of participants in the ANTIGUA LIVESTOCK IMPROVEMENT PROJECT:-

1. Raising of ruminants should be the main farm activity of the cooperator who shall have at least three years experience in managing ruminants and be able to devote a minimum of four hours each day directly attending his/her animals.
2. They should have the base resources needed to utilize the improved production techniques. These resources shall include: (a) current ownership of five or more ruminants; and (b) access to at least five acres of agricultural land. This land shall be owned on a freehold basis or rented for a term of not less than seven years.
3. They should be willing to demonstrate approved practices to others.
4. They should be willing to devote time to record keeping, training courses and the development of new management skills.
5. Should be innovative - willing to try new methods and techniques and be willing to accept some risks.
6. Should represent a cross section of livestock producers, to include the following:
  - a. Members of the Livestock Cooperation
  - b. Participants in the L.D.U. programme
  - c. CARDI demonstrators
  - d. Others.

The following signatures signify approval of the Criteria to be used in selecting farmers to participate in the ANTIGUA LIVESTOCK IMPROVEMENT PROJECT:

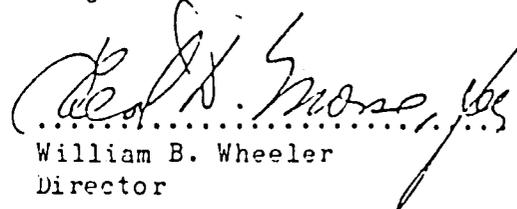
Government of Antigua/Barbuda

  
.....  
Hon. Robin Yearwood  
Minister of Agriculture, Land  
and Fisheries

WINROCK International

  
.....  
Charles E. Burwell  
Project Coordinator

USAID

  
.....  
William B. Wheeler  
Director

23rd March, 1984

APPENDIX 1-4

BY-LAWS OF ANTIGUA LIVESTOCK IMPROVEMENT CO-OPERATIVE SOCIETY LTD.

1. NAME AND ADDRESS

The name of the society shall be the ANTIGUA LIVESTOCK IMPROVEMENT CO-OPERATIVE SOCIETY LTD. and its registered office shall be \_\_\_\_\_, or such other place as shall be decided by the Committee of Management. The Registrar of Co-operative Societies shall be notified of the address of operations.

2. AREA OF OPERATIONS

The Area of Operations shall be Antigua/Barbuda.

3. OBJECTIVES

The Objectives of the society are to promote the economic interests of its members in accordance with Co-operative Principles, and more particularly to:

- (a) Promote Breed Improvement.
  1. To own and monitor imported breeding bulls.
  2. To monitor imported livestock breeding and pay-back programs for members with sheep, goats, and dairy cattle.
  3. To provide AI Service for members.
  4. To assist members with culling and selection for herd improvement.
  5. To assist members with sales of livestock and livestock products.
  6. To provide training and training materials for breed improvement programs.
- (b) Promote Improved Livestock Management Practices.
  1. Encourage sufficient record keeping.
  2. Encourage regular spraying or dipping for external parasites.
  3. Encourage regular treatment for internal parasites.
  4. Encourage improved forage programs.
  5. Provide for purchase and sale to members of necessary farm supplies.
- (c) Provide Farm Equipment for Hire.
  1. Own and maintain farm equipment as a service to members.
  2. Provide scheduling for land preparation, planting, and harvesting.
  3. Provide billing, collecting, and banking of funds for equipment maintenance and depreciation.
  4. Transport animals.
  5. Provide equipment service to non-members as able.
- (d) Acquire by purchase, lease, donation or otherwise, and hold property, movable or immovable, in connection with any or all the objectives of the Society.
- (e) Promote any other measure designed to foster and maintain the spirit and practice of co-operation, mutual help, and self help.

#### 4. MEMBERSHIP

A member shall be a person who:

- (a) Has met the criteria for a Demonstration Farm for the ANTIGUA LIVESTOCK IMPROVEMENT PROJECT residing in the Society's area of operations.
- (b) Is not engaged in any activity opposed to the interests of the Society.
- (c) Has attained the age of seventeen (17) years.
- (d) Has signed the application for the registration of the Society, or made application for membership as prescribed in By-Law #5.
- (e) Paid an entrance fee of \$25.00 which shall not be re-imbursable.
- (f) Acquired at least five fully paid-up shares of \$100.00 each.

#### 5. APPLICATION FOR MEMBERSHIP

Application for membership shall be on the prescribed form, duly signed by the applicant and endorsed in writing by two members of the Society in good standing, and shall be lodged by the Secretary for presentation to a regular meeting of the Committee of Management which after due consideration will accept or reject the application.

#### 6. VOTING RIGHTS

Each member on fulfilling the provisions of By-Laws #4 and #5 shall have one Vote only in the affairs of the Society. A member shall not be allowed to appoint any other person to vote on his behalf at any meeting of the Society.

#### 7. LIABILITY

The liability of a member shall be limited to the value of the shares to which he may have subscribed. This Liability shall continue for a period of two years after the individual ceases to be a member of the Society, but only in respect of such debts as the Society may have contracted at the time membership ceased.

#### 8. TERMINATION OF MEMBERSHIP

Membership shall be terminated by:

- (a) Cancellation of the registration of the society.
- (b) Death.
- (c) Insanity.
- (d) Ceasing to hold the minimum share capital required.
- (e) Ceasing to be a Bona-fide Farmer.
- (f) Expulsion from the Society by a vote of at least two-thirds of the members present at a General Meeting in accordance with Rule #15.

In the event of a member's death, the sum actually paid for his share or shares shall be transferred to the nominee or nominees appointed by him in writing and recorded in the register of members signed in the presence of two attesting witnesses, provided that not more than one nominee be appointed unless the member holds more than the minimum of five shares.

9. FUNDS OF THE SOCIETY

The funds of the Society shall consist of:

- (a) Share capital, which shall be unlimited, divided into shares of the par value of \$100.00 each.
- (b) Entrance fees in accordance with By-Law #4 and #5.
- (c) Loans from financing institutions and other sources approved by the Registrar in writing.
- (d) Selling charges, commission charges and other business charges on business transaction on behalf of members as may be decided by the Committee of Management from time to time.

10. SHARE CAPITAL

Each member is expected to contribute towards the share capital of the Society by:

- (a) Paying in full for at least five shares at \$100.00 each at the time of application for membership.
  - (b) Subsequent purchase of other shares at the member's discretion.
  - (c) Paying for shares by means of excess created from sales to the Society such excess to be deducted by the Society and credited to the member's share capital.
- No member shall hold more than one-fifth of the share capital of the Society.

11. SHARE CERTIFICATE

Every member shall be provided with a share certificate for shares allotted to and fully paid for by him, such certificate to be numbered and registered and issued, and must contain the share holders full name, number of shares owned by him, and their value at par, and signed by two members of the Committee of Management and should be impressed with the seal or stamp of the Society.

12. SHARE REGISTER

A Share Register shall be kept in which shall be recorded the name, address and occupation of the person to whom each share was originally allotted, and the date of the transfer, the name and address of the transferee and the date of the transfer, in case of cancellation, the date when the share was cancelled.

13. TRANSFER OF SHARES

Shares in the Society shall be transferable but not with-drawable and may be transferred to any Member or any one eligible for membership with the consent of the Committee of Management and upon payment of a fee of \$10.00 for each transfer; provided that if the transferor is on the Committee of Management, no fee is payable. All applications for transfer of shares shall be made on the form prescribed by the Registrar, shares may be transferred to the Society provided that such transfer does not reduce the member's share holding below the minimum specified in this By-Law.

Such shares shall be accepted by the Committee of Management on behalf of the Society. Payment for such shares will only be made after due account has been taken of any debts due to the Society by the holder of those shares.

14. INTERESTS ON SHARES

Interest may be payable on fully paid up shares from surplus at such rate as the General Meeting on the advice of the Committee of Management, may from time to time approve.

15. RECEIPTS AND DISBURSEMENTS

All receipts and disbursements shall be supported by the proper vouchers and all disbursements in excess of fifty dollars shall be made by cheque.

16. BANKING ACCOUNT

The Committee of Management may, subject to the approval of the Registrar open a Banking Account. All cheques shall be signed by the Treasurer and one of two other Authorized Members of the Committee.

17. GENERAL MEETINGS

The supreme authority of the Society is vested in the General Meeting, at which all members of the Society have the right to be present and vote.

The Annual General Meeting shall be convened by the Committee within 90 days after the end of the Financial year of the Society. At least eight clear days notice shall be given before any such meeting is held provided that the Registrar may at anytime after the audit of accounts has been completed convene the Annual General Meeting which shall proceed as if it had been called by the Committee.

A Special General Meeting of members may be convened at anytime by the Committee; or by request of at least 1/5 (one fifth) of the members such request should be made in writing and should state specifically any matter or proposal they wish to discuss. The Chairman shall comply with such request.

18. QUORUM AT GENERAL MEETINGS

The presence of twenty per cent or ten members of the membership which ever is the greater, shall form a quorum at a General Meeting- should a quorum not be present within one hour of the time set, the meeting if called at the request of Members shall be considered dissolved. All other Meetings shall stand adjourned to the same day in the following week and at the same time and place.

19. CHAIRMAN AT GENERAL MEETINGS

The President of the Society, or in his absence the Vice President shall preside at General Meetings, provided that the Registrar may preside at any Meeting convened by himself or at his demand. The President may, by a decision of the Meeting, adjourn the Meeting from time to time and from place to place, but no business shall be transacted at any meeting so adjourned except the business left unfinished at the Meeting from which the adjournment took place.

20. VOTING AT GENERAL MEETINGS

Any question put to a General Meeting, unless otherwise specified in the Ordinance or Rules, shall be decided by a majority of votes. Voting shall be by show of hands; Voting by call of name or by ballot shall be held if this is demanded by five or more members present at the Meeting, provided such demand is made before any declaration of a vote by show of hands has been made.

In respect of any resolution put to a vote, the Chairman shall declare whether it has been carried or lost, and whether by show of hands or unanimously or by a particular majority, and this declaration shall be recorded in the minutes.

#### 21. BUSINESS OF THE ANNUAL GENERAL MEETING

The following, amongst other matters shall be dealt with by the Annual General Meeting.

- (a) Confirmation of minutes of the previous Annual General Meeting and any intervening Special General Meeting.
- (b) The consideration and adoption of the annual statement of accounts and the audited annual balance sheet and auditor's report.
- (c) The disposal of funds available for distribution.
- (d) The adoption of the Annual Report of the Management Committee.
- (e) The fixing, subject to the approval of the Registrar, the maximum liability, as required by rule 20.
- (f) Election of members to the Management Committee.
- (g) To appoint auditors for the ensuing year subject to the approval of the Registrar.
- (h) To consider any other business duly brought forward.

The order of Business at Annual General Meeting shall include:

- (a) Ascertainment that a Quorum is present.
- (b) Taking apologies for absentees.
- (c) Reading and approval of Minutes of last Annual General Meeting and of any intervening Special General Meeting and discussion of matters arising there from.
- (d) Unfinished business left from the previous meeting.
- (e) Receiving report of Management Committee.
- (f) New business.
- (g) Adjournment.

#### 22. BUSINESS OF SPECIAL GENERAL MEETING

At a special General Meeting only that business for which the meeting was called may be discussed.

#### 23. MINUTES OF GENERAL MEETING

Minutes of General Meeting shall be entered in the Minutes Book by the Secretary and numbered consecutively, and shall contain:

- (a) The number of members present at the meeting, and the names of the President and members of the Management Committee who were present.
- (b) The total number of members of the Society on the date on which the meeting was held.
- (c) All resolutions passed or decisions made at the Meeting.

24. ELECTION OF THE COMMITTEE OF MANAGEMENT

The Committee of the Registered Society shall consist of seven members.

At the first Meeting the Committee shall be elected and shall hold office until the election of another committee at the first Annual General Meeting.

- (a) At each Annual General Meeting thereafter, of such number of members as may be necessary to fill vacancies arising from expiry of term of office or otherwise; the term of office being two years.

Election to the Committee shall be by ballot, and an equality of votes shall be decided by the drawing of lots. A member of the Committee ceasing to be such by expiry of term of office or by resignation shall be eligible for re-election.

No member shall be eligible for election to the committee unless he has been nominated by two other members.

No member shall be elected to the committee if he is directly or indirectly engaged in any activity which in the opinion of the General Meeting conflicts with the interest of the Society.

25. ELECTION AND APPOINTMENT OF OFFICERS

At their first meeting, which shall be held within ten days of their election or at any subsequent Meeting in the event of a vacancy among the Officers, the committee shall elect from its own number a President, Vice President and a Treasurer, and from its own number or otherwise elect or appoint a Secretary.

26. VACANCIES IN THE COMMITTEE OF MANAGEMENT

Any member who fails to attend three consecutive meetings of the Managing Committee without sufficient reason shall be deemed to have vacated his office. Where vacancies occur in the Managing Committee the remaining members shall elect substitutes to fill such vacancies within eight days. Substitutes so elected shall only hold office until the next General Meeting following their election, but shall be eligible for election to continue terms of Office by the General Meeting.

27. DUTIES IN THE COMMITTEE OF MANAGEMENT

The Committee of Management shall have the General direction and control of the affairs of the Society, and shall represent the Society before all competent authorities and in all dealings and transactions with third party, with power to institute or defend suits brought in the name of or against the Society, and in general it shall carry out such duties in the Management of the affairs of the Society as have not been specifically assigned by the Regulations or the By-Laws to the General Meeting or to any other Officer of the Society. In particular, it shall be the special duty of the committee:

- (a) To watch closely the financial condition of the Society and the operating results of its business and to take action required to keep these in a sound business like condition.
- (b) To act upon all applications for membership and on the exclusion or expulsion of members.

- (c) To fix from time to time, subject to the approval of the Registrar, the amount of the surety bond which shall be required of all officers handling money and shall authorize the payment of the premium or premiums thereof by the Society.
- (d) To raise loans in accordance with By-Law 27.
- (e) To authorize and supervise investments of the Society.
- (f) To provide adequate insurance of all movable and immovable property of the Society.
- (g) To employ, fix the remuneration and prescribe the duties of such employee: as may in their discretion be necessary.
- (h) To appoint such sub-committee for facilitating the work of the Management Committee as may be necessary from time to time.
- (i) To maintain an active programme of co-operative education and to maintain relations with other Registered Societies aimed at promoting the best interests of the Society and the Co-operative Movement.
- (j) To submit the accounts of the Society for audit in pursuance of the provisions of Section 37 of the Ordinance.
- (k) To perform such other duties as the members in General Meeting may from time to time authorize.

#### 28. MEETING OF THE MANAGEMENT COMMITTEE

The Management Committee shall meet as often as the business of the Society requires, but at least once in every month. Decisions at Meetings shall be decided by a majority of votes; in the event of a tie the Chairman shall have a casting Vote, Five Members shall constitute a quorum.

#### 29. MINUTES OF MEETINGS OF THE COMMITTEE

Minutes of Committee Meetings shall be recorded by the Secretary in the minute book in consecutive numerical order, and shall be signed by the President after confirmation; and shall contain the following particulars:

- (a) The names of members present and the date of the Meeting.
- (b) A short statement of all matters discussed and decisions made, and a record as to whether each decision was made unanimously or by a majority.

#### 30. RESERVE FUND

The Management Committee shall set aside to a Reserve Fund all entrance fees and fines collected from members and at the end of each financial year before the declaration of dividend at least (25) per cent of the net profits.

The Reserve Fund shall be the indivisible property of the Society and may be utilized in the business of the Society or be applied with the sanction of the Committee of Management or meet bad debts or losses sustained through extraordinary circumstances over which the Society has no control. The Reserve Fund shall not otherwise be distributed.

31. DISPOSAL OF SURPLUS

The net profits of the Society as ascertained by the audit, after payment of interest on Loan Capital and Deposits, if any, and after making the necessary provision for depreciation on fixtures, equipment and property shall be allocated as follows:

- (a) At least twenty five per cent shall be carried to the Reserve Funds in accordance with By-Law #30.
- (b) The remainder shall be utilized as the Annual General Meeting may decide in any one or more of the following ways:
  - 1. To pay a dividend to members on fully paid up shares not exceeding 10% per annum.
  - 2. To pay a bonus to members in proportion to the use they have made of the services provided by the Society.
  - 3. In yearly contributions to an Education Fund constituted by the Society.

32. HONORARIUM

No Member of the Committee of Management shall receive any compensation as a member of the said committee; but may be paid out of pocket expenses for the performance of work authorized or agreed upon by the Committee.

33. FINANCIAL YEAR

The Financial Year of the Society shall begin on 1st January of the year and end on 31st December.

34. PROVISIONS OF ORDINANCE AND RULES TO APPLY

Notwithstanding what may be contained in these By-Laws all the provisions contained in the Ordinance and Rules shall apply to the Society's conduct of its affairs and operations.

35. VOLUNTARY DISSOLUTION

The Society may be dissolved by the consent of three-fourths of its members but only in the manner provided by the Ordinance and Rules.

I certify that the forgoing By-Laws Nos..... of the ANTIGUA LIVESTOCK IMPROVEMENT CO-OPERATIVE SOCIETY LTD. have been registered by me as No..... on the ..... day of ..... 19..... .

Dated at St. John's this ..... day of ..... 19.....

Registrar of Co-operative Societies  
Antigua



**WINROCK  
INTERNATIONAL**

APPENDIX 1-5

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
P. O. Box 1066, St. Johns, Antigua  
Telephone 31362

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
LIVESTOCK BREEDING PROGRAM  
AGREEMENT TO COOPERATE

I, \_\_\_\_\_, residing in the Parish of \_\_\_\_\_,  
Antigua, agree to hold, care for and control the breeding of \_\_\_\_\_  
from the Antigua Livestock Improvement Project, subject to the following  
conditions:

- a. That approved criteria for a Demonstration Farm have been met.
- b. That livestock facilities have been approved.
- c. That a breeding program has been approved and is on record.
- d. That an acceptable pay back has been approved and is on record. Obligation is released after completion of pay back.
- e. That all reasonable care and attention will be exercised in the maintenance and management of the listed animals.
- f. That the animals may be inspected by a representative of the Antigua Livestock Improvement Project, Veterinary Officer or his Agent at any reasonable time during the period of holding.
- g. That in the event of an accident or illness, the farmer shall, with all practicable speed, notify the Veterinary Officer and the Antigua Livestock Improvement Project Personnel.
- h. The Antigua Livestock Improvement Project reserves the right at its discretion to withdraw the animals at any time during the period of holding if any of the above conditions are violated.

FARMER: \_\_\_\_\_  
 DATE: \_\_\_\_\_ 19 \_\_\_\_\_  
 WITNESS: \_\_\_\_\_  
 DATE: \_\_\_\_\_ 19 \_\_\_\_\_

APPROVED BY: \_\_\_\_\_

REPRESENTATIVE:  
ANTIGUA LIVESTOCK IMPROVEMENT PROJECT

DATE: \_\_\_\_\_ 19 \_\_\_\_\_

## ANIMAL PAY BACK PLAN

Important concepts of the breeding plan are as follows:

1. To share improved livestock with as many farmers as possible.
2. To produce cross-bred animals.
3. To maintain pure breeding units.
4. To develop a pay-back plan that is not an economic liability to the farmer.

### Goats

1. Females (Does)

The recipient agrees to make available to the Antigua Livestock Project during a three year period, the same number and age of Does as those he received.

2. Males (Bucks)

- a. For the first year the bucks are to be rotated among members of the Cooperating Farmers.
- b. Bucks will be used to breed does of non-cooperating farmers for a fee to help defray costs of keeping the animals.  
(Breeding fee not to exceed \$25.00 E.C.)
- c. Bucks will not be paid back in-kind.

Bucks and Does will be owned by recipients after above obligations have been met.

### Sheep

1. Females (Ewes)

The recipient will repay, during a three year period, to the Antigua Livestock Project the same number and age of ewes as he received.

2. Males (Rams)

- a. During a three year period, the same number and age of rams are to be paid back to the Antigua Livestock Project.

# Winrock International

Antigua Livestock Improvement Project  
P.O. Box 1068  
St. John's, Antigua  
Telephone: 31362

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Cont./

- b. Rams can serve non-cooperating farmers' ewes for a fee (not to exceed \$25.00 E.C.).

## Dairy Cows (Jamaica Hope)

The recipient will return to the Antigua Livestock Project, during a period of three years, six animals. The farmer may substitute some bulls if the committee agrees and there is a need for Jamaica Hope Sires. The farmers obligation is met after the pay-back.

## Beef Bulls (Jamaica Hope)

1. Bulls will be owned by the Antigua Livestock Project.
2. Bulls may be rotated every two-three years.
3. Bulls have been placed with a leading farmer in areas where farms join one another.
4. The recipient of the bull will have the service of the bull free for its care.
5. Adjoining farmers will make arrangements for the use of the bull with the caretaker. The caretaker will be responsible for care and scheduling of the bull.
6. The two bulls at Paynters Livestock Station will sire animals to be purchased by any farmer, whether a cooperating farmer or not.

APPENDIX 1-6

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT

NUMBER 538-0112

INTERIM EVALUATION

USAID, RDO/C

Final Document

November 19, 1985

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## I. INTRODUCTION

In January 1984 AID authorized a three year Operational Program Grant (OPG), in the amount of US\$530,000 Winrock International Livestock Research and Training Inc, to assist a program in Livestock Improvement in Antigua.

The purpose of the AID project entitled "Antigua Livestock Improvement" is to provide Support to livestock producers to enable them to increase the quantity and quality of livestock products and thereby improve their productivity and income. The major output of the project is expected to be the establishment of a core group of producers demonstrating improved techniques for production and marketing of livestock.

This report represents the results of the first evaluation which was conducted by a three member team in April 1985.

## II. PROJECT SETTING

### a. Country Description

Antigua-Barbuda is located in the northern part of the Leeward Islands of the Eastern Caribbean, approximately 300 miles east of Puerto Rico. The main island - Antigua - has a land area of 108 square miles, roughly measuring 12 miles long from east to west and 9 miles wide from north to south. Antigua's landscape is characterized by scattered hills and undulating valleys in the north and east, by a rolling plain in the central area, and by high summits and ridges (up to elevations of 1,300 ft.) in the volcanic regions of the south-west. There are no continuous forests, and while some useful species of timber can be found on the higher ridges most of the land not under cultivation is in rough pastures, acacia and scrub tree species. The soils are somewhat variable with clay and sandy loams in the north and east, clays and clay loams in the central plain, and alluvials and clay loams in the south-west. Although the soils are generally poorly drained, they do not exhibit major nutrient deficiencies, except for phosphorus in some locations. The climate is characterized by periods of high rainfall followed by seasonal drought (annual rainfall averages 45 inches, with almost half of it occurring from August to November). There are no rivers in Antigua, although during the rainy season several watercourses are formed but subsequently run dry at the onset of the dry season (February to April). The average annual temperature is about 78°F, with seasonal averages ranging from 84°F in the summer to 75°F in the winter.

There are approximately 35,000 acres in Antigua-Barbuda which are available for agricultural use. Since the collapse of the sugar industry in the late 1950's, there has been no large scale private farming activity, except for a short-lived corn and soybean production scheme in the mid-1970's. The Government of Antigua-Barbuda currently controls about 60 per cent of the arable lands but has been unable to establish viable agricultural enterprises on most of these lands.

### b. Livestock Sector

The livestock sector of Antigua has grown significantly over the last fifteen years. A 1981 CARDI Agricultural Profile of Antigua states that during the 1960's the population of beef cattle remained fairly static until the end of the decade when large tracts of land formerly in sugar cane were made freely available for grazing to anyone owning cattle, sheep or goats. As a result the number of cattle increased dramatically from 4,000 head in 1961 to 10,000 head by 1973. Current estimates place the national cattle herd size at less than 16,000 and possibly as low as 12,000 due to the severe drought of 1984.

This sector accounts for three quarters of the contribution made by agriculture to the Antigua GDP. Recent trade statistics show importation of US\$2.4 million of these products, with a projected import requirement of US\$2.9 million by 1990. Potential demand for high quality meat and dairy products is therefore good. This domestic market for high quality meat and dairy products could be met, at least in part, by local producers. Current

imports account for approximately 50 per cent of total animal products consumed domestically (imports make up 90 per cent of the animal products consumed in the tourist trade). Apart from import substitution possibilities, there may be an opportunity for Antigua to export meat and milk to neighboring countries such as Martinique and Guadeloupe. The livestock industry productive capacity is not in a position to respond satisfactorily to the existing or potential demand for high quality meat and dairy products.

