

UNCLASSIFIED

BOTSWANA

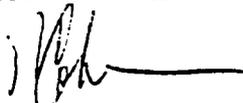
AGRICULTURE TECHNOLOGY IMPROVEMENT

(633-0221)

UNCLASSIFIED

SEP 16 1981

TRANSMITTAL MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

FROM: AAA/AFR/DR, John W. Koehring 

SUBJECT: Project Authorization - Botswana Agricultural
Technology Improvement Project (633-0221)

Problem: Your signature is required for the attached Action Memorandum to the Administrator recommending a grant of \$9,180,000 from Section 531 Economic Support Fund appropriation to the Government of Botswana (GOB) for the Botswana Agricultural Technology Improvement Project (633-0221). The project has a seven year life, requiring the Administrator's approval. It is planned that a total of \$761,000 will be obligated in FY 1981.

Discussion: The purpose of this project is to improve and expand the capacity of the GOB Ministry of Agriculture to develop and extend farming systems recommendations relevant to the needs of small, resource-poor farmers and to provide adequate supplies of quality seed to all farmers. The project is essentially institution-building in nature, requiring a long-term commitment in participant training and technical assistance. It seeks to develop a system of on-farm crop research, strengthen the capabilities of the GOB agricultural research station and extension service, and expand the capacity of the GOB Seed Multiplication Unit.

Approval of a seven year life of project is required. Also, approval of source/origin waivers from AID Geographic Code 941 (Selected Free World) to Code 935 (Special Free World) totaling \$387,000 is requested for the procurement of (a) office supplies (\$60,000), (b) spare parts for GOB-purchased vehicles (\$22,500), (c) limited amounts of farming inputs for on-farm research (\$200,000), and (d) materials for housing renovation and refurbishing (\$105,000). A waiver of nationality requirements from AID Geographic Code 941 to Code 935 is requested for the procurement of approximately \$37,500 in services. All waiver justifications are found in Annex V B of the Project Paper. The Initial Environmental Examination required an Environmental Assessment because pesticides will be used to treat seeds in the seed multiplication process. An Environmental Assessment in the form of a risk/benefit analysis was performed. This assessment, which concludes that Captan can be used as a pesticide under the project, is included in Annex II C of the Project Paper.

The proposed project has been thoroughly reviewed by the appropriate committees and the analyses are found to be acceptable in all respects. On September 4, 1981, the ECPR recommended that the project be submitted to the Administrator for authorization.

Recommendation: That you sign the Action Memorandum to the Administrator recommending authorization of the project and the requested waivers. Also, please clear the Project Authorization (attached).

Attachments:

Action Memorandum for the Administrator
Project Authorization
Project Paper

Clearances:

DAA/AFR: WHNorth	<u>[Signature]</u>	Date:	<u>9/16/81</u>
AAA/AFR/DP: ICoker	<u>[Signature]</u>	Date:	<u>9/16/81</u>
AFR/DR: NCohen	<u>[Signature]</u>	Date:	<u>[Signature]</u>
AFR/DR/SA: DKline	<u>[Signature]</u>	Date:	<u>9/14/81</u>
AFR/DR/ARD: DSchaer	<u>JCS for DS</u>	Date:	<u>9/14/81</u>
GC/AFR: TBork	<u>[Signature]</u>	Date:	<u>9/15/81</u>
AFR/SA: TMorse	<u>[Signature]</u>	Date:	<u>9/15/81</u>
COM/ALI: PHagan	<u>(draft)</u>	Date:	<u>9/15/81</u>
SER/CM: MSnyder	<u>(phone)</u>	Date:	<u>9/22/81</u>

Drafted by: AFR/DR/SA: JPagano:agb:9/11/81 [Signature]

SEP 18 1981

ACTION MEMORANDUM FOR THE ADMINISTRATOR

THRU: ES

THRU: AA/PPC, Larry Smucker (Acting) 

FROM: AA/AFR, F. S. Ruddy

SUBJECT: Project Authorization - Botswana Agricultural
Technology Improvement Project (633-0221)

Problem: Your approval is requested for a grant of \$9,180,000 from the Section 531 Economic Support Fund appropriation to the Government of Botswana (GOB) for the Botswana Agricultural Technology Improvement Project (633-0221). The Project has a seven year life and this requires your authorization. It is planned that \$761,000 will be obligated in FY 1981.

Discussion: The proposed Agricultural Technology Improvement Project seeks to improve the welfare of small farmers and increase food production through the development, extension and adaptation of relevant farming technologies. This goal reflects the concern of the GOB and USAID/Botswana for increasing productive employment opportunities in rural areas. While Botswana has experienced very rapid economic growth in recent years through the expansion of mining industries and increased livestock production by the small, commercial (i.e., expatriate) farming sector, this growth has provided few employment opportunities and few direct benefits to the 85% of Botswana living in rural areas. Initially, the GOB addressed this problem by rapidly expanding social services in rural areas. Recently, however, the GOB has shifted its attention to the more complex issue of rural employment opportunities and income generation, giving particular attention to arable agricultural production by small farmers through its Arable Land Development Program. The purpose of this project will further these objectives by improving and expanding the capacity of the GOB Ministry of Agriculture (MOA) to develop and extend Farming Systems recommendations relevant to the needs of small farmers and to provide adequate supplies of quality seed to farmers. Specifically, the project seeks to (a) institute a system of on-farm research and experimentation to identify constraints and develop solutions for the small farmer; (b) strengthen the capability of the MOA's Department of Agricultural Research and its research station to undertake research in small farmer arable crops (cereals and legumes); (c) institutionalize linkages between the Department of Agricultural Research and the MOA's Agriculture Field Service (i.e., extension service) to insure that the technologies developed for small farmers are disseminated to that target group, and (d) assist in expanding the capacity of the MOA's Seed Multiplication Unit to produce quality seeds for major crops. While the project is essentially institution-building in nature and will have few immediate beneficiaries over the short term, the target group of small farmers towards which research will be focused

- those having between one and ten hectares of land and less than 40 head of cattle - comprise nearly 60 percent of the traditional farmers in Botswana or some 47,300 farm households. It is believed that at least 40 percent of these farmers are women.

Both the policy environment and support systems are ideal for encouraging increased agricultural production. First, as discussed in Annex I - F of the PP, the GOB's agricultural pricing policy encourages agricultural production, particularly in grain deficit areas. Second, the GOB is devoting substantial domestic and donor resources to increasing its agricultural production through the Arable Land Development Program; and the GOB's extension service is well organized and staffed so as to facilitate the extension of applicable research findings and management techniques.

The life of project funding will be \$9,180,000 of which \$761,000 would be obligated in FY 1981. The following table illustrates the financial inputs:

	<u>First Year</u>	<u>LOP</u>
Technical Assistance	80,000	5,493,000
Commodities	320,000	320,000
Participants	361,000	714,000
Operations & Support	---	345,000
Contingency & Inflation	---	<u>2,308,000</u>
TOTAL	\$761,000	\$9,180,000

The GOB will contribute the equivalent of \$3,129,000, or 25.4 percent of the total cost of the project. This contribution will cover the salaries of counterpart staff and participant trainees, vehicles for the project and their operational costs, and housing for some technicians.

The Project Committee has concluded from the analyses of the Project Paper that:

- (1) the project approach is technically and economically sound, socially acceptable and administratively feasible;
- (2) the technical design and cost estimates are reasonable and adequately planned, thereby satisfying the requirements of Section 611(a) of the Foreign Assistance Act, as amended; and
- (3) the timing and funding of project activities are appropriately scheduled and the implementation plan is realistic and establishes a reasonable time frame for carrying out the project.

The Initial Environmental Examination required an Environmental Assessment because pesticides will be used to treat seeds in the seed multiplication process. An Environmental Assessment in the form of a risk/benefit analysis was performed. This assessment, which concludes that Captan can be used as a pesticide under the project, is included in Annex II-C of the Project Paper.

The Project Agreement will contain a condition precedent which requires the GOB to undertake certain procurement actions prior to disbursement of funds for the seed multiplication equipment. Also, the GOB will covenant to develop an agricultural research strategy. The development of this strategy will help to more clearly define the GOB's emphasis on arable agricultural research.

The responsible AID officer in the field will be the Agricultural Development Officer, Douglas Jones, and the AID/W backstop officer will be Douglas Kline, AFR/DR/SA. The Ministry of Agriculture will be the responsible implementing agency for the GOB. The project was designed and will be implemented by the Mid-America International Agricultural Consortium (MIAC) which was selected under Title XII Collaborative Assistance contracting procedures. Kansas State University is the lead institution for the MIAC.

Your approval of a seven year life of project is requested. Although most project activities will take place during a five year period, a seven year project life will permit counterparts to complete their training in the U.S. and third countries and return to Botswana.

Your approval of source/origin waivers from AID Geographic Code 941 to Code 935 totaling \$387,000 is requested for the procurement of office supplies, spare parts for GOB-purchased vehicles, farming inputs for on-farm research, and materials for housing renovation and refurbishing. A waiver of nationality requirements from AID Geographic Code 941 to Code 935 is requested for the procurement of approximately \$37,500 in services. All waiver justifications are found in Annex V B of the Project Paper.

The Project Review was held on August 21, 1981 and the ECPR was held on September 4. A Congressional Notification advising of a program change in the estimated total AID contribution to the project was forwarded on September 14, 1981; the waiting period will expire on September 28, 1981.

There are presently no human rights issues in Botswana.

Recommendation: That you sign the attached Project Authorization thereby approving life-of-project financing of \$9,180,000, a seven year life of project, and the requested waivers.

Attachments:

- A. Project Authorization
- B. Project Paper

Clearances:

General Counsel: JBolton
AAA/PPC/PDPR: JEriksson

KCK fa Date: 9/21/81
Archie fa Date: 9-22-81

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D C 20523

PROJECT AUTHORIZATION

Name of Country: Botswana
Name of Project: Agricultural Technology Improvement Project
Number of Project: 633-0221

1. Pursuant to Section 531 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Agricultural Technology Improvement Project for Botswana ("Cooperating Country") involving planned obligations of not to exceed \$9,180,000 in grant funds over a six year period from date of authorization, subject to the availability of funds in accordance with the AID OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. I also authorize a seven year life of project.

2. The project will assist the Cooperating Country to (a) establish and institutionalize a Farming Systems Research Program relevant to the needs of small farmers and (b) expand the capacity of the Cooperating Country's Seed Multiplication Unit to produce quality seeds for major crops, by financing the costs of technical assistance, training and commodities.

3. The Project Agreement which may be negotiated and executed by the officer to whom such authority is delegated in accordance with AID regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as AID may deem appropriate.

a. Source and Origin of Goods and Services

Goods and services financed by AID under the project shall have their source and origin in the Cooperating Country or in countries included in the AID Geographic Code 941, except as AID may otherwise agree in writing.

b. Conditions Precedent

The Project Agreement shall contain a condition precedent which provides, in substance, as follows:

Prior to the disbursement, or to the issuance of documentation pursuant to which disbursement will be made, of funds for the purchase of seed equipment, the Cooperating Country will furnish

to AID, in form and substance satisfactory to AID, (a) evidence that a contract has been signed with a purchasing service agent for the procurement of the equipment, or (b) tender documents and an executed contract for the procurement of the equipment and (c) evidence that the building which will house the seed multiplication equipment will be completed on a timely basis.

c. Covenants

The Project Agreement shall contain covenants which provide, in substance, as follows:

1. Establishment of Positions. The Cooperating Country agrees to establish and fill the new positions as set forth in Annex A to the Project Agreement.

2. Participants. The Cooperating Country agrees that candidates for participant training will be selected on a timely basis in accordance with the implementation plan in Annex A to the Project Agreement.

3. Counterparts. The Cooperating Country agrees to assign counterparts to each of the technical assistance personnel in the number and manner specified in Annex A to the Project Agreement.

4. Housing and Office Space. The Cooperating Country agrees to provide suitable housing and office space for technical assistance personnel and that technical assistance personnel will not be required to commence service in Botswana until such housing and office space are made available, except as AID otherwise agrees in writing.

5. Research Strategy. The Cooperating Country during the first year of the project agrees to review its agricultural research priorities and prepare a research strategy statement to serve as a guide for planning further research programs. The Cooperating Country further covenants to review their strategy periodically to ensure that research staff, resources and funds are being utilized appropriately.

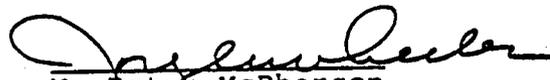
d. Waivers

Notwithstanding paragraph a. above and based upon the justification set forth in Annex V-B to the Project Paper, I hereby:

1. Waive the requirement set forth in Handbook I, Supplement B, Chapter 5 that commodities procured with funds granted to a RLDC have their source and origin in countries included in AID Geographic Code 941 to permit the procurement of vehicle spare parts, office equipment, research fund commodities and support commodities (approximate total cost \$387,000), which have their source and origin in countries included in AID Geographic Code 935; and certify that exclusion of procurement of these commodities from Free World countries other than the Cooperating Country and countries included in Code 941 would seriously impede attainment of US foreign policy objectives and objectives of the foreign assistance program.

2. Waive the requirement set forth in Handbook I, Supplement B, Chapter 5, that the suppliers of services to be financed under grants to a RLDC have their nationality in AID Geographic Code 941 countries to permit the procurement of services (approximate cost \$37,500) from suppliers having their nationality in countries included in AID Geographic Code 935; and certify that the interests of the United States are best served by permitting the procurement of these services from Free World countries other than the Cooperating Country and countries included in Code 941.

Date: Sept 24, 1981


M. Peter McPherson
Administrator

Clearances: KCK 9/22/81
GC:JBolton
AA/AFR:FSRuddy SEP 21 1981
A'AA/PPC:LSmucker 9-23-81

Drafted:GC/AFR:TBorkmy:9/14/81:29218


Clearance:

DAA/AFR: WHNorth	<u>[Signature]</u>	Date: 9/16/81
GC/AFR: TBork	<u>[Signature]</u>	Date: 9/15/81
GC/AFR: EDragon	<u>[Signature]</u>	Date: 9/15/81
AAA/AFR/DP: JCoker	<u>[Signature]</u>	Date: 9/15/81
AAA/AFR/DR: WKoehning	<u>[Signature]</u>	Date: 9/16/81
AFR/SA: TMorse	<u>[Signature]</u>	Date: 9/16/81
AFR/DR/SA: WWolf	<u>[Signature]</u>	Date: 9/14/81
SER/COM/ALI: Jagan	<u>[Signature]</u>	Date: 9/20/81

AFR/DR/SA: Jragano:agb:9/14/81 [Signature]

PID Submission Date:	January 20, 1981
PID Approval Date:	February 3, 1981
PP Submission Date:	August 17, 1981
PP Final Review Meeting Date:	September 4, 1981

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET			1. TRANSACTION CODL <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete		Amendment Number _____		DOCUMENT CODE 3		
2. COUNTRY/ENTITY BOTSWANA			3. PROJECT NUMBER 633-0221						
4. BUREAU/OFFICE AFRICA			5. PROJECT TITLE (maximum 40 characters) Agricultural Technology Improvement						
6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY 07 01 87			7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4) A. Initial FY 81 B. Quarter 4 C. Final FY 86						
8. COSTS (\$000 OR EQUIVALENT \$1 =)									
A. FUNDING SOURCE		FIRST FY			LIFE OF PROJECT				
		B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total		
AID Appropriated Total									
(Grant)		(761)	()	(761)	(7,718)	(1,462)	(9,180)		
(Loan)		()	()	()	()	()	()		
Other U.S.	1.								
	2.								
Host Country					1,610	1,519	3,129		
Other Donor(s)									
TOTALS		761		761	9,328	2,981	12,309		
9. SCHEDULE OF AID FUNDING (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) ESE	140	080		0		9,180		9,180	
(2)									
(3)									
(4)									
TOTALS									
10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each) 030							11. SECONDARY PURPOSE CODE 180		
12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)									
A. Code		R/AG		BS					
B. Amount		9,180		9,180					
13. PROJECT PURPOSE (maximum 480 characters)									
<p>To improve the capacity of the Ministry of Agriculture's Research and Extension Programs to develop and effectively extend farming systems recommendations relevant to the needs of the small farmer.</p>									
14. SCHEDULED EVALUATIONS					15. SOURCE/ORIGIN OF GOODS AND SERVICES				
Interim		MM YY	MM YY	Final	MM YY				
		07 83			07 85	<input type="checkbox"/> 000	<input checked="" type="checkbox"/> 941	<input checked="" type="checkbox"/> Local	<input checked="" type="checkbox"/> Other (Specify) 935
16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment)									
17. APPROVED BY		Signature Louis A. Cohen <i>Louis A. Cohen</i>					18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION		
		Title Mission Director			Date Signed MM DD YY 08 1 38 1				
		MM DD YY			MM DD YY				
		08 2 58 1							

INSTRUCTIONS

The approved Project Data Sheet summarizes basic data on the project and must provide reliable data for entry into the Country Program Data Bank (CPDB). As a general rule blocks 1 thru 16 are to be completed by the originating office or bureau. It is the responsibility of the reviewing bureau to assume that whenever the original Project Data Sheet is revised, the Project Data Sheet conforms to the revision.

Block 1 - Enter the appropriate letter code in the box, if a change, indicate the Amendment Number.

Block 2 - Enter the name of the Country, Regional or other Entity.

Block 3 - Enter the Project Number assigned by the field mission or an AID/W bureau.

Block 4 - Enter the sponsoring Bureau/Office Symbol and Code. *(See Handbook 3, Appendix 5A, Table 1, Page 1 for guidance.)*

Block 5 - Enter the Project Title *(stay within brackets; limit to 40 characters).*

Block 6 - Enter the Estimated Project Assistance Completion Date. *(See AIDTO Circular A-24 dated 1/26/78, paragraph C, Page 2.)*

Block 7A. - Enter the FY for the first obligation of AID funds for the project.

Block 7B. - Enter the quarter of FY for the first AID funds obligation.

Block 7C. - Enter the FY for the last AID funds obligations.

Block 8 - Enter the amounts from the 'Summary Cost Estimates' and 'Financial Table' of the Project Data Sheet.

NOTE: The L/C column must show the estimated U.S. dollars to be used for the financing of local costs by AID on the lines corresponding to AID.

Block 9 - Enter the amounts and details from the Project Data Sheet section reflecting the estimated rate of use of AID funds.

Block 9A. - Use the Alpha Code. *(See Handbook 3, Appendix 5A, Table 2, Page 2 for guidance.)*

Blocks 9B., C1. & C2. - See Handbook 3, Appendix 5B for guidance. The total of columns 1 and 2 of F must equal the AID appropriated funds total of 8G.

Blocks 10 and 11 - See Handbook 3, Appendix 5B for guidance.

Block 12 - Enter the codes and amounts attributable to each concern for Life of Project. *(See Handbook 3, Appendix 5B, Attachment C for coding.)*

Block 13 - Enter the Project Purpose as it appears in the approved PID Facesheet, or as modified during the project development and reflected in the Project Data Sheet.

Block 14 - Enter the evaluation(s) scheduled in this section.

Block 15 - Enter the information related to the procurement taken from the appropriate section of the Project Data Sheet.

Block 16 - This block is to be used with requests for the amendment of a project.

Block 17 - This block is to be signed and dated by the Authorizing Official of the originating office. The Project Data Sheet will not be reviewed if this Data Sheet is not signed and dated. Do not initial.

Block 18 - This date is to be provided by the office or bureau responsible for the processing of the document covered by this Data Sheet.

AGRICULTURE TECHNOLOGY
IMPROVEMENT PROJECT
LIST OF CONTENTS

<u>Parts</u>		<u>Pages</u>
I	<u>Summary and Recommendations</u>	
	A. Recommendations	1
	B. Summary of Project Description	2
II	<u>Background and Detailed Description</u>	
	A. Project Background	4
	B. Detailed Project Description	11
III	<u>Project Analysis</u>	
	A. Technical Analysis	19
	B. Economic Analysis	35
	C. Social Analysis	40
	D. Engineering Considerations	46
	E. Administration Analysis	47
	F. Financial Analysis and Plan	55
IV	<u>Implementation Arrangements</u>	
	A. Implementation Schedule	59
	B. Implementation Responsibilities	60
	C. Procurement Plan	63
	D. Evaluation Plan	64
	E. Conditions and Covenants	65
 <u>Annexes</u>		
I	<u>Project Background</u>	
	A. Administrative Structure of the Ministry of Agriculture	
	B. Farming Systems Charts	
	C. Summary of Agricultural Research	
	D. Summary of Agricultural Extension	
	E. Constraints in Arable Agriculture	
	F. Pricing Policy for Agriculture	
II	<u>Project Details</u>	
	A. Logical Framework	
	B. List of Critical Events	
	C. Environmental Concerns	
	D. Long Term Technical Assistance	
	E. Illustrative List of Short Term Technical Assistance	
	F. Information Concerning Counterparts	
	G. Washington Cable in Response to PID	
	H. USAID/B Logistical Support Policy	

III

Financial Exhibits

- A. Calculation of AID Expenditures
- B. GOB Staff Requirements by Fiscal Year
- C. U.S. Participant Training Program Costs
- D. Illustrative List of Research Support Costs

IV

Engineering Exhibits

- A. Equipment List for Seed Building

V

Legal Exhibits

- A. Letter of Application
- B. Detailed Justification for Waivers
- C. Project Authorization
- D. 5c (1) Country Checklist

USEFUL ABBREVIATIONS AND ACRONYMS

AD	Agricultural Demonstrator
AS	Agricultural Supervisor
ALDEP	Arable Lands Development Program
APRU	Animal Production Research Unit
ATIP	Agriculture Technology Improvement Project
BAC	Botswana Agricultural College
BAMB	Botswana Agriculture Marketing Board
CDO	Community Development Officer
CDSS	Country Development Strategy Statement
CFDA	Communal First Development Area
CIMMYT	International Center for Corn and Wheat Improvement
CRSP	Collaborative Research Support Programs
DAFS	Department of Agriculture Field Services
DAO	District Agricultural Officer
DAR	Department of Agriculture Research
DLFRS	Dryland Farming Research Scheme
EFSAIP	Evaluation of Farming Systems and Implements Project
FSR	Farming Systems Research
GOB	Government of Botswana
ICRISAT	International Center for Research in Sub-Humid and Arid Tropics
IFPP	Integrated Farming Pilot Project
LUPAG	Land Use Planning and Advisory Group
MOA	Ministry of Agriculture
ODA	Overseas Development Agency (U.K.)
RAO	Regional Agricultural Officer
REC	Research Extension Coordinator
SADCC	Southern African Development Coordination Conference
SAMDP	Southern Africa Manpower Development Project
SAREC	Swedish Agency for Research Cooperation with Developing Countries
SMU	Seed Multiplication Unit
TGLP	Tribal Grazing Lands Program
USAID	Agency for International Development Mission in Botswana
NDB	National Development Bank

PART I: SUMMARY AND RECOMMENDATIONS

SECTION A: RECOMMENDATIONS

Authorization of an incrementally funded grant of \$9 180 000 with the following planned obligations: FY 81, \$366 000; FY 82, \$2 346 000; FY 83, \$2 175 000; FY 84, \$2 000 000; FY 85, \$1 293 000; FY 86, \$1 000 000. The grant is subject to the following waivers and approvals:

1. A procurement source and origin waiver from A.I.D. Geographic Code 941 to 935 for the procurement of approximately \$387,000 of commodities.
2. A waiver of nationality requirements from A.I.D. Geographic Code 941 to Code 935 for the procurement of approximately \$37,500 of services.
3. Approval of a seven year project life.

SECTION B: PROJECT DESCRIPTION

1. The Problem

Botswana has enjoyed rapid and relatively steady growth during the past decade, due primarily to expansion in the mining sector and favorable export prices for the livestock sector. Consistent growth in the economy as a whole is reflected in GDP per capita which was \$87 in 1965 and is now estimated at \$550. However, because mining has generated few employment opportunities and ownership of cattle is heavily concentrated, only a small proportion of the population has benefited from this growth. In 1977, only 5 500 held jobs in the domestic mining industry (nearly four times as many were employed in the South African mines as migrant laborers), and 1980 agricultural statistics data indicate that 5 percent of the households owned about half the national herd of cattle, while 28 percent owned no cattle at all, and another 17 percent owned ten or less.

As viewed by both the GOB and USAID, the central problem in creating equitable development in Botswana is dealing with the problem of scarcity of opportunities for rural productive employment. While the potential for productive, income generating activities in the rural areas of Botswana is limited, opportunities do exist to broaden access for the thousands of rural households currently operating at or below subsistence levels. These opportunities hinge in part on increased productivity and higher returns in arable agriculture.

2. Research Needs

While crop production research has been on going in Botswana for several decades, Botswana grain and legumes yields have remained stable at 150-250 kg per hectare and are among the world's lowest. These low crop yield levels suggest a major opportunity to increase output of food commodities and improve returns to production resources.

With the new GOB emphasis on creating employment opportunities for Botswana in rural areas and the subsequent initiation of the Arable Lands Development Program (ALDEP), the GOB has now begun to increase its interest in arable agricultural research. A substantial portion of the current research program is funded by donor agencies, providing little flexibility to fit the changing requirements of the GOB. This is particularly the case in the Division of Arable Crops Research where the presence of many commodities makes a durable interdisciplinary commodity approach to research difficult when research resources are limited.

The presence of critical gaps in on-station research has precluded work which addresses the problems of limited resource farmers. These gaps, coupled with a lack of coordination with Botswana's Department of Agricultural Field Services, a lack of work on small farmers' fields, and the absence of an overall research strategy have contributed to an inability on the part of the GOB to deal with small farmer production problems in arable agriculture.

3. The Project Strategy

To resolve the interrelated problems discussed above, this project will improve the capacity of the Ministry of Agriculture's research

and extension programs to develop and effectively extend farming systems recommendations relevant to the needs of the small farmers. Within the context of institutionalizing a Farming Systems Research program in Botswana, the project has three sub-purposes. These are:

- (a) To improve the capacity of the GOB's Ministry of Agriculture's Department of Agricultural Research to develop technologies appropriate to small farmer needs.
- (b) To improve the capability of the extension service to transfer technologies which can be utilized by small farmers and strengthen and institutionalize the linkage between the Research and Extension Departments.
- (c) To insure that adequate supplies of needed seed for major agricultural crops are available for distribution to Botswana farmers.

Over the project life, FSR teams will be working with farmers on their own fields utilizing various small farm technological possibilities. These teams (whose composition is described below) will serve as the focal points for initiating adaptive Farming Systems Research activities. Technical Assistance provided at the national level will complement work undertaken at the district level by improving the capacity of the Department of Agricultural Research to focus on problems relating to small farmer needs and by improving the linkage between the Department of Agricultural Field Services (DAFS) and the Department of Agricultural Research (DAR).

4. End of Project Status

By the end of the project it is anticipated that an on going FSR approach will be institutionalized in Botswana. Within the context of this approach, the following will have taken place by the end of the project life:

- (a) The Ministry of Agriculture's Department of Agricultural Research will be structured to respond more effectively to on going FSR and ultimately to farmers' needs.
- (b) The capability of the DAR to conduct research in small farmer arable crops will have improved.
- (c) Strong linkages will have developed between the Ministry of Agriculture's Research and Extension Departments resulting in more relevant adaptive technologies.
- (d) The extension service will have technologies to disseminate which are relevant to small farmer needs.
- (e) Farmers will have access to improved quality seed varieties as a result of more relevant research and an improved seed multiplication and distribution system.

PART II - BACKGROUND AND DETAILED DESCRIPTION

SECTION A : PROJECT BACKGROUND

1. Economic Profile

Botswana has enjoyed rapid and relatively steady economic growth during the past decade, due primarily to expansion in the mining sector (diamonds, copper-nickel and coal) and favorable export prices for the livestock sector. Gross Domestic Product was equivalent to only \$47 million at current prices in 1966, the year independence was achieved, but reached \$243 million in 1973/74 and \$381 million in 1976/77. Since diamond production began at the Orapa mine in 1970, the mining sector's share of GDP has grown to over 30 percent; it accounts for 60 percent of exports and over 33 percent of government revenues. A second diamond mine at Jwaneng will come on stream in 1982, eventually doubling the country's diamond production.

The volume of livestock production has remained stable. The national herd of cattle more than doubled between 1966 and 1977. Under the Lome Agreement, Botswana beef commands prices in the European Economic Community that are 25-30 percent above world market levels. At present, livestock accounts for only a slightly smaller share of GDP than mining, and 70 percent of value added in the agricultural sector.

Consistent growth in the economy as a whole is reflected in increases in GDP per capita from \$87 in 1965 to a current estimate of \$550. In distributional terms, however, this growth has been very uneven because the principal growth sectors, mining and livestock, provide returns to small segments of the population. In 1977, only 5 500 people held jobs in the domestic mining industry (nearly four times as many were employed in South African mines as migrant laborers), and agricultural survey data from rural Botswana in 1980 indicated that about five percent of households owned about half the national herd of cattle, while 28 percent owned no cattle at all, and another 17 percent owned ten or less.

While urbanization is proceeding more rapidly in Botswana than in most other developing countries, 35 percent of the population still resides in the 10 rural districts. For the majority, whose livelihoods do not depend on mining incomes or the price of cattle, the upward trend of GDP has had little or no impact, aside from the rapid expansion of social services in both urban and rural areas. Thus the majority of Botswana citizens have yet to participate in and benefit from the process of economic development.

2. The Employment Problem

a. Magnitude of the Problem

The stated objectives of Botswana's development policy are rapid economic growth, social justice, economic independence and sustained development. While considerable progress has been made towards

attaining three of these objectives, the GOB defines social justice as a more equitable distribution of the benefits of development, including higher incomes. This stated GOB objective has clearly not been achieved. As viewed by both the GOB and USAID, the central problem in creating equitable development in Botswana, particularly for the rural majority, is the scarcity of opportunities for productive employment. The magnitude of this problem was outlined in a 1978 report to the GOB which described access to productive work opportunities as 'desperately unequal' and estimated current unemployment and underemployment at over 100,000. This report called for a comprehensive program during the Fifth National Development Plan period (1980-85) to create new jobs and increase incomes, with a focus on the rural areas, where the problem is most acute.

The nature and scope of the problem can be traced to a combination of policy decisions, economic conditions and ecological factors. While the potential for productive, income-generating activities in the rural areas of Botswana is limited, opportunities do exist to broaden access for the thousands of rural households currently operating at or below subsistence levels. These opportunities hinge in part on increased productivity and higher returns in arable crop production.

b. Causes of Unemployment

(1) Structure of the livestock sector

At present within the livestock sector, which has benefited from high export prices, cattle tend to serve more as a means of savings and investment than as a source of income to their owners. As such, they are vulnerable to the cyclical drought conditions that characterize Botswana. The country's range resources are known to be seriously overstocked, especially in the densely populated, communally owned areas of eastern Botswana. While no prolonged drought has occurred since 1961-65, the combination of high stocking rates and low offtake threatens the longterm viability of the livestock sector.

Of equal importance is the uneven distribution of ownership which severely limits the potential of cattle to generate rural incomes. Fifty percent of the cattle marketed each year come from largely white-owned freehold farms, which account for only 3 percent of the land and 14 percent of the national herd. Many Botswana who own sizeable herds have other sources of income (e.g. salaried employment in the

1. Michael Lipton, Employment and Labour Use in Botswana, December 1978 Government Printer, Gaborone. Lipton estimated the total Botswana labor force at 365 000. He argued that an additional 35 000 jobs would have to be created each year to produce full employment by 1987, but this assumes that all Botswana of working age desire full-time employment. Assuming that a target figure for 'full' employment would be somewhat smaller, the need for new jobs can be estimated at between 15 000 and 20 000 per year. To date, new job creation has rarely attained 6 000 per year.

civil service), and can therefore pursue a strategy of building up their herds by limiting offtake and minimizing expenses on herd management.¹

Compared with arable farming, however, even minimal offtake rates from cattle herds offer much higher returns to Botswana farmers. The GOB Ministry of Agriculture estimates that at current prices and yield levels, a farmer can earn more from selling one ox than he can realize from growing four hectares of sorghum or nine hectares of maize, not taking into account the greater labor requirements for arable farming. For those Botswana who own cattle and are in a position to choose between further investment in livestock or in arable agriculture, (e.g. purchase of additional inputs, expanded hectareage), the choice is obvious. While they rarely abandon crop farming altogether, the maintenance and growth of their herds naturally command most of their attention.

Thus, cattle is the preferred livestock enterprise on traditional farms providing meat, milk, draft power, and a source of cash income for many farm holders. Currently 72 percent of traditional farms report having some cattle. Although traditional farmers have access to cattle for specific periods throughout the year, only about 40 percent actually own cattle, the remainder being able to hire oxen at plowing time or borrow cattle under various social conventions. Recent micro-studies in several areas of the eastern corridor indicate that between 60-80 percent of households in this area own some cattle.² Availability of animal draft power for plowing is a major constraint to arable crop production. Many of the traditional farmers owning few or no cattle do have sheep or goats. Small poultry enterprises are common and donkeys and mules are becoming increasingly important as a source of draft power and transportation.

(2) The nature of arable agriculture

According to recent estimates 37 percent of the 90 000 traditional farms have some arable cropland. In the 1979-80 cropping year 82 percent planted one or more crops. Major food crops are sorghum and maize, with millet, beans and cowpeas and other pulses, sunflower and groundnuts

-
1. Aside from costs associated with the provision of water (e.g. borehole operating costs), the principal expenses generally consist of low wages paid in cash or in kind to non-stockowners who tend the animals. Many head of cattle are also loaned out or shared on a temporary basis through traditional arrangements such as the mafisa system, which allow non-owners to use animals as draft power for plowing and to utilize their milk, but do not provide direct cash incomes.
 2. Cattle ownership in the rest of Botswana, the more sparsely populated Kalahari region, is more heavily skewed.

being of lesser importance. Typically traditional farms will have less than ten hectares cropland, averaging about 4-5 hectares planted in crops in any one year.¹ About 75 percent of all traditional farmers fall within this category. Usually 60 percent or less of the area planted is harvested with the major factors influencing this ratio being rainfall and effective weed control.

The production practices of the poor majority can be characterized as dependent upon outside sources of draft power, deprived of male labor for farmwork (one study found that over half of this target group consists of households headed by women), a lack of cash to employ non-family labor and with production (in an average year) considerably less than minimum household subsistence needs (Output of 1000 kg from four hectares would be insufficient to provide a household of six with the FAO estimate of 250 kg per person for a nutritionally adequate diet). Data from the 1974/5 Rural Income Distribution Survey showed that more than 50 percent of rural households fell below the 'poverty datum line' (then estimated at \$732 per household), and depended on casual employment, gathering and migrant labor earnings and remittances to supplement arable farming. In the context of recurrent drought, the poor majority are most susceptible to severe hardship during periods of food scarcity and high prices.

Botswana's national food grain balance has been negative. Annual production of cereals has ranged from less than 15 000 tons in extremely dry years to 90 000 tons during years of favorable rainfall. While averages are not particularly meaningful in light of these wide variances, mean annual production over the last decade is around 50 000 - 60 000 tons. Currently annual food grain requirements are estimated in the 100 000 - 120 000 ton range. The shortfall is met primarily through imports of maize from South Africa at commercial terms (plus some \$5,000,000 in Title II WFP grants).

While crop production research has been ongoing in Botswana for several decades, Botswana grain and legume yields have remained stable at 150-250 kg per hectare and are among the world's lowest. Nevertheless, the low crop yield levels indicated above suggest a major opportunity to increase output of food commodities and to improve returns to productive resources. Agricultural productivity in neighbouring countries and other areas with similar agro-climatic environments is typically several times that which is being achieved in Botswana, and no doubt technological change in Botswana's agricultural sector can achieve comparable productivity levels. Even

1. Returns to arable farming are presently so low, however, that even those households cultivating between four and ten hectares are likely to fall below or near the statistical poverty line.

experimental work done in Botswana indicates that, with improved technology and farm management practices, large and significant increases in crop yields are possible. Moreover such increases can lead to production increases at the extensive margin as increased returns to cropping enterprises make crop production a more attractive opportunity to utilize underemployed rural labor resources.

3. The Arable Lands Development Program

To increase employment opportunities through arable agriculture the GOB has undertaken a major new initiative - the Arable Lands Development Program (ALDEP). This effort, which is the centerpiece of Botswana's approach to increase arable production, is a \$20 million GOB program which began in 1981 with IFAD financial support.¹ ALDEP represents a major departure from previous government efforts in agricultural development in several respects:

(a) The emphasis is on arable crops as opposed to a primary focus on livestock production as had been the case with many of the earlier agricultural programs.

(b) The target group is the 60 000 plus farmers with less than ten hectares of arable land under crops and less than forty head of cattle as opposed to larger commercial farmers who have been the chief beneficiaries of the limited activity in this area in the past.²

(c) It is a major effort to deal with the growing employment and equity problems in the rural areas by providing additional employment and income opportunities.

ALDEP will utilize and build upon existing institutions concerned with agricultural development including the Department of Field Services, MOA, the Botswana Agricultural Marketing Board (BAMB), the Department of Cooperatives and the National Development Bank (NDB). Activities complementing efforts to improve agricultural productivity will include the provision of agricultural credit to purchase equipment and inputs, improved inputs supply markets, on-farm storage, product marketing services, and water supply in the arable crops zone (for human and animal consumption).

4. Present Agriculture Research and Extension

a. Agricultural Research

Agriculture Research work in Botswana began in the late 1940's. At that time, the primary emphasis of agricultural research and development was placed on variety selection for major commodities and on specialized

1. Other major GOB programs to increase employment opportunities include the Tribal Grazing Land Policy, the Rural Industries Program, and the Communal First Development Areas initiative. These are discussed in the Botswana Rural Sector Grant (633-0077).

2. In fact not all these farmers are eligible for the program (see the Technical Analysis).

research activities seemingly dictated more by the interest of researchers than by farmers needs. Subsequently, given the importance of the livestock sector and its growth in the past fifteen years, research emphasis has been shifted to livestock; and a major share of current research continues to be directed toward animal production problems. The results of this research are being utilized to control disease, selectively improve grazing areas, and generally improve livestock production practices. These efforts, combined with significant government subsidization of livestock production in the country, have led to an expansion of cattle numbers to the point where overgrazing is widespread, particularly in the communal grazing areas.

With the new GOB emphasis on creating employment opportunities for Batswana in rural areas and the subsequent initiation of the ALDEP program, the GOB has only recently begun to focus on arable agricultural research. A substantial proportion of the current research program is funded by donor agencies, providing little flexibility to fit the new changing requirements of the GOB. The structure of research therefore reflects a mixing of the classic research model along with disciplinary lines supplemented by donor sponsored projects in selected problem areas. This is particularly the case in the Division of Arable Research where the presence of many commodities makes a durable interdisciplinary commodity approach to research difficult when research resources are limiting.

The presence of critical gaps in on-station research has precluded work which addresses the problems of limited resource farmers. These gaps, coupled with a lack of coordination between Botswana's Department of Agricultural Field Services (the extension service), work on small farmers fields, and the absence of an overall research strategy have contributed to an inability on the part of the GOB to deal with small farmer production problems in arable agriculture.

The GOB is well aware of the problems associated with developing small farmer technologies and is strongly committed to the establishment of a strong research program in this area. The MOA's Departments of Agricultural Research, Field Services, and Division of Planning and Statistics are developing a research strategy which they anticipate will more effectively utilize GOB and donor resources in focusing on small farmer problems and which will strengthen the linkage between small farmers, the Department of Field Services, and the Department of Agricultural Research in this effort. Within the context of this research strategy, the GOB is committed to the broad principles of moving towards a commodity research focus in cereals and legumes at the national research level, to support the establishment of an integrated Farming Systems Research program in rural Botswana, and to strengthening the linkage between research and extension.

b. Agricultural Extension

Botswana's Department of Agricultural Field Services is among the most well developed and organized extension services in Africa. At the national level, most of the key positions have been localized

with B.Sc. and M.Sc. graduates who have, since independence, worked in both junior and senior field positions. At the regional level all of the Regional and District Agricultural Officers positions have been localized, most with previous extension experience and Diploma and/or B.Sc. academic credentials. At the local level, Agricultural Demonstrators (AD's) are trained to the certificate level at Botswana Agricultural College. The overall structure of the extension service is well institutionalized and reflects Botswana's needs. The principle problem with the extension service is the number of vacancies which exist at the district and local level. This lack of manpower characterizes nearly all GOB Departments. AID has devoted substantial resources to training agricultural manpower in Botswana through the Agricultural College Expansion Project which has doubled the number of certificate level graduates who serve as AD's and instituted a diploma level program which will soon graduate its first class to train District and Regional Agricultural Officers. AID and other donors have also financed the training of many senior level Field Services personnel in the US and third countries. A current look at the staffing of Field Services indicates that 25 percent of the AD positions are vacant. Current staffing plans indicate that most of these positions will be filled by 1983.

The transport problem for extension agents is being dealt with by field services with loans provided to AD's for the purchase of motorcycles. When motorcycles are used for official business AD's are reimbursed by the GOB.

The major constraint to the effectiveness of the Department of Agricultural Field Services is the lack of a systematic flow of reliable research results to extend. The proposed Project is designed to alleviate this problem.

SECTION B: DETAILED PROJECT DESCRIPTION

1. Goal

The goal of this project is to improve the welfare of small farmers and increase national food production through the development, extension and adaptation of relevant technology. This goal is fully consistent with the major thrust of the GOB's Fifth National Development Plan and to USAID/Botswana's strategy as articulated in its Country Development Strategy Statement (CDSS). Both the USAID and GOB strategies are based on the assessment that while the country is experiencing rapid economic growth, the impact of that growth has been uneven with little direct benefit (in the form of 'higher incomes) flowing to the rural areas. The GOB initially addressed this problem by rapidly expanding social services in rural areas, but recently has shifted its attention to the more complex issues of rural employment opportunities and income generation. The expansion of employment opportunities in the private and public sector are limited. Further, the opportunities for income generation from increased livestock production and offtake are not great for the smaller farmer given the nation's limited resource base and the structure of cattle ownership. Accordingly, the GOB is placing considerable emphasis on increasing the arable agriculture production of smaller farmers, particularly those farmers owning 40 or fewer head of cattle. A secondary objective of the government is to substantially increase national production of cereals and legumes. Over the long term, this increase in agricultural production will generate additional returns to resources and purchasing power within the sector. The demand for both productive inputs and consumer goods will expand leading to increased requirements for direct labor inputs in agriculture and employment opportunities in agriculture support services--both public and private. Increasing employment opportunities for rural Botswana is the focus of the GOB in its most recent five year plan and is consistent with USAID/Botswana's strategy as articulated in its CDSS.

Both GOB officials and USAID recognize that achievement of this long term goal will require a sustained commitment over the long term to increased expenditures and efforts focused towards arable agriculture in research and extension and in the development and implementation of projects geared toward specific farmer needs and problems. As discussed in the Project Background, the GOB has already begun to focus on these issues and is devoting substantial resources to the implementation of a national Arable Lands Development Program (ALDEP).

2. Purpose

The purpose of the proposed Project is to improve the capacity of the Ministry of Agriculture's research and extension programs to develop and effectively extend farming systems recommendations relevant to the needs of the small farmer. It is anticipated that the establishment and institutionalization of a Farming Systems Research program in Botswana will make research activities responsive to small farmer needs and ultimately result in higher yields per hectare, increased small farmer production, and increased small farmer income. The project has three sub-purposes which will contribute directly to the institutionalization of an FSR program in Botswana. These are:

- (a) To improve the capacity of the GOB's Ministry of Agriculture's Department of Agricultural Research to develop technologies appropriate for small farmer needs.
- (b) To improve the capability of the extension service to transfer technologies which can be utilized by small farmers and strengthen and institutionalize the linkage between the research and extension departments, and
- (c) To insure that adequate supplies of needed seed for major agricultural crops are available for distribution to Botswana farmers.

Over the project life, FSR teams will be working with farmers on their fields utilizing various small farm technological possibilities. These teams (whose composition is described below) will serve as the focal points for initiating adaptive Farming Systems Research activities. Technical assistance provided at the national level will compliment work undertaken at the district level by improving the capacity of the Department of Agricultural Research to focus on problems relating to small farmer needs and by improving the linkage between the Department of Agricultural Field Services (DAFS) and the Department of Agricultural Research (DAR).

3. End of Project Status

By the end of the project it is anticipated that an on-going FSR approach will be institutionalized in Botswana. Within the context of this approach, the following will have taken place by the end of project life:

- (a) The Ministry of Agriculture's Department of Agriculture Research will be structured to respond more effectively to on going FSR and ultimately to farmers' needs.
- (b) The capacity of the DAR to conduct research in small farmer arable crops (specifically cereals and legumes) will have improved.
- (c) Strong linkages will have developed between the Ministry of Agriculture's (MOA's) Research and Extension Departments resulting in more relevant adaptive technologies.
- (d) The extension service will have technologies to disseminate which are relevant to small farmer needs; and
- (e) Farmers will have access to improved quality seed varieties as a result of more relevant research and an improved seed multiplication and distribution system.

4. Project Activities in Terms of End of Project Status

a. Adaptive Farming Systems Research in Rural Botswana

(1) The methodology

The objective of this project activity is to understand existing farming systems and experiment with technologies and practices which will increase small farmer productivity taking into consideration the interdependence and interrelationships among the various elements of the farming system.

Two multidisciplinary technical assistance teams will be placed in rural Botswana to work with existing and newly designated counterpart

staff to begin identifying constraints to the expansion of arable crop production as perceived by farm families, and design and subsequently test possible improvements which seek to either alleviate constraints or exploit areas of flexibility in the existing farming systems. All testing will take place on farmers' fields and will require the active participation of farmers in plowing, planting, cultivation and harvesting.

Where existing technology (e.g. varieties, tillage methods, seeding rates, fertilizer response, etc) is already known, researchers will work with cooperating farmers to test alternatives to fit the particular farming system. Where shelf technology is inadequate the research teams will both draw on knowledge and suggest needed research areas to Botswana's DAR Research teams.¹

(2) Locations

The two FSR teams will be based in two locations:

(a) Francistown, in Northeast Botswana, serving Francistown Agricultural Region. From Francistown the team will serve the Tutume Agricultural District, which is headquartered 110 kilometers from Francistown. The GOB will provide office space and housing for the team in Francistown plus a guest house and offices for the team in Tutume.

(b) Mahalapye, in East/Central Botswana, where the team will also work with farmers in the Palapye and Serowe Agricultural districts. Housing and office space will be provided by GOB in Mahalapye.

~~The~~ two areas encompass 35 percent of the arable crop farms in the country.

(3) Composition and phasing of Technical Assistance for FSR teams

Each of the two FSR teams will include an Agronomist and an Agricultural Economist. Additionally, the Francistown team will include an Animal Scientist.

The Mahalapye FSR team will begin work in year one of the Project (July 1982) and will: (a) identify groups of target farmers' sharing common farming systems; (b) look at technologies and practices which might be appropriate for testing during the first planting season; and (c) with the help of counterparts identify specific farmers with whom to work.

At the time the Project Paper was being drafted, a group of Kansas State University faculty was in the field identifying 'recommendation domains' or target groups sharing common farming systems. Thus, it is anticipated that some of the work in identifying these groups will be completed prior to the arrival of the first FSR team. The remainder of this work will be completed prior to the first planting season.

By the beginning of the first planting season, the FSR team in Mahalapye will be working with farmers in Mahalapye, Palapye and Serowe Agricultural Districts on their fields experimenting with various improved techniques.

1. Every effort will be made to coordinate this research with other countries and international centers.

The second FSR team will be placed in Francistown during year two of the Project (July 1983) and will begin to work on farmers' fields during the 1983/84 planting season. In addition to the Agricultural Economist and the Agronomist to be placed in Francistown, an Animal Scientist will also be located in Francistown during the second year of the project. This individual will serve both the Francistown and Mahalapye areas and with his counterpart will provide a major input in the areas of tillage and smallstock production. To ensure that these team members work jointly in resolving problems of the farming system level (and not as disparate elements each focussing on components related to their discipline), one of the FSR team members in each area will act as that area's coordinator, focussing on the work of the long term technicians, short term technicians and their counterparts. This will help institute a farming systems focus to resolving technological problems and insure that experiments taking place on farmers' fields take into account all elements of the farming system.

The GOB will provide a Motswana Sociologist to serve the Project. This individual, who will be located at the Ministry of Agriculture, will be assigned half time during year one of the Project and will be expected to spend a significant amount of time in the field working with the FSR team in Mahalapye. During year two of the Project, when the FSR/Francistown team arrives, this individual will be assigned full time for the remaining four years of the Project.

Agricultural inputs for experimentation on farmers' fields such as seeds, fertilizer, tillage equipment, etc, will be partially financed through the Project's special research fund. It is anticipated that cooperating farmers with finance will provide labor at a minimum and in some cases will provide other needed inputs as well.

(4) Counterparts and training

To insure institutionalization of the FSR concept in Botswana over the long term, the GOB has committed itself to providing counterparts for all long term technical assistance staff. At the FSR team level, diploma level graduates would be provided for each of these positions so that each counterpart will have the opportunity to work closely with a technician and also to receive project funded BS. training. By the end of the project, most of the FSR regional positions will be localized. The phasing of this training is discussed in greater detail in the Technical Analysis.

b. Restructuring and Strengthening of the Department of Agricultural Research

As discussed in the Technical Analysis the linkage and interface between FSR field based research and Experiment Station research is critical if FSR is to be successful. FSR teams must be able to suggest priority areas of research to the national Agricultural Research Station at Sebele which they perceive as technological or managerial bottlenecks in increasing agricultural production on farmers' fields. These priority areas would, of course, be based on their experiments on farmers' fields. The national Agricultural Research Station must be appropriately structured and have the technical ability to focus on areas relevant to small farmer production and to the priority areas as identified through FSR. FSR represents an important complement to existing research activities and is not designed to replace, but

rather to significantly improve the effectiveness and responsiveness of the traditional applied research establishment. Thus if FSR is to be effective, national research must be structured and have the technical ability to compliment FSR field activities.

(1) Strengthening the Department of Agricultural Research

As discussed in the Technical Analysis, the GOB's Department of Agricultural Research has weaknesses in its structure and technical expertise which render it, in the view of the Project Paper team, unable to respond effectively to FSR research. As discussed in the Project Background, the GOB is currently in the process of redefining its national research strategy in part to sharpen its focus on the development of small farmer technologies in arable agriculture and to improve its ability to respond to FSR research. As part of this strategy, the GOB's Department of Agricultural Research will begin to structure its activities using a commodity focus concentrating on commodities produced by the majority of Botswana's arable producers.

(2) Composition and phasing of Technical Assistance for agricultural research

As part of its new research focus, activities at the MOA's Research Station at Sebele will begin to be restructured along commodity lines in legumes and cereals, those crops produced by most Batswana farmers and which are most suitable for arable agriculture.