At present it is largely unorganized with about 70 per cent of livestock production based on a landless producer system, where animals graze uncontrolled and at no cost on idle government lands. Approximately 3,600 of the 12,000 cattle are maintained in fenced areas on Land Development Unit (LDU) farms, three government farms, communal pastures and on large estates. In this situation the industry financial inputs are minimal, animals tend to be loosely managed, and little effort is made by animal owners toward achieving high quality or high quantity of product. Additionally, much of the idle lands available to these producers has become infested with acacia thorn trees and rough pastures of native grass. This has resulted in minimal pasturage and low capacity to feed cattle. The industry is further beset by technical, economic and political constraints which must be addressed if improvement in production is to be achieved.

### III. PROJECT DESIGN

#### 1. Constraints

##### a. Technical

There are several technical constraints to improving livestock production in Antigua; namely low pasture quality, seasonal feed storage, low genetic quality of breeding stock, and lack of livestock management skills. The most critical of these factors appears to be feed shortages which result from adverse climatic conditions. Most grazing areas are in native grass pastures and normally have a low capacity to feed cattle. This capacity is further reduced during the dry season. In addition, irrigation for pasture production is not practical because of the water supply problem. Thus Antiguan livestock producers are faced with a major difficulty of a seasonal cycle of weight gains followed by sharp weight losses. The principal consequences of this situation are poor female fertility and a lengthening period of time (from two/three to four/five years) to reach acceptable slaughter weights. Unless this constraint is addressed, there would be no advantage to increasing genetic potential or improving management practices for meat and milk production.

##### b. Economic/Political

Perhaps more important constraints to production are economic and political in nature. These problem areas include an inadequate marketing and processing infrastructure, restrictive Government of Antigua-Barbuda policies on land tenure, pricing and exports; lack of farm credit; and limited technical support services.

Government policies are the more critical constraint, especially as they relate to price controls and land tenure. The fixed government price for cattle under 4 years old is EC\$1.10 lbs live weight. The price of processed local beef is controlled by the government at EC\$3.00 lb for beef steak and EC\$2.50 for other beef. Most of the farmers interviewed strongly expressed the view that the controlled price of EC\$1.10 lb live weight did not permit them to make a profit. Controlled prices therefore are apparently a disincentive for producing superior products.

Land tenure had also been a continuing problem since, until recently, no long-term leases were available for the GOAB controlled lands. Without long-term leases or land ownership, livestock producers are not disposed to improving or even conserving pasture values; nor are they able to mortgage land to obtain credit to invest in improving pastures or livestock productivity.

The current marketing system for livestock products is composed of two distinct parts. One part services the hotel/tourist industry and the other resident market. The hotel/tourists market has much stricter quality requirements than the resident market. Development of export markets for livestock has not been encouraged because of concern about depleting local supplies and raising prices to Antiguan consumers.

Basically, therefore, Antiguan livestock producers are faced with a situation involving little or no price differential on meat quality, little opportunity for exporting to more profitable markets and poor quality but low (or no) cost for most feed. Under these circumstances, the strategy followed by most producers --- expanding the numbers of livestock owned without attention to increasing productivity --- is entirely rational, but works against the long-term national interest in improving livestock productivity.

## 2. Interventions

The Antigua Livestock Development Project was designed to increase production of meat and milk for local and tourist trade and to promote the achievement of national self-sufficiency, as well as the development of significant export trade to nearby countries. The project was aimed at three objectives. Firstly to realize a fifty per cent or greater increase in production of meat and milk from herds of selected cooperators, thereby demonstrating the technical feasibility of appropriate production and management interventions. Secondly, to improve and conserve the quantity and quality of livestock feed produced from pasture and food crop by-products. And thirdly, to train Antiguan in livestock and pasture management, herd health and special skills such as artificial insemination.

The underlying assumption of the project is that these objectives are achievable through interventions addressing the technical and political/economic constraints. A two fold approach is being used to address these constraints. Firstly, the project design calls for the technical constraints to be addressed by Winrock technical assistance, funded by USAID, in cooperation with CARDI and other regional organizations. The general implementation strategy involves the technical advisor working with cooperating farmers to improve feed production, produce genetically superior livestock, and improve management and marketing practices. The primary technical effort is directed towards effectively producing forage reserves to carry animals through the dry season, eventually upgrading the genetic potential of livestock, and introducing improved herd management practices. The thrust of this effort is to illustrate the technical and economical feasibility for making substantial increases in the productivity of livestock producers. The project is expected to provide basic data in order to promote investment in the industry and the supply of credit to producers. It is also expected to stimulate demand by demonstrating to supermarket and hotel/restaurant operators that adequate quantities of animal products of high quality could be supplied by National Producers. Secondly, in regard to political/economic constraints, the Government of Antigua-Barbuda agreed to review and revise its current policies concerning land tenure and price controls, thus removing these constraints to investment in the industry.

Project implementation therefore required the following:

- a. Winrock to provide a skilled technician (with practical farming and developing country experience, and with proven ability to work with and motivate people) to provide assistance in Antigua;

- b. Local cooperating farmers to be available and willing to invest their labor, livestock and other resources in the project;
- c. Suitable land to be available to demonstrate feasibility of pasture improvement for grazing and for hay/forage/silage production;
- d. Active collaboration to take place between the Ministry, CARDI and Winrock personnel in support of the project;
- e. The government of Antigua-Barbuda policies, regarding land tenure and price controls, to be revised in order to remove unnecessary constraints to livestock production; and
- f. USAID to provide financial support for technical assistance, equipment and livestock.

#### IV. EVALUATION FINDINGS

##### 1. Implementation

##### A. Discussion of Activities

Project activities commenced with the arrival of the Winrock Advisor in January 1984. A coordinating committee was established and a first year Implementation Plan was devised by the Winrock Advisor and approved by USAID/RDO/C in accordance with the Grant Agreement.

The first year project activities were geared to establishing a cooperative group of thirty livestock producers in order to demonstrate improved livestock production techniques by December 1984. Specific components of the Implementation Plan were: (a) initiation of the Project Coordination, (b) the establishment of a farmer/cooperator group, (c) procurement of field equipment, (d) implementation of training and field extension program, (e) development of a national artificial insemination program, and (f) introduction of farm/pasture improvement.

##### (a) Project Coordination

As required in the Grant Agreement, the Project Coordinating Committee was established upon the arrival of the Winrock Advisor. The Committee is composed of the Director of Agriculture, the Chief Veterinary Officer, the USAID Project Officer, the Winrock Advisor, the Chief of CARDI's Leeward Islands Unit, and the Chairman of the Cooperating Farmers Group established through the project. The Committee meets at least on a quarterly basis, and has effectively performed its role of providing guidance and assistance to the Winrock Advisor for the implementation of project activities.

##### (b) Farmer/Cooperator Group Establishment

A group of approximately thirty farmers were selected in accordance with criteria approved by USAID. The criteria for selection of demonstration farms were developed through a series of meetings between representatives from the Ministry of Agriculture, farmers groups and the Winrock Advisor. The Winrock advisor has succeeded in organizing the cooperator group into a functional, though loosely organizational structured association with a Chairman and a Secretary. Regular weekly meetings are held at which attendance is always good.

Topics relevant to the industry are discussed, lectures are given and decisions are made for the interest of the farmers. The evaluation team attended one such meeting and was impressed by the sense of commitment which emerged. Participating farmers expressed the view that the association provided a forum for them to reach a consensus on important matters relating to the industry, and for the first time the livestock farmers were in a position to articulate their problems and concerns as a group. Farmers were unanimous in their opinion that the Winrock Advisor played a key role in the organization of the group and that his participation as a facilitator was most

effective. This is a significant achievement in a setting where individualism prevails, and is evidenced by the positive interest displayed by the group in the future of livestock farming.

Indeed the evaluation team considers the formation of the group to be an important step towards the development of the livestock industry. Annexes B,C,D, and E indicate the selection criteria, members and officers of the cooperating group, a summary of meetings held and a list of speakers.

(c) Procurement fencing materials and Field Equipment

Fencing materials have been procured and used by the cooperating farmers. To date 600 acres have been fenced for 12 of the twenty-five selected farmers. The evaluation team visited four farm sites and are satisfied that the materials have generally been effectively utilized. Electric fencing has been introduced on farms in order to control on-pasture grazing and to prohibit access by roaming goats. This device has not been as effective on some farms as was anticipated and the problems of intruding goats continues. However, the Winrock Advisor has demonstrated where modifications to the systems implemented on other farms, have been effective in eliminating the problem. There are plans to introduce these modifications on all farms. The fencing of farms is further discussed under a later section entitled "farm improvements".

All of the equipment, except the sod seeder, has been delivered, after nine months delay. Nevertheless, this delay in itself did not inhibit the implementation of project activities as scheduled. At the time of arrival of the equipment, severe drought conditions still prevailed. The farmers were thus more concerned with preserving their cattle stock than in establishing pasture and developing forage conservation techniques.

The equipment is being utilized on the cooperating farms. With the onset of the rains in December 1984, hay was made and stored on six farms. It is interesting to note that user uses as well as conditions precedent to use of the equipment were developed by the farmers themselves. For example, as a result of some of the pastures not being cleaned before equipment use, damage was done to the mower and baler. Consequently, the group by consensus laid down a rule, that before the equipment was used on any pasture, it would have to be properly cleared. This illustrates a very businesslike approach to the use of equipment by the group, as well as their understanding of its importance for their enterprises.

(d) Training

Training is a major component of the project and focuses on such areas as artificial insemination (AI), livestock working facilities, farm record-keeping and use, and operation and maintenance of field equipment. The project advisor must be commended for commencing training activities even under not so favourable conditions. He has provided significant training for his GOAB counterpart who is expected to manage the livestock program after

completion of this project. However, formal training for the counterpart in management of such a program is desirable in order to further enhance his capabilities.

( i) Artificial Insemination (AI)

AI has commanded strong support in developing countries as a chief method of cattle improvement programs. It must be noted that AI is most appropriate and effective for stock improvement programs on well managed commercially operated farms. Also, AI is a very costly development program requiring significant expenditure on infrastructure for a successful program. Such cost considerations must be important for small countries with scarce resources such as Antigua. For example, the Barbados Ministry of Agriculture has estimated the cost for artificially inseminating each cow is approximately US\$20.00. Arguably, the above mentioned factors have contributed to the Government's position of not being more fully supportive of a National AI program.

Under the project a five day training program in AI was held in June ahead of the scheduled date. It is important to note that, evidently, AI is not a very feasible program for livestock improvement with the cooperating group as constituted. AI requires three important steps to be taken, if it is to be effective. Firstly, open cows need to be tied and segregated from bulls in the herd. Secondly, considerable time has to be spent with cows to be able to determine which are cycling. And thirdly, detailed records must be assiduously kept for each cow. In order to take these steps, farmers need to be full-time. Because the cooperating group is composed of part-time farmers, it is therefore understandable why AI has not been a successful project intervention. Although the farmers are fully aware of the tremendous benefits to be derived from AI for herd improvement, they have not readily accepted it for the reasons mentioned above. In the circumstances, it follows that the use of the bull should be introduced as the best breeding system for this group of livestock cooperators.

( ii) Livestock Working Facilities

Four livestock work and holding facilities were constructed in 1984 with assistance from the cooperating farmers. The evaluation team was unable to observe any in operation and is therefore not in a position to assess the adequacy thereof. The team supports Winrock's view that the existing facilities must be assessed for their adequacy, before more are constructed. This view is shared by the farmers who indicated that they were hesitant to establish more structures at the moment.

(iii) Farm Record-Keeping/Use

The cooperating farmers received initial training in the concept and use of record-keeping systems as a tool for effective farm management. The system was introduced but not with much success. Like most record-keeping systems it was designed for more sophisticated farmers than those in the Caribbean. Consequently, although the farmers perceive the desirability of maintaining adequate records, they appeared to be very

reluctant to adopt this particular system. Winrock recognizes the need to provide a more suitable record-keeping package and plans to design and introduce one accordingly.

( iv ) Operation and Maintenance of field Equipment

Training in this area had not commenced at the time of the evaluation. However, the team has been informed by the Winrock Advisor that a training program has been drawn up and will commence in the near future

( e ) Farm/Pasture Improvements

( i ) Fencing

As mentioned above, many farmers are using electric fencing, some more effectively than others. The combination of electric and conventional with electric fencing used to control grazing of pastures, generally speaking, has worked well. However, a few farmers complained about the suitability and efficiency of the solar power unit. This problem has been recognized by the Winrock Advisor and a superior model solar unit code is to be introduced. These have been ordered and will be in place within a few months. The project has set up some eight fencing demonstrations in the first year.

( ii ) Improved Pastures and Forage Conservation

Due to the prolonged drought and the delay in the arrival of field equipment, less than the planned pasture improvement has occurred. In fact, 400 acres of the 1200 acres have been established. However, with the return of the rainy season, and through CARDI's cooperation, the Winrock Advisor plans to speedily increase pasture improvement in year 2 of the Project with an anticipated target of 800 acres.

Three of the farmers whose pastures were improved in the CARDI Forage Project were able to make hay on arrival of the field equipment.

( f ) Land Leases and Price Control

The Government has finally addressed the problem of land tenure. The present position is that the leases have been prepared and at the time of the evaluation some five farmers have obtained their leases. A precondition laid down by the Government for obtaining a lease was that arrears of rents should be liquidated. However, this stipulation was changed, through encouragement from both the project steering committee and the farmers group, to allow the leases to be signed on the proviso that outstanding arrears would be liquidated within six months or the lease would be nullified. The resolution of this land tenure issue should stimulate interest in farmers towards further investment in the industry.

On the issue of price controls government has made slow progress. At the present time, it is unclear to what extent price controls

are restricting the farmer from receiving a fair market price for his livestock. Current Government price controls are \$1.10/lb for live bulls, steers, and heifers; and \$1.00/lb for sheep and goats delivered to the St. John's public abattoir.

A preliminary economic analysis by Winrock Ag. Economist, Ken Young, indicates that improved production of livestock in Antigua may not be economical even at free market prices. However, it would appear that producers have been subsidizing their part-time cattle production from other income sources. Producers have traditionally based their profitability on the extent to which their out of pocket expenses are covered by returns from livestock sales. None of the farmers interviewed include over-head costs (such as vehicle use, personal time and amortization of capital assets) as real expenses. For example, although Government and other donors such as CARDI have provided finance for fencing, farm ponds, etc., these costs should be taken into account as overhead costs. When both operating and overhead costs are compared to gross returns, there might be a net loss to the producer. According to the Winrock preliminary analysis, the break even price for a 50 acre farm operation of various production schemes is EC\$2.35/lb or more.

## B. Comments on Implementation

### a. Government Policy

The GOAB made commitments regarding policy changes and in-kind contributions. The evaluation team notes the Government is fulfilling its obligations in regard to in-kind contributions of facilities consisting of technical assistance and personnel. In regard to the policy changes, progress has been made toward land tenure reform with the granting of land leases to producers for a 10 year period at increasing rates of EC\$30, EC\$60, and EC\$75 per acre with the option to renew for a further ten years. Producers are required to pay arrears in order to have their leases in effect. At the time of the evaluation, five leases were completed while others are awaiting payment of arrears averaging EC\$1,500 - EC\$3,000. Almost all leases are for former Livestock Development Units of 50 acres each.

The situation regarding removal of price controls, for livestock products remains largely unchanged. The government has however agreed to having a study conducted to investigate the feasibility of modifying the control price of EC\$1.10/lb. on live animals or of EC\$2.50 and EC\$3.00 on cut meat in the public market meat stalls. Many farmers in the group are selling their high quality livestock on a parallel market to butchers, hotels, etc. at double or more the controlled price.

The evaluation team recognizes that this is a highly complex and political issue. The resolution of the issue is a critical factor for the success of this project as well as the development of a viable industry.

b. Cooperators

The producers participating in the Project are by and large meeting their obligations under the selection criteria for cooperators. There are vestiges of that apathy which can be attributed to historical, cultural and economic conditions in Antigua. For example, some farmers have been lethargic in their attitude to storing baled hay. Similarly, most farmers are either slow to begin keeping records on a systematic basis, or are hesitant to publicly share that information. Yet, their perceptions are that the training received in bookkeeping and pasture improvement has been appropriate. The team considers it necessary to modify the record keeping systems and provide further training in order to facilitate its use by the farmers.

c. Winrock

As is evident from the foregoing the Grantee has met most of the implementation objectives for the first year. Equipment maintenance training is still to be conducted. There are some apparent shifts in the implementation strategy which involves de-emphasizing artificial insemination and dairy production.

2. Design Validity

One of the first tasks of the Team was to carefully review the Project Design and relation to its appropriateness to the current livestock situation in Antigua.

The Team has concluded that the design was appropriate and valid for the conditions under which the Project is being implemented.

V. CONCLUSIONS

On the basis of its evaluation findings the team has arrived at the following conclusions:

1. The objectives of the Antigua Livestock Project and its design remain valid and within the context of the Antiguan situation.
2. The first year implementation plan is appropriate for the achievement of project activities. However, in the team's opinion, more emphasis needs to be placed on methodology for record keeping which can deliver effective training for the farmers. In addition, AI as a means of improving breeding stock should be de-emphasized.
3. Winrock has accomplished most of what was planned for the first year, in spite of the initial delays in start up to project implementation.
4. There is an effective and very functional relationship between Winrock, the Ministry of Agriculture, CARDI, and the cooperating farmers.
5. The technical assistance inputs have been timely and effective. However, given the farmer's slow receptivity of training in record keeping and in some measure, pasture improvement, more attention is required for the implementation of training activities.
6. Progress has been made toward the modification of the public policy governing land tenure. As regards price regulation, the Government is taking steps to resolve this issue.

VI. RECOMMENDATIONS

1. Equipment - The maintenance training should be conducted as soon as possible. The rental rate for the equipment should be assessed and a firm rate set.
2. Cooperator Organization - The cooperating farmer's group is a well organized and effective body. For it to be more effective it should be a constitutionally registered association. Such a body would be more visible both to the Government of Antigua and to other external funding agencies. To achieve this the project advisor in association with the farmer's group should develop a constitution and a set of by-laws for the sole purpose of registering the group. The Registrar of Cooperatives and Societies is supportive of this approach. A cooperative or producer's society would be the most form of association.
3. Long-Term Training - An opportunity should be provided for the counterpart to go to the U.S. and pursue a long term specialized training in Agriculture.
4. Artificial Insemination - The artificial insemination program should be discontinued. It is too costly and relatively ineffective for this group of farmers. In its place the team feels that the project should import eight to ten Jamaica Red beef bulls for distribution among the cooperating farmers. A sharing and use schedule can be easily worked out.
5. Project Extension - Even though the project was started in the midst of the worst drought in the past twenty years in Antigua, it is a tremendous credit to the project coordinator that so much was accomplished. The view was expressed by many individuals both from the farming group and from the coordinating committee that the project should be extended for an additional year (from June 30, 1987 to June 30, 1988). The Evaluation team shares this view and recommends that AID consider extending the PACD in order to maximize the benefits of these interventions.
6. Project Model - This project should be used as a model by USAID for funding agricultural projects in small states. It is a very concise project with clear cut objectives, a manageable focus, and relatively easily obtainable goals. It is hoped that more projects of this scope and budget size would be funded throughout the Eastern Caribbean in the near future.

EVALUATION SCOPE OF WORK AND METHODOLOGY

SCOPE OF WORK

The purpose of the Evaluation is to determine the progress being made towards the achievement of Project objectives; to identify constraints to project implementation and to assess the effectiveness of the project strategy.

A. Specifically, the Evaluation will assess:

1. (a) The continuing validity of the Project objectives, assumptions and design;
- (b) The appropriateness of the implementation plan as a means of achieving Project objectives; and
- (c) The degree of success with which the plan is being implemented.
2. (a) The effectiveness of the coordinating mechanism established for Project implementation;
- (b) The effectiveness of the functional relationships between Winrock, Ministry of Agriculture, CARDI and the cooperating farmers;
- (c) The effectiveness of the technical assistance and other inputs; and
- (d) Appropriateness of training programs for farmers and Ministry personnel.
3. Progress being made towards:
  - (a) Modification of public policies concerning land tenure and price controls which affect investment in livestock enterprises;
  - (b) Formation of livestock farmers association;
  - (c) The transfer of technology appropriate for Antiguan farmers in pasture improvement, hay and silage production, livestock management and marketing;
  - (d) The provision of support services to foster livestock production; and
  - (e) Improvement of skills of farmers and Ministry personnel.

B. The evaluation is also expected to identify:

- (a) The constraints which impede or are likely to impede progress towards successful implementation of the Project; and
- (b) Unplanned effects which have occurred as a result of the Project.

C. The Evaluation Report should include such recommendations as may be deemed necessary in order to facilitate Project implementation towards the achievement of Project objectives.

METHODOLOGY/WORKPLAN

a. Workplan

In conducting the Evaluation the team will perform the following tasks:

1. Become conversant with all principal Project documents including the Grant Agreement No. 538-0112, Winrock Implementation plans, and other relevant documentation; and
2. Conduct extensive discussion and interviews with Winrock, Ministry officials, and the cooperating farmers.

b. Methodology

The evaluation team consisted of Gerry Proverbs, Livestock Specialist CARDI, Darwin Clarke - Evaluation Officer, RDO/C, and Mike Maxey, Assistant Agricultural Officer, RDO/C. The team visited Antigua in April 1985 to conduct the evaluation in accordance with the terms of reference outlined above.

The evaluation methodology includes the following:

- ( i) A perusal of the principal project documents and files at RDO/C.
- ( ii) A review of the Winrock Implementation Plan and progress reports at the Winrock office.
- (iii) Extensive interviews with the Winrock Advisor and his Antiguan counterpart.
- ( iv) Interviews with the CARDI Leeward Islands Chief of Unit.

- ( v) Interviews with the Permanent Secretary Ministry of Agriculture, the Chief Agriculture Officer, and the Chief Veterinary Officer.
- ( vi) Interviews with more than 50% of the cooperating farmers, and,
- (vii) Visits to four farm sites.

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
AID PROJECT NO. 538-0112

APPROVED CRITERIA FOR SELECTION OF DEMONSTRATION FARMS

The following criteria have evolved from a series of meetings with the Ministry of Agriculture, Lands & Fisheries and Farm Groups for the selection of participants in the ANTIGUA LIVESTOCK IMPROVEMENT PROJECT:-

1. Raising of ruminants should be the main farm activity of the cooperators who shall have at least three (3) years experience managing ruminants, and be able to devote at least two (2) hours daily to caring for his or her animals.
2. They should have basic resources needed to utilize the improved production techniques. These resources should include:-
  - a. Current ownership of five (5) or more ruminants; and
  - b. Access to at least five (5) acres of agricultural land. This land should be owned on a free hold basis or rented for not less than 7 years.
3. Should be willing to demonstrate approved practices to others.
4. Should be willing to devote time to record-keeping, training courses and the development of New Management skills.
5. Should be innovated - willing to try new methods and techniques and be willing to accept some risks.
6. Should represent a cross section of livestock producers, to include the following:
  - a. Members of the Livestock Cooperative -
  - b. Participants in the L.S.M. program -
  - c. C.M.D.I demonstrators -
  - d. Others.

The following signatures signify approval of the criteria to be used in selecting farmers to participate in the ANTIGUA LIVESTOCK IMPROVEMENT PROJECT.

For Government of Antigua/Barbuda

.....  
Hon. Robin Yearwood

For Winrock International

.....  
Charles E. Burwell  
Project Coordinator

For AID

.....  
Director Wheeler  
Grant Officer

## APPENDIX 1-7

MEMORANDUM OF UNDERSTANDING BETWEEN  
CARDI, (CARIBBEAN AGRICULTURAL RESEARCH  
AND DEVELOPMENT INSTITUTE), AND  
WINROCK INTERNATIONAL, (ANTIGUA LIVESTOCK  
IMPROVEMENT PROJECT).

Whereas CARDI (through the forage component of its E.D.F. Grant) and Winrock (through the Antigua Livestock Improvement Project), each are endeavouring to improve the forage situation of the Livestock farmer of Antigua, the following areas seem appropriate for cooperation:-

1. CARDI - to provide technical input for demonstration farms and for larger acreages supplied by Government.
2. CARDI - to provide legume and grass seed as possible.
3. CARDI - to supply tillage equipment until Winrock Project equipment arrives.
4. CARDI - to house Livestock Project equipment until other arrangements are made by the participating farmers.
5. CARDI - to provide operation and maintenance for Livestock Project equipment.
6. CARDI - to provide seed bed preparation and seed for three to five acres on demonstration farms.
7. Winrock (Project) to reimburse CARDI for all expenses, (except technical assistance) such as seed, fertilizer, operation and maintenance costs.
8. Winrock (Project) to provide a complete line of equipment for a medium size operation, including seeding equipment.
9. Winrock (Project) equipment to be shared with CARDI as needed.
10. Winrock (Project) to develop and administer hourly charges for each piece of equipment, to include operation, maintenance and depreciation.
11. Winrock (Project) to assist demonstrators with costs of fence, seed and fertilizer.
12. CARDI & Winrock - to organize demonstrations and training in forage, production, utilization and storage.
13. CARDI & Winrock - to share information and data acquired.

CG3/42

84-01-16

The President  
Winrock International  
Petit Jean Mountain  
Arkansas 72110  
U.S.A.

Dear Dr. Wheeler:

As requested in your letter of December 13, 1983, we are forwarding a copy of the Memorandum of Understanding between WINROCK and CARDI. We have retained one copy.

We look forward to increased cooperation in the future.

Sincerely,

  
S. Parasram  
Director,  
Research & Development

SP/dd

Mem. of understanding <sup>A-40</sup>  
copy filed - See under Family Agreement



WINROCK  
INTERNATIONAL

December 19, 1983

Mr. J. A. Bergasse  
Agriculture Executive Director  
CARDI  
University Campus  
St. Augustine, TRINIDAD  
WEST INDIES

Dear Mr. Bergasse:

Dr. Wheeler signed on December 6 the memorandum of understanding between CARDI and Winrock. The enclosed signed copy is sent in anticipation of receipt of a copy signed by you.

Sincerely,

*Patty Allison*  
Patty Allison

PA:br

cc: H. A. Fitzhugh

Sam Patterson: For further action

*WAB*

10-1-84

*Bill*

MEMORANDUM OF UNDERSTANDING  
BETWEEN THE  
CARIBBEAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE  
AND THE  
WINROCK INTERNATIONAL LIVESTOCK RESEARCH AND TRAINING CENTRE.

WHEREAS, the WINROCK INTERNATIONAL LIVESTOCK RESEARCH AND TRAINING CENTRE (hereinafter referred to as WINROCK) and the CARIBBEAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE (hereinafter referred to as CARDI) are involved in agricultural research and development in the tropics; and

WHEREAS WINROCK and CARDI are mutually interested in collaboration of staff in research, training and related activities; and

WHEREAS, the parties wish to embark on collaboration in various disciplines relevant to Farming Systems and component research activities.

WHEREAS, the two Institutions have cooperated on an informal basis to further these interests and now desire to record here their mutual understandings in this record;

NOW, THEREFORE, the parties hereto do hereby record their understanding as follows:

ARTICLE I

1. Objectives

The purpose of this Memorandum of Understanding is to further the following objectives:

- 1.1 To create a frame of reference and provide a basis for effective cooperation on programmes and projects of mutual interest.

- 1.2 To prepare proposals for specific, concrete programmes and projects to be identified and agreed upon jointly, and to seek the necessary financing for their implementation.
- 1.3 To collaborate with one another on the implementation of technical cooperation programmes and projects financed by third parties, in accordance with arrangements mutually agreed upon for this purpose.
- 1.4 To develop cooperative activities in furtherance of the mutually re-inforcing interests of the two Institutions.
- 1.5 To participate in cooperative educational endeavour on farming systems.
- 1.6 To facilitate the following:
  - a. Participation of WINROCK and CARDI staff in joint training, research and development activities.
  - b. Engagement of CARDI staff as Consultants to WINROCK on matters of research, training and development.
  - c. Engagement of WINROCK staff as Consultants to CARDI on matters of research, training and development. And,
- 1.7 To enlarge and strengthen the capacities and capabilities of each Institution through the cooperative use of materials and facilities which support the mutually agreed programme.

ARTICLE II

2. Implementation

To implement the aims and purposes expressed in Article I, it is understood and agreed that:

- 2.1 This Memorandum of Understanding will not interfere with the basic responsibilities and opportunities of the contracting parties, for independent action. Neither does it establish any legal or financial obligation on the part of either party.
- 2.2 The responsibilities assumed by each of the cooperating parties will be limited to the availability of the resources foreseen for the financing of specific projects.
- 2.3 Each project will be developed as a separate agreement, specifying objectives, mutual obligations, nature and sources of financing.
- 2.4 Proposals for cooperative work under this Memorandum will be submitted through liaison officers designated by each of the Institutions to assure conformity with the aims and purposes as set forth in Article I.
- 2.5 Individual programmes of work under this Memorandum will be jointly planned and implemented, and programme results and other benefits will be shared or mutually exchanged by the two Institutions.
- 2.6 In recognition of the mutual interests and benefits to be gained by CARDI and WILFRICK, costs of implementing, training and other activities will be shared in accordance with these interests as well as specifically understood and agreed to.

ARTICLE III

3. Duration

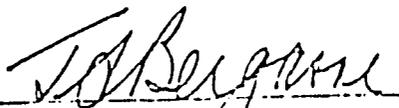
- 3.1 This Memorandum of Understanding is effective upon its signing by the appropriate officer of each of the signatory Institutions.
- 3.2 This Memorandum may be amended at any time by mutual consent and shall continue to be in force and effect indefinitely unless terminated by either party giving written notice of intent to terminate. Insofar as possible, such notice will be given six months in advance of the termination date.

ARTICLE IV

4. Modification

- 4.1 The terms of this Memorandum may be modified upon approval by both contracting parties through an exchange of notes to be incorporated automatically in the text of the Memorandum.
- 4.2 Any notice or request required under this Memorandum or specific project agreement between CARDI and WINROCK shall be in writing.

Executed for CARDI

  
\_\_\_\_\_  
Executive Director  
J. A. Bergasse

A-45

Executed for WINROCK

  
\_\_\_\_\_  
President  
R. O. Wheeler



2. The Rental shall be subject to review after the expiration of the first four (4) years of this lease and for every five (5) years thereafter.
3. That if the Lessee shall be desirous of taking a new lease of the farm for a further term of \_\_\_\_\_ years from the expiration of the term hereby granted and shall not more than twelve nor less than six months before the expiration of the term hereby granted give to the Lessor notice in writing of such his desire and if he shall have paid the rent hereby reserved and shall have performed and observed the several stipulations herein contained on his part to be observed and performed up to the termination of the tenancy hereby created then the Lessor will grant to the Lessee a new lease of the farm at a rental to be agreed upon but with and subject in all other respects to the same covenants and conditions as are herein contained except this clause for renewal.
4. In addition to the Covenants under Section 53 (a) (c), (f), (g), and (h) of the Act, the Lessee hereby Covenants with the Lessor as follows:-
  - (i) To use manage and develop the farm for livestock farming only and not to suffer or permit any part thereof to be used for any other purpose whatsoever except with the written consent of the Lessor previously obtained.

- (ii) To keep in good repair all buildings, gates, stiles, hedges, walls and fences in and upon the farm and to keep the hedges properly trimmed.
- (iii) To keep all ditches and gutters in and upon the farm cleaned out and all drains sewers and water courses open and free from obstruction and in working order.
- (iv) To adopt adequate grazing management and animal husbandry practices to avoid deterioration of land and pastures including the clearance of acacia within six (6) months of being in possession of the farm.
- (v) To permit the person for the time being filling the post of Veterinary Officer and or a Livestock Officer at all reasonable times to enter the farm and to inspect the same and the livestock thereon and to follow any directions given by such Veterinary Officer for the purpose of controlling disease among the livestock.
- (vi) To make good all damage to any part of the farm or to any buildings erections or fixtures thereon which shall be caused by himself or by his tenant or by his or their family or families' guests incomers or workmen or by his or their stock other than reasonable wear and tear.

- (vii) Not to take on the farm for grazing or to be fed there for any period exceeding three (3) months livestock belonging to any person or persons other than the Lessee without the previous written consent of the Lessor.
- (viii) Not to fell or injure any timber or trees on the farm without the previous written consent of the Lessor.
- (ix) To erect and maintain sufficient fences to enclose and determine the boundaries of the demised lands as may for the time reasonably be required by the Lessor.
- (x) Not to alter any hedge, fence or any part of the farm whereby the size and shape of any field is rendered different from its previous size without the previous written consent of the Lessor.
- (xi) Not to alter remove or destroy any building which may be erected on the farm and not to erect any building on the farm without the previous consent in writing of the Lessor.
- (xii) Not to remove or alter any water supply system which may be installed on the farm or any part of such water supply system without the previous written consent of the Lessor.
- (xiii) At the determination of the tenancy peaceably and quietly to deliver up to the Lessor vacant possession of the farm with all buildings held therewith in such good and substantial repair as shall be in accordance with the terms and conditions herein contained.

5. In addition to the covenants under Section 52 (1) (a) and (b) of the Act the Lessor hereby covenants with the Lessee that on the expiration or sooner determination of the term hereby created the Lessee shall be paid compensation for those improvements to the farm made by the Lessee during the tenancy which improvements have received the prior approval in writing of the Lessor. In the absence of agreement between the Lessor and the Lessee on the amount of compensation, the question is to be

referred to Arbitration in accordance with the provisions of the Arbitration Act 1975 (No. 12 of 1975) of the Laws of Antigua and Barbuda. Provided that any moneys due to the Lessor from the Lessee for rent, breaches of the Lessee's Covenants herein contained or otherwise in relation to the tenancy may be deducted from any compensation payable to the Lessee hereunder.

6. PROVIDED ALWAYS AND IT IS HEREBY EXPRESSLY AGREED DECLARED as follows :-

- (i) That if the rent hereby reserved or any part thereof shall remain unpaid for three (3) months after becoming payable, whether formally demanded or not, or if any Covenant on the Lessee's part herein contained shall not be performed or observed then and in any such case it shall be lawful for the Lessor or anyone acting for him at any time thereafter and after having served notice in accordance with Section 56 of the Act to re-enter upon the farm or any part thereof and thereupon this lease shall absolutely cease and determine but without prejudice to any right of action or remedy of the Lessor in respect of any arrears of rent or any antecedent breach of Covenant by the Lessee.
- (ii) If the Lessee shall desire to determine the tenancy before the expiry of the term hereby created, he shall at any time after the expiration of one year thereof give to the Lessor three (3) calendar months previous notice in writing of such his desire and upon expiration of such notice the present demise and everything herein shall cease and be void but without prejudice to the rights and remedies of either party against the other in respect of any antecedent claim on breach of Covenant.

(iii) All disputes or differences whatsoever which shall arise between the parties hereto touching or concerning this lease shall be referred to Arbitration under the provisions of the Arbitration Act 1975 (No. 12 of 1975) of the Laws of Antigua and Barbuda or any Act amending or in substitution of the same.

(iv) Any Notice made pursuant to or by virtue of this lease shall be in writing and shall be sufficiently served upon the Lessor if addressed to the Permanent Secretary in the Ministry of Agriculture Lands and Fisheries and upon the Lessee by leaving same at his usual or last known place of abode or by posting same in some conspicuous place on the farm.

7. On the death of the Lessee the tenancy shall determine, provided however that:-

(i) If the Lessee shall have mortgaged charged or otherwise encumbered the farm, buildings, erections or fixtures as security for a loan for the purpose of the development of the farm or for acquiring a loan to construct a house with the consent of the Lessor and the mortgage, charge, or other incumbrance is still a subsisting security for such loan, the holder of the security shall be entitled at his election within six (6) months after the death of the Lessee either:-

(a) to nominate a successor Lessee who satisfies the requirements followed by the Lessor in selecting Lessees for a tenancy at the same rent for the remainder of the term and on the same terms and conditions as are herein contained provided however, that in the selection of a successor Lessee the holder of the security shall give priority to the spouse and children of the deceased Lessee; or

- (b) if the Lessee leaves no spouse the children of the Lessee shall have the right to a tenancy of the farm at the same rent for the remainder of the term and on the same terms and conditions as the Lessee has under this Lease if within six (6) months after the death of the Lessee, they have found to manage the farm some relative (including any of their own number) who satisfies the requirements followed by the Lessor in selecting tenants; or
- (c) if no relative can be found who is qualified and willing to manage the farm, the spouse or children as the case may be, shall have the right within six (6) months after the death of the Lessee, to nominate a successor who satisfies the requirement followed by the Lessor in selecting tenants, for a tenancy at the same rent for the remainder of the term and on the same terms and conditions as the Lessee under this Lease.
- (d) for the purpose of this paragraph:-
  - (i) "Child" includes a child born out of wedlock and an adopted child;
  - (ii) "Spouse" includes any persons with whom the Lessee had been cohabiting as man and wife for a period of at least five (5) years immediately preceding the death of the Lessee.

The Lessee shall at all times during the said term ensure and keep insured all buildings and premises to the full value thereof in the joint names of the Lessor and the Lessee against loss by fire, earthquake and hurricane and will whenever required, produce to the Lessor or his agent the policy of such insurance and the receipt for the last premium, thereof.

- 8. All mines, minerals, oils whatsoever as are situate and lying either above or beneath, in or under the said land shall be saved and reserved to the Lessor with ample and sufficient powers from the Lessor and his workmen, agents and labourers with or without animals and vehicles to have ingress, egress and



APPENDIX 3-1

1985 Hourly Charges for Project Farm Equipment

	<u>Hourly charge (EC\$)</u>
M.F. 290 tractor	28.50
M.F. 290 tractor with farm loader	37.00
M.F. 290 tractor with farm loader and rear scraper	38.50
Disc plow	3.50
Tandem disc harrow	10.00
Cultipacker	15.60
Rotary cutter	13.60
Post-hole digger	2.75
Fertilizer spreader	9.00
Sprayer	3.70
Rotary mower	4.70
Hay rake	8.00
Hay baler	15.60
Silage wagon	2.00
Corn planter	8.00
Cultivator	3.50
Forage harvester -- corn	8.50
Forage harvester -- grass	6.00
Livestock trailer	10.00
Sod seeder	18.60
Plowing	90.00 per acre
Harrowing	45.00 per acre
Spraying	45.00 per acre
Planting	25.00 per acre
Brush cutting	80.00 per acre
Post holes	1.00 per hold
Hauling	40.00 kg (min. 3 hrs)

# Winrock International

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Antigua Livestock Improvement Project  
P.O. Box 1068  
St. John's, Antigua  
Telephone: 31362

## FIELD EQUIPMENT

MF 290 Tractor	U.S.\$ 16,110.00
- MF 236 Farm Loader	3,852.00
- Rear Scraper	1,395.00
Disc Plow	1,791.00
Tandem Disc Harrow	3,546.00
Cultipacker	3,114.00
- Transporter	1,260.00
Rotary Cutter	3,258.00
Post-hole Digger	1,170.00
Fertilizer Spreader	981.00
Sprayer	2,232.00
Rotary Mower	1,764.00
Hay Rake	3,780.00
Hay Baler	8,001.00
Silage Wagons- <u>2</u>	7,920.00
Two-row Corn Planter	2,160.00
Cultivator	2,169.00
Forage Harvester - Grass	2,857.00
Forage Harvester - Corn	3,888.00
Livestock Trailer	8,842.50
Sod Seeder	8,000.00
	<u>U.S.\$ 88,090.50</u>

# Winrock International

Antigua Livestock Improvement Project  
P.O. Box 1066  
St. John's, Antigua  
Telephone: 31362

## EQUIPMENT AND PARTS - CONTINUED

* 1984 Chevrolet Blazer - 4 x 4 - Drive	<u>U.S.\$</u> 14,900.00
Mobile Telephone	494.00
Steel tool box with tools	225.00
Grease Gun	20.00
Parts -- see invoices	5,000.00
- Post hole digger (misc.)	
- Heavy duty tires, tubes, and rims -- 290 M.F. Tractor	
- Hay Baler -- extra tires and tubes extra set pick-up gears extra set plunger knives extra set shear knives sheer bolts	
- Hay Rake -- extra tire and tube extra tines, nuts, and bolts	
- Brush Cutter -- extra heavy-duty knives	
- Grass Harvester -- 2 extra sets knives	
- M.F. Disc Plow -- extra 3-pt. hitch pins	
- Rotary Mower -- 2-sets extra blades	
	<u>U.S.\$</u> 20,639.00

\* Special arrangements to be made if project is extended.

Total -- Field Equipment	<u>U.S.\$</u> 88,090.50
Total -- Equipment and Parts	<u>20,639.00</u>
	<u>U.S.\$</u> 108,729.50

# Winrock International

Antigua Livestock Improvement Project  
P.O. Box 1066  
St. John's, Antigua  
Telephone: 31362

## DISBURSEMENT

### Office Equipment

1-Hermes Manual Typewriter	(Co-op)	<u>U.S.\$</u>	638.00
1-File Cabinet 2-drawer	(Co-op)		232.00
1-Desk (steel)	(Co-op)		270.00
1-Desk Chair (swivel)	(Co-op)		229.00
* 1-Minolta Copier EP300	(Co-op)		3,329.00
* 1-Floor Fan	(Co-op)		75.00
* 1-Table Fan	(Co-op)		40.00
* 1-Bug Light	(Co-op)		25.00
* 1-Ice Chest	(Co-op)		40.00
2-Transformers	(Co-op)		177.00

### Training Equipment

* 1-Sony Color TV	(Co-op)		587.00
* 1-VHS Tape Player & Recorder	(Co-op)		740.00
5-Tapes on Goats	(Co-op)		50.00
5-Tapes on Sheep	(Co-op)		50.00
7-Tapes on Cattle	(Co-op)		70.00
Manuals & Books	(Co-op)		100.00
Kodak Projector & Trays	(Co-op)		150.00
Tape recorder-Sony	(Co-op)		104.00
Breeding & Milk Records	(Co-op)		20.00

### Breeding Equipment

2-Semen Tanks	Paynters Lvstk. Station	900.00
Semen-400 ampules	/	3,000.00
2-Breeding Kits	or shared	180.00
2-Bull Chin Ball Markers	/	160.00
2-Pen-block	Co-op & Paynters	40.00
Telephone Recorder		384.00

### Fencing Equipment

Solar chargers & collectors	(Co-op)	300.00
Fibre-glass Posts	(Co-op)	200.00
Insulators, Clips etc.	(Co-op)	50.00
4-Rolls Wire	(Co-op)	100.00
Wire Stretchers	(Co-op)	35.00
Fence Pliers	(Co-op)	15.00

Total U.S.\$ 12,290.00

cont/

# Winrock International

Antigua Livestock Improvement Project  
P.O. Box 1066  
St. John's, Antigua  
Telephone: 31362

## DISBURSEMENT

Page 2

			<u>cont/</u>
	<u>Balance fwd.</u>	<u>U.S.\$</u>	12,290.00
<u>Livestock</u>			
9-Jamaica Red Bulls	(Co-op)	<u>U.S.\$</u>	16,000.00
19-Goats (does)			9,500.00
6-Jamaica Hope Heifers			12,000.00
6-Sheep (1-ram & 5-ewes)			1,500.00
3-Blackbelly Rams			1,000.00
	see		
	<u>Animal Pay-Back Plan</u>		
 <u>Livestock Equipment</u>			
Msc. Equipment	(Co-op)		100.00
	<u>Total Amount</u>	<u>U.S.\$</u>	<u>52,390.00</u>

\* Special arrangements to be made if --  
Project is extended.

## DISBURSEMENT TOTALS

Field Equipment	(Co-op)	<u>U.S.\$</u>	88,090.50
Equipment and Parts	(Co-op)		20,639.00
Disbursements	(Co-op)		52,390.00
	<u>Total</u>	<u>U.S.\$</u>	<u>161,119.50</u>

Breeding Program for Cooperating Farmers

Goats -- #40 Alpine and Nubian Goats imported from the United States.

Cooperating Farmer

Keithroy Browne  
Cheryl Edwards  
A&D Joseph  
R. T. Kentish  
Patrick Maynard  
Raymond Raeburn  
Reuben Richards  
Joseph Robinson, DVM  
Joseph Samuel  
Sydney Samuel  
Lazman Webson  
Boy's Training School  
Olivers Station  
Denfield Skepple

Sheep -- #16 Dorset Sheep imported from Guiana Island.

Cooperating Farmer

Keithroy Browne  
Lawrence Broodie  
Boy's Training School

-- #4 Barbados Blackbelly Rams

Cooperating Farmer

A&D Joseph  
Sydney Samuel  
Lazman Webson

Dairy Cattle -- #6 Jamaica Hope Dairy Cattle imported from Jamaica.

Cooperating Farmer

Raymond Raeburn

Breeding Program for Cooperating Farmers

Beef Cattle -- #10 Jamaica Red Bulls imported from Barbados.

Cooperating Farmer

Lawrence Broodie  
Eaton Emanuel  
Ashley Joseph  
Aubrey Lake  
Reuben Richards  
Joseph Samuel  
Sydney Samuel  
Theophane Samuel  
Paynters Station

Semen -- Frozen Bull Semen imported from Jamaica and the United States for use in the Artificial Insemination Program (AI).

350 Units Red Poll - 5 sires  
50 Units Holstein - 1 sire  
100 Units Jersey - 2 sires  
50 Units Brahman - 1 sire  
100 Units Jamaica Hope  
650 Total Units Semen

## Project Imports of Animals and Semen

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Frozen bull semen	350 units Red Poll	- 5 sires
	50 units Holstein	- 1 sire
	100 units Jersey	- 2 sires
	50 units Brahman	- 1 sire
	<u>100</u> units Jamaica Hope	- 3 sires
	650 total	

Goats	19 Alpine	- 6 bucks
		- 13 does
	21 Nubian	- 8 bucks
		- 13 does
	<hr/>	
	40 total	

Cattle	10 Jamaica Red bulls	
	<u>6</u> Jamaica Hope females	
	16 total	

Sheep	4 Barbados Blackbelly rams	
	16 Dorset (Guiana Island)	- 6 rams
		- 10 ewes
	<hr/>	
	20 total	

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APPENDIX 4-1

USAID/WINROCK INTERNATIONAL

Antigua Livestock Improvement Project

June 4 - 22, 1984

Arrival of Richard Newton from Winrock International

1. To design and build cattle handling facilities for a representative sample of Livestock Cooperators to prepare them for Artificial Insemination program.
2. To prepare plans and estimates with a bill of materials for farmers interested in constructing their own facilities.
3. To recommend adaptation and design of facilities at Oliver's Livestock Station, to permit the Station to be a model dairy reproduction Centre.

Suggested Agenda

June

- Mon 4: Arrival into Antigua of Mr. Newton at 5:30 p.m.
- Tues 5: Visitation and selection of Livestock Cooperators farms
- Wed & 6: for construction, with Mr. C. Burwell, Mr. Lazman Webson  
and Mr. Ickford Emanuel.
- Thurs 7: Design sample facilities for discussion with farmers  
inputs. (Thursday evening meeting with Livestock Farmers).
- Fri 8: Procure materials - Mr. I. Emanuel and Mr. L. Webson  
to
- Sun 10: (Scrap metal and welding equipment. Pick-up available  
through Mr. Webson
- Mon 11:  
to
- Fri 15: Begin construction on 1st farm, with Mr. I. Emanuel and  
fencing crew to assist, along with farmers and helpers.
- Sat 16:
- Sun 17:
- Mon 18:  
to
- Fri 22: Continue construction with the same crew as above.  
Discuss plans for Oliver's with Dr. Robinson.
- Sat 23: Mr. Newton leaves Antigua for the United States

USATO/Minrock International  
Antigua Livestock Improvement Project  
Artificial Insemination Training Course  
June 13 - 29, 1984  
Paul Schumacher - Minrock International

Suggested Agenda

June

- Thurs 14: Schumacher arrives in Antigua
- Fri 15: Orientation to Livestock and Artificial Insemination - Antigua
- Sat 16: Review Artificial Insemination Course material
- Sun 17:
- Mon 18: All day class, Oliver's - Heat detection, sire selection, nutrition record keeping, semen handling, etc.
- Tues 19: Afternoon class, Oliver's - Use of charts, books, handouts
- Wed 20: Morning class. Reproductive organs - using slides, video tapes, etc.
- Thurs 21: (All day class. Breeding and working on cows and handling
- Fri 22: semen. The actual insemination of cows and ear tagging will be done.
- Sat 23: (Review and review course material for evening Livestock
- Sun 24: meeting with farmers.
- Mon 25: Actually set up Artificial Insemination system at Oliver's and try breeding cows in newly constructed facilities.
- Tues 26: (Evening meetings with livestock farmers to cover: All the
- Wed 27: farmer needs to know about heat detection, sire selection,
- Thurs 28: nutrition, culling, etc., records.
- Fri 29: Wrap up - Is the system in place?
1. Trained and equipped technicians
  2. Transportation for technicians
  3. Office at Oliver's -
    - a. 24 hr coverage - record-o-phone
    - b. Record system in place
    - c. Enough good semen of the desired breeds
    - d. Enough supplies and equipment on hand
    - e. One person in charge of the following:
      - Regular and timely service
      - Inventory of semen and supplies
      - Ordering semen and supplies
      - Monitoring semen register
      - Monitoring liquid nitrogen
      - Collection and accounting of service fees
      - Liaison between Technicians and farmers
      - Education Programs

4. Determine cost of service and amount to be subsidized.
5. Samples of holding facilities in place with plans, costs and bills of materials for farmers wishing to build to take advantage of Artificial Insemination.



CARIBBEAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE  
P.O. Box 766 · FRIARS HILL · ST. JOHN'S · ANTIGUA, W.I.

Cables: "CARDINST"  
ANTIGUA

Telephone: 20661

Our Reference

February 21, 1984

Mr. Charles E. Burwell  
Antigua Livestock Imp. Project  
P. O. Box 1371  
St. John's, Antigua

Dear Sir:

FORAGE SEED PRODUCTION PROJECT

Our Project is sponsoring a workshop in the nature of two field days (March 20th & 21st) in Barbados. The objective of the Field Days are to stimulate wider interest among farmers in various islands in the use of forage grasses and legumes and to act as a forum for scientists concerned with the development of pastures for livestock in the region.

We are aware of your interest in Forage Development in Antigua and we wish to extend to you an invitation to attend the meeting and to participate fully in the workshop.

If you find it possible to attend I would be pleased if you would make direct contact with Gerry Proverbs, CARDI, Barbados who has agreed to coordinate the workshop.

Yours sincerely,

V.A.L Sargeant  
Project Coordinator

VALS:jh

FORAGE FIELD DAY

PROGRAMME

Day 1

Tuesday March 20, 1984

- 8:30 am Registration at Springhead Farm
- 9:00 am Welcome - Mr. J. Broadhurst
- 9:15 am CARDI's Forage Programme - Mr. V.A.L. Sargeant
- 9:30 am Tour pastures & open discussions  
to
- 11:00 am Refreshments
- 11:30 am Forage Seed Production Programme in Antigua - P. Phillip
- 12:00 Forage Establishment Programme at Mobilissa, Guyana -  
Dr. P. Osuji
- 1:00 pm Lunch
- 2:00 pm Field visit to the ADC's Hope Dairy Farm, St. Lucy

Day 2

Wednesday March 21, 1984

- 9:00 - 11:30 am Field visit to Mr. C. O. Williams' Dixie Farms, Waterhall,  
St. James

- 0 -



CARIBBEAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE

CAVE HILL CAMPUS, P.O. BOX 64, BARBADOS W.I.

Cables: "UNIVADOS"  
Bridgetown

Telephone: 425 - 1334; 425 - 1335

Our Reference.

1986-05-13

Mr. Charles Burwell  
Project Coordinator  
Winrock International Institute  
For Agricultural Development  
P.O. Box 1066  
St. John's  
ANTIGUA

Dear Colleague:

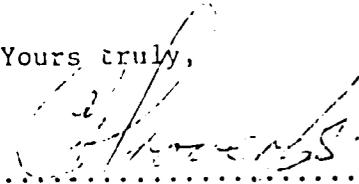
CARDI Barbados invites you to attend a Forage field-day and seminar at Springhead Farm, St. James on June 4, 1986 at 9:00am.

This field-day and seminar is being co-hosted by CARDI, the Ministry of Agriculture, the BAS and the BADC and is supported by the European Development Fund through the CARDI Forages Project.

The programme as you can see from the agenda has been designed to assist farmers with their pasture establishment and to provide them with some techniques for managing them for grazing and cut and carry systems. Come and see some of the newer improved grasses such as coastal bermuda coast cross #1 and dwarf elephant grass and the legumes siratro, glycine and protein banks using "CARDI Cunningham" leucaena.

We look forward to seeing you there.

Yours truly,

  
.....  
Gerald Proverbs  
Head of Unit

GP:mm

CARDI/MOA/BAS/BADC

FORAGE FIELD-DAY

AGENDA

Place: Springhead Plantation, St. James

Date: June 4, 1986

9:00am R E G I S T R A T I O N

Session 1

9:30 - 11:30am Tour of Pastures with Discussion

- Joseph Hassell, Farmer
- Gerald Proverbs, Animal Scientist

11:30 - 1:00pm L U N C H

Session 2

1:15 - 1:45pm Forage Establishment & Maintenance

- Robert Patterson, CARDI Forage Agronomist

1:45 - 2:15 Management of Pastures for Cut & Carry and Grazing Systems.

- Robert Quintyne, Senior Ag. Officer, Ministry of Agriculture

2:15 - 2:45 Forage Establishment & Maintenance

- Patrick Bethell, Farmer

2:45 R E F R E S H M E N T S

\$\$\$\$\$\$\$\$\$\$

CARDI/MINISTRY OF AGRICULTURE FIELD DAY

FORAGE PRODUCTION & LEGUMES

BETTY'S HOPE FIELD STATION  
JANUARY 24, 1985

P R O G R A M M E

THURSDAY JANUARY 24:

9:00 - 9:10	Welcome & Introductions	- V. Sargeant
9:10 - 10:00	Grain Legume Production at CARDI	- Dr. L. Singh
10:00 - 10:45	Equipment used in the Production of Forage	- C. Burwell
10:45 - 11:30	Types of Forage/Legumes Seeds being produced at CARDI	- P. Philip
11:30 - 12:15	Visit to Forage/ Legume Plots.	
12:15 - 1:15	L U N C H	
1:15 - 2:30	Visit to Farmers' Holdings	
2:30	C L O S U R E	

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CARDI - WINROCK Field Day  
Antigua - Friday 13 June 1986

Justification:

Almost all of the livestock farmers in Antigua are part-time operators, having, in addition to their animal activities, a full-time job in some other sector of the economy. They are therefore fully occupied in their outside work normally from 08.00 to 16.00 hours from Monday to Friday. In general, the days of the weekends are spent in tending to the needs of their animals. It is therefore difficult for them to abandon their other activities in order to attend a full, formal field day, whether it takes place on the weekend or during the working week. When the opportunity arose to arrange an informal farmers meeting - field day to discuss pasture management, it was decided to arrange it to take place after normal working hours on a week day, in order to test farmer reaction.

The Event:

It was seen that in a field sown to improved pastures 6 years ago, and which had been subjected to heavy over-grazing for at least two years, areas which were protected from grazing during the 1985-86 rains produced a good stand of the species which had been originally sown. Close by, a property which has been subjected to good pasture management has shown remarkable improvement during the past 12 months. It was an ideal opportunity to emphasize the importance of management in the maintenance of good pastures. Farmers were therefore invited to participate in a meeting - field day to take place starting at 16.30 hours on a Friday afternoon. Invitations were made by word of mouth with effect from the Tuesday preceding the event.

Participation:

A total of 15 people took part in the event, of which 11 were actively involved in the keeping of livestock. In view of the limited publicity given to the event, this was a satisfying total, although it is to be regretted that no member of the Antigua Department of Agriculture Extension Division took part, despite their being verbally invited.

Expenses:

The only direct expenditure involved in the field-day was for the liquid refreshments offered to farmers during the course of the farm visits. The timing of the meeting obviated the need to provide food, while the nature of the subject to be discussed entailed no special preparation. Costs were therefore kept to a minimum.

Conclusions:

In the light of the experience gained in this field-day, there would appear to be a lively interest in this sort of event. While the idea of meeting at the property of a commercial livestock farmer is not new, the concept of a "twilight meeting" to fit in with the working schedule of part-time operators appears to be something that has not been tried, at least in recent years. The results are encouraging and the approach will be tried again in the future, since it appears to present a low-cost method of reaching farmers who would find it difficult to attend a full-scale, conventional field day which would be held at a time when many livestock owners are normally fully occupied by their other activities.

page five

One will be fed ad lib forage, while the other will receive forage plus commercial feed supplement- It is hoped to establish the growth potential for local, unimproved sheep, the level of which is expected to lie in the region of 0.3 to 0.5 lb/day. Once the potential is documented, local feeds, such as Leucaena meal or cotton-seed will be substituted for the commercial ration in order to devise an economical ration for the feeding of growing sheep.

Half of each group of sheep will be given both coccidiostats and treatment against parasites in order to study the importance of these control measures in animal growth. In the future, it is hoped to repeat the work using local goats instead of sheep.

## Field Day - Friday 13 June 1986

A small, informal farmers meeting - field day was held in Antigua in the late afternoon of Friday 13 June, 1986. It was arranged by the CARDI-EDF Forage Programme, with the cooperation of the WINROCK Livestock Improvement Project. The participants assembled at 4.30 pm and the meeting terminated at about 6.30 pm, just before dark. After pastures had been inspected on two farms, the group saw the installations for a sheep feeding experiment to be conducted with the assistance of WINROCK personnel.

### 1. The property of Mr J. Winter

This property had received considerable assistance from the CARDI Forage Programme in the early years of the present decade, while under the ownership of Mr Barrymore Stephens. It has been heavily over-grazed during the last two years by cattle, sheep and goats.

The field to be inspected had been sown by CARDI in 1980-81 to a mixture of Guinea Grass with the legumes Glycine, Siratro and Rabbit Vine. Recently, heavy grazing pressure, largely with sheep, had apparently all-but eliminated the sown species. In November 1985, the owner had obtained some circular corn cribs of about 12 feet diameter, which were placed in the field. These structures have mesh sides with metal rooves, which permit the entry of light but probably reduce the effective rainfall, particularly towards the centre of the enclosed area, which is protected from grazing. Within about 8 weeks of the arrival of the cribs, the species which had originally been sown in the field began to reappear inside the protective structures. The dominant sown species was Siratro, but plants of Guinea Grass were also common. Glycine and Rabbit Vine were present, but contributed

page two

relatively little to the available forage. This is not surprising, since it is the usual case in newly sown pastures. It is to be expected that at low to medium grazing pressure, the proportion of Glycine and Rabbit Vine would increase appreciably over the course of the next year or two.

The soil in the field is compacted as a result of heavy grazing over a considerable period of time. The recovery of the sown species when protected from grazing shows that full reseeding of the field would not be necessary, but if the stocking rate on the farm could be reduced to reasonable levels, renovation of the field would be desirable. This should entail ripping to a depth of about 6 inches with a chisel-plough in order to aerate the soil. A small amount of seed of Guinea Grass and legumes could then be broadcast to increase the proportion of desired species. Careful grazing management should then be employed to ensure the survival of the sown pasture species.

A protein bank of Cunningham Leucaena had been sown by CARDI in the same field in 1982. This had now grown out of the reach of the grazing animals, but the owner stated that he was keeping it as a reserve in case of a delayed start to the wet season. Once the rains are established, this area should be cut at a height of 12 inches or less, to encourage regrowth. If the field is to be grazed, the Leucaena should be protected from grazing during the regrowth period by temporary fencing. The forage would then be available for use during the 1987 dry season.

A stand of giant (K8) Leucaena was sown by CARDI in 1983 in an area adjacent to the field. The spacing used was 6 ft. between rows and 3 ft. within the row. This was thought to be too close, since while many of the trees on the outside of the block had trunk diameters of 6 to 8 inches or more, most of the trees in the centre of the block has diameters of 4 inches or less. It was suggested that the larger trees should now be cut to give room for the development of the smaller ones. While each of the larger trees were big enough to cut into at least 3 or 4 good-sized fence posts, the owner stated that in his experience, untreated Leucaena posts only lasted for about 9 months under Antigua conditions. He preferred the idea of using the trunks to make charcoal, while feeding the foliage to the livestock.

2. The property of Mr A. Joseph

Following the 1983 - 84 drought, one field had been sown to Sorghum to provide quick feed. This had been undersown with some Guinea Grass. The Sorghum had been allowed to seed once, to thicken up the stand. The sown Guinea, reinforced by self-sown seedlings of both a native and the sown varieties has filled in to form a good, highly productive pasture.

In an adjacent field, Chrysopogon was sown with a mixture of forage legumes. By mid 1985, establishment was assessed as fair, but in the absence of overgrazing, good pasture management has allowed the spread of both the grass and the legumes. The pasture has improved markedly in the last 12 months.

A further area of native, unsown Guinea Grass, growing with volunteer legumes (Leucaena, Desmanthus, Rhynchosia, Teramnus etc) was cut in June 1985 for hay. Some was mechanically baled using the WINROCK equipment, while a further area was stacked by hand following the CARDI recommendations for making a hay-stack (CARDI fact-sheet ref: AP-F1, June 1980). This area now has more Guinea Grass and native legumes than were present 12 months ago.

The owner explained that although he has some 35 cattle grazing on about 63 acres, he employs a strict rotational grazing system. After each grazing, when the animals are removed, the pasture is slashed with a brush-cutter to help to control undersirable weeds and to remove the old, unpalatable pasture. Recuperation after this treatment is rapid and the pasture maintains good feeding value even during the dry season. The pastures are becoming progressively better in both productivity and quality under this management regime. They are not over-grazed, even though they are supporting higher stocking rates than many others in the area, because they are well managed and are allowed adequate rest periods between grazings. Periodic mechanical brush-cutting at some 6 inches above the level of the ground is one of the cheapest and most important practices that a farmer can employ in order to eliminate weeds and to keep his pastures in good condition throughout the year.

3. Sheep Feeding Facilities

Dr Clarence Mannasmith from WINROCK International showed the small animal feeding facilities that he is establishing at Long Lane in conjunction with ASEC. The project is designed to house 60 sheep divided into two groups.

APPENDIX 5-1

A. Case Study Data on Raeburn Milk Yield

St. Clair Estate  
February 21<sup>st</sup> 1986

No. 171 - "CHARIS" - Calved 8/11/85  
 Nov. 21<sup>st</sup>/30<sup>th</sup> - 179.6 lbs Preen - 17.9 lbs per day  
 Dec 1/31<sup>st</sup> - 395.4 " " 12.75  
 Jan 1/31<sup>st</sup> 388.6 " " 12.53

No. 299 - "NORA" - Calved 24/11/85  
 Nov. - 25<sup>th</sup>/30<sup>th</sup> - 746 lbs Preen - 14.92 lbs  
 Dec - 1<sup>st</sup>/31<sup>st</sup> 425.6 " " 13.72  
 JAN 1<sup>st</sup>/31<sup>st</sup> 452.4 " " 14.59

No. 167 - "ETHELYN" - Calved 26/11/85  
 Dec. 15<sup>th</sup>/31<sup>st</sup> - 500.4 lbs Preen - 16.14 lbs  
 JAN 1<sup>st</sup>/31<sup>st</sup> - 463.2 " " 14.94 lbs

No. 218 - "LEAZENIA" Calved 5/1/86  
 JAN - 7<sup>th</sup>/31<sup>st</sup> - 346.4 lbs Preen 15.56 lbs

No. 278 - "BUTTERCUP" - Calved 16/1/86  
 JAN - 20<sup>th</sup>/31<sup>st</sup> 1262 lbs - Preen 13.29 lbs

8

(2)

All animals calved normally without any problems - Calves at birth estimated to weigh between 50-60 lbs exact #167 which produced an outstanding yield around 70/80 lbs.

Since arrival in Antigua, heifers have been confined and fed green chop for the first three months then entirely on hay & grain to date.

The reason for this type of feeding is due to lack of paddock facilities at the moment but hopefully will be able to put them out to pasture in the near future.

I am very pleased with their Dairy Disposition. They let down with ease and with out completely and no problems with breaking in - very remarkable" and even though animals were "flighty" before calving they settled down from the time

Best Available Document

(5)  
Palms were seen.  
Due to a non-existent snowing  
of the front on the Island Sale of  
New York is very limited hence  
once per day shipping is the  
only way to go to the market.

I am hoping that this situation  
will be corrected soon.

Yours truly  
Rababurn

P.S.

(X) - Some Bloody Milk was  
discarded or fed to Calves (not weighed)

Best Available Document

B. Case Study Data on Livestock Productivity by J. Samuel

Joseph W. Samuel  
#2 Rennie St.  
Otto's New Town,  
St. Johns  
Antigua W.I.  
February 1, 1986.

Mr. Charles Barwell  
Antigua Livestock Imp. Project  
P.O. Box 1066  
St. Johns.

Dear Charlie,

Having been selected as a participant in the Antigua Livestock Improvement Project, and having received from the project two Nubian Does, and one Buck, as well as one Pure Bred Red Poll Bull, I feel obliged to write to you in your capacity as representative of the Sponsors of the Programme

- 2 -

- Winrock International and US AID - , to express my sincere gratitude for the assistance received. I would also like to take this opportunity to report on the progress made since receiving the assistance.

### GOATS

As you may recall my goats developed a slight temperature soon after their arrival but having overcome this there has been no serious problems since. Thank the Lord.

My two Does have been bred and are now expecting kids in March of this year. I am very pleased with their performance with respect to weight gain and the way

they have adapted to our tropical conditions.

I have also crossed the buck with at least five of my local does and am anxiously waiting to see what results I will receive. The buck has been performing very efficiently. I reckon that he is now twice the size he was when he arrived at the farm and still growing.

The future for the production of goats' meat and milk does look very promising, and much credit should be given to our Sponsors - Winrock International and U.S. Aid - , both for the vision and the efforts made to make this vision a reality despite the many problems. I wish to say

that I am very grateful for what you have done, thank you for your effort. I would like to add though, that now that we have made some progress, please see us through to a successful conclusion.

### CATTLE

As you are already aware, I also received a pure bred Red Poll Bull at 21 months of age. My impressions are that he has so far performed incredibly, and to date he has bred nine (9) Cows and (8) heifers, two cows and two heifers have been bred for two other farmers. We are therefore already expecting (17) seventeen calves out of him before year's end, - a good

performance - in just four months for a youngster, and when one takes into account the size of some of the cows bred, I think that he is just fantastic. Besides he has a very cool temperament, I am now waiting with anxiety to see what his offspring will be like. Again I must say a hearty thank you to our sponsors for the assistance received in improving our livestock, and many thanks to you personally for the advice and assistance you have given.

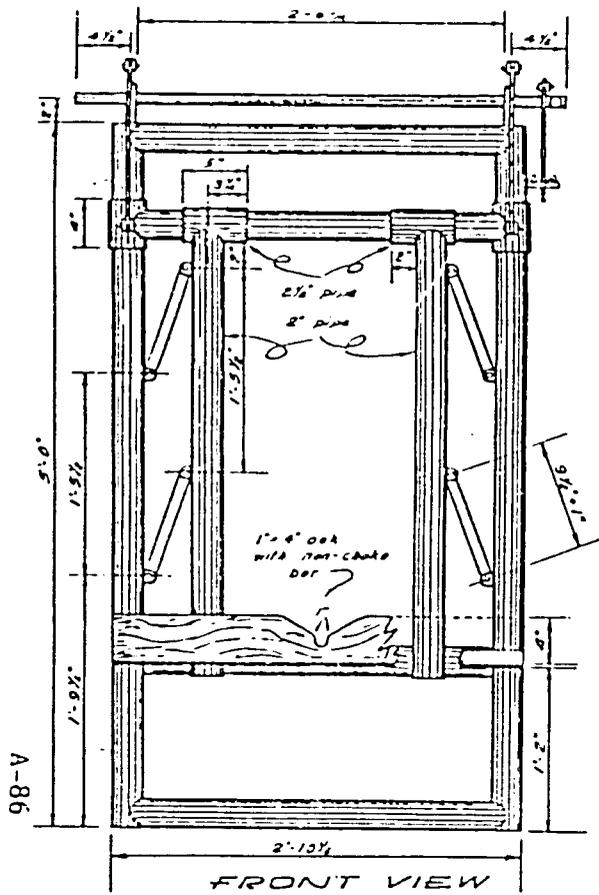
May God continue to Bless our efforts, as we endeavour to lay a good foundation for the future of the next generation. Thank You.

Yours truly,  
W. J. Samuel

### C. Farm Account Book Example Record

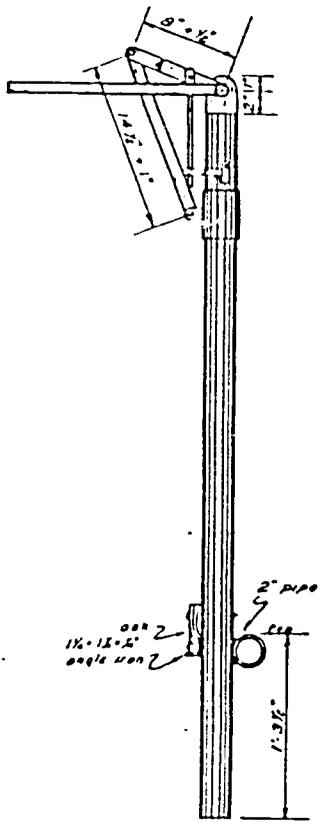
Example of beef production cost determined from farm account book records

Item	Unit	Cost or price/unit	No. of units	Cost or revenue
<b>Total income</b>				
Cow sales	900 lb/hd	0.80	3	2,160
Heifer sales	600 lb/hd	1.10	2	1,320
Bull sales	900 lb/hd	1.10	5	4,950
Milk sales	26 oz bottle	1.00	3,600	3,600
Hay sales	Bale	3.00	400	1,200
<b>Total</b>				<b>13,230</b>
Total cash cost (see Farm Account Book)				11,640
<b>Less:</b>				
Income from milk and hay sales				4,800
a. Cost for beef production				6,840
b. No. pounds of beef produced = 2,700 + 1,200 + 4,500 =				8,400 lb
Cash cost per lb beef = a/b = \$0.81				
+ labor cost (171 hrs @ \$3.00 = \$3,513/8,400) = \$0.42				
+ interest on investment (page 37) = 10% \$26,540 = \$2,654				
÷ 8,400 lb = \$0.32/lb				
c. Total cost = \$0.82 + \$0.42 + \$0.32 = \$1.55/lb				

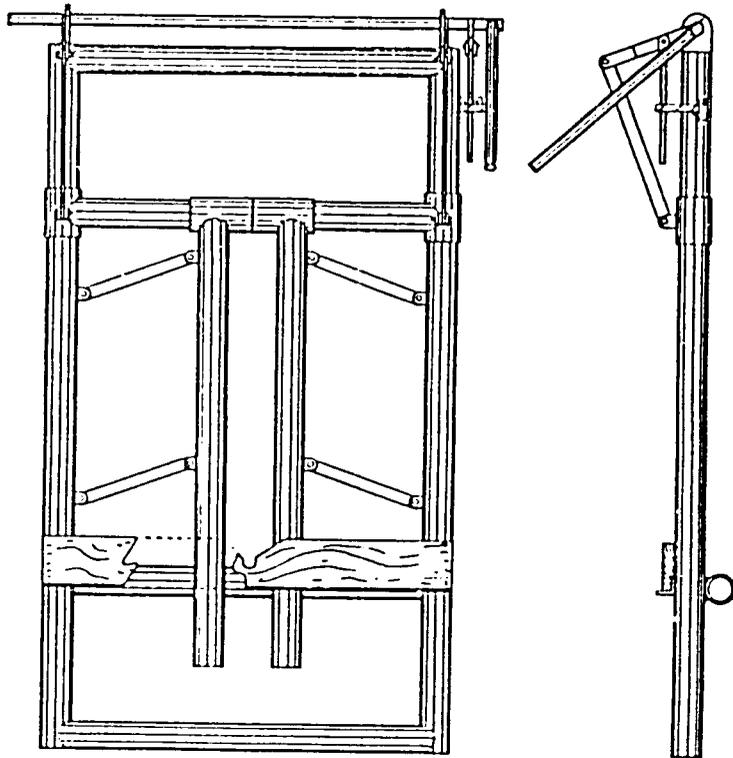


A-86

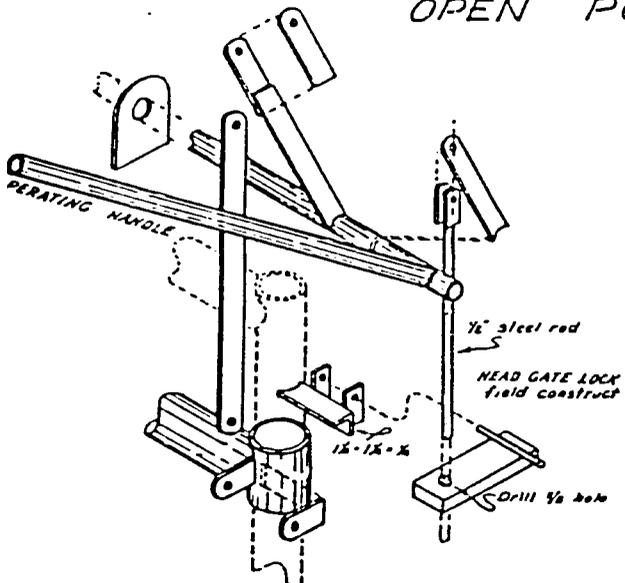
FRONT VIEW  
OPEN POSITION



SIDE VIEW



CLOSED POSITION



OPERATING CONTROLS  
(may be located on left side if necessary)

**NOTES:**

1. Operating controls may be on left or right side. (Shown on left)
2. Hinges and latch could be welded on frame for full opening gate. (Not shown)
3. Normal position of head gate is "closed", must be held in the open position to receive cattle.
4. Head gate lock to be constructed on completed gate for smooth operation. (Flat plate must be held down by hand for gate to open.)