The project's Research/Extension Liason Officer (RELO) will also have research responsibilities as a legume agronomist at the Sebele experiment station. This will strengthen the commodity approach to research and establish his identity with the research community as well as compliment his role in extension. At the beginning of year three of the Project, a project financed Cereal Agronomist will further strengthen the commodity focus and provide necessary technical back up for the FSR team. His arrival is programed for the third year of the project to allow the FSR regional teams sufficient time to help in determining needed research priorities for cereal producing arable farmers. External funding is being sought for a Sorghum Breeder beginning in year three, with travel and support financed under the Project. His/her arrival will strengthen the commodity focus on the cereals side.

(3) Counterparts and training for agricultural research

To insure that the research station is capable of supporting FSR research over the long term, the GOB has committed itself to providing counterparts for the Research Extension Liaison Officer/Legume Agronomist and Cereals Agronomist.¹ The counterpart for the Cereals Agronomist will leave for training to the MSc level during year one of the project and will return during year three of the project allowing for a two year overlap between the counterpart and the long term technician. Two counterparts will be provided for the RELO/Agronomist position, both preferably with BSc degrees (although depending on availability, one may be a diploma level counterpart). Both of these counterparts will be sent for further training to the MSc and/or BSc level. This training will be phased so as to insure that a

counterpart will be working with the Research Liaison/Legume Agronomist for the full project life.

c. Development of Linkages Between the MOA's Research and Extension Departments

To insure that research developed by FSR and at the research station is useful, adaptable, and meets the needs of small farmers, strong linkages must be developed between MOA's Departments of Agricultural Research and Agricultural Field Services. As mentioned above, a Research Liaison Officer/Legume Agronomist will be provided for the project life. This individual, with his counterpart, will serve as a key link between research and extension. Through his/her association with research as the Legume Agronomist he/she will be able to assist the Department of Agricultural Research in setting research priorities which meet farmer needs. Through his appointment in Agricultural Field Services (where his office will be located) he will be able to insure that research is informed of extension needs for specific adaptive technologies that can be extended by Agricultural Demonstrators and will work in farmers' fields. For a detailed job description for the RELO see Annex II-D.

In addition to the counterparts being provided for the RELO position. The GOB, through the Department of Agricultural Field Services, will provide Agricultural Supervisors for each of the two field teams. These Agricultural Supervisors will work with the FSR teams, and Agricultural Demonstrators in project areas and ultimately in experimenting with technologies with farmers on their fields. It is anticipated that the assignment of this support staff from Field Services will strengthen the link between research and extension.

d. The Extension Service Will Have Technologies to Disseminate Relevant to Farmers' Needs

(1) Methodology

As discussed in the institutional analysis, the MOA's Department of Agricultural Field Services is a relatively strong institution with a well developed cadre of Regional Agricultural Officers, District Agricultural Officers and Agricultural Demonstrators. Although there are a number of vacant positions particularly at the AD level, this situation is improving with the increased numbers of certificates and diploma level graduates from the AID financed program at the Botswana Agricultural College. The principle problem with the Extension Service is the lack of adaptive technologies which can be disseminated to small farmers. It is anticipated that activities discussed above will result in the development of these adaptive technologies. For example, this project will help strengthen the ALDEP program by improving the existing technical packages and initiating new technologies which are appropriate for small farmer needs.

(2) Technical Assistance, training and counterparts

The individuals responsible for the coordination of the overall program and ultimately for helping to ensure that adaptive technologies are developed are the Team Leader and his counterpart who will be based at the Department of Agricultural Research at Sebele. These Agricultural Economists will oversee the activities of the two FSR teams, and will serve as their link to DAFS, the DAR at Sebele and to the Division of Planning and Statistics, MOA. This linkage function includes assisting the FSR teams in identifying and selecting potential innovations from available research results which appear

suitable for farm level trials; communicating the results of FSR team activities to researchers at Sebele, aiding in the determination of research priorities which reflect the needs of farmers in the target areas; helping to institutionalize the linkage between farm level and planning activities; and providing a channel of communication to research centers and programs outside Botswana. The GOB has agreed to provide two counterparts for this position. At least one of these individuals will have a BSc and be trained to the MSc level while the other one will be receiving training for a BSc if he/she has a diploma. Their training will be phased so that a counterpart will be working with a long term technician during the entire five year project life.

e. Seed Multiplication

(1) Rationale

Foundation Seed

The SMU seed processing plant at Sebele is limited in size, has badly worn out equipment and is poorly sited to handle commercial seed processing. As a result, based upon recommendations from a US seed consultant, the GOB has determined to separate commercial seed production and processing from that for foundation seed. Beginning in 1982 BAMB will assume responsibility for production, processing and marketing of commercial seed. The foundation seed production function will continue to be handled by SMU at Sebele. The GOB has committed its own Domestic Development Funds for the purchase of new seed cleaning, treating and handling machinery and to equip a modern seed analysis laboratory. All of this equipment will be installed in the existing SMU building. Additionally the SMU will operate a small seed production farm for the production seed, provide supplies of certified foundation seed to BAMB for distribution to commercial seed growers, carry out all seed analysis laboratory work, inspect commercial seed production fields to insure varietal homogeneity and seed purity, and have responsibility for enforcement of the proposed Seed Regulation Act. As indicated these activities will be financed mainly through the GOB's Domestic Development Fund and as an item in their recurrent budget.

Commercial Seed Production

The GOB has specifically requested that support for the commercial seed production activity be included as an element in the Agricultural Technology Improvement Project. What is planned is a large building to house seed cleaning and treatment machinery to be constructed at Pitsane, adjacent to the railway about 100 km south of Gaborone. The building and attendant works (mainly railway siding, loading docks, etc) will be funded from GOB resources. AID will provide funds for US seed cleaning treatment and handling equipment, a resident advisor to be handled under an OPEX arrangement and support for training in the commercial seed production program. The BAMB facility at Pitsane would be used for cleaning, treatment, bagging and storage of commercial seed. Maize, sorghum, cowpeas and sunflower would be handled initially. Other seed types could be added as demand requires and processing capacity permits.

(2) Technical Assistance and training

The resident advisor would work at Pitsane but would probably live at Lobatse about 24 km distant where adequate housing is already available.

1. This individual will be Project funded but will not be included in the institutional contract. Instead USAID/B's OPEX recruitment contractor, Transcentury Corp, will do the recruitment.

A critical element of the seed processing component of the project will be the training of appropriate Batswana in commercial seed production. At present, few or no trained personnel are capable of supplying this expertise. This element of the project will assist the GOB to fill an important need for improved seed quality, varieties well adapted to Botswana ecosystems, and reduce and ultimately eliminate commercial seed import requirements.

5. Project Inputs

To finance the activities described above, \$12,309,000 is required, of which USAID will contribute \$9 180 000 (75 percent of Project costs) and the GOB will finance \$3,129,000 (25 percent of the Project costs).

a. AID Financed Input

(a) Technical Assistance (\$4 059 397). AID will finance 37.5 person years of long term Technical Assistance and 55 person months of short term Technical Assistance.

(b) Technical Support (\$1,437,124). AID will finance some costs associated with long term Technical Support such as travel to and from post, educational allowances, household maintenance, secretarial support, office equipment, etc.

(c) Commodities (\$320 000). AID will finance equipment for seed processing.

(d) Operations and Support (\$345 000). AID will finance some commodities for on farm trials and tests such as fertilizer, seed and small farm implements. Additionally, AID will finance the maintenance of GOB supplied vehicles.

(e) Training (\$714 000). AID will finance 96 person months of short term US and third country training and 22 person years of long term training.

(f) Inflation (\$1 503 456). A ten percent compounded inflation factor has been added to AID project costs.

(g) Contingency (\$801 023). A ten percent contingency has been added to AID project costs.

b. GOB Financed Inputs

(a) Technical Assistance (\$635 266). The GOB is providing 61 person years of counterparts for long term training and to work with Technical Assistance staff and 141 person years of support staff (enumerators, secretaries, etc).

(b) Technican Support (\$441 465). The GOB is providing in-country per diem for counterpart and US long term Technical Assistance staff and is also financing any use of private vehicles for business.

(c) Commodities (\$190 970). The GOB is financing the purchase of 16 vehicles including replacement vehicles for the Project and is also providing some funds for the purchase of inputs for farm level trials and tests.

(d) Operations support (\$97,072) The GOB is financing commodities to be based in Agricultural Research such as fertilizer seeds, implements, etc.

(e) Construction and Rent (\$1 061 499). The GOB is financing the construction of buildings for seed processing and is providing all housing for long term technicians.

(f) Training (\$220 350). The GOB is providing 15 person years of US and third country training for counterparts.

(g) Inflation (\$482,378). A 10 percent compounded inflation factor has been added to GOB financed costs.

Part III: PROJECT ANALYSIS

SECTION A: TECHNICAL ANALYSIS

1. The Problem

a. Heterogeneous Farming Systems

Research in low income countries aimed at developing improved practices for small farmers has often been based on a number of erroneous assumptions. Frequently, therefore, very little has been produced that is relevant for large sections of the farming community. The assumptions, which are often not explicitly questioned, include those pertaining to homogeneity of the environment in which farmers operate, optimistic notions concerning characteristics of that environment (e.g. good soil, availability of improved inputs, access to markets), and inaccurate notions concerning the goals and characteristics of farm production units.

The environment in which farmers operate is complex. A farming system is the result of interactions among several interdependent components. At the center of the interactions are the farmers themselves, whose households and means of livelihood are intimately linked. Within a specific farming system, farming families allocate certain quantities and qualities of their basic inputs (land, labor, capital and management) to three processes (crops, livestock and off-farm enterprises) to maximize attainment of their goal(s). Figure 1, Annex B illustrates some of the possible underlying determinants of the farming system. The 'total' environment in which farming households operate can be divided into two parts: the technical element and the human element.

The technical element determines the types and physical potential of livestock and crop enterprises, and includes two factors: physical (for example, water, soil, solar radiation and temperature) and biological (that is, crop and animal physiology, diseases and insect attacks). Man has sometimes been effective in modifying the effect of these through technology development.

The farming system evolves as a subset of what is possible within the technical element. The human element plays a key role in this determination and is characterized by two types of factors, exogenous and endogenous. Exogenous factors (i.e. the social and institutional environment), are largely outside the control of the individual farming family, and will influence what it will be able to do. These factors can be divided into three groups:

- (a) Community structures, norms and beliefs.
- (b) External institutions. These can be divided into two main groups, inputs and outputs. On the input side, government agencies often finance and manage credit and farm requisite distribution systems. On the output side, the government may directly (e.g. marketing boards) or indirectly (e.g. improved evacuation routes, transportation systems) influence the price farmers receive.
- (c) Miscellaneous influences, such as population density and location.

Unlike exogenous factors, the endogenous factors are controlled by the farming family. It is the farming family which ultimately determines the farming system that will emerge, given the constraints imposed by the technical element and exogenous factors.

b. Heterogeneity in Botswana agriculture

In Botswana acceptance of traditional assumptions will result in the development of technology inappropriate for large sections of the farming community. The determinants of the farming systems discussed above help in explaining the heterogeneity that currently exists in Botswana agriculture. Some of the most important factors contributing to this heterogeneity are discussed below.

(1) The technical element

Rainfall is a major factor affecting production of both crops and livestock. Average annual rainfall ranges from less than 250 mm in the southwest reaches of the Kalahari Desert to 600 mm in the eastern part of the country where most of the country's population is located and where most crop production takes place. Superimposed on this is variation in soil types with sandveld (i.e. yellow, reddish-brown and grey usually deep soils of sandy texture often underlain by calcrete) in the western part of the country giving way to hardveld (i.e. dark-reddish-brown, medium textured soils of varying depths associated with dark colored clayey soils) towards the east. Both types of soils tend to be low in organic matter and fertility. The relative harshness of the natural element, including the probability of frost towards the end of the growing season, limits the yields and range of crops that can be grown without irrigation and fertilizer. Under existing conditions yields of cereal crops (i.e. sorghum, millet and maize) in the Central and Francistown areas average only about 200 kg per ha. while beans and pulses yields are even lower. Because of large variations in the amount of rainfall both between and within years there is a corresponding large variation in yields from year to year. This makes arable production in particular a risky occupation.

(2) The human element

Like so many other countries in the Southern African area dualism is found in Botswana agriculture. In 1980 there were an estimated 360 large commercial farms and 80 000 traditional farms operating in Botswana.¹ The commercial farms which constitute only 0.4 percent of the total farms in the country are, however, very important in the Botswana economy. For example:

(a) They are much larger than traditional farms. In the case of cattle, farm holdings averaged 42.5 head and better than 1 300 head in the traditional and commercial sectors, respectively, while crop areas planted averaged 4.1 and 118.5 hectares per crop operation.

(b) The productivity of commercial farms tends to be higher. For example, on commercial farms herd loss rates through death appear to be one third of those belonging to traditional farms while average annual offtake rates are much higher (i.e. 15.6 percent versus 8.1 percent). At the same time yields of food crops tend to be three to four times higher on commercial farms.

(c) Commercial farmers thus hold 15.7 percent of the total cattle and 3.6 percent of the total smallstock (i.e. sheep and goats) in the

1. Traditional farming is conducted on tribal lands while commercial farming is found on 'titled' lands. Since titled lands may include clear title, long term lease, etc, commercial farming includes, but is not limited to freehold farms.

country. They also account for 14.9 percent of the total food crop production (i.e. millet, sorghum, maize, beans/pulses) and more than two thirds of the total cash crop production (i.e. groundnuts and sunflower).

The harshness of the natural environment has had a marked influence on the production mixes of traditional farmers. Keeping cattle is considered a less risky activity than crop production. For the smallest (i.e. 45 percent of the total traditional farmers) and therefore presumably the poorest farmers, primary emphasis is on crop production since they own less than ten cattle. Twenty eight percent in fact own no cattle at all. Because of constraints such as capital, draft power, etc, they only plant one to two hectares. For medium sized cattle farmers (i.e. 34 percent of the total number of traditional farmers) with from 10 to 40 cattle, the number of hectares planted increases from two to seven, and the number of smallstock becomes more important in the overall production pattern. For large traditional cattle farmers (i.e. 21 percent of the total number of traditional farmers), with more than 40 cattle, the production activities may either be specialized or mixed. A significant number of farmers in this group specializes in cattle and grow few crops. (The same holds for commercial farmers, where 62 percent keep livestock only). However, when crops are planted, the area planted tends to be larger than in the other two groups. Part of this increase may be due to increased capital availability (i.e. tractors, draft power, etc). The number of smallstock held by this group tends to be higher.

To date research activities in the livestock area have tended to be directed to the larger commercial farmers and have overshadowed those devoted to cropping activities. In terms of the natural comparative advantage that cattle production has over crop production in Botswana it can be argued that in economic terms the choice is rational. However, Botswana is faced with two cruel dilemmas, namely its sensitive external political situation and hence the desirability for food self-sufficiency and its internal pattern of economic and demographic development necessitating creation of employment for the rapidly expanding population. According to the Lipton report of 1978, the only hope in the medium term for solving these two dilemmas or problems is through increasing the productivity of arable agriculture on traditional farms. Although questions can be raised as to whether Botswana's long term comparative advantage can ever lie in crop agriculture, the government, in recognizing both the need for distributive equitability and the urgency of slowing down the drift to open unemployment in urban areas, has no alternative but to try and increase the productivity of arable agriculture. The other large scale rural enterprise, cattle raising, simply does not have the same employment potential. The proposed project is designed to help the Government of Botswana in its efforts to improve the productivity of arable agriculture on traditional farms.

A crucial step in this process of increasing the productivity of arable agriculture is the development and adoption of appropriate improved technologies and practices. For this to occur relevant research, policies and support systems have to be put in place. The proposed project will fill in some of the gaps that currently inhibit the possibility of this being achieved.

c. Problems in Agricultural Research

Agricultural research is in a difficult position in Botswana. Three factors contributing to this are as follows.

(a) Partly because of the past economic position of Botswana it has not been possible for GOB to support a research organization that undertakes research programs in all the possible areas pertaining to improving the welfare of the agricultural populace.

(b) A substantial proportion of the current research program is funded by donor agencies. Once such projects are functioning there is often relatively little flexibility in terms of adjusting their programs to fit changes in the requirements of the GOB. The structure of research in Botswana therefore reflects a mixing of the classic research model of research within discipline areas with donor sponsored projects in selected problem areas. This is particularly the case in the Division of Arable Research where the presence of many commodities makes a durable interdisciplinary commodity approach to research difficult when research resources are limiting. A model for an interdisciplinary commodity approach does exist in the other division of the Department of Agricultural Research, namely the Division of Animal Production and Range Research.

(c) The natural environment as stressed earlier is relatively unfavorable particularly for arable agriculture. The challenge of developing relevant improved technology and improved practices for limited resource farmers located in such an environment is therefore great. It is, therefore, not surprising that the application of research findings from the experiment stations often give disappointing results on farmers' fields and as a result the credibility of on-station research is weakening.

It is important to take these factors into account in designing a project relevant to the needs of Botswana. Specifically the project design seeks to incorporate these needs in the following manner:

(a) Through filling gaps in on-station research that preclude research work addressing the problems of limited resource farmers, the central focus of this project. In doing so it is hoped that the research organization, particularly with arable crops, will be able to move towards a commodity research focus.

(b) Through providing additional support for the recent move towards bringing researchers, farmers and extension workers closer together by undertaking some of the research work on farmers' fields under the umbrella of FSR.

The following sections deal with the rationale for the proposed inclusion of the various components in the project.

2. Getting Close to Farmers: Farming Systems Research

a. Complementary to Experiment Station Based Research

Investment in agricultural research is justified through economic returns which result from improved practices adopted by farmers in response to farmer recognized problems. Ideally, projects conducted on experiment stations are designed by researchers to investigate

solutions to problems of farmers which have been communicated to researchers by farmers in an interactive process. Technology developed on the Experiment Stations from these investigations should then be evaluated on farmers' fields as part of farming systems adapted to that situation. Based on this evaluation, the new technology will be adopted if it is better than existing technology.

If the technology does not represent a solution to the problem, the result of the evaluation is referred back to the Experiment Station. Based on these data, new studies are developed in the continued quest for a solution to the problem.

In recent years, Botswana has recognized significant weaknesses in the arable research program because of the lack of evaluation of technology in farming systems on farmers' fields and the lack of opportunity for an interactive process between researchers, extension workers and farmers. As a result the government has perceived Farming Systems Research (FSR) as a way of bridging the gap.

b. Stages in Farming Systems Research

The FSR approach is being implemented in Botswana in recognition of the heterogeneous character of the farming community. It stresses a 'bottom up' approach through a strategy of starting the research process at the farmers' level by first ascertaining their needs and then addressing these needs through the determination of appropriate research priorities. The work of the FSR team consists of four stages (Figure 2 in Annex 1B).

(a) The Descriptive or Diagnostic Stage. The actual farming system is examined in the context of the total environment, to identify constraints which farmers face and to ascertain the potential flexibility in the farming system in terms of timing, availability of resources, labor shortages in female headed households, etc. An effort is also made to understand goals and motivation of farmers that may affect efforts to improve the farming system.

(b) The Design Stage. A range of improved technologies and/or improved practices is identified that is thought to be relevant in dealing with the constraints delineated in the Descriptive or Diagnostic Stage. Strategies for dealing with the constraints can involve either developing technology or practices to break them, or to avoid them through exploiting the flexibility that exists in the farming system. The Design Stage utilizes information derived primarily from work on the Experiment Station (that is the 'body of knowledge' in Figure 2 in Annex 1B), or from the farming systems of some of the more successful farmers.

(c) The Testing Stage. A few promising improved technologies and/or practices arising from the Design Stage are examined and evaluated under farm conditions, to ascertain their suitability for producing desirable and acceptable changes in the existing farm system. Criteria for evaluating the changes are based on those that are important to farmers. The Testing Stage consists of two parts: first, trials at the farm level with joint researcher and farmer participation, and later, farmers testing with full control by farmers themselves.

(d) The Extension Stage. Implementation of the strategies that were identified and screened during the Design and Testing Stages.

In practice there are no clear boundaries between the various stages. Design activities for example, may begin before the Descriptive or Diagnostic stages and may continue into the Testing Stage as promising alternatives emerge during the trials at the farm level where farmers, extension workers and researchers interact directly. Similarly, there is an extension component from the earliest stages of adaptive research and by the time of farmers' testing and extension activities become central to FSR work.

c. Plans for Farming Systems Research in Botswana

The GOB is in the process of implementing FSR-type programs with the help of donor agency support. In principle the proposed organization appears to be as follows:

(a) Nationally focussed Experiment Station based research located at Sebele and four sub-stations in other parts of the country which will incorporate into their research programs research priorities ascertained as important in serving the needs of farmers, particularly traditional farmers, in Botswana.

(b) Regionally focussed FSR teams, concentrating on arable crop production and the interface between crops and livestock, will test technologies emanating from the Experiment Station based personnel. The relationship between Experiment Station based research and the FSR team will therefore be recursive in nature.

(c) Control of the different FSR programs will be instituted under a GOB established post which will facilitate institutionalization of the linkage between Experiment Station based research and the FSR teams in the field, and establish coordination between the FSR teams themselves.

(d) In recognition of the important linkage between research and extension in the development and dissemination of relevant improved technologies and practices the GOB favors the inclusion of a Research Extension Liaison Officer (RELO).

As FSR teams become institutionalized in the Botswana government structure, it is anticipated that their influence will be widely felt. Broadly speaking, the functions of an effective FSR team will eventually encompass the following fields:

(a) Research: interaction with farmers and Experiment Station based research in determining relevant research priorities and hence development of relevant improved technologies and practices.

(b) Extension: delivery and evaluation of improved technologies and practices through effective liaison with, and feedback from, the extension service.

(c) Information: provision of relevant agricultural advice for incorporation into extension education programs.

(d) Training: contribution of curricula material to agricultural training institutions.

(e) Institutional support: exertion of influence on support services to provide farm requisites and marketing opportunities in a form useful to small farmers.

(f) Participation: stimulation of local community organizations through interaction with farmer contact groups.

Realistically the MOA and AID must acknowledge that the FSR team approach will take many years to become fully effective in all these functions. The above list is provided to indicate the potential scope of the GOB's commitment to FSR. The FSR's main functions are with research and extension and other functions are likely to follow later as the FSR approach becomes institutionalized throughout Botswana.

d. FSR Contribution of the Proposed Project

(1) Location of the FSR teams

As discussed earlier the GOB has proposed the project should staff two FSR teams, one in the Central and the other in the Francistown Agricultural Region. The headquarters selected for the two teams are Francistown and Mahalapye. Francistown was selected as an area of focus because of: (a) the large number of full time farmers; (b) access by the majority of farmers to draft power; (c) the presence of millet as well as sorghum as the important crops; (d) the general receptivity of farmers in the area to the introduction of new technology and (e) the possibility of extending FSR work to the Tati Agricultural District at a later date.

Mahalapye was selected as an area of focus due to: (a) the variation in soil types which provide a good cross section for FSR experimentation; (b) the location of a research station in Mahalapye which will assist the team in increasing the interface between extension and research; (c) the presence of a District Agricultural Officer (DAO) for both East and West Mahalapye and almost a full component of Agricultural Demonstrators (ADs) indicate the presence of a strong extension support system; (d) easy accessibility of Palapye; and (e) some farming families utilizing donkey draft power while others use cattle and tractors.

(2) Staffing and functions of the FSR teams

Both teams will consist of Technical Assistance in the form of an Agronomist and an Agricultural Economist in each team. In addition two more disciplines that will be represented in the FSR teams are as follows:

(a) Long term Technical Assistance in the Animal Science area. Such a person would be located in Francistown but would be expected to service both teams and address areas related to the interface between crops and livestock.

(b) An Anthropologist/Rural Sociologist who will be provided by the Rural Sociology Unit in the Division of Planning and Statistics in the MOA will work with both the FSR teams.

The work responsibilities of the FSR teams¹ will involve the usual activities associated with FSR work including:

(a) Surveys both of a socio-economic and technical nature to help verify the recommendation domains currently being identified,² to help diagnose problems to be resolved through improved technology or

1. Job descriptions for each of the disciplines funded under Technical Assistance are given in Annex IID.

2. This is being done by a team of six including two Batswana and four staff members from Kansas State University.

practices or through modification in the support systems serving farmers, to monitor changes in farming systems, to assess the best methods of introducing changes to ensure farmer participation, group responsibility, etc.

(b) To carry out and evaluate simple research managed trials on farmers' fields or livestock in which limited numbers of treatments are tested.

(c) To monitor and evaluate farmer managed tests of the improved technologies and practices.

(d) To help where necessary under the guidance of the RELO, in training extension workers to disseminate the improved technologies and practices among other farmers in the same recommendation domain.

(e) To undertake other special studies that are considered to be important in ensuring effective implementation of FSR in the areas in which the teams are located.

(f) To liaise where necessary with local community organizations and institutions providing the support or delivery systems to ensure that they are supportive of, and compatible with, the improved technologies and practices that are to be extended.

(3) Some issues to consider in implementing FSR work

At this stage it is difficult to be too specific about all the issues that will be faced in implementing the FSR projects in the two areas. However, five important points are as follows:

(a) A plan for FSR work has to be drawn up and agreed to well in advance of each rainy season. Agreement has to be reached both within the FSR team itself and with people and institutions in the area that will be influenced by its operation. With reference to the former interdisciplinary cooperation and coordination is an essential ingredient in determining the success of FSR. Two strategies for creating conditions to ensure the latter are:

(i) Establishing a close link between research and extension by having some of the support staff at the certificate level seconded from DAFS rather than all be provided and funded by DAR.¹ The remainder will be provided by DAR.