C. 99

MINUTE

FROM: Chief Veterinary Officer

TO: Director of Agriculture

DATE: 8th September, 1984

NO: VID 4/11 "A"

I forward herewith a legal opinion of the Legal Department in regard to the use of electrical farm fencing.

Because of the "wandering small ruminants" menace to agricultural development, it is proposed that electrical fencing should be used. The disadvantages (possible legal liability) should not be allowed to affect this decision. We are living with similar constraints. However, all necessary precautions will be taken.

.....  
J. L. Robinson, D.V.M.  
Chief Veterinary Officer

JLR/hcj

c.c. Permanent Secretary  
Ministry of Agriculture, Lands & Fisheries

Mr. Charles E. Burwell ✓

*Had you not got a copy of the "legal opinion" from the Legal Dept?  
Suke*

C. 99

**MINUTE**

**FROM:** Chief Veterinary Officer

**To:** Director of Agriculture

**RE:** 8th January, 1985

**No:** VLD 4/11 "A"

Your minute 1104/DA/750/84 of 27th December, 1984. Electric Fencing.

No electric fence has been erected at Government facilities and those on private farms, even though land may be leased from Government, do not require any recommendations from this Ministry. The legal opinion given has been made quite clear to the Project Officers erecting the fences, and I will further ask them to notify it to the farmers concerned. The voltage usually employed is six to twelve (6 - 12) volts from batteries. In my humble opinion, the harm to the smallest child is far from fatal in the absence of extenuating circumstances.

I am notifying that electric fences have been erected on livestock farms; at Mr. Charlesworth Edwards, Mr. Joseph Samuel, Mr. George Jonas, Mr. Albert Frederick, Mr. Raymond Raiburne, Mr. Stephen Jensen and Mr. John Marshall, and that these have been so identified. I will add that the main purpose is to keep livestock within rather than keeping people out, but that people should note that there will be certain amount of discomfort to trespassers who come in contact with such fences, and that people should be wary when travelling in agriculturally developed fenced areas.

.....  
J. L. Robinson, M.V.M.  
Chief Veterinary Officer

JL:hoj

c.c. Permanent Secretary  
Ministry of Agriculture, Lands & Fisheries

Mr. Charles Surwell ✓  
Winrock/USAID Project Coordinator

Mr. D. Lewis, A.M.A. A-88  
Local Counterpart

MEMORANDUM

From my discussion with Mr. J. L. Robinson, the Chief Veterinary Officer, I gather that it is proposed to electrify the fencing around certain livestock farms or holdings, with a view to greater livestock control. According to him this will be of a "low" voltage. I understand that the object of the exercise is not to keep trespassers out, but rather to control the animals inside. The farms or holdings will be located at various points in the country, some near residential areas.

While all this may be in keeping with modern methods of farming and livestock control in larger and more developed countries, since the matter has been referred to this department I think I should point out the legal implications of the proposed scheme.

Generally, an occupier is not liable to a trespasser as to the condition of the premises; but he is liable if he is not entitled to set a trap with the deliberate intention of injuring a trespasser - see *Pind v Holt* (1888) 4 Bing 625 and *Little v Gas Light & Coke Co.* (1879) 12 Q.B. 410. The occupier is also liable for damage or injury to persons coming on to the premises who are not trespassers, that is to say who come to the premises either at their invitation or with their permission or acquiescence, which may be either express or implied. See *Wright v Carter* (1873) 12 Q.B. 237 and *Furber v South* (1874) 12 Q.B. 237. See also *Wright v Carter* (1873) 12 Q.B. 237 and *Furber v South* (1874) 12 Q.B. 237.

In a residential area, the proximity of farms to residential areas is such that the danger of a child or other person carelessly or thoughtlessly coming into contact with the electrified fence is not too remote, and damages may result in substantial damages being awarded against the occupier.

If the proposed scheme is implemented, very clear warnings should be placed in prominent positions on the farms and the wires carefully insulated and periodically checked to guard against the risk of accidental injury or death to employers or members of the public.

  
J. A. Osborne.



WINROCK  
INTERNATIONAL

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
P. O. Box 1066, St. Johns, Antigua  
Telephone 31362

FIELD EQUIPMENT

MF 290 Tractor	U.S.\$ 16,110.00
A. MF 236 Farm Loader	3,852.00
B. Rear Scraper	1,395.00
Disc Plow	1,791.00
Tandem Disc Harrow	3,546.00
Cultipacker	3,114.00
A. Transporter	1,260.00
Rotary Cutter	3,258.00
Post-hole Digger	1,170.00
Fertilizer Spreader	981.00
Sprayer	2,232.00
Rotary Mower	1,764.00
Hay Rake	3,780.00
Hay Baler	8,001.00
2 - Silage Wagons	7,920.00
Two - row Corn Planter	2,160.00
Cultivator	2,169.00
Forage Harvester - Grass	2,857.00
Forage Harvester - Corn	3,888.00
Livestock Trailer	8,842.50
Sod Seeder	8,000.00
	<hr/>
	\$ 88,090.50

## APPENDIX 5-5

### MACHINERY MAINTENANCE AND REPLACEMENT PLAN

The information found in Agricultural Machinery Costs will be used to provide the funds for proper and timely maintenance, repair, and eventual replacement of Project equipment after the Grant has expired.

The group of Demonstrator Farmers have discussed in detail the proposed hourly rental charges for equipment and are in agreement with the plan.

Requests have been made for (2) Operator's Manuals and (2) Service Manuals for all equipment. When all of the equipment is on the Island operational service and maintenance schedules will be adhered to according to the manufactures recommendations.

During September or October TA will provide training courses in proper operation, repair, and maintenance for the equipment. At the end of this period a Field Day will be held with CARDI at the Bettys Hope Field Station. Equipment will be demonstrated -- actually plowing, harrowing, planting, harvesting etc. This will also be a time for exhibit of CARDI's work with forage.

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
AGRICULTURAL MACHINERY COSTS

\*\*\*\*\*

PREPARED - JUNE, 1984

By

Lazman S. Webson  
Vice Chairman

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Explanatory Notes

1. Almost every textbook on Agricultural Machinery employs slightly differing methods of calculating machinery costs. There are various reasons for this; to suit a particular accounting system or to take advantage of a particular method of taxation, or perhaps as the result of individual preference on the part of the Author.

The system adopted in these costings has been devised by me, as a result of extensive training by a Technician from Britain who was attached to the Ministry of Agriculture for several years in the late 1970's, and is considered most suitable for existing conditions in Antigua.

In some cases, there is a lack of accurate records relating to Annual use, and, in particular, to work output. In such cases assessments have been made, which it is thought accurately reflect the general standards of operator expertise, field conditions and management ability pertaining to Antigua. Nevertheless, it is likely that any inaccuracies will be corrected as they become evident. A log book system of recording will be used for all items of equipment operated by the Project for the first 12 months, so as to provide accurate information for future use.

2. Depreciation: Owing to the present world wide inflatory trends, it is quite conceivable that cost of a Tractor could rise to fifty percent more in five years. As a result, conventional depreciation of initial purchase price has been dispensed with, and a 'replacement cost' substituted. This replacement cost is based on the prevailing price of a particular machine, regardless of its age, and should be re-calculated at least annually. In this way, whilst the full replacement cost will not be realized, there should theoretically be more money available than under the more usual system of depreciation.
3. Interest Rates: Owing to the widely held belief by economists that interest rates, especially in the U.S., are likely to remain high during 1984, a rate of Interest higher than the prevailing rate has been charged. As the actual Interest cost shown is calculated from present machinery prices (rather than the amount actually paid for a particular machine) this again means an increase in the amount of money theoretically available for the eventual replacement of that machine.
4. Insurance, housing and vehicle tax costs are self explanatory.
5. Supervision and Clerical costs are based on Staff levels and should apply to any organization operating a machinery fleet of this size and complexity.
6. Operators' wages and repairs cost are self explanatory.
7. Servicing costs are based on a servicing schedule that will be enforced from the beginning of the Project.
8. Fuel costs are based on the present price paid at the pumps.
9. An assessed figure for oils and lubricants have been used in all cases, until more accurate figures can be obtained.

.....  
Lazman Webson

Work Output Assessment For Antigua

1. It is not possible to give rigid and entirely accurate figures for work output for a given operation with a given set of equipment. Soil type and operator skill (or the lack of it) will obviously influence the end result.
2. In the following table, probable output per hour is indicated, but should only be regarded as a guide and may well be revised as further information becomes available. It does not cover all existing equipment. Output figures have been adjusted to suit conditions in Antigua.

	Output Per Hr. In Acres		
	Theoretical Maximum	Expected On	
		5 Acres +	1 Acre
1. Ploughing 8" depth 3 Furrow disc at 3m.p.h.	.73	.55	.15
2. Disc Harrow 9' cut mounted at 4m.p.h.	4.00	3.25	1.15
3. Spinner Broadcaster at 5m.p.h.	12.00	5.0	2.50
4. Seeder at 3m.p.h.	1.80	1.20	.50
5. Two (2) Row Corn Planter 38" row width	3.85	2.00	1.00
6. 8' boom Sprayer at 4m.p.h.	4.00	2.00	1.00
7. 5' cut Rotary Slasher at 3½ m.p.h.	2.10	1.50	.50

Useful Formulae

1. To evaluate Theoretical working capacity  

$$\frac{\text{EFFECTIVE WORKING WIDTH OF IMPLEMENT} \times \text{SPEED IN M.P.H.}}{8.25}$$
2. To calculate effective working capacity.  

$$\frac{\text{EFFECTIVE WORKING WIDTH OF IMPLEMENT} \times \text{SPEED IN M.P.H.}}{10}$$
3. To calculate Field Efficiency (for Comparison purposes).  

$$\frac{\text{EFFECTIVE WORKING CAPACITY}}{\text{THEORETICAL WORKING CAPACITY}} \{ \times 100 \}$$

A.L.I.P.

Agricultural Machinery  
Rotary Mower M.F. 70 Drum Type 5' 6" cut  
Assumed Depreciation Life - 3 years at  
500 hours per year

Implements  
Capital Cost \$5,292.00

<u>I. Basic Costs</u>	<u>\$ Per Annum</u>	<u>\$ Per Hour</u>
1. Replacement/Depreciation	\$1,764.00	\$ 3.53
2. Interest @ 15% of Capital Costs	397.00	.79
3. Housing - Approx.	50.00	.10
Total Basic Costs	<u>\$2,211.00</u>	<u>\$ 4.42</u>
<u>II. Operating Costs</u>		
1. Repairs @ 70% of Capital Cost	\$ 397.00	\$ .79
2. Servicing - Approx.	100.00	.20
3. Lubricants - Approx.	50.00	.10
Total Operating Cost	<u>547.00</u>	<u>1.09</u>
Add Basic Costs	<u>2,211.00</u>	<u>4.42</u>
A. Total Cost of owning and operating	<u>2,758.00</u>	<u>5.51</u>
Add 20% Contingencies	552.00	1.10
Charge	<u>\$3,310.00</u>	<u>\$ 6.61</u>
B. Suggested charge per hour	<u>\$7.00</u>	

A.L.I.P.

Agricultural Machinery  
210 Litre Fertilizer Spinner Broadcaster  
Assumed Depreciation Life - 5 years  
@ 150 hrs per year

Implements  
Capital Cost \$2,943.00

<u>I. Basic Costs</u>	<u>\$ Per Annum</u>	<u>\$ Per Hour</u>
1. Replacement/Depreciation	\$ 589.00	\$ 3.92
2. Interest @ 15% of Capital Cost	221.00	1.47
3. Housing - Approx.	50.00	.33
Total Basic Costs	<u>\$ 860.00</u>	<u>5.72</u>
<u>II. Operating Costs</u>		
1. Repairs @ 50% of Capital Cost	736.00	4.90
2. Servicing - Approx.	50.00	.33
3. Lubrication - Approx.	25.00	.17
Total Operating Cost	<u>811.00</u>	<u>5.40</u>
Add Basic Cost	<u>860.00</u>	<u>5.73</u>
A. Total Cost of owning and operating	<u>1,671.00</u>	<u>11.13</u>

Add 20% contingencies	<u>334.00</u>	<u>2.25</u>
Charge	<u>\$2,005.00</u>	<u>\$13.38</u>

B. Suggested charge per hour \$13.50

A.L.I.P.

Agricultural Machinery 100 Gallon 8' Boom Sprayer (FMC DP20/122) Assumed Depreciation Life - 3 years @ 1,000 hours per year	Implements Capital Cost \$6,696.00
---	---------------------------------------

<u>I. Basic Costs</u>	<u>\$ Per Annum</u>	<u>\$ Per Hour</u>
1. Replacement/Depreciation	\$2,232.00	\$ 2.32
2. Interest @ 15% of Capital Cost	502.00	.50
3. Housing - Approx	50.00	.05
	<hr/>	<hr/>
Total Basic Cost	<u>\$2,784.00</u>	<u>\$ 2.87</u>

<u>II. Operating Costs</u>		
1. Repairs @ 60% over 3 years	1,339.00	1.34
2. Servicing - Approx.	50.00	.05
3. Lubricants (for pumps) Approx.	40.00	.04
	<hr/>	<hr/>
Total Operating Costs	1,429.00	1.43
Add Basic Costs	<u>2,784.00</u>	<u>2.87</u>
	<hr/>	<hr/>
A. Total cost of owning and operating	4,213.00	4.30
Add 20% Contingencies	<u>843.00</u>	<u>.86</u>
	<hr/>	<hr/>
Charge	<u>\$5,056.00</u>	<u>\$ 5.16</u>

B. Suggested Charge per hour \$5.50

A.L.I.P.

Agricultural Machinery Cultivator 2-3 Rows MF301 Assumed Depreciation Life 5 years @ 500 hours per year	Implements Capital Cost \$6,507.00
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<u>I. Basic Costs</u>		
1. Replacement/Depreciation	\$ 838.00	\$ 1.68
2. Interest @ 15% of Capital Cost	488.00	.98
3. Housing - Approx.	40.00	.08
	<hr/>	<hr/>
Total Basic Cost	1,366.00	2.74

<u>II. Operating Costs</u>		
1. Repairs @ 15% over 5 years	610.00	1.22

2. Servicing - Approx.	\$ 20.00	\$ .04
3. Lubricants	-	-
Total Operating Cost	650.00	1.26
Add Basic Costs	1,266.00	2.74
A. Total cost of owning and operating	1,996.00	4.00
Add 20% Contingencies	399.20	.80
	<u>\$2,395.20</u>	<u>\$ 4.80</u>
B. Suggested charge per hour	<u>\$5.00</u>	

A.L.I.P.

Agricultural Machinery		Implements
4½ Ton Tipping Trailer		Capital Cost \$4,400.00
Assumed Depreciation Life - 6 years		
@ 700 hours per year. (M.F. 200 with silage sides)		
I. <u>Basic Costs</u>		
1. Replacement/Duplication	\$ 733.00	\$ 1.05
2. Interest @ 15% of Capital Cost	330.00	.47
3. Housing - Approx.	40.00	.06
Total Basic Costs	1,103.00	1.58
II. <u>Operating Costs</u>		
1. Repairs @ 50% over 6 years	367.00	.52
2. Servicing - Approx.	60.00	.09
3. Lubricants	30.00	.04
Total Operating Costs	457.00	.65
Add Basic Costs	1,103.00	1.58
A. Total Cost of owning and operating	1,560.00	2.23
Add 20% Contingencies	312.00	.45
Charge	<u>\$1,872.00</u>	<u>\$ 2.68</u>
B. Suggested charge per hour	<u>\$3.00</u>	

A.L.I.P.

Agricultural Machinery		Implements
2 Row Corn/Cotton Planter with fertilizer attachment (M.F. 401)		Capital Cost \$6,450.00
Assumed Depreciation Life 8 years @ 200 hours per year.		
I. <u>Basic Costs</u>		
1. Replacement/Depreciation	\$ 810.00	\$ 4.05
2. Interest @ 15% of Capital Cost	486.00	2.43
3. Housing - Approx.	50.00	.25
Total Basic Costs	1,346.00	6.73

<u>II. Operating Costs</u>		
1. Repairs @ 50% over 8 years	\$ 405.00	\$ 2.03
2. Servicing - Approx.	100.00	.50
3. Lubricants (graphite) Approx	40.00	.20
	<hr/>	<hr/>
Total operating costs	545.00	2.73
Add Basic Costs	1,316.00	6.73
	<hr/>	<hr/>
A. Total cost of owning and operating	1,891.00	9.46
Add 20% Contingencies	378.00	1.89
	<hr/>	<hr/>
Charge	\$2,269.00	\$11.35
	<hr/> <hr/>	<hr/> <hr/>
B. Suggested charge per hour <u>\$12.00</u>		

A.L.I.P.

Agricultural Machinery Costs Series I - Tractor  
66-80 H.P. Two-wheel-drive Tractors. Capital Cost - New - \$48,500.00.  
Assumed Depreciation Life - 5 years - @ 1800 hours per year. (This  
H.P. group includes M.F.155, 270, 295. 1.H.624, Ford 5000).

<u>I. Basic Costs</u>		
1. Replacement/Depreciation	9,700.00	5.38
2. Interest @ 15% of Capital Cost	3,638.00	2.02
3. Insurance (one 20% fleet discount)	1,200.00	.67
4. Housing - Approx.	500.00	.28
5. Vehicle Tax	240.00	.13
6. Supervision & Clerical costs	2,000.00	1.11
	<hr/>	<hr/>
Total Basic Costs	17,278.00	9.59
<u>II. Operating Costs</u>		
1. Operators wages (\$250. x \$50.)	12,500.00	6.94
2. Repairs 100% over 5 years	9,700.00	5.38
3. Servicing - Preventive Maintenance	4,000.00	2.22
4. Fuel @ 2 gals/hour @ \$5.00	18,000.00	10.00
5. Oil & Lubricants - Approx.	1,600.00	.59
	<hr/>	<hr/>
Total Operating Costs	45,800.00	25.43
Add Basic Costs	17,278.00	9.57
	<hr/>	<hr/>
A. Total cost of owning and operating	63,078.00	35.02
Add 20% Contingencies	12,616.00	7.00
	<hr/>	<hr/>
Charge	\$75,694.00	\$42.02
	<hr/> <hr/>	<hr/> <hr/>
B. Suggested charge per hour <u>\$42.00</u>		

Notes: Fuel factor = add 2X increased price per gallon.

A.L.I.P.

Agricultural Machinery

Hay Rake and Tedder

Assumed Depreciation Life - 5 years @ 500 hrs per year.  
(M.F. 560 Side delivery)

Implements

Capital Cost \$11,340.00

I. <u>Basic Costs</u>	<u>\$ Per Annum</u>	<u>\$ Per Hour</u>
1. Replacement/Depreciation	\$2,265.00	\$ 4.54
2. Interest @ 15% of 1/2 Capital Cost	851.00	1.70
3. Housing - Approx.	250.00	.50
Total Basic Costs	<u>3,369.00</u>	<u>6.74</u>
II. <u>Operating Costs</u>		
1. Repairs @ 50% over 5 years	1,134.00	2.27
2. Servicing - Approx.	350.00	.70
3. Lubricants - Approx.	100.00	.20
Total Operating Cost	<u>1,584.00</u>	<u>3.17</u>
Add Basic Costs	<u>3,369.00</u>	<u>6.74</u>
A. Total cost of owning and operating	<u>4,953.00</u>	<u>9.91</u>
Add 20% Contingencies	<u>991.00</u>	<u>1.98</u>
Charge	<u>\$5,944.00</u>	<u>\$11.89</u>
B. Suggested charge per hour <u>\$12.00</u>		

A.L.I.P.

Agricultural Machinery

Forage Harvester

Assumed Depreciation Life - 5 years @ 500 hrs per year. (F.H. 113 Flail)

Implements

Capital Cost \$8,570.00

I. <u>Basic Costs</u>		
1. Replacement/Depreciation	1,714.00	3.43
2. Interest @ 15% of 1/2 Capital Cost	643.00	1.27
3. Housing - Approx.	300.00	.60
Total Basic Costs	<u>2,657.00</u>	<u>5.32</u>
II. <u>Operating Costs</u>		
1. Repairs @ 50% over 5 years	857.00	1.71
2. Servicing - Approx.	250.00	.50
3. Lubricants - Approx.	100.00	.20
Total Operating Costs	<u>1,207.00</u>	<u>2.41</u>
Add Basic Costs	<u>2,657.00</u>	<u>5.32</u>
A. Total cost of owning and operating	<u>3,864.00</u>	<u>7.73</u>
Add 20% Contingencies	<u>773.00</u>	<u>1.55</u>
Charge	<u>\$ 4,637.00</u>	<u>\$ 9.28</u>
B. Suggested charge per hour <u>\$9.00</u>		

A.L.I.P.

Agricultural Machinery  
Forage Harvester

Implements  
Capital Cost \$11,664.00

Assumed Depreciation Life - 5 years @ 500 hours per year.  
(M.F.30 Corn Harvester)

I. <u>Basic Costs</u>	<u>\$ Per Annum</u>	<u>\$ Per Hour</u>
1. Replacement/Depreciation	\$ 2,333.00	\$ 4.67
2. Interest @ 15% of $\frac{1}{2}$ Capital Cost	875.00	1.75
3. Housing - Approx.	350.00	.70
Total Basic Costs	<u>3,558.00</u>	<u>7.12</u>
II. <u>Operating Costs</u>		
1. Repairs @ 50% over 5 years	1,166.00	2.33
2. Servicing - Approx.	300.00	.60
3. Lubricants - Approx.	100.00	.20
Total Operating Costs	<u>1,566.00</u>	<u>3.13</u>
Add Basic Costs	<u>3,558.00</u>	<u>7.12</u>
A. Total Cost of owning and operating	5,124.00	10.25
Add 20% Contingencies	1,025.00	2.05
Charge	<u>\$ 6,149.00</u>	<u>\$12.30</u>
B. Suggested charge per hour <u>\$12.50</u>		

A.L.I.P.

Agricultural Machinery  
Hay Baler (rectangular)

Implements  
Capital Cost \$24,000.00

(M.F.220 56" wide, 52 teeth pick up)

Assumed Depreciation Life - 5 years @ 500 hrs per year.

I. <u>Basic Costs</u>		
1. Replacement/Depreciation	4,800.00	9.60
2. Interest @ 15% of $\frac{1}{2}$ Capital Cost	1,800.00	3.60
3. Housing - Approx.	50.00	.10
Total Basic Costs	<u>6,650.00</u>	<u>13.30</u>
II. <u>Operating Costs</u>		
1. Repairs @ 50% over 5 years	2,400.00	4.80
2. Servicing - Approx.	400.00	.80
3. Lubricants - Approx.	100.00	.20
Total Operating Costs	<u>2,900.00</u>	<u>5.80</u>
Add Basic Costs	<u>6,650.00</u>	<u>13.30</u>
A. Total cost of owning and operating	9,550.00	19.10
Add 20% Contingencies	1,910.00	3.82
Charge	<u>\$11,460.00</u>	<u>\$22.92</u>
B. Suggested charge per hour <u>\$23.00</u>		

A.L.I.P.

Agricultural Machinery

Livestock Trailer

Assumed Depreciation Life - 6 years @ 700 hrs per year  
(Optico 16'x6'x7'x6")

Implements

Capital Cost \$26,525.00

<u>I. Basic Costs</u>		
1. Replacement/Depreciation	\$ 4,421.00	\$ 6.32
2. Interest @ 15% of Capital Cost	1,990.00	2.84
3. Housing - Approx.	400.00	.57
Total Basic Costs	6,811.00	9.73
<u>II. Operating Costs</u>		
1. Repairs @ 40% over 6 years	1,769.00	2.53
2. Servicing - Approx.	250.00	.36
3. Lubricants - Approx.	100.00	.14
Total Operating Costs	2,119.00	3.03
Add Basic Costs	6,811.00	9.73
A. Total cost of owning and operating	8,930.00	12.76
Add 20% Contingencies	1,786.00	2.55
Charge	\$10,716.00	\$15.31
B. Suggested charge per hour <u>\$15.00</u>		

A.L.I.P.

Agricultural Machinery

Sod Seeder Drill

Assumed Depreciation Life - 8 years @ 200 hrs per year.