(ii) Setting up local 'committees' where extension leaders, representatives of the relevant institutions operating in the area (e.g. ALDEP, CFDA, etc), other local leaders, farmer representatives and FSR personnel can meet and agree on the proposed work plan.

(b) It is necessary to delineate the farming clientele the proposed project should address. It is proposed that the project should have as its major focus farming families having one to ten hectares of arable land and owning less than 40 cattle. According to a study undertaken by the Division of Planning and Statistics in the Ministry of Agriculture in 1980 these farmers accounted for 47 300 or 59 percent of the 80 000 traditional farmers in Botswana. The range of farmers covered does include 22 000 farming families who are not eligible for the

¹. Three Agricultural Demonstrators/Agricultural Supervisors will be seconded to each team. These will be in addition to those continuing to work full time for DAFS in the areas in which the Testing Stage will be undertaken.

ALDEP program. These are farmers who have less than three hectares of arable land available and own less than 40 cattle. Thus the project will include some farmers below the minimum levels that qualify farmers for the ALDEP program.

(c) Decisions will have to be made as to which recommendation domains¹ will be the focal point of the FSR teams. It is proposed that the Division of Planning and Statistics in the Ministry of Agriculture should play a role in the selection process to ensure that attention is focussed on target groups of farmers that are consistent with national goals. This approach also serves to start institutionalizing the micro-macro link that is currently lacking in most FSR projects.

(d) Decisions will have to be made over the selection of farmers within recommendation domains who will participate directly in the FSR Testing Stage. Some factors that will need to be taken into account in selecting the farmers are as follows:

(i) They should be representative of the recommendation domain(s) which the FSR teams are working with, in order that the results can be transferable to other farmers in the same recommendation domain(s).

(ii) To minimise operational and supervisory costs it would be advisable to cluster the selected farmers in three or four locations in each area.

(iii) The numbers of farmers in direct contact with the FSR teams will, in order to minimize measurement errors and maximize researcher-farmer interaction, initially have to be limited. However, as work progresses from farm trials to farmers' testing the numbers involved will obviously increase.

(iv) Apparently some families, particularly those who are poorer, obtain draft power through draft pool arrangements. The significance of this will shortly be ascertained as a result of the study to be undertaken by the Rural Sociology Unit in the Division of Planning and Statistics. If it proves to be important then it will be necessary for the FSR teams to work directly with not only one but all families in selected draft pools, since working with one family may have unfavorable effects on other families in the same draft pool.

(v) It is proposed that some farm trials should be started in the first year, that is, November 1982. It is, of course, understood that at that time the Descriptive/Diagnostic Stage might not be quite as complete as would be desirable. However, in-depth verification of the preliminary conclusions derived from the initial work undertaken in the Descriptive/Diagnostic Stage can be obtained simultaneously with carrying out the initial farm trials which is the first part of the Testing Stage.

3. Filling Gaps: On-Station Research

There is general recognition within DAR that there are gaps in the existing research programs and that there is not as high a degree of

1. Recommendation domains are groups of target farmers with similar farming systems, similar resource base and hence similar problems.

coordination between the various programs as would be desirable. There is therefore a desire to move further towards a commodity research focus. As far as the Project is concerned it is essential to ensure on-station support in the area of cereals and legumes. Without appropriate Experiment Station based research, FSR emphasizing work on farmers' fields is not possible. A commodity oriented approach on the Experiment Station is highly desirable to help in putting together components amenable to testing on farmers' fields. As indicated earlier cereals and legumes are the two major commodity groups grown by farmers under the dryland farming conditions in the Central and Francistown Agricultural Regions where the proposed FSR teams funded under the project are to be located. There are two ways to obtain on-station inputs to work with on farmers' fields: first, through exploiting linkages with external organizations and, secondly, through on-station support within Botswana.

a. Exploiting Linkages

It is appreciated that it is unreasonable to expect that Botswana should provide all the Experiment Station based research necessary to support FSR teams in the field. Rather, wherever possible linkages outside the country need to be fully exploited. Examples are:

(a) The Consultative Group of International Agricultural Research Institutes (CGIAR) have considerable expertise in the area of sorghum, millet and groundnuts (ICRISAT), maize and wheat (CIMMYT) and cowpeas (IITA).

(b) US sponsored programs also have expertise in some areas such as semi-arid crops (SAFGRAD), sorghum, millet and legumes (Title XII CRSP's).

(c) Programs undertaken within a regional context such as the commodity group research approach proposed under the auspices of the Southern African Development Coordinating Council (SADCC), and in national settings such as maize work in Zimbabwe.

b. Additional Requirements for On-station Staff

Careful consideration of the gaps in Experiment Station research work that needs to be filled in order to fully exploit the complementarity between on-station research and FSR work in the two areas has indicated the need for agronomic work in cereals and food type legumes and breeding work on sorghum. Millet, sorghum, maize and cowpeas/beans are the major crops grown in the two areas in which the FSR teams funded under the Project will be located. Systematic on-station agronomic work on these crops needs to be strengthened. Currently a small amount is done under the auspices of the UK funded DLFRS and EFSAIP projects (see Administrative Analysis). However, little has been done to develop local capacity in the area. With reference to sorghum breeding, activities are currently confined to screening activities. However there now appears to be little likelihood that individual germ plasm will out-perform local varieties unless it can be incorporated into a breeding program specific for Botswana conditions. There is general agreement that some local variations such as Segalane are essentially inputs in any sorghum breeding program. Additional justification for supporting on-station work in these ways is given in Annex II D.

The following recommendations are being made with reference to the Project:

- (a) The Research Extension Liaison Officer (RELO) will do some part-time work as a Legume Agronomist at Sebele.
- (b) A Cereal Agronomist to be stationed at Sebele will be funded under the Project starting year three. In the interim some on-station research can be done at the Mahalapye sub-station by the Agronomist attached to the Mahalapye FSR team.
- (c) Other funding will be sought for a Sorghum Breeder position.

INSORMIL (Sorghum-Millet CRSP) has already been approached to provide staff for the sorghum breeder position once they have also been asked to consider providing a cereals agronomist. Additionally the bean-cowpeas CRSP may be a source for financing the services of a full-time legume agronomist. If additional research staff can be obtained from these sources, salary savings from the cereals agronomist position would be reallocated to cover support costs for these staff and to phase in the cereals agronomist earlier than currently planned.

4. Closing the Gap Between Research and Extension

a. Integrating Research and Extension

The DAR and the DAFS are officially linked at the top as companion departments whose directors are responsible to the Permanent Secretary of the Ministry of Agriculture. There are some lateral linkages of an informal nature between the Crop Production Division of Field Services and the Arable Research Division of Agricultural Research. A formal relationship exists in the Arable Agriculture Priorities Committee and a newly formed Arable Agriculture Development Committee. Similar relationships exist between the Animal Production Division of Field Services and the Division of Animal Production and Range Research of Agricultural Research. The research staff contributes to farmer training courses.

The DAR directs its research to farmer needs through consultation with DAFS, feedback from extension officers and organizations, ideas of research scientists and other sources. However, identification of research priorities appears to come largely from the top down and needs more input at the farm level. The research results are written up into reports, expanded into subject matter pamphlets and training materials by the information service and made available to extension for training purposes and use when assisting farmers. The extension service has difficulty in reaching farmers and providing technology that is tailored to the realistic needs of farmers. Transportation difficulties, insufficient staff, lack of proper technology and training, and lack of extension involvement in research activities are causes for much of the difficulty. The FSR project is designed to facilitate a stronger approach to solving farmer problems and bring closer collaboration between research and extension efforts.

b. The Research Extension Liaison Officer

This project will establish the position of Research Extension Liaison Officer (RELO). The RELO will be responsible for collaboration and interaction among experiment station workers, FSR teams and others working on farmers' fields, extension officers at all levels and

others as appropriate. The work of the RELO is expected to enhance the utilization of research by:

- (a) Compressing the time span between discovery of technology and its dissemination to farmers.
- (b) Increasing the volume of relevant research output that passes through the system.
- (c) Raising the quality and quantity of technology through on-farm trials and farmer tests.

In order to facilitate this the RELO will maintain close contact with the FSR program and assume responsibility for helping to train farmers and extension personnel at the local, district and regional level through workshops, field days and tours, in-service training and training material. Nationally the establishment of this position will help to bring about a closer collaboration between DAFS and DAR. A major advantage of the Project is the close linkage between research and extension work and training through the involvement of field trials and on-farm tests. Finally in order to encourage open communication between the different FSR projects and between research workers, extension staff and interested persons, the RELO will organize an Annual FSR Workshop to report on past activities, plans of work, etc. The Project will provide some funding to facilitate this and enable proceedings to be published.

c. FSR Instruction at the Botswana Agricultural College

In addition to the linkages discussed above, the FSR approach will be integrated into the certificate and diploma level programs at the Botswana Agricultural College. Future ADs and DAOs will receive instruction in FSR at the college and will, where possible, be involved in FSR field work.

5. Implementation: Help in Seed Multiplication

Currently production of seed for sale to Botswana farmers is a function of the Seed Multiplication Unit (SMU) of the DAR. The SMU produces both foundation seed and commercial seed, and processes both at one facility located at Sebele. Marketing of commercial seed is handled by the Botswana Agricultural Marketing Board (BAMB) which obtains processed seed from SMU and also imports considerable quantities from other countries--mainly South Africa and to some extent Zimbabwe.

The decision to make the production of commercial seed the responsibility of BAMB is correct. As indicated earlier the Project will provide some support for the establishment of this program.

There is justification for including the commercial seed production component under the project because the production and distribution of improved varieties of seed adapted to the Botswana ecological zones is a very economical and cost effective input in agriculture. A high proportion of farming families already purchase some seed for production purposes. Having improved seeds in use on the farms involves an integrated and interlocking or overlapping chain of activities:

- (a) Germ plasm development through the plant breeding and commodity research program of the Experiment Stations.
- (b) Variety testing, cultural practices, soil fertility and other related research on the stations and in the field in an integrated commodity research program to develop a technological package to optimize the returns from the improved seed.
- (c) Seed multiplication and variety certification in preparation for release to the commercial seed producers.
- (d) Commercial production and certification of the improved varieties in quantities and quality to meet the demand for seed.
- (e) Processing, marketing and distribution of the seed to farmers in all areas of the country at prices which can be afforded, particularly by farmers with limited resources.
- (f) Demonstration of the productivity and value of improved seed is a vital part of the Farming System Research program.

Finally, the cooperation and linking of the Experiment Station researchers, the FSR staff, the extension staff and marketing agency is vital in this chain of activities. In the current situation in Botswana, it appears there is definite need to concentrate on all aspects of improving this chain of activities. The development of commercial seed production and processing is thus a vital part of the total FSR program.

6. Coordination at the Center: the Team Leader

The Team leader who will be an Agricultural Economist will provide administrative and professional leadership for the project. The administrative task will be substantial owing to the general complexity of the project, the training and consultancy elements and the placement of project staff in four different locations. In order to enable the Team Leader to play an active professional role, the Project will provide funding for a locally hired Administrative Assistant.

In his/her capacity as an Agricultural Economist, it is important that the Team leader will:

- (a) Provide help in the economic interpretation of experiments carried out on the Experiment Stations.
- (b) Provide professional guidance to the FSR teams at Mahalapye and Francistown.
- (c) Provide an input into institutionalizing the micro-macro link, that is, between the FSR teams and institutions responsible for developing agricultural policy (e.g. Division of Planning and Statistics in the Ministry of Agriculture) and delivering support systems (e.g. ALDEP).
- (d) Facilitate professional interaction and collaboration between the various FSR teams and between FSR workers and Experiment Station based researchers.

In addition, the Team Leader will provide the principal project liaison with the MOA Reference Group which will meet periodically to review progress towards the attainment of project objectives. The Reference Group will be chaired by the MOA Permanent Secretary and will consist of representatives of all MOA departments involved in the Project (DAR, DAFS, Planning and Statistics, BAMB).

7. Technical Assistance

A summary of the long Technical Assistance, discussed in earlier sections of the Technical Analysis, is given in Table III-1. Excluding the Sorghum Breeder position 37.5 person years will be funded under the Project.

Table III-1: Long Term Technical Assistance^a

Place	Position	Arrival	Departure
Sebele/Gaborone	Ag Economist	July 82	June 87
	RELO/Legume Agronomist ^b	July 82	June 87
Mahalapye ^c	Ag Economist	July 82	June 87
	Agronomist	July 82	June 87
Pitsane	Commercial Seed Production Advisor ^d	July 82	Dec 84
Francistown ^c	Ag Economist	July 83	June 87
	Agronomist	July 83	June 87
	Animal Scientist	July 83	June 87
Sebele	Cereal Agronomist ^b	July 84	June 87

- a. This does not include the Sorghum Breeder for which other external funding is being sought to commence in July 1983.
- b. If other external funding is forthcoming for a full time Legume Agronomist and Cereal Agronomist, then both these positions would commence in July 1983.
- c. FSR teams.
- d. To be provided under an OPEX arrangement.

In addition a number of specialists will be required to consult with the Sorghum Breeder, the Cereal and Legume Agronomists and the FSR team members. Two visits will usually be required, one in the first or second year and one in the second or later years. The purpose of the visits will be: (a) to assist in identifying research priorities and helping to establish the work; (b) to provide technical advice, special services and expertise not otherwise available; and (c) especially in the second visit, to evaluate progress and changes or additions to the work. An illustrative list of the 55 person months of short term consultants to be funded under the Project are included in Annex II E.

8. Counterparts and Training

The GOB is committed to localization as soon as possible and have made a commitment to provide counterparts for the project. Batswana expected to graduate in agriculture are given in Table 1 in Annex 1E.

Training of counterparts consists of two activities:

- (a) On the job training which is why the GOB will make every effort to provide counterparts for the whole time the long term Technical

Assistance staff are in the country. This means that during the five year project there will be a total of 15 counterparts (see Table 2 in Annex 1E and Table III-2). It is not necessarily anticipated that all these counterparts will continue to serve on FSR teams after the end of the project but may serve in other positions in DAFS, DAR or the Division of Planning and Statistics.

(b) Formal training of a short or long term nature which is important in preparing individuals to act as full professionals in their own right. In this project it is proposed that USAID funding be provided for 22 person years of long term training (see Table 3 in Annex 1E). Because of the lack of qualified staff in Botswana it is likely that much of the training will have to be at the BSc level. There are likely to be other funding sources for long term training if the USAID funding proposed under the project proves to be insufficient.

In addition it is proposed that eight person years of USAID funding be provided for short term training for a few of the superior ADs involved in the project. Such training involving FSR could be undertaken at one of the CGIAR institutions.

Table III-2: Counterparts to be Supplied by Year and Source

(a) Details

Date	No.	Qualification	Discipline	Source
1982 July 1	1	BSc	Ag Economist	Div of Planning
	1	BSc	RELO	DAFS
	1	BSc	Cereal Agronomist	DAR
	1	Diploma/BSc	Ag Economist	Div of Planning
	1	Diploma/BSc	RELO	DAFS
	1	Diploma/BSc	Ag Economist	Div of Planning
	1	Diploma/BSc	Agronomist	DAR
	1	Diploma/BSc	Commercial Seed Production	BAMB
1983 July 1 ^a	1	Diploma/BSc	Animal Scientist	DAFS
1984 ^b July 3	1	Diploma/BSc	Ag Economist	Div of Planning
	1	Diploma/BSc	Agronomist	DAR
	1	Diploma	Commercial Seed Production	BAMB
1985 ^b July 3	1	Diploma/BSc	Ag Economist	Div of Planning
	1	Diploma/BSc	Agronomist	DAR
	1	Diploma/BSc	Animal Scientist	DAFS

- a. An extra two will be required if the plan in footnote b in Table 2 in Annex 1E is not followed.
 b. These are replacements for those going on further training.

(b) Summary

Year	SOURCE			
	Divison of Planning	DAR	DAFS	BAMB
1982	1 BSc 2 Diploma/BSc	1 BSc 1 Diploma/BSc	1 BSc 1 Diploma/BSc	-- 1 Diploma
1983	--	--	1 Diploma/BSc	--
1984	1 Diploma/BSc	1 Diploma/BSc	--	1 Diploma
1985	1 Diploma/BSc	1 Diploma/BSc	1 Diploma/BSc	--

Finally it is proposed that if possible the initial counterparts attend one or both short courses offered by CIMMYT in Nairobi in the area of FSR. Two two-week courses are offered, the first on Field Experimentation held in April/May and the second on Description and Diagnosis which is held in October. Other USAID funds outside the project are available to fund this training.

SECTION B: ECONOMIC ANALYSIS

1. Introduction

The long run objective of this Project is to establish some of the preconditions necessary for ~~bringing~~ about improvement in the welfare of Botswana farmers. The Project is primarily an institution building project which will strengthen the GOB's capacity to improve technology to Botswana farmers. As such it cannot with certainty provide direct or immediate pecuniary benefits. One of the often used techniques to analyze the economic feasibility of a project--that of cost-benefit analysis--is difficult to apply to projects of this nature. Most of the measures of project outputs cannot be assigned meaningful monetary values. It is particularly difficult to monetize the value of a well established national agricultural research system, or the worth of the increased skills acquired by participants as a result of the additional training which they may receive. Nevertheless, agricultural development analysts in general agree that investment in research--be it basic, applied or adaptive--has high payoffs for the developing world.

Internal rates of return to public expenditures in agricultural research have been calculated in the 34-50 percent range in the United States and other studies have shown rates of return of over 60 percent in India and Colombia. It is believed that similar rates of return can be generated by investment in agricultural research and extension in countries where yield levels and agricultural productivity is low such as is the case in Botswana.

A unique feature of this project which could have a favorable impact on the internal rate of return is the explicit strategy of strengthening the research-extension linkages. The farming systems research approach is one which first considers the small farmers' resource situation, then seeks new ways to utilize these resources to meet the farmers' special needs. The benefits of this approach should result in increased production, improved nutrition and improved living conditions in general. However, due to the intrinsic nature of farming systems research, expectations of a quick 'pay-off' in terms of benefits to the small farmer should be avoided. A more reasonable view suggests that a gestation period of ten years or more is required before benefits accrue as farmers adopt new farming methods and improved production practices.

These benefits should be achieved with little or no loss to large farmers. This sector is already more advanced and well financed and has access to effective research systems already in place. The shifting of scarce research and extension efforts to the small farmer should result in increased productivity to this group, as this is where land, labor and other resources are the most underutilized. Thus, the Project must be viewed in terms of its long run impact rather than what can be accomplished within the short period of Project Implementation.

The agricultural research effort should result in a winnowing of potentially fruitful research options and a focussing of research priorities c

relevant problems. This would shorten the time horizon in which significant innovation and adaptation of more productive technology will occur and genuine productivity increases can be achieved in future years.

The commercial seed production component of the Project is one which is expected to produce more immediate results. As has been noted earlier there is already an active demand for purchased seed and many farmers are receptive to trying new and proven varieties. This component of the Project will build on previous work in variety screening and in complement with the Ministry's foundation seed program which is now being established should adequately address the needs to supply this important input.

In the context of the GOB's long term goals and the objectives of this Project the benefits from the Agricultural Technology Improvement Project can be ascribed to two general categories, viz: increases in production and generation of employment.

2. Production Increases

The Project is expected to identify new agricultural production techniques and management practices which will permit farmers to increase yields per area planted. Additionally some labor saving technologies are expected to be identified which will permit farmers with labor constraints to increase labor productivity and increase output. In the absence of knowledge of what those research results will be, which crops or commodities will be affected, what specific practices will be recommended, how readily and rapidly they will be adopted by a significant number of farmers, it is impossible to determine the magnitude of production increases. Nevertheless the use of some well reasoned assumptions may permit some crude quantification and evaluation of results.

We may surmise that farming systems research will focus mostly on the commodity mixes that presently prevail in the target areas. Sorghum, maize, millet, grain legumes and oil seed crops will be the commodity targets. It is well established that crop yields and beef cattle off-take rates are much lower on resource poor traditional farms than for comparable productivity indicators on larger commercial farms. Examples are given below, based on 1980 data for the country as a whole.

		Traditional farms	Commercial farms
Yield in kg/ha	Sorghum	215	460
Yield in kg/ha	Maize	167	907
Yield in kg/ha	grain legumes	144	250
Yield in kg/ha	all crops	195	623
Beef cattle offtake (percent)		8.1	15.6

It is also established that the rate of abandonment (area planted but not harvested) is higher on traditional farms than for commercial (25 percent versus 6 percent).

Of the 26 000 or so traditional farmers in the two regions in which the Project will be focused, assume that about one quarter of these (say 6 500) could increase yields by 50 percent within ten years. Given the current low yield levels this does not seem unreasonable. Further, if these same farmers were to increase their harvested acreage from the current average of about 3.4 hectares to 5 hectares the total production from the two regions would amount to 23 000 MT versus the current level of 14 400 MT. This would result in an increase in gross regional income of \$1.3 million at current prices and exchange rates, or an increase of \$200 per farmer-producer.

As another example, assuming the national average beef cattle offtake rates are representative of the 6 500 farmers in the two regions a modest increase in cattle offtake from 8.5 percent to 10 percent would generate an increase in livestock income of about \$1.2 million-- a gain of nearly \$200 per farm.

Increases on the order of those described in the examples above clearly appear to be feasible. Adequate economic incentives currently are being provided by forward looking agricultural pricing policies for both cereal and pulse grants and livestock (see Annex I-F for a discussion of pricing policy). It remains for an active research and extension service to provide the necessary support to achieve those production increases.

3. Employment Generation

As is the case in most other developing countries, the unemployment problem in Botswana stems from very low levels of productivity in the rural areas and an insufficient number of employment opportunities for those migrating into urban areas. The problem is particularly acute at this time for Botswana, because several important sources of employment during the last decade or more have levelled off and some are beginning to decline. According to a 1978 study,¹ the estimated breakdown of employment was as follows:

Formal sector, non-farm	64 500
Informal urban sector	12 000
Informal rural sector	17 500
Non-freehold crop production	35 000
Non-freehold livestock production	60 000
Freehold farms	6 500
Hunting and gathering	<u>5 600</u>
Total in Botswana	201 100
(Including migrant laborers in South Africa)	261 100

In very general terms, Lipton estimates the Botswana Labor Force to be almost 365 000, implying an unemployment level of over 100 000. Although it is difficult to discern from Lipton's analysis exactly where the unemployment is located, some estimates are possible. Demographic data show that population growth in urban areas is 13 percent per year, while growth in formal sector employment is less than 9 percent. This implies a very rapid growth rate in urban unemployment and underemployment. In the rural areas Lipton estimates that total

^{1/} Lipton, op.cit

employment in the crop and livestock sectors is about 95 000. Assuming conservatively that 160 000 persons are available for agricultural work and have no alternative means of employment, rural under-employment can be estimated at 40 percent.

Looking at the future, employment opportunities will have to grow by 11 000 to 12 000 per year to keep up with the increase in the Labor Force. This would not permit any reduction in the level of unemployment estimated by Lipton. Of the sectors shown above, employment in Freehold Farms, hunting and gathering and perhaps livestock are not likely to increase, while employment in South African mines can be expected to decline and eventually terminate. The key sectors, therefore, are the urban formal and informal sectors, the crop production sector and rural non-farm employment. If urban employment is projected to grow by 9 percent per year (7 000 new jobs), this leaves a minimum of 4 000 jobs to be provided in the crop and rural off-farm employment sectors. The problem obviously becomes much more serious as more and more people leave rural areas to seek employment elsewhere. A crucial factor in the development of Botswana will be to create opportunities for employment in rural areas. The GOB has designated the agricultural sector as being the most viable sector which can present opportunities for rural employment.¹

This Project is expected to impact on employment in several different ways. First if new or modified farming techniques can be discovered which will provide attractive income producing opportunities in farming, more rural people--particularly those in the younger age group--will chose to remain on the farm rather than seeking employment elsewhere. In some cases new job opportunities in farming will be created as more intensive cultivation techniques expands the labor requirement for agricultural production. In others under utilized labor resources can be used more productively. Moreover, the anticipated increases in productivity will provide more resources to pay wage labor.

Second, increased agricultural productivity and incomes will directly generate a demand for support services with both backward and forward linkages to the agricultural sector. Agri-business services such as farming inputs marketing and credit will require additional hands. Increased output will require more and better transportation, storage and processing services and facilities. These services in turn will generate additional demands for secondary support services which will also mean new jobs.

Additionally, the increased incomes in rural areas will have a multiplier effect and generate additional demands for consumer and social services which will also mean more jobs.

Lipton's target of 4 000 new jobs annually to be provided in the rural sector is indeed a challenge to development in Botswana. In as much as the two regions in which this research effort of the project is concentrated comprises about 35 percent of the traditional farming households in Botswana this would suggest that a proportional share of the target for the project area would be about 1 400 new positions annually.