Implements

Capital Cost \$34,560.00

<u>I. Basic Costs</u>		
1. Replacement/Depreciation	4,320.00	21.60
2. Interest @ 15% of Capital Cost	260.00	1.30
3. Housing - Approx.	100.00	.50
Total Basic Costs	4,680.00	23.40
<u>II. Operating Costs</u>		
1. Repairs @ 50% over 8 years	2,160.00	10.80
2. Servicing - Approx.	250.00	1.25
3. Lubricants - Approx.	250.00	1.25
Total Operating Costs	2,230.00	13.30
Add Basic Costs	4,680.00	23.40
A. Total cost of owning and operating	\$ 7,340.00	\$36.70
Add 20% Contingencies	1,468.00	7.34
Charge	\$ 8,808.00	\$44.04
B. Suggested charge per hour <u>\$44.00</u>		

A.L.I.P.

Agricultural Machinery, Series II

Post Hole Digger - Tractor Mounted

Assumed Depreciation Life, 3 years @ 600 hrs per year.  
(Bush Hog 2102 with 3" Auger)

Implements

Capital Cost \$3,510.00

<u>I. Basic Costs</u>		
1. Replacement/Depreciation	1,170.00	1.75







2. Interest @ 15% of 1 Capital Cost	567.00	2.89
3. Housing - Approx.	50.00	.16
Total Basic Costs	<u>2,092.00</u>	<u>6.90</u>
II. <u>Operating Costs</u>		
1. Repairs 70% over 10 years	109.00	2.70
2. Servicing - Maintenance, Approx.	150.00	.50
3. Lubricants - Approx.	60.00	.20
Total Operating Costs	<u>1,019.00</u>	<u>3.40</u>
Add Basic Costs	<u>2,092.00</u>	<u>6.90</u>
A. Total cost of owning and operating	3,111.00	10.30
Add 20% Contingencies	622.00	2.06
Charge	<u>\$ 3,733.00</u>	<u>\$12.36</u>
B. Suggested charge per hour <u>\$12.00</u>		

## APPENDIX 5-6

### INCREASED ANIMAL PRODUCTION FROM PASTURE

R.T. PATERSON

The Caribbean region consists mainly of small countries in which land for animal production is in limited supply and the livestock farmer must compete for land with other groups, such as crop farmers and property developers. In areas with abundant land resources, such as some of the South American countries, the most important measure of successful animal production is productivity per animal. In the Caribbean region, much more attention must be paid to productivity per unit of land. That is what will determine whether or not a farmer can make enough money from his property to be able to live on the income from his animals. It is dependant upon the use of productive, good quality pastures, used efficiently by animals with the genetic ability to respond to an improved feeding regime.

Management decisions can greatly influence the productivity per unit of land. Let us consider for a moment two neighbouring farms, each one of 100 acres. The two farms are identical. They have the same pasture, the same carrying capacity, the same type of animals, but on one the farmer sells his males and calves down his heifers when they are three years old, while on the other, sales and calvings do not take place until the animals are five years old. Let us assume that the farms can carry one adult animal per acre of land. Now if the marking percentage (the number of calves surviving to weaning and branding from 100 cows put to the bull) is 75% and the mortality in the second year of life is 8.5%, the herd structure on each of the two farms will be as shown in Table 1. The younger animals have been converted to Animal Units (AU) that is, their equivalent in adult cows, to enable a comparison to be made. An AU can be assumed to be about 900 lb liveweight.

Table 1: Herd structure when males are sold and heifers calve at 5 and 3 years

	Farm 1 (5 years)		Farm 2 (3 years)	
	No. of animals	Animal Units	No. of animals	Animal Units
Cows	32	32	42	42
Bulls	2	2	2	2
Calves (to 1 year)	24	5	32	8
1 - 2 years	22	9	29	17
2 - 3 years	21	13	28	28
3 - 4 years	21	17	--	--
4 - 5 years	<u>20</u>	<u>20</u>	<u>--</u>	<u>--</u>
Total:	142	98	133	97
Annual sales (males and cull cows)	20		28	
Offtake	14.1%	20.4%	21.5%	28.9%
Relative Efficiency	100	100	150	141

A-108

Although the two farms are identical, except for their sales and breeding policy, the farm which sells at 3 years carries fewer total animals at the same overall stocking rate. The herd includes more adult breeding cows, therefore it produces more calves and in terms of animal sales per year, it is between 40 and 50% more efficient than the other farm, depending upon whether the offtake is compared with animal numbers or the number of animal units kept on the property. The farmer with earlier sales and calvings has a faster through-put of his animals, a faster return on his capital and a much greater annual income than his neighbour. His profit per acre is much greater even though his income per breeding cow is almost the same.

An animal that takes 5 years to reach a slaughter weight of 900 lb must make a net gain of 170 lb per year. This can be achieved in 6 months or less at a growth rate of about 1 lb/day. During the other 6 months of the year, the weight losses in the driest 2 to 3 months must be just balanced by the gains made in the other 3 to 4 months. This is the common situation when animals are kept on native, unimproved pastures without access to pasture legumes or good quality conserved fodder.

Now let us consider what it means in practical terms to get an animal to slaughter weight in 3 years. Although in some parts of the tropics, cattle on good pastures regularly gain 1.3 lb/day without concentrate feeding, a rate of 1.1 lb/day is more common. At this rate of gain, an animal that continued to grow throughout its life without a set-back would reach 900 lb at about 26 months of age. This can be seen as the potential, but few animals will achieve it in practice, since disease, parasites, shortage of feed etc, will usually cause the growth rates to fall below the 1.1 lb/day figure at one time or another.

Looking at the problem another way, to reach slaughter weight by three years, the animal must make a net gain of on average, about 280 lb per year. It must therefore gain weight for about 8½ months of the year and maintain itself without loss for the other 3½ months in order to reach the target. If weight losses are experienced during 6 to 8 weeks of the year, the target will only be reached if the animal grows rapidly during the whole of the rest of the year. This is not easy to achieve, but with good quality pastures and careful animal and pasture management it can be done in the Caribbean.

So what are the lessons to be learned from these theoretical considerations? They may briefly be described as follows:

1. There is a need to supply high quality feed all the year round to young stock, to keep them growing at an optimum rate for as much of the year as possible. The aim should be to sell well-finished males at 3 years or less, and to mate heifers at 24 to 26 months so that they calve down at three years.
2. The stocking rate must be set at a level which fully utilizes the pastures, but does not allow them to become over-grazed. When pastures are over-grazed their recovery is slow, and their annual production falls. This will result in less feed for the animals, which will decrease their growth rates and increase the amount of time needed to finish them to slaughter weight.
3. In general terms, the Caribbean islands are fortunate in that animal diseases present relatively few problems, particularly with cattle. Nevertheless, control of both internal and external parasites is of great importance, to prevent an excessive worm or tick burden from resulting in decreased animal growth.

4. Older stock must be sold (both males and cull cows) to make room for the younger animals that are coming on. It is usually more profitable to sell older animals, even at low prices, than to risk over-stocking, with its consequent effect on the growth rate of the younger animals. The young stock represent the future of the farm, and must therefore be given the best treatment.

These lessons can be summed up in just a few words: the importance of good pastures and a high standard of pasture and animal management.

They can be translated into simple steps which can be incorporated into the plan of action for the farm.

1. There must be adequate feed of a high enough quality to permit year round animal growth. While grasses can provide sufficient energy and protein during the rains, not even the best of them can do so without fodder conservation or irrigation during the dry season. Legumes, on the other hand, can provide the desired level of quality. The use of legumes, either in the general pasture, or as a protein reserve or bank, constitutes the key to successful and profitable animal production.
2. The herd and the pastures must be well managed. A grazing strategy should be evolved, where the best available feed is provided to the young, growing stock, to ensure high growth rates. Dry cows in the early months of pregnancy do not require such high quality pasture as growing animals or very productive, lactating cows.

3. A marketing policy should be developed which attempts to sell some animals at the end of the rains, or at the start of the dry season, in order to reduce the grazing pressure on the farm during the hardest part of the year. Cows which conceive at the start of the rains will drop their calves towards the end of the following dry season. If those calves can be finished in less than three years (say 32 months) they will be ready for sale before the start of the dry season, and their absence will allow the remaining animals to obtain more pasture during the period of feed shortage.
4. A continuous programme of pasture improvement will set the farm productivity into an upward spiral. Improved feed will increase animal growth rates which will improve the quality of the meat and increase profitability of the farm. If some of the increased profits are put back into better pastures and livestock with a higher growth potential, growth rates will be increased further, resulting in still higher profits.
5. Farming must be considered as a business, just the same as any other type of commercial enterprise. The shop-keeper does not make money while his goods stay on his shelves. He only gains when he sells them, and the faster his turnover, the higher his profits. Beef production is exactly the same.
6. The few tourists who insist on eating steaks produced to USDA standards from GRAIN FED CATTLE will never be satisfied with beef produced from pasture. It is the opinion of the writer that this specialist market should not be contemplated at this time by the local producers, but should continue to be served by direct imports. There does, however, exist a large and growing demand from both the tourist and the resident sectors for tender, high quality PASTURE FED BEEF. This demand could and should be satisfied by the local production of young, well grown and well finished steers.

APPENDIX 6-1  
IMPLEMENTATION PLANS  
1984 to 1987

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
Implementation Plan for 1987  
January - June

Ministry of Agriculture,  
Lands and Fisheries

Winrock International  
USAID Project 538-0112

Charles E. Burwell  
Project Coordinator

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
Implementation Plan for 1987  
January - June

FOURTH YEAR ACTIVITIES:

1. Activities initiated during the previous three years of the project 1984 through 1986 will be documented, evaluated, and strengthened during the project completion period January - June 1987; specific examples include:
  - a. Final Project Report will be developed.
  - b. Final Project Evaluation will be carried out.
  - c. Technical assistance for the support of the farmers cooperative, Antigua/Barbuda Livestock Improvement Co-operative Society Ltd., will be extended.

IMPLEMENTATION SCHEDULE -- 1987 January - June

Final Report

January



- Winrock Advisor and Livestock Project Office relocate to NH USA.
- Winrock Advisor prepares 1987 IMPLEMENTATION SCHEDULE January - June relative to available budget.
- Winrock Advisor assembles information for Final Project Report.
- Winrock Advisor travels to Winrock International headquarters in AR USA for collaboration on Final Project Report.
- Winrock Advisor reviews data from Sheep Feeding Trials with TA representatives from Winrock International -- Dr. Mannasmith, Veterinarian and Dr. Young, Agricultural Economist.
- Winrock Advisor consults with Finance Department at Winrock International regarding information for USAID Final Budget allocation.
- Winrock Advisor and Winrock Program Director, Dr. Fitzhugh review Antigua Livestock Improvement Project design and implementation for use as model for other small countries.
- Winrock Advisor presents seminar for Winrock Staff on Antigua Livestock Improvement project.

February

Final Evaluation

March



- Winrock Advisor will travel to Antigua early March to prepare for Evaluation by USAID March 23-27, 1987.
- Winrock Advisor to participate in Evaluation.

↓  
May

- Winrock Advisor will make available for the Evaluation Team a Draft of Final Reports of the Livestock Project and Sheep Feeding Trials.
- Winrock Advisor will report to USAID, Barbados at end of Project.

Technical Assistance for Co-operative

March

↑  
↓

- Winrock Advisor will provide Technical Assistance for Antigua/Barbuda Livestock Improvement Co-operative Society Ltd. during the transitional period.
- Winrock Advisor will review operational procedures relating to project equipment hire program.
- Winrock Advisor will review the breeding and pay-back plan in effect for Cooperating Farmers.
- Winrock Advisor will continue to strengthen the linkage between the Co-operative and CARDI.
- Winrock Advisor will assist with the introduction of the E.D.F. Project as related to the farmers Co-operative.
- Winrock Advisor will assist in the establishment of an Information System for the Co-operative.
- Winrock Advisor will discuss Farm Plans including Record-keeping with individual farm members.
- Winrock Advisor will continue to assist with development of Co-operative Facilities.
- Winrock Advisor will plan and conduct a Training Trip to Barbados for a group of Cooperating Farmers to attend the annual CARDI Field Day and Visitation of Livestock Farms.
- Winrock Advisor will discuss results of the Sheep Feeding Trials with all interested farmers.

June

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
Implementation Plan for 1986

Ministry of Agriculture,  
Lands and Fisheries

Winrock International  
USAID Project 538-0112

Charles Burwell  
Project Coordinator

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
Implementation Plan for 1986

THIRD-YEAR ACTIVITIES

1. Activities initiated under First- and Second-year Objectives will be continued; specific examples include:
  - a. Organization of cooperating farmers will be strengthened.
  - b. Payment procedures for use of field equipment will be evaluated.
  - c. Cooperators will develop good forage programs.
2. Genetic improvement of livestock will involve selection and culling, AI, the use of live bulls, and crossbreeding.
3. Farm-management training will include recordkeeping; forage establishment, harvesting, and storage; fencing; breeding; feeding; and herd health. Training will be done in the classroom, on the farm, and through field days. Participation by extension personnel will be encouraged.
4. The practicality and profitability of dairying will be evaluated.
5. Evaluation

## IMPLEMENTATION SCHEDULE -- 1985

### Strengthen Farmer/Cooperator Group Organization

- January
- 
- Approve bylaws and register new cooperative -- Antigua Livestock Improvement Cooperative Society, Ltd.
  - First meeting held.
  - Officers and management committee elected.
  - Winrock advisor and cooperative officers initiate establishment of a revolving fund.
  - Winrock advisor and management committee examine list of cooperator farmers to add or delete names based on interest and active participation.
  - Winrock advisor, counterpart, and management committee will encourage new members to join the cooperative society.
  - Winrock advisor and counterpart meet regularly with officers and management committee to coordinate usage and charges for field equipment and to determine the frequency of training meetings and subjects to be covered.
  - Winrock advisor and management committee explore options for agricultural loans.
  - Winrock advisor, counterpart, and management committee explore marketing possibilities.
  - Winrock advisor and counterpart assist management committee to monitor animal breeding and pay-back plan.

June

## Strengthen Collaboration

January



- Winrock advisor prepares 1986 implementation schedule and budget for approval by coordinating committee.
- Coordinating committee conducts annual review of the livestock project.
- Coordinating committee meets after each quarterly report to discuss progress and problems encountered.
- Winrock advisor assists coordinating committee to evaluate the options available for final placement of field equipment and livestock at termination of project.
- Coordinating committee evaluates status of land tenure for cooperating farmers.
- Winrock advisor encourages extension service to participate in training sessions and field days.
- Winrock advisor provides livestock training materials to extension service.
- Winrock advisor provides training programs for extension on request, including videotapes on beef cattle, sheep, and goats.
- Winrock advisor and counterpart develop guidelines with CARDI regarding field equipment -- storage, maintenance, and operation.
- Winrock advisor and counterpart develop forage programs with CARDI for demonstration on cooperators' farms.
- CARDI collaborates with the livestock project to provide training programs and field days.
- Winrock advisor continues collaboration with all agencies interested in or promoting livestock development in Antigua (such as EDF, OAS, UECS, and CARDATS).

December

## Genetic Improvement of Livestock

January



- Winrock advisor and counterpart will assist cooperators in culling of their herds and selection of replacements.
- Winrock advisor and counterpart assist with selection of sires for AI use by cooperative farmers and others.
- Winrock advisor orders appropriate semen.
- AI programs may be organized so that technicians respond on call from farms or selected cows are transferred from farms to livestock station during breeding season.
- AI service to be available to government farms and to private individuals.
- Winrock advisor and counterpart with management committee develop a natural breeding program using young sires.
- Winrock advisor and counterpart assist management committee with developing and monitoring cross-breeding and animal back plans.
- Monthly training sessions will be conducted on improved husbandry practices such as feeding, breeding, and herd health to improve reproductive efficiency.

December

## Farm Management

January



- Individual farm plans will be developed with cooperators.
- Winrock advisor and CARDI will provide farm soil maps for individual farmers.
- Winrock advisor and counterpart will meet with CARDI collaborator and individual farmers to determine the most appropriate mix of enterprises for each farm.
- Feasibility of each new enterprise will be evaluated using farm records and management techniques introduced during TA provided by Winrock International.
- Emphasis will be on the technical and financial feasibility of total enterprise.

December

## Training

January



- Farm-management training will be an ongoing program.
- Winrock advisor will finalize degree training preparations for David Lewis, counterpart.
- Winrock advisor and counterpart to continue monthly or bimonthly training and business meetings with farmers.
- Winrock advisor and counterpart to provide video-tapes and slide presentations covering AI, beef, goats, and sheep management.
- CARDI will provide special programs on forage selection, growth, harvest, and storage.
- Livestock division will provide special programs on livestock health problems.
- Total training will be at least equal to 10 1-day courses.

December

January



June

- Training will be provided in evaluation and selection of livestock and in design of appropriate breeding programs to supply quality livestock and livestock products.

September



October

- TA from Winrock International will provide follow-up evaluation and training in recordkeeping systems introduced in 1984 and 1985 with emphasis on using the records from the first 2 years for farm planning and evaluation.

January



December

- Winrock advisor and counterpart will encourage extension to be involved in training activities.
- Training emphasis will be increasingly directed to the demonstration farms and to the use of field days. These events will be open to all interested parties.

#### Development of Forage Program

January



- Winrock advisor, counterpart, and CARDI personnel will work with farmers to develop forage systems appropriate for their operation.
- CARDI will provide information about legume and grass species, compatibility, management, harvesting methods, and storage techniques.
- CARDI will provide seeds and technical information.
- CARDI will provide storage for field equipment.
- CARDI and the project will share equipment when appropriate.
- The project can be a vehicle to deliver CARDI forage research to the farmer.

- CARDI will assist in land preparation and seeding for 3 acres to 5 acres for cooperator farmers.
- Recommendations on stocking rates will be developed for each farm.
- The livestock fence crew will improve fences on government farms.
- The owners or renters will improve fence on non-government land.
- More electric fence will be established to control small stock -- combined with permanent fence when appropriate.
- Fields will be cleaned of debris and acacia so areas may be efficiently worked with equipment. Annual crops such as corn, sudan sorghum, and sugarcane will be grown.
- When appropriate, grasses and legumes will be sod-seeded.
- Forage will be harvested and stored as follows: pasture, hay, silage (corn or grass), and stacks.
- Fertilizer and seed will be purchased when necessary.
- Various preservation techniques for corn and grass silage will be demonstrated.
- Strip-grazing using electric fence will be demonstrated.
- Hay-making and storage will be demonstrated.



December

## Evaluate Dairy Potential

January



- Feasibility of producing milk will be tested on a small scale with one main producer and two or three satellite farms.
- Winrock advisor, counterpart, and management committee will collect and evaluate information on market acceptance of fresh milk including goat milk. (Must it be pasteurized? How will it be packaged and delivered? Will the price be competitive with available products?)
- Winrock advisor, counterpart, and management committee will assist producers with securing simple equipment for processing and packaging on a small scale (less than 100 cows).
- Winrock advisor, counterpart, and management committee will assist with plan and development of simple milking facilities for producers.
- Winrock advisor will order frozen semen for AI.
- Winrock advisor and counterpart with assistance from CADDI will help dairy farmers plan goat forage programs.
- Winrock advisor and counterpart will assist development of appropriate rations for milk production, stressing the need for supplementary minerals.
- Winrock advisor and counterpart will assist breeding programs -- heat detection, culling, selection, AI, choice of dairy bells.
- Winrock advisor and counterpart with assistance from the veterinary division will develop health programs for dairy cattle -- TB and brucellosis testing, internal and external parasites, foot care, skin-disease control.



December

- Winrock advisor and counterpart will provide special training in caring for newborn calves and raising dairy replacements.
- All dairy activity will be done on a small scale -- one to three producers with 6 to 10 cows each. Financial inputs will be in keeping with the small scale. The reason for the dairy exercise is to test the feasibility of larger scale production. Many Antiguan cattle farmers express a desire to milk cows. The relatively small size of livestock-development-unit farms may dictate that a farmer look for other current cash flow such as producing some milk rather than only beef.

#### Project Evaluation

- As specified in the Grant Agreement AID Project No. 533-0112, Antigua Livestock Improvement Project Grant Agreement Evaluation will be carried out cooperatively between AID, the grantee, H. LF, CARLI, and outside consultants as needed necessary.
- An intramural evaluation will be conducted 14 months after the signing of the grant agreement by a steering committee that includes a representative each from the Government of Antigua and Barbuda (GOAB) Ministry of Agriculture, Lands and Fisheries (HALF), the Caribbean Agricultural Research and Development Institute (CARDI), AID, Winrock, and the cooperating farmers.
- A final evaluation will be conducted 6 months prior to the project assistance completion date (June 30, 1987).
- The Winrock advisor will prepare information for the final evaluation team as requested.

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
Implementation Plan for 1985

Ministry of Agriculture,  
Lands and Fisheries

Winrock International  
USAID Project 538-0112

Charles E. Burwell  
Project Coordinator

## ANTIGUA LIVESTOCK IMPROVEMENT PROJECT

### Implementation Plan for 1985

#### SECOND YEAR ACTIVITIES:

1. Activities initiated under FIRST YEAR OBJECTIVES will be continued; specific examples include:
  - a. Organization of cooperating farmers will be strengthened.
  - b. Scheduling, maintenance, operation, and payment procedures for field equipment use will be developed and evaluated.
  - c. Artificial insemination (AI) programs will be extended.
  - d. Construction of livestock holding facilities will continue.
  - e. Cooperators will fence leased land and develop good forage programs.
2. Genetic improvement of livestock will involve selection and culling, AI, importation of breeding stock, and cross breeding.
3. Farm management training will be expanded to include record keeping, forage establishment, harvesting, and storage, fencing, breeding, feeding, and herd health. Training will be done in the classroom, on the farm and through field days. Participation by Extension personnel will be encouraged.

4. Forage production and preservation on large tracts of government land (e.g., Paynters, Airport) will be developed.
5. MALF personnel will be identified for advanced training.
6. Practicality and profitability of dairying in Antigua will be evaluated.

#### IMPLEMENTATION SCHEDULE -- 1985

##### Strengthen Farmer/Cooperator Group Organization

- January
- Election of Chairman, Vice Chairman, Secretary, and Treasurer plus a three- to four-person Executive Committee.
  - Winrock Advisor initiates establishment of a revolving fund and Organization Bank Account.
  - Winrock Advisor and Counterpart with Officers and Executive Committee examine list of Cooperator Farmers to add or delete names based on interest and active participation.
  - Winrock Advisor, Counterpart, and Officers will review lease and rental arrangements.
  - Winrock Advisor and Counterpart meet regularly with Officers and Executive Committee to coordinate usage
- 



and charges for Field Equipment and to determine the frequency of Training Meetings and subjects to be covered.

- Winrock Advisor explores options for agricultural loans.
- Winrock Advisor and Counterpart explore marketing possibilities with Officers and Executive Committee of Cooperating Farmers.

March

### Strengthen Collaboration

January

- 
- Winrock Advisor prepares 1985 IMPLEMENTATION SCHEDULE and Budget for approval by Coordinating Committee.
  - Coordinating Committee conducts annual review of the Livestock Project.
  - Coordinating Committee meets following each Quarterly Report to discuss progress and problems encountered.
  - Coordinating Committee evaluates status of land tenure for Cooperating Farmers.
  - Coordinating Committee evaluates need and role of fulltime MALF counterpart.
  - Winrock Advisor encourages Extension Service to participate in training sessions and field days.
  - Winrock Advisor provides livestock training materials to Extension Service.

- Winrock Advisor provides training programs for Extension on request, including videotapes on beef cattle, sheep, and goats.
- Winrock Advisor and Counterpart develop guidelines with CARDI regarding field equipment -- storage, maintenance, and operation.
- Winrock Advisor and Counterpart develop forage programs with CARDI for demonstration on Cooperator's Farms.
- CARDI collaborates with the Livestock Project to provide Training Programs and Field Days.
- Winrock Advisor collaborates with V. A. L. Sargent of CARDI regarding joint program planning on an administrative level and with Perry Philip at the field level.

December

Genetic Improvement of Livestock

January

- TA provided from Winrock International to evaluate genetic potential of Antiguan livestock and to assist the Cooperative Farmers in developing practical genetic improvement for Antigua.
- Meetings will be held with the Cooperators to determine breeds, ages and sex of animals to be imported. (cattle, sheep and goats, and(or) semen)

- Winrock Advisor and Counterpart determine with Cooperators how and where imported stocks will be maintained.
- Winrock Advisor, Counterpart, Officers, and Executive Committee will develop guidelines for sharing imported animals and their offspring.
- Winrock Advisor and Counterpart will assist recipients in preparing facilities for receipt of animals.
- Winrock Advisor will organize importation (breeds, age, sex and weight) and obtain quotations for shipping costs.
- Winrock Advisor will coordinate inquiries regarding availability and cost of quality animals from exporting countries in region.
- Winrock Advisor will obtain necessary permits, tests, and health papers and arrange for shipment.
- Winrock Advisor and Counterpart will make arrangements for unloading and transport to quarantine area or recipients' farms.
- Winrock Advisor and Counterpart will assist Cooperators in culling of their herds and selection of replacements.
- Winrock Advisor and Counterpart assist with selection of sires for AI use by Cooperative Farmers and others.
- Winrock Advisor orders appropriate semen.