1. However, both the GOB and USAID are not neglecting rural productive employment opportunities through the development of rural industries, hunting and gathering, and labor-intensive public works. Support for the first two programs is provided through USAID's Rural Sector Grant. An OPG to support the GOB's new Labor Intensive Public Works program is planned for

Initially it is expected that the research component of the project will involve only a relatively few farmers who will be directly participating in the FSR research studies. The approach will be to have each field team work with only three to four groups or clusters of farmers at various locations. These clusters will perhaps range from 20-40 in size, suggesting that about 100 farmers will be involved in each region. If as a result of the direct association with the project field staff, each farmer could increase his productivity and improve his management capability so as to be able to provide employment (albeit part time or for a member of his own family) for one additional person this would be a significant achievement. As more definitive research results are forthcoming and the demonstration effect results in other producers adapting their farming systems to new technology with concomitant productivity increases it is realistic to expect the demand for labor to increase significantly over the next decade. Increased availability of commercial seed likewise will contribute modestly toward this goal. Thus, while this project alone will not resolve Botswana's longer term employment problem it can contribute both directly and indirectly to creation of new employment opportunities within the project area. Moreover, given the diverse range of other development programs directed at similar objectives (ALDEP is perhaps the best example) other new jobs will be created in the agricultural sector. Over time, a multiplier effect will increase further the opportunities for rural employment and will therefore provide additional impetus for Botswana's development as more emphasis is placed on the rural areas.

4. Findings

While no formal cost-benefit analysis has been attempted here, the Project Design Team finds the project to be economically sound and a desirable element of the USAID Mission's assistance program for Botswana.

The Project will lead to increased output of food commodities (cereal grains, legumes) and thus reduce aggregate requirements for food imports. Modest foreign exchange savings will result, greater national economic independence will be achieved, and improved nutritional status for the population will be within reach. The Project is expected to contribute to employment generation and increased incomes in rural areas. There will be no adverse income distribution effects and the project will lead to greater economic equity redounding to the benefit of low income rural people. The Project will reinforce the GOB's goals to maintain the productivity of the natural resource base for future generations and will enhance the long run growth potential of the agricultural sector.

It is concluded that the project is economically feasible and an appropriate element of the USAID assistance program to Botswana.

SECTION C: SOCIAL ANALYSIS

1. Impact of the Project

The Project's greatest and most lasting impact will be in assisting the established research and extension service to better meet the needs of the majority of Botswana's farmers. The demonstration that the Farming Systems Research approach can act as a viable link between research and extension will strengthen these two institutions.

In the project areas, a direct impact will occur on the participating farms and communities. This impact will be enhanced as the project focuses on the resource poor farmer target group who hitherto have been neglected by most research and development efforts. Over the medium to long term, the impact will also spread beyond the participating farmers and project area given that the project will strengthen linkages between research and extension and develop technologies which are suitable for small farmers.

Over the long term, the Project is aiming towards, although in its very short time frame will not achieve, stabilizing community food production to self-sufficiency levels. The levels of production increase envisaged will help reduce the need for the farmer to use cattle sales or cash through remittances for the purchase of food to meet subsistence requirements. The acquisition and holding of cattle has a strong socio-cultural basis and represents both savings and wealth. As such, there is a strong incentive for smaller farmers who own cattle to produce arable crops to a level of self-sufficiency in order to avoid having to sell off a portion of their small herd to purchase food for consumption. The increase in food production will maintain the stability of production within the community and ensure the inequalities in production, consumption and income distribution are not exacerbated.

In sum, the impact of the project lies in its strength of existing institutions over the medium term to long term, the Project's impact on 'the farms' will be to increase food production to subsistence levels, thereby reducing the amount of cash spent on imported food purchases. By the end of the Project, research and extension institutions will enable the Government of Botswana to more fully meet the needs of its rural population.

2. Institution Building

One of the more important roles this project has to play is one of institution building. If Farming Systems Research is to have any long term impact on agricultural development in Botswana it must be seen to be a necessary and important supplement to the existing research and extension departments of the Ministry of Agriculture. Perhaps the most important area where Farming Systems Research can assist is by solving the perennial problem of the link between research and extension in agriculture. This is seen as being so important that the project includes a special position, the Research Extension Liaison Officer, to liaise between the research and extension departments.

The Farming Systems Research approach which focuses on the farmer is more likely to transfer the farmer's needs to the research station where the Farming Systems Research team will also have a strong input. The linkage with the research station will assist in changing the

focus of arable crop research in Botswana to more closely meet the needs of the resource poor farmers. The extension linkage can operate to improve the extension advice such that a wider range of farmers are addressed by the extension field staff.

The training of Botswana in Farming Systems Research methods is seen as perhaps the most important tool for successful institution building. The development of a cadre of Botswana with Farming Systems Research expertise will insure that this type of research approach will have longevity and stability.

3. Transferability

The rationale for the development of a farm typology is to group together farmers with similar farming systems, resource bases and problems. Thus, technologies developed on a few farms will be applicable to a large number of other farms of the same type. Although the Project will work directly with a few farmers representing various farming systems the solutions developed will be applicable and therefore readily transferable to many other farms of that type in and outside the project area.¹

Since most of Botswana's farmers operate the same traditional technology of broadcast plow planting (93 percent according to a 1980 Agricultural Statistics Survey) and have a similar resource base (59 percent have one to ten hectares and less than 40 head of cattle), it is not unreasonable to expect fairly broad applicability and hence transferability of technologies that are developed by the project to small farmers outside the project area.

Involving the extension service at an early stage in the Farming Systems Research methodology will facilitate the transfer of solutions to farmers' problems outside the project area. Eventually the supplementation of the extension advice with technologies appropriate to small farmers will enable the extension service to cover a wider range of farmers especially in the resource poor group who are at present largely neglected.

4. Location

The bulk of Botswana's population lives in the eastern part of the country along the railroad line, with the exception of a small concentration around the Okavango river delta. Southeastern Botswana and the Delta area are already served by two Farming Systems Research type projects, the Evaluation of Farming Systems and Agricultural Implements Project and the Agricultural Development Ngamiland Project. To date the Francistown and Central Regions have been by-passed by most agricultural research efforts, favoring the natural resources of the Okavango river delta system and the more densely populated and productive southern areas.

1. During the PP design, a group of Kansas State University faculty was in field identifying groups of resource poor farmers with similar problems, resources and farming systems (recommendation domains). Their analysis is not yet complete. As discussed in the Implementation Section of the PP, one of the initial tasks of the FSR field teams will be to refine these recommendation domains to ensure that technologies tested will be widely applicable to large numbers of farmers within the same group(s).

The areas selected for the Project contain many farmers who could be called small resource poor farmers. That is, they operate the traditional technology of broadcast plow planting, have less than twenty head of cattle, and less than four hectares of land. Thus, they are representative of the majority of farmers in the communal areas of Botswana.

Some of the farmer problems that will be identified by the Farming Systems Research teams may require infrastructural or institutional solutions. Although reasonable infrastructural support systems exist in the area, the problems stand their greatest chance of solution through focusing on areas where the district and national administration are concentrating their development efforts. In addition there will be a positive feedback effect with team members advising national and district officials where scarce sources for infrastructural development might best be employed.

5. Community Structures

It is at the community level that the social feasibility of this project is most important. The following two areas are of particular concern:

(a) It is difficult at this point to predict either the impact of the Project on village-level political institutions or the level of support the project will receive from these institutions. Some of the rural areas of Botswana are politically fractionalized along the lines of economic class, ethnic origin and allegiance to traditional versus modernizing elites. In some cases these lines of cleavage will run parallel to one another, and members of a single ethnic group will, for example, be disproportionately concentrated in one economic class. Situations of this sort could pose potential problems for a research project targeted at farmers with a similar resource base. If this target group is identified with a particular ethnic group or political faction, the Project runs the risk of losing wide-based community support. A narrow identification of the Project with particular ethnic or political interests would inhibit the spread of project innovations from participating to non-participating farmers.

(b) Little is presently known about the real units of agricultural production in the project area. Especially among resource poor farmers, these productive units may link together several farming households in draft and labor pooling capital intensive or draft-intensive technologies. Innovations of this kind would tend to concentrate shared resources in the hands of a few participating farmers, to the detriment of neighboring households.

Present attempts to identify groups of target farmers by Kansas State University faculty are taking into account in their selection, economic class, ethnic origin and allegiance to elites to insure that target farmers are not associated with particular factions. The KSU team includes a Rural Sociologist who is focussing principally on these issues. The Project includes a Botswana Sociologist half time during year one and full time when the team arrives in Francistown. It is anticipated that this individual will play a major role in refining the target groups selected and in the selection of individual farmers. A long term Sociologist is not being AID financed because it is felt that a Botswana would have a better understanding of these complex social relationships. Short term Technical Assistance in Sociology

and/or Anthropology will be provided with project funds, however, for special subject areas for which expertise is not available.

6. Beneficiaries

Table III-3 was prepared by the Agricultural Statistics Unit, Ministry of Agriculture, using 1980 national survey data. The ALDEP program focuses on farmers having four to ten hectares available for cultivation and 40 or less cattle. The potential target group of this project is slightly larger focussing on target groups of farmers having between one and ten hectares of arable land with 40 or fewer cattle. Of the 80 000 traditional farms in Botswana, this group comprises 47 300 or 59 percent of the traditional farmers in Botswana.

In reviewing Table III-3 which designates the target groups, it is important to keep in mind several basic facts about Botswana agriculture.

(a) For urban and rural Botswana alike, cattle are the principle measure and store of wealth. Cattle holdings therefore serve as an excellent proxy for more elaborate measures of economic class resource availability. In aiming the Project at farmers with 40 or fewer cattle, there can be no doubt that the project is explicitly directed at smaller farmers. As the table demonstrates, this economic class constitutes a significant portion that is 79 percent of the total farming population.

(b) Not all rural Botswana are involved in crop farming. This is especially true for the very rich and the very poor. The rich can profitably specialize in semi-commercialized open range cattle ranching. The poor, on the other hand, may be excluded from crop agriculture because they lack both capital resources and draft animals, usually oxen. In focussing on farmers with one to ten hectares of available land, the project is directed at smaller farmers with a demonstrated commitment to crop agriculture. Again, farmers within this range constitute an important segment that is 59 percent of the national farming population.

(c) In Botswana as elsewhere, it is virtually impossible to design technologies applicable only to resource poor farmers. It is quite likely, therefore, that innovations designed for smaller farmers will also be adopted by larger farmers. In addition to the immediate target group, the beneficiaries of this Project will include a large and wealthier group of farmers.

(d) There should be little expectation that this project will directly help the very poor (those with less than one hectare of cultivated land). In Botswana this segment of the rural population is not significantly in crop agriculture and lacks the basic means.

7. Women

Women are responsible for most of the small scale crop agriculture in Botswana. They make the farming decisions, and frequently do the planting, weeding, harvesting and marketing of arable agriculture products. Since women will be among the primary beneficiaries of the project (at a minimum 40 percent of the beneficiaries in the target group are women) there would be no purpose in devising programs within the Project which would treat women as a special interest group. Instead, the target group has been defined (and broadened in relation to the

Table III-3: Traditional Farms Classified by Number of Arable Hectares Available and Size of Cattle Herds^a

Cattle Land (ha)	0	1-10	11-20	21-30	31-40	41-50	51-60	61-100	101-150	150+	TOTAL
0	3 400	1 400	600	1 000	750	300	500	950	250	750	9 900
.1 - 1.0	3 850	1 350	700	550	100	150	200	400	50	250	7 600
1.1 - 2.0	5 450	3 100	2 200	750	600	550	300	350	150	50	13 500
2.1 - 3.0	3 750	1 800	2 250	1 000	550	200	100	300	200	450	10 600
3.1 - 4.0	2 600	2 200	1 750	1 000	550	650	450	450	250	200	10 100
4.1 - 5.0	1 400	1 050	1 400	1 600	550	300	150	450	700	0	7 600
5.1 - 6.0	550	1 550	1 150	950	500	450	200	550	400	0	6 300
6.1 - 7.0	600	450	1 200	350	500	100	650	50	100	0	4 000
7.1 - 8.0	450	600	1 250	1 150	500	350	400	400	200	300	5 600
10.1+	250	300	700	750	400	450	50	800	700	400	4 800
TOTAL	22 300	13 800	13 200	9 100	5 000	3 500	3 000	4 700	3 000	2 400	80 000

a. Availability of arable land is defined as that land that families have cultivated sometime in the last five years.

Source: Department of Planning and Statistics, Ministry of Agriculture

ALDEP program) to include the smaller farmers of which a large proportion are women.

It will be absolutely essential to sensitize expatriate personnel to the fact that the majority of farmers are females.

SECTION D: ENGINEERING CONSIDERATION

The seed processing facility at Pitsane will be financed by the GOB and furnished with equipment supplied by AID. BAMB has specified the building size based on the seed processing capacity recommended by a US Department of Agriculture Consultant. A Seed Processing Technologist has specified the equipment necessary to meet this capacity. An AID Engineer has reviewed the construction program proposed by BAMB and has inspected the construction site. The site is a plot already allocated to BAMB adjacent to the existing BAMB depot in Pitsane. The plot is large enough to easily accommodate the proposed construction and will have adequate transport access when the existing railway spur and road in the depot are extended. Electricity for the seed processing equipment will be supplied from the existing, under-utilized, generator at the depot. The building will be similar to the grain storage warehouses BAMB has erected throughout Botswana over the past few years. Based on the contributions by consultant specialists, the review and inspection by an AID Engineer and the previous experience of BAMB, the proposed site, design and construction program are considered adequate and appropriate for the project.

SECTION E: ADMINISTRATIVE ANALYSIS

1. Administrative Arrangements for US Technical Assistance

a. Coordination Among Three Locations by Team Leader

The US long term Technical Assistance team will be located in four different and widely dispersed locations within Botswana: three members will be located in the Gaborone area (the Team Leader and the Cereal Agronomist at the main research station at Sebele and the RELO in Gaborone at the MOA's Department of Agricultural Field Services); two in Mahalapye (Central Agricultural Region), 200 km north of Gaborone; three in Francistown (Francistown Agricultural Region) 465 km north of Gaborone; and a financed Commercial Seed Production Advisor hired under an OPEX arrangement in Lobatse, 75 km south of Gaborone.

This distribution is necessary due to the location of existing GOB agricultural infrastructure and the need to work with different farming systems. Although access to Gaborone from Mahalapye and Francistown is good (first class paved roads), US advisors will be housed at their respective stations, which will make the administration of the project slightly more difficult. For this reason, and the general complexity of the project involving eight long term team advisors and 55 person months of short term Technical Assistance, an overall Team Leader is deemed necessary. This person will be an experienced agricultural professional who can coordinate the work done by the US team at the various locations and serve as the team's spokesman with the MOA in Gaborone. In the context of his overall coordinative role, the Team Leader will report to the Permanent Secretary for cooperation between research and extension; to the MOA Director of Agricultural Research through the designated coordinator of Farming Systems Research for the research component of the project and to the Director of Agricultural Field Services for the extension component of the project. He will be represented routinely in extension by the RELO. He will also play an important substantive role as Farming Systems Economist supporting the research/extension structure, with progressively more time devoted to the substance of research in the later years of the project.

b. Administrative Support for the US Team

The Team Leader will be based at the main research station at Sebele, where he can work closely with research activities. A separate office in Sebele will be provided by the GOB for the Team Leader. The Team Leader will make two pre-implementation visits to ensure that logistical and other arrangements are made prior to the team's arrival. His early tasks will also include planning the arrival schedules for the long term advisors and the first short term consultants, working closely with both research and extension to select the first groups of Batswana to go to the US for academic training and laying the professional groundwork and work plan for the balance of the US team.

An Administrative Assistant will be contracted through the USAID/Botswana Support Office and will assist the team leader with the difficult logistical support problems associated with coordinating teams located in four different project areas. Additionally, this individual will assist the USAID/Botswana Field Support Office (FSO) in providing housing and household maintenance for the team as described below.

The administrative responsibility for long term technicians, once they have arrived in country, will rest with the USAID/Gaborone Field Support Office (FSO) which is currently responsible for all contract personnel. The FSO will provide the eight man team services relating to housing repair and maintenance in the event that the GOB is unable to provide these services. Moreover, the FSO will be responsible for supplying supplemental furnishings in addition to that provided by the GOB. The FSO will also assist with travel arrangements, shipment of household effects from Botswana and other related support. The addition of a project-financed Administrative Assistant to assist in logistical support will strengthen the capability of the FSO to provide assistance to an additional eight long term technicians.

c. Housing of the US Team

Housing for the US team in the four locations previously mentioned will be the responsibility of the GOB. The GOB has prescribed standards for staff housing which are suitable for expatriate professionals. The GOB will designate three houses from previously USAID financed projects in the Gaborone/Sebele area for the team leader, RELO and the Cereal Agronomist. In Mahalapye, two GOB houses will be available (and if not available will be constructed by the GOB), for the Agricultural Economist and the Agronomist. The Commercial Seed Production Advisor will be housed by the GOB in Lobatse. In Francistown, where housing is in short supply, the GOB has indicated that if adequate housing is not available previous to the team's arrival, the GOB will lease appropriate housing. Maintenance of the GOB-provided houses will be the responsibility of the Botswana Housing Corporation (BHC) at no cost to the Project. In the event that BHC is not able to provide timely and effective maintenance the USAID/Field Support Office will provide such services with Project funds.

d. Selection of the US Contractor

The Mid America International Agricultural Consortium (MIAC) comprised of the Universities of Nebraska, Missouri, Kansas State, Oklahoma State and Iowa State has assisted the USAID/Botswana office in the preparation of this Project Paper under the terms of a Title XII Collaborative Agreement, between the AID/W and MIAC entered into as of June 26, 1981. Subject to the authorization of the Project and signature of the Project Agreement after AID/W review, and with the concurrence of the GOB and USAID/b, a contract will be negotiated with MIAC as the Contractor to assist the GOB in implementing the Project.

2. Role of USAID/Botswana

a. Administrative and Logistical Support

The USAID Project Manager will be the Agricultural Development Officer (ADO). He will act as liaison between the Project Team and USAID/Botswana on matters pertaining to program and substance. He will be largely responsible for conducting Project Evaluation Summaries (PES) in cooperation with the team and the GOB. As discussed above, the USAID/Field Support Office will assist the Team Leader in facilitating the smooth start up of the Project in the first months following the team's arrival, as well as continuous logistical support similar to that provided to all contract teams presently operational in Botswana.¹ A copy of the Mission logistical support policy for contract technicians is included in Annex II H of this Project Paper.

1. The CPEX Commercial Seed Production Advisor will not receive USAID logistical support but will receive such support from the GOB.

b. Project Monitoring

The Mission has discussed in detail its management responsibilities under the proposed project. The Mission's Agricultural Development Officer (ADO) will provide overall guidance and supervision to the US Technical Team and will monitor various aspects of the project. With the USAID-financed Crop Production Project having phased out and the Livestock and Planning Projects scheduled for phase out in 1983, it is anticipated that the ADO will have sufficient time to devote to the management of this complex project. As a matter of policy, the Team Leader will participate in substantive monthly meetings with the Project Manager concerning on-going implementation of the Project. A detailed description of an evaluation plan can be found in Part IV, Section D.

3. Summary Discussion of the Organization of the Participating
GOB Institutions¹

a. Organization of the Ministry of Agriculture

Research, extension and training activities in the livestock and arable production area come under the umbrella of the Ministry of Agriculture (see Annex IA), facilitating coordination between the various activities. Being specially geared towards smaller traditional farmers the proposed Project addresses particular aspects within the Department of Agricultural Research (DAR) program and the Department of Agricultural Field Services (DAFS). Within the context of an overall Farming Systems Research approach it also proposes to improve the linkage between the two departments.

The DAR, DAFS, BAMB and the Division of Planning and Statistics of the Ministry of Agriculture (MOA) will all be involved in this Project. Overall project coordination will be the responsibility of a project Reference Group, following normal GOB procedures. This Reference Group which will meet at least twice each year, will be chaired by the MOA Permanent Secretary and will be comprised of representatives of DAR, DAFS, BAMB and the Division of Planning and Statistics. As discussed below, the overall organizational structure of MOA is adequate for support of the project although staffing is thin in some areas and many posts are occupied by expatriates. Numerous Batswana are away for degree level training; some are also enrolled in the Botswana Agricultural College for certificate and diploma level training. These persons will soon be available for localization of certain posts.

b. Agricultural Extension

The DAFS in the Ministry of Agriculture has responsibility for agricultural extension services. The extension activities are centered in the Field Section of this department which is headed by the Principal Agricultural Officer who reports to the Deputy Director of DAFS. The Deputy Director coordinates activities of the section and reports to the Director of DAFS. Within DAFS, specialist support for extension is provided by four Divisions, (a) Animal Production; (b) Land Utilization; (c) Crop Production; and (d) the Agricultural Management Association. Other specialist support within the Ministry of Agriculture is provided by: (a) the Department of Agricultural Research, (b) the Department of Animal Health, (c) the Department of Cooperative Development, and (d) the Agricultural Information Section.

1. Detailed descriptions of these institutions is included in Annex IC and ID of this Project Paper.

Responsibility for direct extension work with farmers lies with a cadre of about 200 Agricultural Demonstrators (ADs) with certificate level training from Botswana Agricultural College. This cadre is distributed throughout the cultivated land areas of Eastern and Northern Botswana. The three Western districts (Tsabong, Hukuntsi and Ghanzi) have no ADs at present. In the remaining seventeen districts there is a shortfall of ADs due to the trained manpower shortage. Because of the vacancies, present coverage is about 75 percent of the total potential. The situation will improve since the Botswana Agricultural College has doubled its enrollment of certificate level students through an AID financed grant. It is anticipated that by 1983 most vacant AD positions will be filled. Thus, when this project has generated technologies for extension to small farmers, the AD positions will be fully staffed.

In this respect, three Agricultural Supervisors (ASs) will be assigned to each of the two field teams. These ASs who will be seconded to the project from Agricultural Field Services, will work directly with ADs and farmers in FSR experimentation. The assignment of these ADs will help strengthen the linkage between research and extension. Because these individuals will be assigned directly to the project on a full time basis, this will ensure that extension services will be available to the team when needed.

The country is divided into six agricultural regions, and each region is composed of two or more districts. An agricultural district is staffed by a District Agricultural Officer (DAO) and a District Agricultural Supervisor (DAS) to supervise the cadre of Agricultural Demonstrators (i.e. the twelve or more per district if all positions are filled). The Regional Agricultural Office links the districts with the Ministry; these offices are staffed by a Regional Agricultural Officer (RAO), Animal Production Officer, Land Use Officer, Agricultural Management Association Officer, Ranch Extension Officer, and a 4B Club Supervisor. Regional Crop Production and Horticulture positions are also being proposed.

There has been a shortage of qualified individuals to serve in key DAO and RAO supervisory positions. The establishment of a diploma program at the Agricultural College (graduating its first class this year) will provide additional manpower to fill DAO positions. Additionally BS training being provided under the AID financed programs (SAMDP and Agricultural Planning) is beginning to alleviate the shortage at the RAO level.

Extension education as conducted by the Department of Agricultural Field Services is geographically oriented in the field. The recent addition of the position of Crop Production Officer at the regional level adds some needed specialization in that field for ADs in the arable crops area. The experience of the Field Services in the conduct of demonstrations is an asset in the initiation of the FSR project. Extension personnel assigned to identify with or to work on the project will have had significant experience in contacts with farmers. To reinforce the field-based work of ADs, three Rural Training Centers are located at Sebele, Mahalapye and Maun to provide facilities for training courses for farmers. Two additional centers near Francistown and Kanye are planned. Six Government ranches are also used for farmers' short courses. In the six year period from 1978 - 1979 the short courses served 21 724 participants.

The extension effort is being improved by organizing the country into regions and districts for administration and support services. A five year training plan has been developed and is being implemented for increasing the number of qualified personnel. In-service training is well planned and improving in quality. The FSR program will further improve the quality of extension work by (a) increasing staff and expanding research at the central Experiment Station and other locations; (b) providing a Research Extension Liaison Officer to facilitate getting research to the field and feedback to researchers; (c) providing training to extension workers at training meetings and through participation of ADs and others in the conduct of tests and trials on farmers' fields; and (d) and most importantly, providing additional relevant technology for use by farmers through field tests and farmer trials.

c. Department of Agricultural Research

Agricultural research and development work in Botswana began in the late 1940s. At that time major emphasis was placed on variety selection for major commodities and on specialized research activities reflecting the interests of researchers. Later research emphasis shifted to livestock and currently a major share of research work still continues to be directed towards animal production problems.

Currently the DAR is divided into two divisions, namely Animal Production and Range Research, and Arable Research. The strengths of the two divisions in terms of staffing are given in the following table.

Table III-4: Staff in the Two Research Divisions of DAR^a

Position	DIVISION	
	Animal Production and Range Research	Arable Research
Establishment:		
Professional ^b	8 (5)	16 (10)
Technical support	(41)	(35)
Project staff ^c	10	10

- a. This table does not include staff outside the divisions, for example, under the Director, in the Estate Management Unit, etc.
- b. The figures in brackets indicate those filled with Botswana.
- c. These are staff funded by donor agencies who don't fill establishment posts.

(1) Division of Animal Production and Range Research

Current research activities in the Division of Animal Production and Range Research can be divided into three main groups as follows:

- (a) Work on pastures involving range monitoring, increasing productivity of natural pastures and pasture improvement through fertilization and introduction of new grasses and legumes.

(b) Work on cattle involving collection of baseline data on beef production, improving productivity of cattle through breeding and improved nutrition programs, economic evaluation of different beef production systems, modelling of Botswana livestock production systems, and work on milk production and dairy management.

(c) Recently work on sheep and goats involving the collectin of base-line data and breeding for dropping lambs and kids in autumn and spring.

(2) Division of Arable Research

Currently research activities can be divided into five groups as follows:

(a) Basic research under the auspices of the Dryland Farming Research scheme (DLFRS) funded by the Ministry of Overseas Development, UK, involving physical factors inhibiting crop emergence, investigating aerial and edaphic factors which affect the growth of the established crop and looking at factors that determine optimum plant population.

(b) Improvements in the ox cultivation system mainly in Eastern Botswana which is undertaken under the auspices of another UK Government-sponsored project called Evaluation of Farming Systems and Agricultural Implements Project (EFSAIP). Some of this work takes place on farmers' fields.

(c) Fertilizer response studies formerly financed through a FAO Fertilizer Program and now to continue with inclusion of soil type and agronomic practices.

(d) Work in the area of Crop Protection including control of insects, diseases and weeds.

(e) Product programs involving screening cereal and legume crop varieties, work on horticultural crops involving irrigation, and limited work on wheat and groundnuts.

(f) Area programs involving improvements to the Molapo (flood plain) agriculture system in Ngamiland, and work on improving arable agriculture in the Kalahari sands system.

With the new GOB emphasis on creating employment opportunities for Batswana in rural areas and the subsequent initiation of the ALDEP program, the GOB has only recently begun to focus on arable agricultural research. A substantial proportion of the current research program is funded by donor agencies, providing little flexibility to fit the new changing requirements of the GOB. The structure of research therefore reflects a mixing of the classic research model with research along disciplinary lines supplemented by donor sponsored projects in selected problem areas. This is particularly the case in the Division of Arable Research where the presence of many commodities makes a durable interdisciplinary commodity approach to research difficult when research resources are limiting.

The presence of critical gaps in on-station research has precluded work which addresses the problems of limited resource farmers. These gaps, coupled with a lack of coordination between Botswana's Department of Agricultural Field Services (the extension service), work on small farmers' fields, and the absence of an overall research strategy have contributed to an inability on the part of the GOB to deal with small farmer production problems in arable agriculture.

The GOB is well aware of the problems associated with developing small farmer technologies and is strongly committed to the establishment of a strong research program in this area. The MOA's Department of Agricultural Research, Field Services and Division of Planning and Statistics are developing a research strategy which they anticipate will more effectively utilize GOB and donor resources in focussing on small farmer problems and which will strengthen the linkage between small farmers, the Department of Field Services and the Department of Agricultural Research in this effort. Within the context of this research strategy, the GOB is committed to the broad principles of moving towards a commodity research focus in cereals and legumes at the national research level, to support the establishment of an integrated Farming Systems Research program in rural Botswana, and to strengthening the linkage between research and extension.

As discussed in the technical analysis, in the context of an FSR approach, the project is providing a series of inputs to improve the capacity of the research station and to focus its program along commodity lines. The following will be provided: (a) a Research/Extension Liaison Officer/Legume Agronomist for five years; (b) a Cereals Agronomist for three years; (c) a Sorghum Breeder through other donor resources; and (d) short term technical assistance in key subject areas and (e) training of counterparts to serve in key positions.

(3) Coordination

A significant weakness in the present situation in the MOA is the lack of coordination between research and extension. The Research/Extension Liaison Officer is a very important position in achieving this cooperation in the arable crops area. This person will interact between Research and Extension. Feedback from the field teams will be disseminated throughout DAFS by the RELO as to the successes and failures of research that originate on farmers' fields. New research results coming out of the Sebele or Mahalapye Research Stations and farmers' fields will be coordinated by both the Team Leader and RELO in achieving maximum dissemination to the MOA's extension personnel. The RELO will report directly to the Director of Field Services and maintain liaison with both the Director of Research and the Permanent Secretary of Agriculture.

Within the Department of Agricultural Research there will be more precise focus and coordination of the research projects on farmers' problems, especially within the context of a commodity approach. The present organization particularly within the arable crops area seems to be largely by discipline or by donor sponsored project. The DAR, DAFS and the Division of Agricultural Planning and Statistics are presently developing an Agricultural Research Strategy which will define more closely the direction of agricultural research in Botswana.

Under the proposed project, the Team Leader will report directly to the Director of Agricultural Research at Sebele. The interfacing research results from either the research station or the farmers' fields will be directed toward the main office at Sebele. Recommendations will then be channelled out to the extension staff by the RELO. The team will also liaise with the Division of Planning and Statistics in order to institutionalize the linkage between work at the farmer level with national policy.

It is the opinion of USAID/Botswana that the GOB is committed to the institutionalization of the research-extension link. Both research and extension are cooperating in arranging for counterparts for the technical staff members of the project. Similarly both departments are cooperating in providing logistical support services, offices, transportation and equipment for the staff working on the project. The GOB is committed to providing offices for staff members at Sebele, Gaborone, Francistown and Pitsane. Similarly eight vehicles are committed to the project.

To assist in coordination and cooperation two reference groups are to be established by the GOB:

(a) A reference group under the chairmanship of the Permanent Secretary will meet twice per year. This group will have representatives from the various institutions with which the Project is to be linked (e.g. DAFS, DAR, Division of Planning and Statistics, BAMB, etc).

(b) A professional reference group under the chairmanship of the Head of the Arable Crops Division will meet every three months where the Team Leaders of the various Botswana Farming Systems Research teams will meet (e.g. this Project, the SAREC Project in Ngamiland, EFSAIP, Dryland Farming Research, and the Animal Production Research Unit).

SECTION F: FINANCIAL ANALYSIS AND PLAN

1. Summary

The total budget for this project is \$12,309,000 of which USAID will contribute \$9 180 000. The GOB contribution will be \$3,129,000 which is 25.4 percent of the total Project costs. Major components of the budget are in Table III-5.

Table III-5: Summary of Project Costs (US dollars)

USAID	Item	GOB
4 059 397	Technical Assistance	635 266
1 437 124	Technician Support	441 465
320 000	Commodities	190 970
345 000	Operations and Support	97 072
--	Construction and Rent	1 061 499
714 000	Training	220 350
1 503 456	Inflation	482,378
801 023	Contingency	--
9 180 000	TOTAL	3,129,000

The budget has been prepared in close cooperation with GOB officials. Project Paper design members and USAID/Botswana officers have met numerous times with top Ministry of Agriculture and Ministry of Finance and Development Planning Officers to review the GOB Project budget and recurrent cost implications. In addition, two members of the MOA worked with the team to prepare the Project Paper.

It is evident that the GOB fully recognizes the recurrent costs inherent in implementing a Farming Systems Research project of this magnitude and has clearly demonstrated its willingness and ability to meet both capital and recurrent cost requirements attributed to the GOB in the Project budget. The recurrent costs to the GOB are estimated to be the pula equivalent of \$250,000 per year after project completion. This will be mainly for salaries and operational costs to sustain the research capacity at the end of project level and to operate the commercial seed production unit with BAMB. Currently, the Ministry of Agriculture's annual operational budget ceiling is approximately \$11,150,000 with a projected annual real increase of 10.37% annually through the end of the Fifth National Development Plan period. Thus, the additional recurrent costs of the project are estimated at about 2.27% of the Ministry's current budget and well within planned budget increases.

2. Estimated AID Contribution by Fiscal Year

Table III-6: AID Expenditures by Fiscal Year (US dollars)

a. Details

ITEM	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	TOTAL
<u>1. Technical Assistance</u>							
Long term: ^a							
Ag Economist (Tex- Leader)		105 040	97 411	96 140	96 140	96 140	490 871
RELO		105 040	97 411	96 140	96 140	96 140	490 871
Ag Economist		105 040	97 411	96 140	96 140	96 140	490 871
Agronomist		105 040	97 411	96 140	96 140	96 140	490 871
Ag Economist			97 411	96 140	96 140	96 140	385 831
Agronomist			97 411	96 140	96 140	96 140	385 831
Animal Scientist			97 411	96 140	96 140	96 140	385 831
Cereal Agronomist				96 140	96 140	96 140	288 420
Commercial Seed Advisor ^b		100 000					100 000
Short term:							
Consultants ^c	25 000	75 000	100 000	150 000	100 000	100 000	550 000
Sub total	25 000	595 160	781 877	919 120	869 120	869 120	4 059 397
<u>2. Technical Support</u>							
		180 000	284 802	325 922	323 200	323 200	1 437 124
<u>3. Commodities</u>							
	320 000						320 000
<u>4. Operations and Support</u>							
Vehicle maintenance		7 000	8 000	10 000	10 000	10 000	45 000
Special research cost		60 000	60 000	60 000	60 000	60 000	300 000
Sub Total		67 000	68 000	70 000	70 000	70 000	345 000
<u>5. Training</u>							
MSc degree ^e		60 000	60 000				120 000
BSc degree ^f				60 000	240 000		300 000
Short term	21 000	63 000	84 000	84 000	42 000		294 000
Sub total	21 000	123 000	144 000	144 000	282 000		714 000

a. See Annex III-A for details on how these were calculated.

b. Employed under OPF arrangement.

c. 55 person months.

d. Project support budget for long term advisors outside University contract and pro-rated (see Annex III-A).

e. Three participants

f. Five participants some of these funds are allocated a little early to permit flexibility in timing of training

(b) Summary including inflation and contingency

<u>1. Technical Assistance</u>	25 000	595 160	781 877	919 120	869 120	869 120	4 059 397
<u>2. Technical Support</u>		180 000	284 802	325 922	323 200	323 200	1 437 124
<u>3. Commodities</u>	320 000						320 000
<u>4. Operations and Support</u>		67 000	68 000	70 000	70 000	70 000	345 000
<u>5. Training</u>	21 000	123 000	144 000	144 000	282 000		714 000
Sub total (in 1981 prices)	366 000	965 160	1 278 679	1 459 042	1 544 320	1 262 320	6 875 521
Inflation			127 867	305 827	511 169	558 593	1 503 456
Costs with inflation added ^a	366 000	965 160	1 406 546	1 764 869	2 055 489	1 820 913	8 378 977
Contingency ^b		96 516	140 654	176 487	205 546	182 091	801 296
GRAND TOTAL	366 000	1 061 676	1 547 200	1 941 356	2 261 037	2 003 004	9 180 273

a. 10% compounded.

b. 10%

Rounded to: 9 180 000

3. Estimated GOB Contribution by Fiscal Year

Table III-7: Breakdown of Costs by GOB by Year (US dollars)

Component	FY 82	FY 83	FY 84	FY 85	FY 86	TOTAL
Technical Assistance:						
Counterparts	38 429	60 233	71 067	86 607	87 692	344 028
Supporting staff	36 634	61 851	64 251	64 251	64 251	291 238
Technical Support:						
per diem, duty allowances	31 075	50 850	55 935	55 935	55 935	249 730
Use of private vehicles for business	24 701	38 600	42 058	42 058	44 318	191 735
Commodities:						
Vehicle purchase	50 850	30 510		50 850	30 510	162 720
Agricultural implements	5 650	5 650	5 650	5 650	5 650	28 250
Operations and support:						
Stores	2 260	2 599	2 988	3 437	3 952	15 236
Office supplies	2 260	2 260	2 260	2 260	2 260	11 300
Research support	5 650	12 995	14 943	17 185	19 763	70 536
Construction and rent:						
Seed building	723 629					723 629
Offices	90 400	67 800	11 300			169 500
Rondavels:						
in villages	13 560	13 560				27 120
in Tutume (guest house)		5 650				5 650
Rent of houses	16 950	27 120	30 510	30 510	30 510	135 600
Training:						
Long term					220 350	220 350
Sub total	1 042 048	379 678	300 962	358 743	565 191	2 646 622
Inflation (10% compounded annually)		37 968	63 362	118 743	262 305	482 378
TOTAL	1 042 048	417 646	364 324	477 486	827 496	3 129 000

4. Summary of Project Inputs by Foreign Exchange and Local Costs

Table III-8: Project Foreign Exchange and Local Costs (US dollars)

ITEM	AID		GOB		TOTAL		GRAND TOTAL
	FX	LC	FX	LC	FX	LC	
Technical Assistance	4 059 397			635 266	4 059 397	635 266	4 694 663
Technical Support	434 402	1 002 722		441 465	434 402	1 444 187	1 878 589
Commodities	320 000		190 970		510 970		510 970
Operations and Support	300 000	45 000	87 072	10 000	387 072	55 000	442 072
Construction and Rent			861 499	200 000	861 499	200 000	1 061 499
Training	714 000		220 350		934 350		934 350
Inflation	1 232 834	270 622	250 000	232 218	1 482 834	503 000	1 985 834
Contingency	656 839	144 184			656 839	144 184	801 023
GRAND TOTAL	7 717 472	1 462 528	1 609 891	1 519 109	9 327 363	2 981 637	12 309 000

AID Obligations Schedule by Fiscal Year (\$000)

	<u>FY 81</u>	<u>FY 82</u>	<u>FY 83</u>	<u>FY 84</u>	<u>FY 85</u>	<u>FY 86</u>	<u>TOTAL</u>
1. Technical Assistance	80	931	1 311	879	580	278	4 059
2. Technical Support		433	97	328	207	369	1 434
3. Commodities	320						320
4. Operations and Support		135	70	70	35	35	345
5. Training	361			212	141		714
6. Inflation		383	355	328	212	226	1 504
7. Contingency		214	198	182	118	92	804
TOTAL	761	2 096	2 031	1 999	1 293	1 000	9 180

PART IV: IMPLEMENTATION ARRANGEMENTS

SECTION A: IMPLEMENTATION SCHEDULE

A list of critical events for the Project is included in Annex II B of the Project Paper. Some of the major events are summarized below. It is anticipated that the Project will be authorized in mid-September 1981, with Project Agreement signature schedules for no later than September 30, 1981. Procurement of the US equipment for the Commercial Seed facility will be initiated as soon as the Project Agreement is signed. The Technical Assistance contract will be signed by January 1981 with the Contractor's Team Leader and Campus Coordinator visiting Botswana for two to three weeks to analyze logistical support and draw up preliminary work plans during March of 1982. In July 1982 five of the long term technicians will arrive (the Chief of Party, the Research Extension Liaison Officer/Legume Agronomist, the Agronomist and Agricultural Economist for Mahalapye and the Commercial Seed Production Advisor to be stationed at Pitsane). By August 30, 1982 these technicians will have finalized their work plans. By September 30, 1982 the team will have finished the remaining work on recommendation domains (identifying groups of target farmers with similar characteristics) and by October 30, 1982, they will have begun work with specific target farmers. In July 1983, the Agronomist, Agricultural Economist and Animal Scientist for Francistown will arrive. By August 30, 1983, the team will have completed work on the recommendation domains and by October 30, 1983 they will have begun work with specific target farmers. By July 1984 the Cereals Agronomist will have arrived at Sebele. In July 1985 the first external evaluation will have taken place. The Project's PACD will be August 1, 1988, by that time the final evaluation will have been completed and most positions will be localized with participants trained under the Project.

SECTION B: IMPLEMENTATION RESPONSIBILITIES

1. Government of Botswana

a. Department of Agricultural Research

The biggest GOB obligation in terms of staffing and recurrent costs will be made by DAR. With the arrival of the first long term technicians (July 1982) DAR will provide two counterparts, one at the BSc level who will immediately be sent off for MS training. This person will return and work with the Cereal Agronomist who is scheduled to arrive at Sebele in July 1984. The other counterpart will be a diploma level person who will be counterpart to the Agronomist in the Mahalapye FSR team. This person will be replaced by another one when he/she departs for BS degree training in July 1984. Then in July 1983, another Agronomist counterpart will be stationed with the Francistown FSR team and once again will be replaced when he/she goes for further training in July 1985. (This move will mean a transfer of the person from DAFS to DAR--see b below).

In addition the DAR will provide substantial support staff. Starting July 1982 these will include one Agricultural Demonstrator, nine Statistical Assistants (Enumerators), two Secretaries and one Driver. In order to staff the Francistown FSR team additional support staff will be required in July 1983, namely seven Statistical Assistants, one Secretary and one Driver.

b. Division of Agricultural Field Services

In July 1982 DAFS will provide a BSc counterpart who will immediately be sent for MS training as an Agronomist. In the meantime, the counterpart to the RELO/Legume Agronomist will be a diploma level person who will be transferred to the Francistown FSR team about the time the MS trained person returns to replace him/her. This person will then be counterpart to the Agronomist which will mean being transferred from DAFS to DAR (i.e. see a above). Also in July 1983 DAFS will provide a counterpart for the Animal Scientist at Francistown. This person will be replaced by another diploma level individual when he/she is sent for further training in July 1985.

In addition DAFS will provide three Agricultural Supervisors (i.e. certificate level) in July 1982 who will work with Project farmers in the Mahalapye area and a further three Agricultural Supervisors to work with Project farmers under the Francistown based team in July 1983.

c. Division of Planning and Statistics

The counterparts to the Agricultural Economists in the Project will be provided by the Division of Planning and Statistics. In July 1982 one BSc level person will be sent for MS training. In the meantime, a diploma level person will be counterpart to the Team Leader. Close to the return of the MS level person, the diploma level individual will be transferred to the Francistown FSR team where he/she will be counterpart to the Agricultural Economist. This person will be replaced by another diploma level individual when he/she goes for BS level training in July 1985.

In July 1982 another counterpart of diploma level will work with the Agricultural Economist on the Mahalapye based FSR team. Once again he/she will be replaced by another one of diploma level when he/she goes for BS training in July 1984.

d. Botswana Agricultural Marketing Board

BAMB will provide partial salary support for the OPEX Commercial Seed Production Advisor who will be provided for 2.5 years. In addition, during the period there will be two counterparts of diploma level both of which will go on a six months training course. BAMB will also provide support staff in the form of an Agricultural Demonstrator and a Secretary.

e. Other Inputs by GOB

The GOB will be responsible for providing adequate housing for the Technical Assistance personnel, counterparts and where necessary, for other support staff. Four professional level staff (i.e. Technical Assistance and counterparts) will be located in Gaborone/Sebele starting July 1982 while another four will be stationed at Mahalapye. At the same time two will reside in Lobatse and work for BAMB in Pitsane. Six professional staff will be located in Francistown in July 1983 and a further two at Gaborone/Sebele in July 1984. A guest house of two rondavels plus shower is needed at Tutume in July 1983 and a total of twelve rondavels (i.e. six in July 1982 and six in July 1983) to be provided by DAFS are required for support staff living in villages where Project farmers are located.

Offices required include three at Sebele in July 1982 with another one in July 1984, one at DAFS headquarters in July 1982, three to be supplied by DAFS at Mahalapye in July 1982, and in July 1983 four at Francistown also to be supplied by DAFS with another two at Tutume. A further office will be required in Pitsane which will be supplied by BAMB.

In terms of vehicles two will be required at Sebele/Gaborone in July 1982. One will be supplied by DAFS. The other one and two further ones required at the same time in Mahalapye will be supplied by DAR. DAR will also provide three further vehicles in Francistown in July 1983. BAMB will supply one at Pitsane in July 1982. (Maintenance of these vehicles will be done in the private sector with funds provided out of the Project). All vehicles will be replaced by GOB after three full years of use when it is anticipated they will have done at least 30 000 km.

Other recurrent costs including per diem, some stores and implement purchase will also be met by GOB mainly through DAR. Two other major contributions by GOB will be provision of the \$723 629 BAMB seed building at Pitsane and fifteen years of degree level training to be funded by GOB for later counterparts at the end of the Project.

2. AID

USAID/Botswana will be responsible for project monitoring, and the USAID/Botswana Project Manager (the Agricultural Development Officer) will serve as the primary contact point for the contract team's Team Leader and will be responsible for obtaining decisions on contract and project matters. USAID/Botswana will prepare necessary PIO/Ts and Project Implementation Letters and will be responsible for preparation of all Project Evaluation Summaries and coordinating the two external evaluations.

As discussed in the Administrative Analysis, USAID/Botswana's Field Support Office (FSO) jointly with the GOB will provide in-country logistical support for the long term technicians. The FSO will be responsible for providing supplementary furniture, the upgrading of housing, and for maintaining housing in areas not normally serviced by the Botswana Housing Corporation, as well as assisting with travel arrangements, shipment of household effects from Botswana, etc.

3. Contractor

The design of this project was carried out through the Collaborative Mode with assistance provided by a Title XII, Institution; it is planned that the project will be implemented by the same institution, the Mid-America International Agricultural Consortium (MIAC). AID/W, in coordination with USAID/Botswana, will contract with MIAC to provide the short¹ and long term² Technical Assistance proposed for the project as well as administrative arrangements related to recruitment, transportation, shipment of household effects, etc.

The Contractor will be responsible for implementing all project funded short and long term participant training (in country, third country and the United States). All administrative responsibilities related to the selection of trainees, design of individually tailored training programs, placement of students and transportation will rest with the Contractor.

-
1. With the exception of short term consultants responsible for 'out-side' evaluations. These individuals will be contracted directly by USAID/Botswana or AID/Washington.
 2. With the exception of the Commercial Seed Advisor who will be recruited and contracted by USAID/Botswana's OPEX recruitment contractor, Transcentury Corporation.

SECTION C: PROCUREMENT PLAN

1. Authorized Source of Procurement

The authorized source of procurement under the project will be the Geographic Code 941 and Botswana, except for those items covered by the source waiver, included as Annex V B and the light duty vehicle, which will be procured from Code 935 sources under the existing blanket vehicle waiver for Southern Africa.

2. Imported Shelf Items

Some items of other than Geographic Code 941 origin will be purchased off-shelf in Botswana. Included among these items will be fertilizers and other low value agricultural inputs; equipment such as photocopiers and calculators for which local service is essential; and office supplies not provided by the GOB. The Field Support Office in consultation with the Team Leader will be responsible for the procurement of these items, taking into consideration all AID rules and regulations concerning commodity eligibility.

3. Seed Equipment

Seed equipment will be purchased through a host country contract utilizing a procurement service agent. Specifications for this equipment will be prepared by the GOB in consultation with the Mission's Agricultural Development Officer (ADO) and the REDSO/EA Procurement Officer.

4. Light Duty Vehicle

USAID experience with projects with large numbers of short term consultants has indicated that it is more cost effective for USAID to purchase a vehicle for the use of consultants than to periodically rent vehicles at exorbitant rates from the single rental agency in Botswana. Since GOB policy does not allow vehicle purchase for these purposes, USAID will purchase directly through its Field Support Office one light duty vehicle for Project use.

SECTION D: EVALUATION PLAN

1. Internal Evaluations

AID Project Evaluation Summaries (PES) will be prepared periodically to examine progress toward achieving project objectives and the performance of the Contractor, USAID and the GOB in meeting project commitments. The first PES is scheduled for July 1983, and others will be scheduled as deemed necessary during the course of the Project. These evaluations will be conducted jointly by the GOB and USAID in accordance with standard AID procedures.

2. Mid-term Formative Evaluation

Specific issues to be considered at this time will include:

a. Adequacy of baseline data for assessment of project impact. The Farming Systems Research Methodology includes by definition an investigation of the socioeconomic and biophysical variables that circumscribe the farm system. These are often termed endogenous and exogenous factors. The Evaluation team should examine the data being collected and ensure that it is adequately disaggregated to measure project impact as well as to identify recommendation domains. Illustrative dimensions for disaggregating these data will include age; sex; marital status; access to draft power; ownership of cattle; non-farm incomes; soil types; annual rainfall; seed varieties and use of fertilizer.

b. Institutionalization of the farming systems research and extension methodology within the DAR, DAFS and the MOA overall. Attention should be paid to the number of persons being trained in different disciplines to assure a balanced and adequate supply for the DAR to sustain the research approach developed under the project. During the project review, a concern was expressed that no sociologists were to be trained under this project, a decision which should be re-assessed at the mid-term. It is recommended, however, that the entire human resource development plan under the project be reviewed at this time.

The evaluation team should assess the staffing pattern of the DAR, DAFS and MOA in order to assure that progress has been made toward institutionalizing the FSR approach through necessary changes in the permanent GOB staffing pattern. The team should note and make recommendations at this time as to what further changes would be necessary or desirable to complete the institutionalization.

3. End-term Evaluation

At the end of the project, a three person team will be contracted for a thorough final assessment of the project and its results. This team will recommend to the GOB additional measures to be taken in order to strengthen its research effort. Issues noted above for the mid-term formative evaluation should be re-examined at the end-term evaluation.

SECTION E: CONDITIONS AND COVENANTS

The Project Grant Agreement will contain, in substance, the following conditions and covenants.

1. Conditions Precedent

Prior to the disbursement of funds, or to the issuance of documentation pursuant to which disbursement will be made for the purchase of seed equipment the cooperating country will furnish AID in form and substance acceptable to AID evidence that documents have been tendered for the seed production building.

2. Covenants

(a) Establishment of positions. The cooperating country covenants to establish and fill the new positions as set forth in Annex A to the Grant Agreement.

(b) Participants. The cooperating country covenants that candidates for participant training will be selected on a timely basis as set forth in the implementation plan in Annex A to the Grant Agreement.

(c) Counterparts. The cooperating country covenants to assign counterparts to each of the Technical Assistance personnel in the manner and number as specified in the Grant Agreement.