- AI programs may be organized so that technicians respond on call from farms or selected cows are transferred from farms to livestock station during breeding season.
- AI service to be available to Government Farms and private individuals combined heat synchronization program.
- More holding facilities to be constructed for AI use.
- Winrock Advisor and Counterpart with representatives of Cooperator Farmers develop a natural breeding program using young sires.
- Winrock Advisor and Counterpart assist with developing cross-breeding program.
- Monthly training sessions conducted on improved husbandry practices such as feeding, breeding, and herd health to improve reproductive efficiency.

June

### Farm Management

January



- Individual farm plans will be developed with Cooperators.
- Winrock Advisor and CARDI will provide farm soil maps for individual farms.
- Winrock Advisor and Counterpart will meet with CARDI collaborator and individual farmers to determine the most appropriate mix of enterprises for each farm.



- Feasibility of each new enterprise will be evaluated using farm records and management techniques introduced during November 1984 by TA provided by Winrock International.
- Emphasis will be on the technical and financial feasibility of total enterprise.

December

### Training

January

- Farm Management Training will be an ongoing program.
- Winrock Advisor and Counterpart to continue monthly or bimonthly training and business meetings with farmers.
- Winrock Advisor and Counterpart to provide videotapes and slide presentations covering AI, beef, goats, and sheep management.
- CARDI will provide special programs on forage selection, growth, harvest, and storage.
- Livestock Division will provide special programs on livestock health problems.



December

February

- Project fence crews will be trained by Winrock Advisor to construct electric fence.

January



February

- Training will be provided in evaluation and selection of livestock and in design of appropriate breeding programs to supply quality livestock and livestock products.

September



October

- TA from Winrock International will provide follow-up evaluation and training in record keeping systems introduced in 1984, with emphasis on using the first year records for farm planning and evaluation.

February



March

- TA from Winrock International will provide training in maintenance and operation of the new field equipment, including field days demonstrating on cooperator farms -- plowing, planting, harvesting, and storing.

January



- Winrock Advisor and Counterpart will encourage Extension to be involved in training activities.
- TA personnel from Winrock International will conduct training sessions on their special subject while in Antigua.



- Training emphasis will be increasingly directed to the demonstration farms and to the use of field days. These events will be open to all interested farmers.

December

### Development of Forage Program

January



- Winrock Advisor, Counterpart, CARDI Personnel will work with farmers to develop forage systems appropriate for their operation. Each additional farm has a cumulative effect, the first farmers will continue to need help with additional problems, as they move along.
- CARDI will provide information about legume and grass species, compatibility, management, harvesting methods, and storage techniques.
- CARDI will provide seeds and technical information.
- CARDI will provide storage and maintenance and operation of field equipment.
- CARDI and the Project will share equipment when appropriate.
- The Project will be a vehicle to deliver CARDI forage research to the farmer.
- CARDI will assist land preparation and seeding for three-five acres for cooperator farmers.
- Recommendations on stocking rates will be developed.

- The Livestock fence crew will improve fences on Government Farms.
- The Project and owners or renters will improve fence on nongovernment land.
- More electric fence will be established to control small stock -- combined with permanent fence when appropriate.
- Fields will be cleaned of debris and acacia so areas may be efficiently worked with equipment.
- Annual crops such as corn, sudan sorghum, and sugar cane will be demonstrated for feed value.
- When appropriate, grasses and legumes will be sod seeded.
- Harvest and storage of forage will be as follows: pasture, hay, silage (corn or grass), and stacks.
- Large areas of forage at the Airport and Paynters Livestock Station will be developed to provide supplemental feed for cooperating farmers and commercial grazing units.
- Fertilizer and seed will be purchased when necessary.
- Building hay stacks will be demonstrated.
- Various silage preservation techniques will be demonstrated.



- Strip grazing using electric fence will be demonstrated.
- Hay-making and storage will be demonstrated.

December

### Evaluate Dairy Potential

February



- Winrock Advisor and Counterpart with Cooperator Farmers will review studies done in recent years regarding dairy potential in Antigua (WORLD BANK REPORT 1984), (ANTIGUA FIVE YEAR PLAN)
- Feasibility of producing milk will be tested on a small scale with six to ten producers.
- Winrock Advisor and Counterpart will collect and evaluate information on market acceptance of fresh milk. (Must it be pasturized? How will it be packaged and delivered? Will the price be competitive with available products?)
- Winrock Advisor and Counterpart with Executive Committee of Cooperators will identify farmers who will be involved in the milk program.
- Winrock Advisor and Counterpart and Executive Committee will identify location of the small dairy processing activity.
- Winrock Advisor and Counterpart will assist dairy producers in developing a milk pick-up scheme.

- Winrock Advisor and Counterpart will assist producers with securing simple equipment for processing and packaging milk on a small scale (less than one hundred cows).
- Winrock Advisor and Counterpart will assist with plan and development of simple milking facilities for producers.
- Winrock Advisor and Counterpart will assist producers develop a sanitary and efficient method of milking, straining, and cooling their milk.
- Winrock Advisor and Counterpart with TA from Winrock International will help farmers to identify the best breed or crossbreed for producing milk in Antigua.
- Winrock Advisor will order frozen semen for AI.
- Winrock Advisor and Counterpart with assistance from CARDI will help dairy farmers plan good forage programs.
- Winrock Advisor and Counterpart will assist development of appropriate rations for milk production stressing the need for supplementary minerals.
- Winrock Advisor and Counterpart will assist breeding programs -- heat detection, culling, selection, AI, choice of dairy bulls. Dairy cattle will be included in importation of animals and(or) semen.

- 
- Winrock Advisor and Counterpart with assistance from the Veterinary Division will develop health programs for dairy cattle -- TB and Brucellosis testing, internal and external parasites, foot care, skin disease control.
  - Winrock Advisor and Counterpart will provide special training in care of the new born calf and raising dairy replacements.
  - All dairy activity will be done on small scale -- six to ten producers with six to ten cows each. Financial inputs will be in keeping with the small scale. The reason for the dairy exercise is to test the feasibility of larger scale production. Many Antiguan cattle farmers express a desire to milk cows. The relatively small size of Livestock Development Unit Farms may dictate that a farmer look for other current cash flow such as producing some milk rather than only beef.

December

### Project Evaluation

- February
- As specified in the Grant Agreement AID Project No. 538-0112 Antigua Livestock Improvement Project Grant Agreement Evaluation will be carried out cooperatively

between AID, the Grantee, and outside consultants as deemed necessary.

An intramural evaluation will be conducted fourteen months after the signing of the Grant Agreement by a Steering Committee that includes a representative each from the Government of Antigua and Barbuda (GOAB) Ministry of Agriculture, Lands and Fisheries (MALF), the Caribbean Agricultural Research and Development Institute (CARDI), AID, Winrock and the Cooperating Farmers.

- The Evaluation will consider:
  1. Project progress to date.
  2. Effective working relationship between and among Winrock and the participants.
  3. Assess the Projects effectiveness toward the Project purpose.
  4. Meeting the outputs set forth in the First Year Implementation Plan.

**ANTIGUA LIVESTOCK IMPROVEMENT PROJECT**  
**Implementation Plan for 1984**

**Ministry of Agriculture  
Lands and Fisheries**

**Winrock International  
USAID Project 538-0112**

**Charles Burwell  
Project Coordinator**

ANTIGUA LIVESTOCK IMPROVEMENT PROJECT  
IMPLEMENTATION PLAN -- 1984

**FIRST YEAR OBJECTIVES**

1. Cooperator group will be organized and functioning as Project mechanism for guiding implementation activities and providing oversight of inputs, i.e., use and maintenance of field equipment.
2. Procurement will be completed on all field equipment and fencing materials.
3. Training will be conducted on artificial insemination techniques, design and construction of livestock holding facilities, operation and maintenance of field equipment, and farm record keeping and data use.
4. National Artificial Insemination Program will be established in conjunction with the MALF.
5. Each cooperator will have a properly fenced, improved forage pasture on his/her land, this land will be under a long term lease (min. seven years) to the cooperator.

**MAJOR IMPLEMENTATION ACTIONS -- 1984**

1. Project Start-up Activities
2. Farmer/Cooperator Group Organization
3. Procurement of Equipment
4. Training
5. Development of National Artificial Insemination Program
6. Cooperator Pasture Improvement

## IMPLEMENTATION SCHEDULE -- 1984

### Start-up Activities

- January
- 
- Project Coordinator nominated by Winrock and approved by AID.
  - Winrock Advisor arrives in Antigua, locates house and establishes residence.
  - Winrock Advisor liaisons with representatives of collaborating organizations and establishes Project Coordinating Committee (USAID: Mike Maxey, RDO/C; Winrock: Charles Burwell, Project Coordinator; CARDI: Val Sargent, Director -- CARDI/Antigua Forage Program; MALF: Joseph Robinson, Director Livestock Division and Francis Henry, Director Agriculture; Farmers: Lazman Webson, President Livestock Cooperative and Joseph Samuel, President Small Farmers Cooperative).
  - Winrock Advisor initiates planning and coordination of activities of three major entities involved in the Project; Winrock, MALF, and CARDI.
  - Winrock Advisor, MALF Counterpart, and CARDI Representative conduct preliminary survey of livestock producers for data on determining criteria to be used to select cooperators.
  - Winrock Advisor with guidance from Project Coordinating Committee drafts selection criteria for cooperators and submits to RDO/C for USAID approval and to MALF for GOAB approval.
- March

## Organization of Cooperator Group

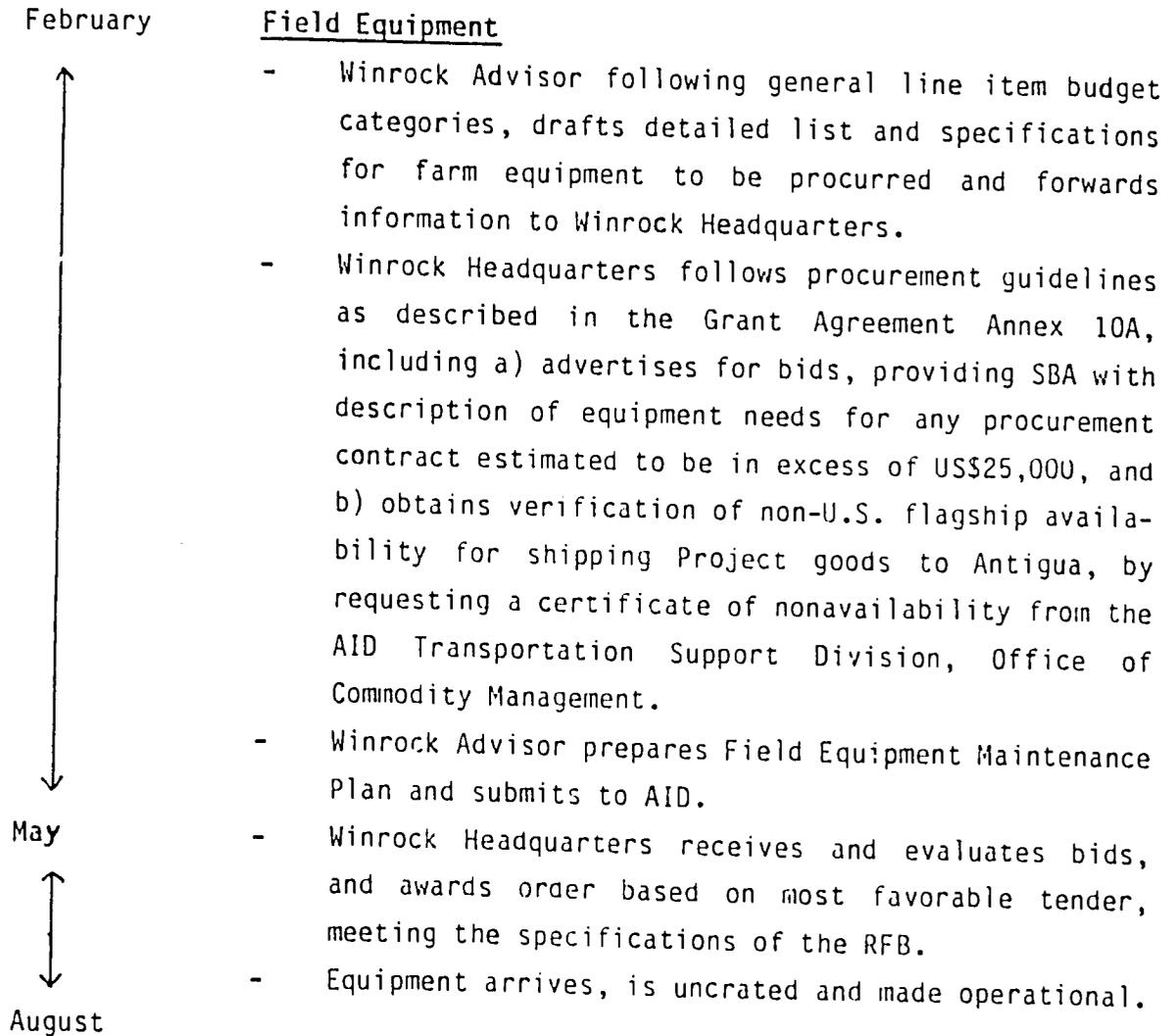
April



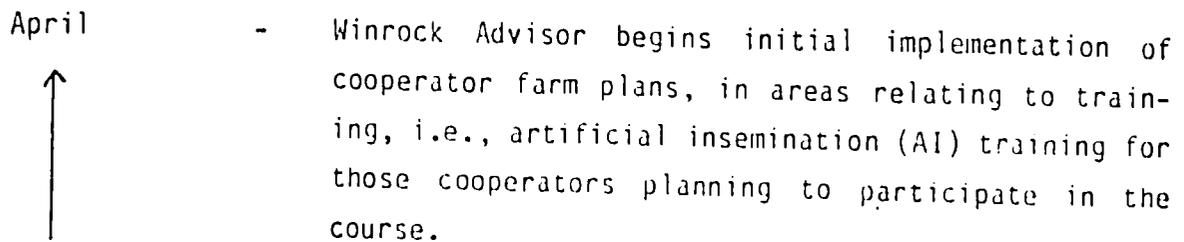
- Winrock Advisor and Coordinating Committee initiate selection of cooperators, nominations made by Committee with final selection made by Winrock advisor.
- Winrock Advisor and Coordinating Committee verify that each cooperator meets minimum criteria; on the requirement of long-term leases, Winrock Advisor will obtain confirmation of GOAB position to grant a minimum seven-year lease on at least five acres of land to each cooperator as necessary.
- Winrock Advisor conducts survey of cooperators to determine their specific needs and interests.
- Cooperators first organizational meeting held to discuss Project objectives, and elect an Executive Committee to work with the Winrock Advisor.
- Weekly cooperator meetings held to plan, coordinate, and set priorities for implementation of Project activities (i.e., training, type of field equipment to be procured, drafting of individual farm plans).
- Winrock Advisor, Cooperator Executive Committee and Cooperators, hold discussions and reach agreement concerning: a) method of field equipment storage, maintenance, use, and payment for service, b) responsibilities of cooperators (i.e., record keeping, participation in demonstration activities).
- GOAB completes land surveys and grants long-term leases to all cooperators.

June

## Procurement of Equipment



## Training and Field Extension Activities



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June

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July

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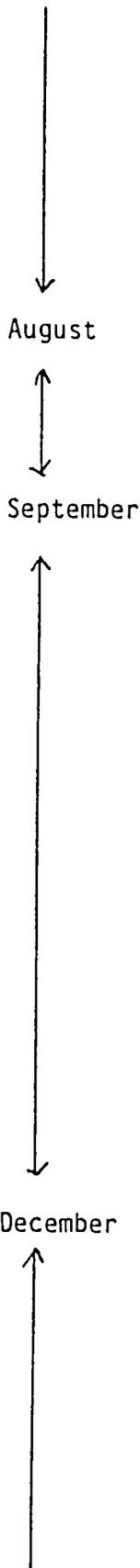
- Winrock Advisor and CARDI Livestock Technician initiate visits to cooperator farms to identify cooperators best suited as demonstrators in AI training.
- Winrock Advisor helps participating cooperators plan and design holding pens for AI of their herds.
- Short-term Winrock TA arrives and begins course on designing and building holding facilities.

Course Description: Corral Design and Building Course

- Objective: At the end of this two-week course, the participants will have the ability to design and build livestock holding facilities pertinent to his/her needs in AI work, disease prevention, internal and external parasite control and in small-scale milk production.
- Participants: Thirty cooperators (with 4 or 5 acting as demonstrators by actually having facilities constructed from local materials), MALF Livestock Technicians, and interested producers. First priority will be on training the core group of cooperators and 1 or 2 MALF technicians.
- Short-term Winrock TA arrives and begins AI course.

Course Description: Herd Improvement Through Artificial Insemination

- Objective: At the end of this two-week course, the participants will have the ability to use AI techniques, plan breeding selection, maintain breeding records, detect cows in heat, understand importance of and know the proper techniques for providing prenatal care; 6 MALF Livestock Technicians and 2 cooperators will, through special training, be able to maintain semen supplies, provide proper sanitation during all phases of AI, know the proper pro-



cedures for maintaining AI records and inventory control of semen and AI supplies.

- Participants: For the general course, the 30 cooperators, 6 MALF Livestock Technicians and interested farmers; 2 cooperators and the MALF personnel will receive special training in addition to the general course.

- Winrock Advisor will continue farm visits (5 to 6 per week) to fine tune the farm plans of the cooperators in regard to soil mapping, fencing, pasture improvements, and AI uses.

- Short-term Winrock TA arrives to provide equipment operation and maintenance training.

Course Description: Field Equipment Use and Maintenance

- Objective: At the end of this two-week course, the participants will be able to properly use and maintain field equipment purchased under the Project, as part of the training the cooperators will participate in the design of a detailed equipment use and maintenance plan for the Project equipment.

- Participants: The 30 cooperators, MALF personnel, CARDI personnel, and interested farmers for the general course, only the cooperators and CARDI personnel will be involved in the design of the equipment maintenance plan; the general public will be invited to a farm equipment field day to be held at the Betty's Hope Forage Station.

- Short-term Winrock TA arrives to give farm record keeping course.

Course Description: Farm Record Keeping and Use of Information Course

- Objective: After this course the participants will have the ability to establish, maintain, and use farm records pertaining to AI/Breeding, Feeding, Calving, Health Management, and Financial Management



- Participants: Cooperators will be principal participants as this training will be the basis for gathering the threshold baseline data for measuring impact of the Project on the Cooperators.

### Development of National Artificial Insemination Program

April



- Winrock Advisor responds to GOAB request to assist MALF establish AI Program, GOAB has been donated a large amount of AI equipment and supplies and needs TA to design program and train MALF personnel.
- Winrock Advisor designs program and requests Winrock TA for training.
- GOAB identifies 6 MALF Livestock, Technicians to be trained to manage the AI Program, job descriptions are officially registered for 5 AI technicians and 1 Program Manager

July



- Winrock TA provides training of MALF personnel and develops firm operational plan for the AI Program including regulations, charges, and general operational procedures.

August

- AI Program starts.

### Farm/Pasture Improvements

May



- CARDI Forage Section (in accordance with Winrock-CARDI MOU) initiates land preparation, for 5 cooperators having private lands, for long-term pasture improvement and short-term feed and hay production.
- Winrock Advisor provides TA and seed material for planting of sudan/sorghum, hybrid corn, and legume grasses.

- ↓
- July
- ↕
- September
- ↕
- December
- Winrock Advisor and cooperators plan and construct adequate fencing on these five demonstration pastures and start demonstrations on proper transitional feeding of poor physical condition livestock.
  - CARDI and Winrock Advisor begin land preparation on farms and remaining cooperators, fencing and forage production is also initiated.
  - Winrock Advisor and cooperators start up largescale pasture improvement activities with Project equipment; including land clearing, land preparation, forage planting, direct seeding of legumes in sod.
  - Winrock Advisor and cooperators start hay making and silage demonstrations on cooperators' farms and storing this feed for the dry season.

APPENDIX 7-1

COMMUNICATION OF IMPORTANCE

Veterinary and Livestock Division  
C/o Ministry of Agriculture,  
Lands & Fisheries,  
P.O. Box 1282,  
ANTIGUA, W.I.

VLD 4/3

22nd January, 1983.

Livestock Farmers,  
ANTIGUA, W.I.

Dear Sir,

For some time now both the Caribbean Development Bank and the Government of Antigua have been concerned over the marketing of milk and meat with particular reference to the products from the Livestock Development Unit Farms.

I am to inform you that work on the establishment of an Integrated Beef Project - The Antigua/Barbuda Meats Development Corporation Ltd. - at Betty's Hope has commenced. Here it is expected that a better price for cattle, at least, than that which is obtained on the local market will be forthcoming.

With regard to the marketing of milk, it was hoped that with assistance the existing foreign owned Antigua Dairy Ltd. would have been able to buy milk produced but it is noted that even during the tourist season milk is not purchased on a regular basis. This has left much to be desired.

I am to be advised that a local group has indicated its intention to purchase a turn-key dairy processing plant equipped, in addition to the pasteurization of milk, to make butter and cheese. This should allow for the buying of all milk produced at all times since the making of butter and cheese will minimise any overstocking or waste.

Finally, the Government of Antigua/Barbuda is anxious that the State should become self-sufficient in pork, poultry and eggs. I am convinced that this can be achieved overnight but for the constraint of animal feed supply. While Antigua is planning for the production of the base products for feed (e.g. corn, sorghum, etc.), the St. Vincent Feed Mill, subsidiary of the St. Vincent Flour Mills, has indicated its ability to supply conventional feeds as regularly as the Parent Body supplies flour for humans. This is very interesting and welcomed. Developments are being closely watched.

The above is to allay the fears of some for the marketing of animal products and encourage the dreams of many to enter more enterprisingly into livestock production.

Yours truly,

J.L. Robinson, D.V.M.  
Chief Veterinary Officer.



Communications on this subject should be addressed to:—

Permanent Secretary,  
Ministry of Agriculture  
Lands & Fisheries,  
Long Street,  
St. John's, Antigua.

and the following  
Number quoted. ALF 4/69

18th April .....1983

Mr. H.A. Fitzhugh,  
Programme Officer,  
Latin America/Caribbean,  
Winrock International Livestock  
Research Training Center,  
Petit Jean Mountain,  
Moulton, Arkansas 72110,  
U.S.A.

APR 28 1983

Dear Sir,

Animal Agriculture Activities in Antigua

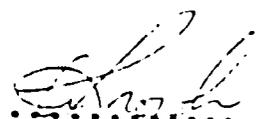
Your letter on the above captioned subject addressed to the Honourable R. Yearwood, Minister of Agriculture is hereby acknowledged.

The Ministry is looking forward to receiving a copy of your Draft Proposal for our consideration.

We also convey our interest in the Project and anticipate our participation, with your support, to enable us to do so.

Kindest regards.

Yours faithfully,

  
.....  
Permanent Secretary

AE/ep



Communications on this subject should be addressed to:—  
Chief Veterinary Officer  
Veterinary & Livestock Division  
c/o Ministry of Agriculture, Lands & Fisheries  
P.O. Box 1282  
St. John's, Antigua

and the following  
Number quoted. VLD 46/4

.....23rd. October,.....19.84.

Livestock Development Unit Farmers

My Dear L. D. U. Farmers:

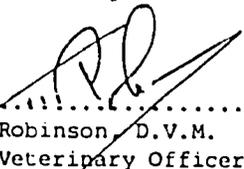
Some of you have occupied your farms since 1975 and among the things promised were leases to enable farmers to have a measure of security of tenure, and also to allow negotiations for loans for agricultural development.

The model lease was presented, discussed and modifications, on your representation, proposed to the Hon. Minister of Agriculture, Lands & Fisheries, Antigua, and what was acceptable passed on to the Legal Department. Not long ago, especially since the advent of Mr. Charles Burwell, Coordinator, Winrock/USAID Livestock Development Project, what was thought to be the final draft was again discussed with you. Your proposals were again considered and modifications made, consequent upon the approval of the Ministry.

The Lease, in its final form, is ready for execution and I am to advise that those of you who do not sign same before November 30, 1984, will be considered as defaulters and will be expected to surrender the farm which you now occupy.