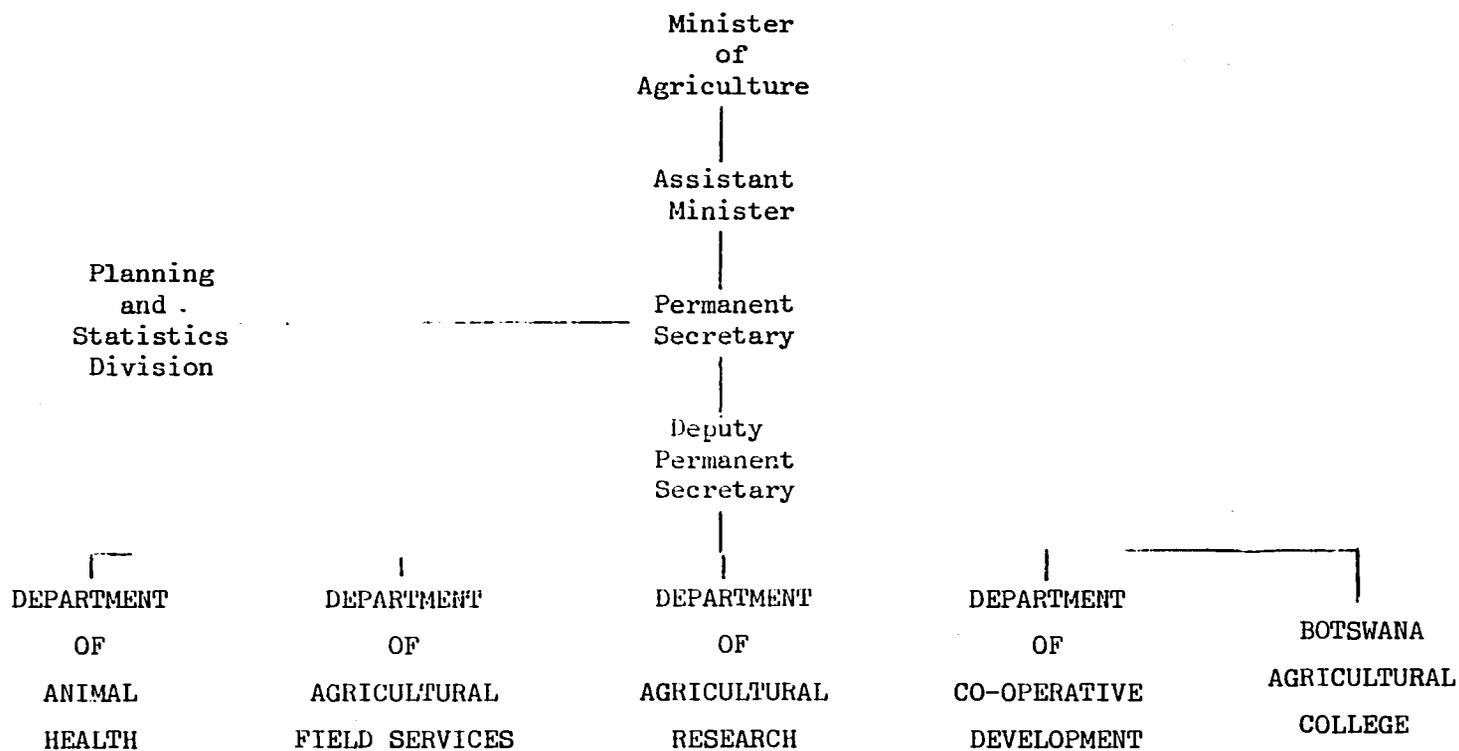
(d) Housing. The cooperating country agrees that no technical assistance personnel will arrive in Botswana unless suitable housing and office space are available, unless AID otherwise agrees in writing.

(e) Research strategy. The cooperating country agrees to develop a **research** strategy within twelve months of the signing of the Project Agreement.

ANNEX I : PROJECT BACKGROUND
SECTION B : FARMING SYSTEM CHARTS

ANNEX I : PROJECT BACKGROUND

SECTION A : ADMINISTRATIVE STRUCTURE OF THE MINISTRY OF AGRICULTURE, 1980/81



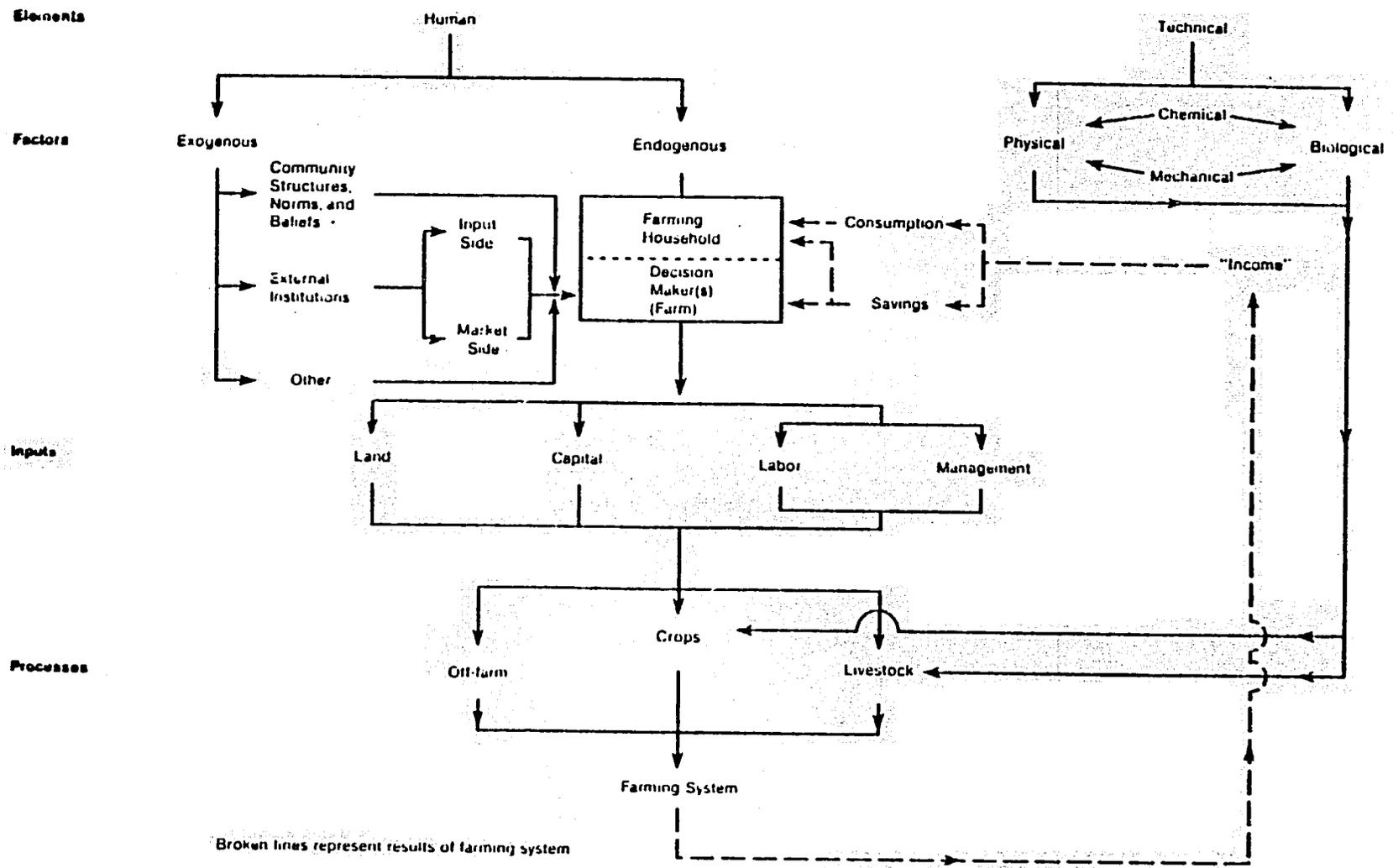


Figure 1 Schematic Representation of Some Determinants of the Farming System

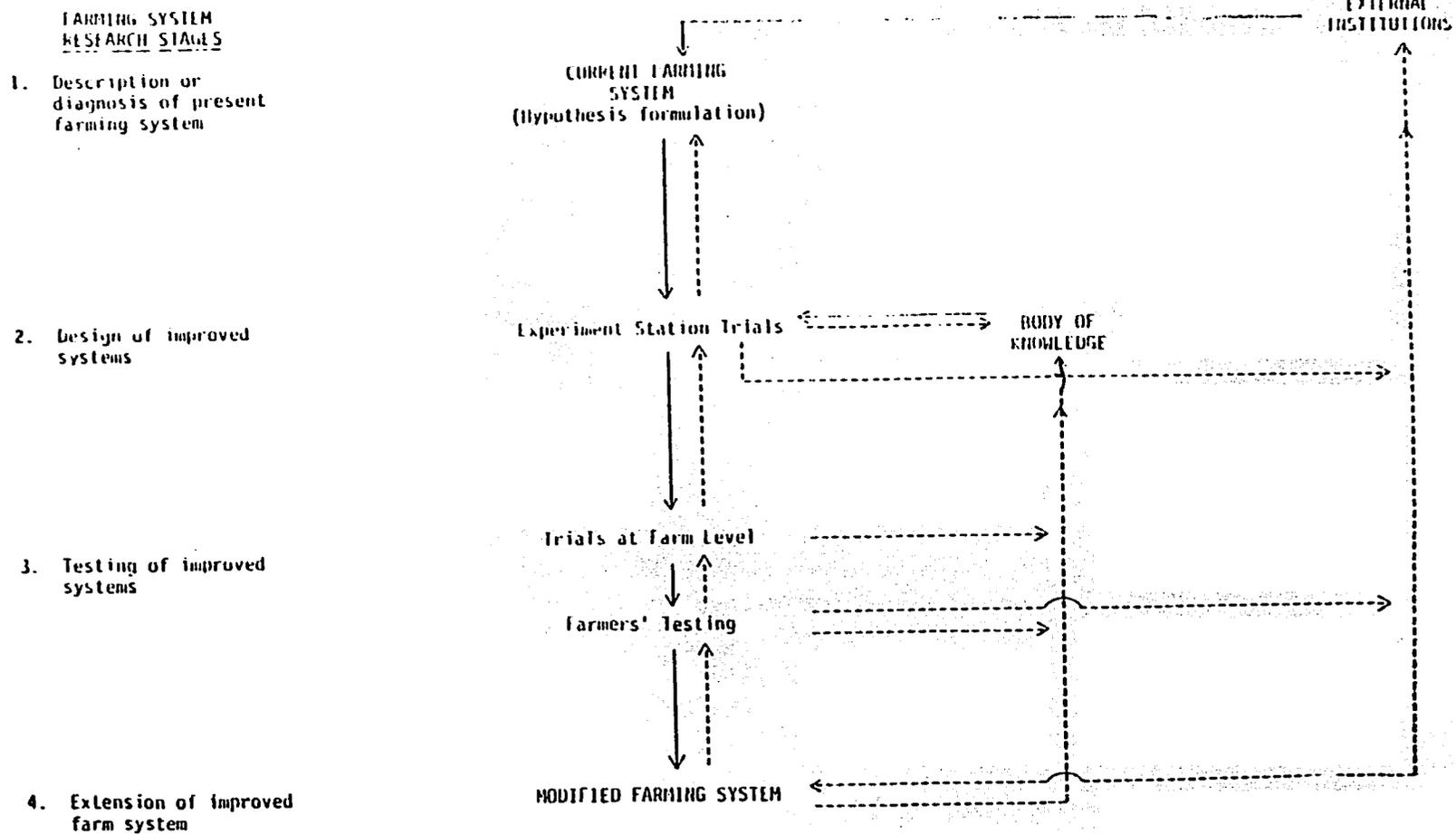


Figure 2 SCHEMATIC FRAMEWORK FOR FARMING SYSTEMS RESEARCH AT THE FARM LEVEL

ANNEX I : PROJECT BACKGROUND

SECTION C : SUMMARY OF AGRICULTURAL RESEARCH

1. Organization

Agricultural research in the Ministry of Agriculture is located in two administrative units, the Department of Agricultural Research (DAR) and the Division of Planning and Statistics (DPS). The DAR has two major divisions - The Division of Animal Production and Range Research, and the Division of Arable Research. Research in DPS is done mainly on special problems in the areas of Sociology and Economics.

The research staff is quite small as might be expected in a country the size of Botswana. For example, in Animal Production and Range research there are 3 professional GOB posts and 10 professional staff funded by donor agencies. In Arable Research there are 16 professional posts and 10 professional staff funded by donor agencies. Research in Botswana started in 1940 and until 1970 was mainly involved in variety testing. Animal Science research followed and was soon given major emphasis because of the economic importance of the cattle industry. Most sociological and economic research has been done in the last ten years. It was initiated because of a recognized need to solve special problems which exist in reaching the small farmer with socially acceptable and economically feasible agricultural development programs.

Most of the past research has been organized in a traditional disciplinary mode. Problems for study were selected because of need but often strongly influenced by the researcher's interest or capability. Donor sponsored research projects tended to reflect the donors interest and often were slanted toward international objectives rather than being specific for Botswana. In spite of a relative short time span and with a small staff a large amount of research information has been developed. The GOB and its research staff are to be complimented for their effort. Details of research staffing and current research activities were presented previously in Part III, Section E.

2. Agricultural Research Strategy

Research is a never ending process and no one ever has all the information that is desired or needed. This is to be expected with a dynamic agriculture in a world that is constantly changing. Research must be steadfast but flexible enough to keep pace with new problems and technology. The GOB has established goals for the growth and development of Botswana including agriculture. The need for agricultural research is recognized as important to meet the needs of rural people and the country in general. Acceptance of the FSR program is an example of this recognition.

A discussion was held with the Ministry of Agriculture concerning the need to review the agricultural research program and to establish a research strategy for guiding future activity. It was agreed that this would help coordinate and direct research to achieve the information most needed in both the short and long range. It would especially

help donor agencies guide their research in the right direction for best results.

The Ministry of Agriculture has agreed to prepare an agricultural research strategy. At their suggestion an outline was prepared to provide ideas for initiating the effort.

The main headings of this outline are presented here:

- (a) National goals relevant to agriculture and the rural sector.
- (b) Primary constraints on agriculture.
- (c) Specific goals of agricultural research.
- (d) Research problem areas (both long and short range objectives should be identified).
- (e) Estimated high return areas of the program.
- (f) Key organizational concepts.
- (g) Allocation of resources to the research problem areas.

3. Farming Systems Research and Agricultural Research

The FSR program represents an important complement to existing research activities. It is not designed to replace research, but rather to improve effectiveness and responsiveness of the traditional applied research establishment. FSR will conduct studies to evaluate the adaptability of research based practices to typical farming systems of the region. From this, recommendations will be formulated and conveyed through the DAFS to AD's who are in direct contact with farmers at the District level.

The effectiveness of the FSR approach will be determined largely by the extent that it is able to complement existing research and extension effort. Thus, throughout this project emphasis is placed on linkages with the existing research and extension activities. FSR will not only use research information but will feedback needs for additional research.

It will be necessary for the FSR teams to become familiar with all available research in Botswana. There will be gaps in the information needed. Some can be filled by the use of research information from other countries with similar environmental conditions. Work at the International Research Centers should be especially helpful. Some information can also be gleaned from discussions with experienced research scientists, extension workers and farmers. Such people are frequently keen observers. They have years of varied experience, they have seen efforts succeed and fail, and from this they have ideas worth consideration. It should be recognized that research does not answer all questions in all detail. It frequently requires an innovative and thinking person to interpret research information and basic principles and in some way fit them to the environmental, social and economic conditions that prevail. This in no way discounts the use and value of relevant research but the FSR program may face such challenges.

The Ministry of Agriculture through all its technical departments and the Agricultural Information Section has done an excellent job in reporting its work. A large number of these reports, bulletins, maps and charts have been assembled by The PP team which will be made available to the FSR program staff. Annual Reports of Agricultural Research have been published for many years. Of special note is a report which covers results of arable crop research from 1960 to 1968. Special reports are available such as a report on Animal Draft Systems Study (EFSaip, 1979-80) and An Initial Report on the Evaluation of Intercropping (EFSaip, 1980). There are reports and maps on the soils of Botswana as well as on weather and climatic characteristics. Activities of the extension service are well illustrated by the DAFS Annual Reports and by the published annual plan of work.

The Division of Planning and Statistics have numerous reports in the area of Rural Sociology and Statistics which characterize the rural environment and farming practices. The Farm Management Survey Results (1980 Survey) can be especially helpful. It is the fourth in a series of farm management survey reports which cover a period of 11 years (1970-1980). It is based on a carefully drawn sample of farmers and describes the farm enterprise organization including cultural practices, crops grown, livestock kept, average assets, and input-output and cost returns data. It will identify changes in agricultural production practices adopted by farmers overtime. Examples of other publications include Botswana Agricultural Statistics by Regions (1980), the Structure of Traditional Agriculture in Botswana (1981) and Traditional Versus Commercial Agriculture in Botswana (1981).

4. Stimulating needed Research

Provisions have been made in this Project to stimulate needed research. The development of an agricultural research strategy by the MOA will be helpful. A Cereal Agronomist will be added to the research staff to study production techniques for the important cereals - sorghum and millet. Research on food type legumes such as cowpeas and beans will be increased by the addition of a Legume Agronomist. It is expected that a Sorghum Breeder will be located at the Sebele Research Station to strengthen the commodity research approach aimed toward more efficient sorghum production. The current research staff sees benefit in the FSR program and will lend their support as needs arise.

Provisions have also been made in the Project to bring in scientists for short periods of time, usually two visits, to work with the FSR and the GOB research staff. They will be selected to provide expertise that is not otherwise available. Their help in formulating and testing farming systems and conferring with research personnel will be of much value.

Efforts are being made by GOB to increase the supply of qualified Botswana personnel to strengthen both research and extension activities.

A Five Year Training Plan (1980-1985) has been developed and published by the Planning and Statistics Division. USAID support and FSR Program will also help this activity.

ANNEX I : PROJECT BACKGROUND

SECTION D : SUMMARY OF AGRICULTURAL EXTENSION

1. Organization

The Department of Agricultural Field Services (DAFS) in the Ministry of Agriculture has responsibility for agricultural extension services. The extension activities are centered in the field section of this department. The field section is headed by the Principal Agricultural Officer who reports to the Deputy Director of DAFS. The Deputy Director coordinates activities of the section and reports to the Director of DAFS. Within DAFS, specialist support for extension is provided by four divisions: Animal Production, Land Utilization, Crop Production and the Agricultural Management Association. Other specialist support within the Ministry of Agriculture is provided by the Department of Agricultural Research, the Department of Animal Health, the Department of Cooperative Development and the Agricultural Information Section.

To administer the extension effort, the country has been divided into six Agricultural Regions. An Agricultural Region may be composed of two or more districts. Each Agricultural Region has an office headed by a Regional Agricultural Officer (RAO) with a supporting staff which includes an Animal Production Officer, a Crop Production Officer, a Land Use Officer, an Agricultural Management Officer, Group Development Officer, Ranch Extension Officer, and a 4-B Supervisor (4-H Leader). Each Agricultural District office is staffed by a District Agricultural Officer (DAO) and a District Agricultural Supervisor (DAS) who supervises a team of twelve or more Agricultural Demonstrators (AD's). The Regional office provides the link with the Ministry and the District. The District Office supervises the planning and work of the AD's who are in direct contact with farm families.

2. Annual Plan of Work

The extension efforts with farmers are based on an Annual Plan of Work. The plan of work is initiated by the AD's who identify problems and needs through their contact with individual farmers, Farmer Committees and others. The plans are committed to paper by AD's in August each year and coordinated by the DAO who in turn produces a District Plan after consultation with members of the RAO's Regional Support Team. The DAO's plan, after approval by the RAO is submitted to Headquarters where copies of the plan are circulated to all Divisions. Divisional heads are required to respond to the plans by indicating the level of assistance which will be available for the year. This goes back to the Regional Office so that each Region is aware of likely support-inputs for the year. It is then incumbent upon the Regional Support Staff to work for full implementation of all District Plans. This is facilitated through quarterly meetings at the Regional level and monthly meetings at the District level.

3. Information Section

The Agricultural Information Section is an important component of the Extension Division. Its tasks are to design and produce extension aids, conduct educational campaigns on cattle marketing, cooperatives, improved agricultural production methods and other topics. There are six production units, namely: Farm Broadcasting, Publications, Campaigns/Shows, Action Research, Photography and Graphics.

4. Youth Work

A 4-B movement (4-H) was established in 1967 and provides an extension cover for rural youth. There are 250 4-B clubs involving over 10 000 members. The members are involved in various activities including vegetable growing, fruit tree planting, and poultry keeping. Approximately 10 000 vegetable seed kits and 6 000 fruit trees have been sold to members. The trees have had about a 75 percent survival rate. Funds have also been made available for purchase of garden tools and sewing machines. These activities will be expanded to an enlarged membership.

5. The Extension Staff

About 525 technical posts are currently established in the DAFS. About 86 posts are vacant at this time mainly in the Field Section (AD's) because of people in training or lack of qualified persons. The Ministry has developed and implemented a five-year training plan for increasing the number of qualified personnel. Present plans call for 212 MDA personnel to receive and complete longterm training (diploma level or higher) from 1980 through 1985. To date only 115 of these planned trainees have been guaranteed funding. In addition the Botswana Agricultural College is graduating 30 Diploma students per year - 15 in Agriculture and 15 in Animal Health.

6. Strengthening the Extension Effort

The Extension Service in Botswana is well organized and directed. It has provisions for a large staff to work with rural families. The family needs and work priorities are developed in an Annual Plan of Work. There are provisions for specialist help, a 4-B movement for youth work and a post for encouraging a role for women in extension work. The following steps have been taken to strengthen the extension effort:

- (a) Increased funding is being provided to train more personnel at the diploma and degree levels. There is also greater emphasis on in-service training.
- (b) Transportation for AD's is being improved by advancing funds for purchase of motorbikes plus mileage payment for travel.
- (c) Recently a Crop Production Officer has been added to the Regional Office for specialist service in crop production and a Group Development Officer has been added to reach more people through group activities such as irrigation, garden projects, water supply, drift fences and

community projects.

(d) Assistance to low income farmers is being stimulated by the ALDEP program which provides subsidies and credit for activities such as draft power, fencing, implement purchase and water development.

(e) Service to farmers is being improved through the Annual Plan of Work which is reviewed quarterly at the Regional level and monthly at the District level. Emphasis is given to identifying needs, assigning work priorities, providing specialist assistance where needed and follow up to insure that planned activities are carried out.

The FSR program will further improve the quality of extension work by:

(a) Increasing the research staff by adding a Cereal Agronomist and a Legume Agronomist and thus expanding research at the Central Experiment Station and other locations.

(b) Providing a Research-Extension Liaison Officer(RELO) to provide a link between research and extension and to facilitate getting research to the field and feedback to researchers.

(c) Providing additional relevant technology for use by farmers through FSR field tests and farmer trials.

(d) Providing training to extension workers at training meetings and through participation of AD's and others in the location and conduct of tests and trials on farmers' fields.

(e) Assisting in the funding and development of seed processing facilities to insure an adequate supply of quality seed of best available varieties.

7. Relationship of FSR Team to DAFS

The following are key points in the relationship of the FSR teams to the Department of Agricultural Field Services (DAFS) in the Ministry of Agriculture:

(a) The RELO should be located in the Field Section of DAFS. It is acceptable for the RELO to perform some legume research duties so long as it does not cause neglect of liaison duties.

(b) The RELO should participate in the semi-annual meeting held by the Field Section for RAO's, the Regional meetings organized by the RAO's and District meetings organized by the DAO in the areas where the Project FSR teams are located.

(c) The FSR team should be represented at the quarterly meetings organized by the RAO's in the Project areas, for the DAO's and AD's. At these meetings a three month work plan is developed for the district, requests are made for specialist help, dates are set, new information presented and other matters attended to.

(d) The FSR team should be represented at meetings of the regional support staff called by the Project area RAO's as needed.

(e) FSR team representatives should attend the District monthly

meeting held by the project area DAO's for the district staff (DAS's and AD's). At this meeting work progress is reviewed, appropriate information is provided, problems and other matters are handled.

(f) Agricultural Supervisors will be seconded to the Project and DAFS AD's will be involved in FSR activities to the extent that time and work priorities permit.

ANNEX I : PROJECT BACKGROUND

SECTION E : CONSTRAINTS IN ARABLE AGRICULTURE

As the Project Paper has emphasized there are many constraints in Botswana to improving the productivity of agriculture practised by the 80 000 traditional farming families. However the much higher yields obtained by commercial or freehold farmers indicates potential for improvement amongst traditional farming families who constitute the central focus of this Project. The constraints that are faced by traditional farmers can be discussed in terms of technical, endogenous and exogenous (institutional) constraints. However it is important to bear in mind that these groups of constraints are not necessarily mutually exclusive. For example a particular technical constraint may be overcome by more labor and/or better timing in the use of labor. However lack of labor which is an endogenous constraint may prevent the elimination of a technical constraint. This is an important reason for an FSR approach which addressed both the technical and human elements.

1. Technical Constraints

Drought, draft power, bird pests and soil crusting are major constraints to the production of sorghum and millet. Maize and legumes such as cowpeas suffer the same constraints except for bird pests. Other important constraints include varieties, weed control, soil fertility, disease, insects and cattle damage.

Drought is the main constraint to all crop production. Mean annual rainfall of 500 mm associated with the wide inter- and intra-variations places severe limitations on crop yields. The crops grown and existing varieties are reasonably well adapted to the region and yield capacity is beyond levels now being realized. Efforts have to be directed to maximise effective use of the available moisture. Improvements in agronomic practices such as tillage, methods of timeliness of planting, fertilizer application and weed control are known to improve water use efficiency and increase yields.

Inadequate draft power is a serious limitation on most small farms especially since timeliness of operations is so crucial. Many farmers do not have draft animals or tractors and must often wait until they can be borrowed or hired. Those who use oxen often have to delay plowing and planting at the beginning of rains so that oxen may graze new grass and gain strength lost during the dry season. Plowing with oxen or donkeys is time consuming, about 0.62 hectares per day with oxen and 0.31 hectares per day with donkeys. Although tillage and planting equipment is available for purchase many farmers lack the necessary equipment.

These constraints of draft power accompanied by inadequate tillage and planting equipment often prevent farmers from timing their operations to best suit soil moisture conditions and planting dates. As a result crops are often planted too late in dry, rough and cloddy seedbeds.