Upon your request, Mr. I Emanuel, Ag. Project Manager, will arrange for an appointment with the Legal Department when you will sign the document prepared.

Yours sincerely,

  
.....  
J. L. Robinson, D.V.M.  
Chief Veterinary Officer

JLR/hoj

c.c. Permanent Secretary  
Ministry of Agriculture, Lands & Fisheries

Director of Agriculture

Mr. Charles Burwell ✓  
Winrock/USAID Coordinator

Mr. I. Emanuel,  
Agricultural Assistant II

## MINUTE

FROM: Chief Veterinary Officer

TO: Permanent Secretary  
Ministry of Agriculture, Lands & Fisheries

DATE: 23rd September, 1986

NO: VLD 4/11

Your minute ALF 4/49 of 29th August, 1986. Economic Analysis of Antigua and Barbuda Livestock Sector.

The impediments as listed at p.11 of the Report are real and the need to overcome remains important for a meaningful livestock industry. However, others come to mind, such as the need for enforcement of management rules, regulation of production practices and the prompt collection of rents. Restricted livestock slaughter should probably be better noted as 'limited'.

A similar exercise, though limited, was carried out some years ago by Mr. Gulston of OECS, but this extensive exercise has revealed prices outside of my expectation. The Gulston exercise did show that the cost of producing one (1) pound of pork is \$4.17EC. In this regard, there might now be an efficiency in feed.

It does not necessarily follow that the raising of the control price or abolition of a control price will result in improvement in quantity and quality of production. It is the consensus that there will be the tendency for the present production system to continue. For that improvement to be achieved it would be mandatory that all impediments, inclusive at par.2, be removed.

I wish to see a free market system, consequent upon an organized production system slowly in the making. However, there should be protection from the dumping in Antigua of cheap meats and modified production in high priced cuts of meats (portion controlled).

Finally, I wish to again place on record the Division's gratitude to both Divrock and USAID for such a thorough exercise with very tangible inputs. I feel that the Project, together with the research aspect resulting in a comprehensive report of four (4) volumes has laid the foundation for good livestock production systems and given the guideline for a modification of Government's policy to meet existing conditions. What is not achieved after the EDF Project should not amount to much.

  
.....  
J.L. Robinson, D.V.M.  
Chief Veterinary Officer

JLR:ulb

cc Director of Agriculture

Mr. Charles Surwell /



FO
✓
✓
✓
✓

Ministry of Agriculture

GOVERNMENT OF ANTIGUA AND BARBUDA

LONG STREET  
ST. JOHN'S, ANTIGUA, W.I.  
Telephone: 809-46-21007/21008/21009

August 31, 1969

Ref: ALF 4/69

Mr. Ted Morse  
Acting Director  
United States Agency for International  
Development  
P.O. Box 302  
Bridgetown  
BARBADOS

Dear Mr. Morse

WINDROCK's Livestock Development Proposal  
for Antigua and Barbuda

09/16/83  
Actual items  
+ letters  
written  
Jesse  
1/10/84

I acknowledge with thanks the receipt of your letter dated August 12, 1969, on the captioned subject.

We are indeed happy that USAID has indicated a willingness to give financial support to the project.

I note USAID's concern regarding policy issues in respect of land tenure and pricing in the livestock sector. I confirm that my Government is aware and sensitive to these issues, and assure you that we have initiated actions to address them.

These actions include a recent submission to Cabinet of a Land Policy Paper which seeks to ensure security of tenure by way of long term leases to farmers so as to encourage long term investment in the sector.

With regards to pricing policy, the Ministry has given active consideration to the matter, and is in the process of reviewing the pricing policies which will make them more favourable to livestock producers and at the same time provide strong incentives for additional investment in the sector.

...../2

In light of our commitment to address the policy concerns, the WINDROCK proposals will be of great benefit to Antigua and Barbuda in fostering livestock development and we look forward to USAID's financial support to facilitate implementation of the project.

In conclusion, we share your views that a positive response on behalf of Government would augre well for the possibility of larger and more encompassing development project in the future. In this regard we look forward for further USAID's financial support to achieve this objective.

Accept, Sir, the assurance of our highest esteem.

Yours faithfully

  
Robin Yearwood  
MINISTER OF AGRICULTURE  
FISHERIES & LANDS



Ministry of Agriculture

GOVERNMENT OF ANTIGUA AND BARBUDA

LONG STREET  
ST. JOHN'S, ANTIGUA, W.I.

Telephone 309-46-21007 21008 21009

December 15, 1983

Ref: ALF 4/69

Mr. W.B. Wheeler  
Director  
United States Agency for International  
Development  
P.O. Box 302  
Bridgetown  
Barbados.

11/21

Dear Mr. Wheeler,

Antigua Livestock Improvement Project -  
WINROCK Technical Assistance

We refer to correspondence ending with your telegram of November 28, 1983 and discussions on December 15, 1983 with your Dr. David L. Jesse on the captioned project.

We are very pleased that AID has approved the project.

At the meeting with Dr. Jesse, the three areas of concern to AID were discussed. These are:

- (i) Government's contribution to the Project
- (ii) The Land Tenure Issue
- (iii) Pricing Issues.

I confirm that the Government of Antigua will provide support to the project in the following forms:

- (1) Counterpart livestock specialist for three years at a half man year per year.
- (2) Two animal technicians full time, over the life of the project.

- (3) Agricultural labourers as required to a maximum of seven over the period of three years.
- (4) The provision of office, livestock facilities and land for pasture and farming demonstrations.
- (5) Exemption of duty and tax on the importation of equipment and supplies for the project.

As regards the land tenure issues, I confirm that the Government is currently leasing lands to livestock farmers for a period of ten years and periods in excess of this with an option to review. The Cabinet has accepted the Ministry's recommendations for offering security of tenure to farmers. At paragraph 3.6 of the Cabinet Paper attached, is outlined the detail relating to this issue. I should add that the Government is receiving assistance from the Organization of American States for the Drafting of Standard Leases with a view of expediting the process of granting Leases. The Ministry has already received copies of these Draft Leases. In summary, the Government is strongly committed to providing security of tenure to farmers to encourage long term investment in Livestock and other Agricultural enterprises with long gestation periods.

In connection with the issue of Pricing Policy, it should be noted that there is no limitation on the price of meats which are produced by farmers who adopt improved methods of husbandry and can sell their animals to operators of meat shops where properly cut and packaged meats are made available to the consumers. To this extent, free market forces obtain.

The Government's view is that the removal of price control and the movement to free market requires a gradual process to allow time for the establishment of the necessary infrastructure of improved husbandry, slaughtering facilities, processing, packaging and marketing. In this respect, Government has already taken action to put in place some of these requirements. These steps include granting of concession to the Antigua and Barbuda Meat Development Corporation Limited which will establish slaughtering, processing, packaging and marketing facilities. The project is committed to buying good quality animals from farmers at free market prices.

When the number of good quality animals increases, a larger number of these animals will be purchased by the sector where price control does not operate. As the general quality of animals improve the Government will allow progressive price increases based on cost of production. As an immediate move towards ensuring improving the farmers profitability, there will be review of the existing price control based on cost of production at average standard husbandry methods. These prices will be based on standards and grades for live animals and meats. Annual reviews of these

price control will be ensured based on improved husbandry methods. Government will work towards removal of price control over a period of three years.

I trust that this response satisfies USAID's concern, and steps will be taken to facilitate the expeditious commencement of the project.

Best Wishes for Christmas and the New Year!

Yours sincerely

.....  
Robin Yearwood  
MINISTER OF AGRICULTURE,  
FISHERIES & LANDS,

2259 USEMBGGI W8

2122 EXTRNAL AK

DECEMBER 21/83  
TELEX NO. 953

MR. W. WHEELER  
BARBADOS

4.12.1  
1

FROM BENJAMIN, PERMANENT SECRETARY, AGRICULTURE FOR MR. WHEELER  
FOR THE ATTENTION OF DR. DAVID L. JESSUP, DEPUTY DIRECTOR, BARBADOS  
ALF 4/83, ANTIGUA LIVESTOCK IMPROVEMENT PROJECT, ANTIGUA, BARBADOS  
TECHNICAL ASSISTANCE. PLEASE INSERT AT PARAGRAPH 4 AND 5 THE  
WORD, "OBTAIN". "HOWEVER, THE GOVERNMENT REQUESTS THAT THE  
PRESENT LEVEL OF PRICE CONTROL ON THE PUBLIC MARKET SHOULD BE  
PUBLIC MARKET COULD ACT AS A DISINCENTIVE TO INVESTORS TO  
INCREASE THEIR INVESTMENT IN THIS SECTOR. LET US KNOW IF  
GRATEFUL FOR YOUR INDICATION THAT OUR LETTER AND THIS LETTER  
SATISFIES AIDS CONCERNED.

FOREIGN AFFAIRS  
ANTIGUA AND BARBUDA

2259 USEMBGGI W8

2122 EXTRNAL AK

14-5/83  
4-4-83  
- 11-11-83  
- 11-11-83

TOD DEC 21 0813

(2) Two animal technicians full time, over the life of the project.

**ACTION MEMORANDUM FOR THE MISSION DIRECTOR**

**FROM:** Mr. David L. Jessee, AGR/ECON

**Action:** Your concurrence is sought with respect to the resolution of three issues raised during the Mission Review of the Antigua Livestock Improvement Project on December 13. You required and we have obtained the following:

1. GOAB commitment to the specific contributions it is to make to the Project;
2. GOAB commitment to make land available with long-term leases to livestock farmers; and
3. GOAB commitment to raise the controlled level of live animal and meat prices to a point where improved livestock operations can become a profitable enterprise.

**Discussion:** Attached to this memo is a letter dated December 15, 1982, directed to you from Mr. Robin Yearwood, Minister of Agriculture, Fisheries and Lands. (A sentence omitted by the typist is contained in the attached telegraph). In this letter Mr. Yearwood commits the GOAB in the three subject areas.

1. The GOAB has committed itself to the provision of each item stated in the project proposal as being a GOAB contribution. Further details will be worked out during the preparation of Winrock's implementation plan.
2. The present policy of the GOAB is to give livestock farmers ten year renewable leases on Crown Lands. The CAS is presently assisting the GOAB to streamline the leasing process. The Minister's "Proposal for a Land Policy", presented to the Cabinet on July 26, 1982 still has not received a final review by the Cabinet, but I was given to understand that the delay is due principally to the fact that the CAS is presently reviewing the operational implication of the policy statement. If the policy guidelines are accepted in their present form, farmers would be given the option of purchasing up to five acres. The existing policy and practices in the area of Crown Land leasing should not present serious obstacles to the project. Favorable Cabinet action on the Land Policy Proposal will, however, brighten the prospects for the livestock sector.
3. The Minister has committed the GOAB to work towards the removal of price control over a three year period. First steps will be taken early in 1984 when a review of the present price controls will be conducted. Differentiation of price by standards and grades for live animals and meats will be introduced. Pricing based on costs of production will also be considered. Prices will be again reviewed in early 1985 and early 1986 with a view to releasing price controls in early 1987.

Politically, allowing these prices to increase progressively is risky. The butchers and the consumers stand to be hurt in the short-run. The Minister furthermore is afraid that increased livestock prices may aggravate the problem of free grazing livestock as more part-time

operators stake out more cattle wherever they are able to graze them. The process of price deregulation must be properly planned and managed. I believe the Minister would welcome competent technical assistance in planning such a strategy. I would propose that RDO/C stand ready to provide technical assistance to perform needed analysis in this area. Up to three or four work-months could be legitimately provided from PD&S funds.

Recommendation: To concur that the GOAB has adequately addressed the three concerns raised during the Mission review of the Project.

APPROVED: \_\_\_\_\_

DISAPPROVED: \_\_\_\_\_

DATE: 1/10/84

Clearance

ARDO:WRBaucom (IN DRAFT) DATE: 12/23/83

CPC:MJune (IN DRAFT) DATE: 12/23/83

DR:TBrown \_\_\_\_\_ DATE: \_\_\_\_\_

RLA:TCarter \_\_\_\_\_ DATE: \_\_\_\_\_

Drafted by:AGR/ECON:DLJessee:mg:lh

ACTION MEMORANDUM FOR THE MISSION DIRECTOR

FROM: Mr. David L. Jesse, AGR/BCON

Action: Your signature is required to authorize the Antigua Livestock Improvement Project (No. 538-0112) and to approve the Operational Program Grant Agreement with Winrock International, a Private Voluntary Organization.

Discussion: The proposed project involves intensive work with about 25 livestock producers in Antigua with the aim of significantly increasing the production and productivity of their operations. In this way, the project will demonstrate the technical and economic feasibility of adopting certain management and technological innovations under conditions typically faced by small and medium scale livestock producers in Antigua.

The project proposal submitted by Winrock has been carefully reviewed by the Mission. A review of the first draft resulted in a letter dated July 27, 1983, from you to Dr. H.A. Fitzhugh, raising a number of issues including GOAB acknowledgement of pricing and land tenure constraints affecting the livestock sector, a direct GOAB endorsement of the proposal and commitment to the project, the overambitious statement of the project purpose, the appropriateness of the machinery and its eventual disposition, the feasibility of milk production, the dependency of the project on planned abattoir and feed lot construction by other parties, the nature of collaboration with CAPDI, the adequacy of the budget, and the calculation of overhead. Winrock redrafted the proposal, dated September 1983, and Mr. Yearwood wrote you a letter dated August 31, 1983. The project committee met October 29, 1983, with Mr. Charles Furwell, the Winrock candidate for the Project Administrator position, and resolved three further issues: 1) the need for an evaluation, 2) the need for participant selection criteria, and 3) the non-availability of AID regional training funds. The Mission Review of the project held December 12, 1983, discussed six issues: 1) GOAB support, 2) selection of the cooperating farmers, 3) the feasibility of the production of beef for hotel trade, 4) ability of the project to address milk production, 5) land tenure, and 6) price controls. As a result of the review you approved the project subject to three points of clarification, i.e. specific commitment of the GOAB to items listed in the project proposal, willingness and ability of the GOAB to lease land to cooperating farmers on a long-term lease, and a commitment by the GOAB to raise the controlled price of live animals and meat to a point where investment in improved livestock will become attractive. Mr. Yearwood in a letter dated December 15, 1983 clarified the GOAB commitment with respect to these points.

The RDO/C Agricultural Division believes the project is technically sound and appropriately designed for the situation in Antigua. Winrock International, as the Grantee and implementing agent, has the demonstrated experience, personnel, and commitment to enable successful implementation. The Antigua and Barbuda Ministry of Agriculture, Lands, and Fisheries officials have collaborated closely with Winrock throughout the project design, and the Minister of Agriculture has personally expressed his interest and support for its implementation. Furthermore, the GOAB has been forthcoming with respect to the pricing and land tenure issues.

Justification to the Congress: The Congressional Notification was submitted on November 30, 1983, and the fifteen day waiting period expired on December 15, 1983. LAC/DP, in State 362656, dated December 23, 1983, allotted US\$264,000 (Two Hundred Sixty-Four Thousand United States Dollars) for FY 1984.

Authority: This is an Operational Program Grant with a registered Private Voluntary Organization (PVO). Winrock International Research and Training Center Inc. is on the list of registered PVO's provided in Handbook 3, Chapter 4, Appendix 4.D, dated March, 1982. The LAC Redelineation of Authorities to the Field, dated August 8, 1983 provides you with the authority to approve and authorize funding not to exceed \$1,000,000 (One Million United States Dollars) for Operational Program Grants.

Recommendation: That you sign the Project Authorization and the Operational Program Grant Agreement.

APPROVED: \_\_\_\_\_

DISAPPROVED: \_\_\_\_\_

DATE: \_\_\_\_\_

Clearance:

AGR/IDI:Maxey	(In Draft) DATE:12/30/83
AADO:SASzadek	(In Draft) DATE:12/30/83
A/PRM:DSoules	(In Draft) DATE:12/30/83
PLA:TBCarter	(In Draft) DATE:1/4/84
CCMT:JETuleja	(In Draft) DATE:1/3/84
CPO:MDJune	(In Draft) DATE:12/30/83
DR:TBrown	(In Draft) DATE:12/30/83
POL/ECCN:JHope	(In Draft) DATE:12/30/83
A/CHARGE:BThomas	(In Subs.) DATE:(Ref: Antigua 0015)
CCM:LFlower	(In Subs.) DATE:1/10/84

Drafted by:AGR/ECCN:DLJessee:mg:lh

January '10, 1984

Hon. Robin Yearwood  
Minister  
Ministry of Agriculture, Fisheries  
and Lands  
Long Street  
St. John's  
ANTIGUA

Dear Mr. Minister:

SUBJECT: Antigua Livestock Improvement Project

As was communicated to you in your discussions on December 15, 1983 with Mr. Jesse, three areas of concern remained after our final review of the subject project. Your letter to me of that same date, and the clarifying telegram from Mr. Benjamin, have persuaded me to approve the project and the grant to Winrock International.

Your willingness to make a substantial contribution to the project, particularly in the form of half of the time of a livestock specialist and the full time of two animal technicians, is noted.

Although your Government is working toward establishing an official Land Policy, my understanding now of your present de facto policy leads me to believe that long-term access to land will be offered by farmers participating in this Winrock Project. I assume that each project participant will be afforded the right to lease on a long-term basis up to five acres, the actual area leased depending on the area he/she presently owns or controls.

Your commitment to work toward the removal of price control over a three year period is particularly gratifying. My understanding is that first steps will be taken early in 1984 when a review of the present price controls will be conducted. Differentiation of price by standards and grades will be introduced for live animals and meat at that time as will pricing based on costs of production. I further understand that prices will be again reviewed in early 1985 and early 1985 with a view to completely releasing price controls on domestically produced animals and meat in 1987.

Progress in deregulation will be a factor in our incremental funding of the Project.

Upon request and subject to the availability of funds, we are prepared to consider providing short-term technical assistance apart from the grant to Winrock for up to three person months out of Project Development and Support Funds, to assist you in planning for decontrol of livestock and meat prices. If you are interested we will be willing to try to arrange this to coincide with your review of the controls scheduled for early 1984.

Congratulations on your bringing this project to its commencement. We look forward to continued collaboration with your Ministry and the farmers of Antigua to develop the agricultural sector.

I understand that Mr. Charles Furwell has been in communication with Mr. Frank Henry and is planning to start work in January. We will try our best to conform to this schedule.

Sincerely,

William P. Wheeler  
Director

Clearance

AFDC:WEPaucor (in draft)

Drafted by:ACE/PCO:DLJessee:mg:lh

UNCLASSIFIED

AMEMBASSY ANTIGUA 000015

FUR

ACTION AID INFO AME DCM P/E CERON

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CN: 00663  
CERG: AID  
DIST: AIDA

OFFICIAL COPY

FOR E. WHEELER, USAID

E.C. 12356: N/A  
SUBJ: USAID PROJECT FOR ANTIGUA - WINROCA

1. USAID OFFICER, DAVID JESSIE, RECENTLY OUTLINED THE AGRICULTURAL PROJECT DEALING WITH LIVESTOCK PRODUCTION THAT IS UNDER CONSIDERATION FOR USAID FUNDING. AS DESCRIBED, A U.S. COMPANY, WINROCA, WILL COORDINATE AND ADVISE A COOPERATIVE TYPE GROUP OF ANTIGUAN CATTLE PRODUCERS TO UPGRADE THE PRODUCTION AND MARKETING OF THEIR LIVESTOCK. HE HAS SPOKE TO THE MINISTER OF AGRICULTURE, MR. ROBIN YEARWOOD, AND HE HAS ASSURED US THAT THE GOVERNMENT OF ANTIGUA AND BARBUDA NOT ONLY ENTHUSIASTICALLY ENDORSES THE PROGRAM BUT WILL TAKE A SERIOUS LOOK AT PRICING AND MARKETING PROCEDURES IN AN ATTEMPT TO CONTRIBUTE TO THE SUCCESS OF THE PROJECT.

2. AMEMBASSY ANTIGUA ALSO ENDORSES THIS PROJECT AND WE STAND READY TO ASSIST IN ITS IMPLEMENTATION IN ANY WAY POSSIBLE.

TECMAS  
BT  
#3494

ACTION	INFO
	ACR
	<input checked="" type="checkbox"/>
R	<input checked="" type="checkbox"/>
F	
EC	
CC	<input checked="" type="checkbox"/>
RL	<input checked="" type="checkbox"/>
CE	

01/17/84  
NRN  
David Jessie  
11/7/84

UNCLASSIFIED

AMEMBASSY ANTIGUA 000015



UNITED STATES OF AMERICA  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
REGIONAL DEVELOPMENT OFFICE/CARIBBEAN

P. O. BOX 302  
BRIDGE TOWN  
BARBADOS

April 19, 1984

Dr. Hank A. Fitzhugh  
Winrock International  
Petit Jean Mountain  
Morrilton  
Arkansas 72110  
U.S.A.

Dear Hank:

This letter is in regard to the criteria to be used by Winrock in selecting livestock producers for participation in the Antigua Livestock Improvement Project, No. 538-0112. As you know, the Grant Agreement contains a special provision (Attachment I, Section H, 2) requiring Winrock to obtain USAID and Government of Antigua and Barbuda (GOAB) approval of criteria for selecting cooperators.

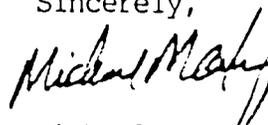
Mr. Charles Burwell, the Winrock Project Coordinator in Antigua, has submitted a set of criteria drafted in collaboration with his counterparts and approved by the GOAB (copy attached). RDO/C has approved these selection criteria. However, we would like to emphasize our concern that inadequate land tenure of potential participants, who are otherwise eligible, be addressed by Winrock and the GOAB during the selection process.

It has been estimated that only six percent of all farms in Antigua consist of five acres or more. The intent in the concept and design of the Project is that the GOAB will facilitate the leasing of land as may be necessary to approximately twenty-five cooperators representing a wide range of commercial livestock producers; a high majority of which probably lack secure land tenure. This position was expressed in a January 10, 1984, letter from RDO/C Director William Wheeler to Minister Yearwood (copy attached). Another letter to Minister Yearwood has been prepared which reconfirms RDO/C's understanding of GOAB intent to grant equitable leases to those producers identified by the Project Committee and approved by the Winrock Project Coordinator but who lack access to at least five acres (copy attached).

We expect Mr. Burwell to approve the selection of the twenty-five most qualified herdsmen representing an appropriate cross section of livestock producers. We also expect the GOAB to facilitate leases, as required, for the producers selected to be cooperators in the Project. This would allow for the selection of producers presently lacking access to land and encourage the GOAB to grant long-term leases to these individuals.

If you have any questions concerning this matter or any other Project activity, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael Maxey". The signature is written in a cursive style with a large, sweeping initial "M".

Michael Maxey  
Agriculturalist/IDI

Attachments A/S



UNITED STATES OF AMERICA  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
REGIONAL DEVELOPMENT OFFICE/CARIBBEAN

P. O. BOX 302  
BRIDGETOWN  
BARBADOS

April 19, 1984

Honorable Robin Yearwood  
Minister  
Ministry of Agriculture,  
Fisheries & Lands  
Long Street  
St. John's  
ANTIGUA

Dear Mr. Minister:

SUBJECT: AID Project No. 538-0112  
Selection of Cooperators for  
Antigua Livestock Improvement

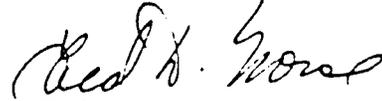
This letter is in reference to the selection criteria to be used by the Project Committee in identifying livestock producers to participate in Project activities and by the Winrock Coordinator, Mr. Charles Burwell, in approving the final selection of the cooperators. Mr. Burwell has submitted a set of criteria drafted in collaboration with his counterparts and approved by your Government.

RDO/C has approved these selection criteria but we wish to emphasize our concern that inadequate land tenure of potential participants, who are otherwise eligible, be addressed during the selection process. The intent in the concept and design of the Project is that your Government will facilitate the leasing of land to cooperators, so as to ensure that each participant obtain secure long-term access to at least five acres of land. This concern and our understanding of your Government's position, was conveyed to you in a January 10, 1984 letter from the RDO/C Director, Mr. William Wheeler (copy attached).

We are pleased with the rapid mobilization of the Project and the cooperation reported to us by Mr. Burwell. We are also aware of the severe drought conditions in Antigua and understand there may be delays in implementing some of the Project activities. We are hopeful that this situation will be short lived and progress will continue successfully.

If you have any questions concerning the selection of cooperators or any other matter relating to the Project, please feel free to contact Michael Maxey of my staff.

Sincerely,

A handwritten signature in black ink, appearing to read "Ted D. Morse". The signature is written in a cursive style with a large initial "T" and "M".

Ted D. Morse  
Acting Director

Attachment A/S