Inadequate stands are obtained and yields are depressed. Ways must be found to insure that farmers have sufficient draft power and equipment to insure timely planting and effective crop stands. Without this other production inputs cannot succeed.

Farmers who grow sorghum and millet invariably report bird damage as a serious constraint to production. Large flocks of quela quela birds have the capability to strip small fields in a few hours. This ever-present hazard often encourages less drought resistant maize sowing in traditional sorghum areas. Preventing or reducing bird damage is difficult. Using family labor to guard fields and scare birds has proved most effective and is commonly practiced. Harvesting the heads and stooking as soon as the crop reaches physiologic maturity can reduce the time that birds have access to the grain. Mechanical bird scarers have not been successful. Breeding to produce resistant varieties has had some success for feed grain sorghum but little as yet in food type sorghums.

Soil crusting is a major problem in the hardveld soils of Botswana. These soils are quite friable when moist but on drying a surface crust or cap develops. The crusting results in poor seedling emergence. Planting as soon after rains which wet the soil to clod depth helps alleviate the problem.

Fertilization studies are inadequate to accurately assess fertilizer needs and expected response. Evidence indicates, however, that low fertility can be a limiting production factor in soils that have been farmed for a long period of time and/or where good management opens the door to above normal yields.

Lack of suitable varieties is sometimes reported as a production restraint. There appears to be a need for improved earlier maturing sorghum varieties. An early maturing variety (60 - 70 days to flower) may have an advantage when planting is delayed because of draft power constraints or late rains.

Eliminating weeds to avoid their competing with the crop for moisture and plant nutrients is always important. Adequate and timely weeding is often a problem because of the labor and time involved. The parasitic witchweed (Striga spp) often causes heavy losses on sorghum in some parts of Botswana. The grass Cynodon dactylon is a particular problem on fields that have been cultivated for a number of years.

A number of insects have been identified which cause damage on sorghum, millet and maize. Some examples are stemborers, aphids, sorghum midge and American bollworm. Insecticide control is considered uneconomic and is seldom practised.

Several crop diseases have been recorded such as molds, smuts, leaf spots, leaf blight, charcoal rot and anthracnose. In general, they are not considered a serious problem except at times in localized areas and seasons.

Lack of fencing to protect arable lands can sometimes be a serious problem for farmers. Cattle allowed to roam at will sometimes seriously damage cereal or legume crops. Under the ALDEP program farmers are being given fencing assistance.

2. Endogenous Constraints

The traditional farming system in Botswana consists of broadcasting seed, plowing with a team of six oxen that are raised for meat rather than draft purposes, chasing away birds at the end of the growing season and finally harvesting by hand. This system yields only about 200 kg of sorghum, maize or millet which explains why most farming families are deficit food producers.

For the poorer farming families (perhaps more aptly called rural households) crop production contributes relatively little to total income. The main sources of income for these families are in off-farm employment within Botswana and migrant labor in South Africa. Male members are often away from home, and even when they remain in rural areas most of their time is devoted to livestock production, often tending cattle belonging to others. Consequently, women provide 70 percent of the labor for crop production. This system was developed over the years in response to environmental conditions in Botswana and changing economic opportunities. Socioeconomic studies of this system have found that, although some aspects of it are socially disruptive, the allocation of labor available to the rural household is optimal from the standpoint of maximizing economic returns and minimizing risks.

As indicated above the major immediate constraint to increased production seems to be access to draft power for timely planting. Related to this problem is the lack of water in the arable lands areas during the optimal plowing period, which is after the first rains. Studies have shown that farmers with direct access to animals and water plant earlier than other farmers and consistently obtain higher yields.

If adequate draft power were made available to poorer farming families (at least four and preferably six oxen per household, using traditional plowing practices), this would presumably enable them to cultivate the six to eight hectares of foodgrains that would meet their subsistence needs. There is a question, however, whether the cost of providing the draft power can be justified in terms of increased production. Would the benefiting households generate the resources necessary to pay for the draft power over the long run? This issue is complicated by the fact that draft power as an investment does not exist in Botswana. The oxen used for plowing are purchased and raised for their meat value. It has yet to be determined whether purchasing oxen primarily as draft power and only secondarily for meat is economic under traditional or even improved farming systems in Botswana. Perhaps for the time being, increasing the access of poorer farm households to draft power should be based on the traditional system of sharing cattle rather than on a government program to provide animal directly to farmers. Alternative sources of power that are being implemented in GOB programs are the use of donkeys and tractors.

A second issue related to increasing production under traditional farming systems is whether other constraints, particularly labor, would become a factor if the power constraint were overcome. For many farm households achieving food self-sufficiency means at least doubling production. Since this would certainly require additional labor inputs, particularly at harvest time, the willingness of the affected households to divert labor from other activities for purposes of food production needs to be determined. Answers to these questions can best come from the application of an FSR approach.

The various micro-economic constraints to increasing crop production come down to a question of opportunity costs of labor and capital. The traditional system is low in cost in terms of both labor and capital. To introduce changes into this system that will lead to self-sufficiency at the household level, it is necessary that the costs (including income foregone) of increasing food production be less than what it would cost the producer to purchase food to cover deficits that he/she typically has at present. This will only occur if the productivity of arable agriculture is substantially increased through the development and dissemination of appropriate improved technologies and institutional support systems.

3. Exogenous Constraints

There is evidence that the exogenous constraints in Botswana are currently less binding than those of a technical and endogenous nature. GOB has responded constructively to perceived exogenous constraints. The problem currently, as the PID indicated, might be construed more as a lack of demand for support services rather than their unavailability. Of course as technical and endogenous constraints are alleviated there will be increasing pressure placed on such services. Currently programs that are important in stimulating agricultural production include the tractor hiring services (both private and those offered through the Brigades), the ALDEP program offering several types of services (including subsidized loans for draft animals and equipment, water catchment areas, fencing, etc.) and the pricing policy of BAMB for agricultural products that has recently been restructured (Annex I, Section F).

Lack of fencing to protect arable lands can sometimes be a serious problem for farmers. Cattle allowed to roam at will sometimes seriously damage cereal or legume crops. Under the ALDEP program farmers are being given fencing assistance.

2. Endogenous Constraints

The traditional farming system in Botswana consists of broadcasting seed, plowing with a team of six oxen that are raised for meat rather than draft purposes, chasing away birds at the end of the growing season and finally harvesting by hand. This system yields only about 200 kg of sorghum, maize or millet which explains why most farming families are deficit food producers.

For the poorer farming families (perhaps more aptly called rural households) crop production contributes relatively little to total income. The main sources of income for these families are in off-farm employment within Botswana and migrant labor in South Africa. Male members are often away from home, and even when they remain in rural areas most of their time is devoted to livestock production, often tending cattle belonging to others. Consequently, women provide 70 percent of the labor for crop production. This system was developed over the years in response to environmental conditions in Botswana and changing economic opportunities. Socioeconomic studies of this system have found that, although some aspects of it are socially disruptive, the allocation of labor available to the rural household is optimal from the standpoint of maximizing economic returns and minimizing risks.

As indicated above the major immediate constraint to increased production seems to be access to draft power for timely planting. Related to this problem is the lack of water in the arable lands areas during the optimal plowing period, which is after the first rains. Studies have shown that farmers with direct access to animals and water plant earlier than other farmers and consistently obtain higher yields.

If adequate draft power were made available to poorer farming families (at least four and preferably six oxen per household, using traditional plowing practices), this would presumably enable them to cultivate the six to eight hectares of foodgrains that would meet their subsistence needs. There is a question, however, whether the cost of providing the draft power can be justified in terms of increased production. Would the benefiting households generate the resources necessary to pay for the draft power over the long run? This issue is complicated by the fact that draft power as an investment does not exist in Botswana. The oxen used for plowing are purchased and raised for their meat value. It has yet to be determined whether purchasing oxen primarily as draft power and only secondarily for meat is economic under traditional or even improved farming systems in Botswana. Perhaps for the time being, increasing the access of poorer farm households to draft power should be based on the traditional system of sharing cattle rather than on a government program to provide animal directly to farmers. Alternative sources of power that are being implemented in GOB programs are the use of donkeys and tractors.

A second issue related to increasing production under traditional farming systems is whether other constraints, particularly labor, would become a factor if the power constraint were overcome. For many farm households achieving food self-sufficiency means at least doubling production. Since this would certainly require additional labor inputs, particularly at harvest time, the willingness of the affected households to divert labor from other activities for purposes of food production needs to be determined. Answers to these questions can best come from the application of an FSR approach.

The various micro-economic constraints to increasing crop production come down to a question of opportunity costs of labor and capital. The traditional system is low in cost in terms of both labor and capital. To introduce changes into this system that will lead to self-sufficiency at the household level, it is necessary that the costs (including income foregone) of increasing food production be less than what it would cost the producer to purchase food to cover deficits that he/she typically has at present. This will only occur if the productivity of arable agriculture is substantially increased through the development and dissemination of appropriate improved technologies and institutional support systems.

3. Exogenous Constraints

There is evidence that the exogenous constraints in Botswana are currently less binding than those of a technical and endogenous nature. GOB has responded constructively to perceived exogenous constraints. The problem currently, as the PID indicated, might be construed more as a lack of demand for support services rather than their unavailability. Of course as technical and endogenous constraints are alleviated there will be increasing pressure placed on such services. Currently programs that are important in stimulating agricultural production include the tractor hiring services (both private and those offered through the Brigades), the ALDEP program offering several types of services (including subsidized loans for draft animals and equipment, water catchment areas, fencing, etc.) and the pricing policy of BAMB for agricultural products that has recently been restructured (Annex I, Section F).

ANNEX I: PROJECT BACKGROUND

SECTION F: PRICING POLICY FOR AGRICULTURE

At the macro-economic level, the most important constraint to achieving the production increases sought by the GOB has been low priced imports from South Africa. Botswana cannot in its current situation easily act independently of the South African market. Therefore the policy of the Botswana Agricultural Marketing Board (BAMB) is to set producer prices at the minimum level that permits it to compete with imports without incurring losses. BAMB's producer prices and purchases of maize and sorghum since 1975 are shown in Table 1.

Table 1: BAMB Purchases of Maize and Sorghum, 1975 - 1981

Crop Year	Maize		Sorghum	
	Price (P/ton)	Purchases (tons)	Price (P/ton)	Purchases (tons)
1975/76	50.00	440	67.14	150
1976/77	55.00	2 379	63.57	138
1977/78	73.00	9 561	80.71	5
1978/79	76.50	6 899	83.30	438
1979/80	105.40	663	118.25	180
1980/81	130.00	5 391	125.00	6 931

During years of good rainfall, BAMB prices are in line with private market prices, but in years of low rainfall farmers can obtain considerably higher prices by selling to private traders. The consensus is that, although BAMB is providing a useful service as a purchaser of surplus food grain production in certain easily accessible parts of the country, its producer price is not high enough to induce significant increases in production. This raises a range of issues related to price policy and subsidies. The key questions are: (a) are the social benefits to increased food grain production (lower urban migration, reduced dependence on outside sources of food) higher than the economic benefits based on free market prices, and (b) can an infant industry case be made for subsidizing higher yielding technologies now, in anticipation of their becoming economic later? If the answer to these two questions is yes, then it is imperative for the government to formulate appropriate price support and subsidy policies as soon as possible. Otherwise the GOB crop production targets will not be achieved.

1. Present Problems

The three general problem areas, each with several dimensions, have led to BAMB's difficulties:

(a) The total size of the BAMB operation in terms of staff, capital stock, storage capacity, is too large for the volume of business BAMB is now handling, or is likely to handle in the near future. This means that BAMB's costs (e.g. interest on long term loans, depreciation of buildings, central management costs, etc) are very high relative to its operating revenues, leading to very high margins per metric ton of produce handled. The causes of the problem are several: original size

of the storage capacity, extension of the depots for the strategic grain reserve and crop improvement project, and method of management and operations. Further, BAMB was established with inadequate financial resources. All parties share responsibility for this and all must contribute to its solution.

(b) The existing pricing structure is inconsistent with BAMB's objectives. The attempt to maintain a single price throughout the country has meant that prices in off-rail, deficit areas are very low, thus discouraging production and turnover, and leading to high BAMB costs per depot. Failure to reflect transport costs in prices means BAMB has suffered losses on its operations for the benefit of the consumer prices in the deficit areas. In addition, BAMB has been encouraged to pay producer prices which are at or above the import parity price from South Africa in Southern Botswana. By definition BAMB must make a loss on its sales if it has to sell its grain in competition with imports, since it has handling costs in addition to grain purchases costs. These pricing problems have meant BAMB has built up unusually heavy stocks, adding substantial financing costs for working capital.

(c) BAMB's approach to fulfilling the functions assigned to it has been to extend its operations to new areas, at Government insistence, following its normal operating procedures. Since the new areas have low turnover, they are necessarily loss-making, and add to BAMB's financial problems. Alternative systems of operation, through agencies, or with differential staffing and operations at different times of year, would make it possible for BAMB's operating costs to be more closely related to its levels of physical operations, thus cutting its losses.

In response to the above problems the GOB has devised a policy which will place BAMB on a sound financial economic and administrative footing to play its role in the development of the arable agricultural sector. The policy will alleviate the unprofitability of BAMB given the competitive nature of South African imports. Prices paid to farmers will increase significantly, giving them the incentive necessary to produce more.

2. Nature of the Solution

The solution proposed for BAMB's financial and operating difficulties can be summarized in the following way:

(a) BAMB will be relieved of a number of fixed obligations which are not appropriately related to its mission. This includes the cost of a large portion of its storage capacity, and the costs of holding stocks in excess of those required for normal trade purposes.

(b) BAMB will change the manner in which the smaller depots are operated. BAMB will maintain the responsibility given to it under its mandate to secure, for producers and consumers alike, a stable market for scheduled produce and to ensure efficient and fair distribution thereof throughout Botswana. But to do so, BAMB itself need not physically operate each and every depot. If it operates loss-making depots for general development purposes, its costs will be met by direct subsidy.

(c) The pricing system for scheduled products will be changed so that the realities of transportation and distribution costs are taken into account. For the major food grains and for farm inputs this will mean establishing a base price at Pitsane, and paying to farmers in grain deficit areas the cost of rail transport to major rail heads and the cost of road transport to marketing centers more than 100 km off line of rail.

(d) If required, an element of direct subsidy from Government will be given to BAMB to enable it to provide release prices which are realistic with respect to both its producer price and the landed cost of imported grains in Botswana. It appears that no such subsidy will be required this year.

(e) BAMB will introduce more efficient management systems to cut costs for the parts of the network for which it retains full operational control.

Taken together, the elements of the package will provide a pricing and marketing system more conducive to promotion of agricultural development, will put BAMB in a stronger and more secure financial position, and will allow Government, producers and consumers to bear their appropriate shares of the costs of maintaining the marketing system.

ANNEX II : PROJECT DETAILS

SECTION A : LOGICAL FRAMEWORK

PROJECT DESIGN SUMMARY
 LOGICAL FRAMEWORK

INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.

Life of Project: _____
 From FY _____ to FY _____
 Total U.S. Funding _____
 Data Prepared: _____

Project Title & Number: _____

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes: (A-1)</p> <p>Improve the welfare of small farmers and increase national production</p>	<p>Measures of Goal Achievement: (A-2)</p> <p>National grain production increases by 10%</p> <p>per capita income increases by 10%</p>	<p>(A-3)</p> <p>National trade figures</p> <p>Updated rural income distribution survey</p>	<p>Assumptions for achieving goal targets: (A-4)</p> <p>That income distribution continues to be a government objectives</p> <p>That there is no significant drop in rainfall</p>

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

AID 1949-28 (1-73)
SUPPLEMENT

PAGE 2

Project Title & Number: _____

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose: (B-1)</p> <p>To improve the capacity of the Ministry of Agriculture's research and extension programs to develop and effectively extend farming systems recommendations relevant to the needs of the small farmer</p> <p><u>Sub-purposes</u></p> <p>(a) Improve the capacity of the GOB's Ministry of Agriculture's Department of Agricultural Research (DAR) to develop technologies appropriate for small farmer needs.</p> <p>(b) To improve the capability of the extension service to transfer technologies which can be utilized by small farmers and strengthen and institutionalize the linkage between the research and extension departments</p> <p>(c) To insure that adequate supplies of needed seed for major agricultural crops are available for distribution to Botswana farmers</p>	<p>Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)</p> <p>New technological packages will have been developed and will be extended to Botswana farmers</p> <p>An FSR program will be on-going in Botswana (posts will have been localized for established positions).</p> <p>Research at the MOA's DAR will be structured to emphasize a commodity approach</p> <p>DAR will be emphasizing cereals and legume conducting this research along commodity lines. Most positions in these areas will be localized</p> <p>DAR will be responsive to the extension service and will be conducting trials based on request from field services</p> <p>The RELO position will be functioning effectively</p> <p>The extension service will have new technologies to disseminate</p> <p>BAMB's seed production unit will be producing and distributing 2000 metric tons of seed per annum.</p>	<p>(B-3)</p> <p>Agricultural Field Service Records (particularly their annual report)</p> <p>Government establishment list and MOA's budget</p> <p>DAR organizational structure and staffing pattern</p> <p>DAR Annual Report</p> <p>DAR and DAS Annual Reports</p> <p>DAFS Annual Report</p>	<p>Assumptions for achieving purpose: (B-4)</p> <p>That sufficient flexibility exists in the system which will develop packages to increase productivity</p> <p>That research for small farmers is a high priority</p> <p>That the Extension Service continues to function effectively</p> <p>That research and extension work together cooperatively</p>

**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

Life of Project:
From FY _____ to FY _____
Total U.S. Funding: _____
Cost Program: _____

Project Title & Number: _____

PAGE

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs: (C-1)</p> <p>(a) Strategy will be developed for agricultural research emphasizing small farmers</p> <p>(b) New technologies will be tested in farmers' fields</p> <p>(c) New technologies will be tested at DAR whose ideas were initiated by FSR and extension</p> <p>(d) New technologies will be developed for dissemination</p> <p>(e) BAMB seed production unit will be completed and functioning</p>	<p>Magnitude of Outputs: (C-2)</p> <p>Research strategy will be developed</p> <p>100 new technologies will be tested in farmers fields</p> <p>50 new technological packages will be developed</p> <p>5 - 10 technological packages will be developed</p> <p>These new technological packages will be disseminated</p>	<p>(C-3)</p> <p>Review of strategy</p> <p>MOA records</p> <p>MOA records</p> <p>MOA records</p> <p>MOA records</p>	<p>Assumptions for achieving outputs: (C-4)</p> <p>That the GOB will develop a strategy</p> <p>That sufficient flexibility exists in the system to develop new technologies</p> <p>That DAR has the capacity to test technologies</p> <p>That DAR has the desire to respond to FSR requests</p> <p>That Agricultural Field Services has the capacity to extend new technologies</p>

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY _____ to FY _____
Total U. S. Funding _____
Date Prepared: _____

Project Title & Number: _____

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Inputs: (D-1)</p> <p>(a) <u>AID</u></p> <p>Technical Assistance Commodities Training</p> <p>(b) <u>GOB</u></p> <p>Counterparts Commodities Training</p>	<p>Implementation Target (Type and Quantity) (D-2)</p> <p>37.5 person years long term Seed equipment, agricultural inputs 55 person months of short term 96 person months of short term 22 person years long term</p> <p>61 person years 16 vehicles 15 person years</p>	<p>(D-3)</p> <p>AID records</p> <p>GOB records</p>	<p>Assumptions for providing inputs: (D-4)</p> <p>That funds are made available</p> <p>That funds are available</p>

ANNEX II : PROJECT DETAILS

SECTION B : LIST OF CRITICAL EVENTS

<u>Date</u>	<u>Major Action</u>	<u>Responsible Organization</u>
August 1981	PP completed	PP Team/GOB
August 1981	PP submitted to AID/W	PP Team/GOB
Sept. 1981	PP reviewed/authorized	AID/W
Sept. 1981	Project grant agreement signed	USAID/B
Sept. 1981	<u>Risk/benefit analysis approved</u>	AID/W
Nov. 1981	<u>Seed processing equipment ordered</u>	<u>GOB/USAID/B</u>
Jan. 1982	Contract signed with Title XII University	AID/W
Jan. 1982	Team Leader and MIAC Project Officer arrive for logistical visit	MIAC
Jan. 1982	PIO/T and DO complete for Seed Expert	
Mar. 1983	Second visit Team Leader	MIAC
June 1982	Housing, office space, and vehicles ready for team arrival	GOB
July 1982	Counterparts and support staff in place for long-term Technical Assistance personnel	GOB
July 1982	Selection and departure of 3 B.Sc. who leave Botswana for M.S. training	GOB/MIAC
July 1982	Seed building complete	GOB
July 1982	Commercial Seed Production technician arrives	
July 1982	Team Leader, RELO and Mahalapye Team arrives (Agricultural Economist and Agronomist)	MIAC
August 1982	Seed Equipment arrives	Procurement Agent
August 1982	Complete work plans of long-term T.A./Counterparts	BOG/MIAC
Sept. 1982	Recommendation domain study complete for Mahalapye	MIAC/GOB
Oct. 1982	Selection of individual farmers to participate in farm level trials and commence work with them	GOB/MIAC
May-June 1983	Internal assessment by T.A. team and GOB of first year field work	GOB/MIAC
June 1983	Housing, office space and vehicles ready for team members arriving in Francistown	GOB
July 1983	Guest House complete at Tutume	GOB
July 1983	Counterpart and support staff for Francistown T.A. in place	GOB
July 1983	Francistown Team arrives (Agronomist, Agricultural Economist and Animal Scientist)	MIAC
July 1983	First Project Evaluation Summary	GOB/USAID/MIAC
August 1983	Work plans for next cropping cycle completed for both Francistown and Mahalapye	GOB/MIAC

Sept.	1983	Recommendation domain study complete for Francistown	GOB/MIAC
Oct.	1983	Selection of individual farmers to participate in farm level trials and tests and commence work with them in Francistown. Select additional farmers in Mahalapye	GOB/MIAC
May-June	1984	Internal assessment of second year field work	GOB/USAID
June	1984	Counterpart for Cereals Agronomist returns from long-term training	GOB/MIAC
June	1984	Housing ready for Cereals Agronomist	GOB
July	1984	Cereals Agronomist arrives	MIAC
July	1984	Mid-Term project Evaluation	GOB/USAID/MIAC
July	1984	Counterpart Agronomist and Agricultural Economist from Mahalapye go for B.S. training	MIAC
August	1984	Work plans for third cropping cycle completed for both Francistown and Mahalapye	GOB/MIAC
Oct.	1984	Selection of additional farmers to participate in farm level trials and tests in Mahalapye and Francistown	GOB/MIAC
Jan.	1985	Commercial Seed Production Advisor departs and position localized	GOB/MIAC
May-June	1985	Internal assessment of third year field work	GOB/MIAC
July	1985	The Francistown counterparts (Agronomist, Animal Scientist and Agricultural Economist) go for training	MIAC/GOB
August	1985	Work plans for fourth cropping cycle complete for both Francistown and Mahalapye	GOB/MIAC
Oct.	1985	Selection of additional farmers to participate in farm level trials and tests	GOB/MIAC
May-June	1986	Internal assessment of fourth year field work	GOB/MIAC
July	1986	Project Evaluation Summary	AID/GOB/MIAC
August	1986	Work plans for fifth cropping cycle complete	GOB/MIAC
Oct.	1986	Selection of additional farmers to participate in farm level trials and tests	GOB/MIAC
May-June	1987	Internal assessment of fifth year field work	GOB/MIAC

July 1987	External evaluation	AID/GOB/MIAC
July 1987	Long-term T.A. depart	AID/GOB/MIAC
July 1987	The counterparts whose B.S. training is to be financed by GOB depart	
August 1988	Project PACD	AID

ANNEX II: PROJECT DETAILS

SECTION C: ENVIRONMENTAL CONCERNS

The project will have minor impacts on land and water resources within the context of adaptive farming systems, training and commercial seed production. To the extent that the activities will succeed in identifying improved practices that will enable Botswana farmers to increase production, the environmental impact will be positive. Better methods of improving and maintaining soil fertility and increased production per unit area will enable Botswana to strive for self-sufficiency in food production with less pressure on marginal lands. This will result in less soil erosion and range and wooded land destruction than would result if increasing population pressure forces more marginal lands into use.

To achieve this long term goal of increasing productivity of the Botswana small farmers, changes in traditional farming systems may be necessary. The FSR teams on the project will conduct on-farm surveys and will monitor project activities to ensure that adverse impacts on the Botswana culture and the eco-system are avoided.

With regard to pesticides, AID assistance under this project for direct procurement of pesticides will be for research purposes only. As such Section 216.3 (b) (2) (iii) of AID's Environmental Regulations apply and exempt this aspect of the project from Section 216.3 (b) (1). It should be noted, however, that careful consideration will be given to the selection of pesticides for research and that a concerted effort will be made to test only chemicals which would ultimately be acceptable under AID Regulation 16, Environmental Procedures.

The commercial seed production inputs provided by AID under this project will complement Botswana's own efforts to develop a viable commercial seed industry. However, no AID funds will be expended for pesticides or other agrochemicals used in conjunction therewith.

In this activity it has already been established that both fungicidal treatment and use of an insecticide are required. The insecticide used will be Malathion and the pattern of use will be similar to that described on certain U.S. EPA registrations for slurry type seed treatments.

Historically, the pesticide used as a fungicide treatment has been Captan but Captan is now under the U.S. EPA RPAR process and based on AID Regulation 16, requires preparation and approval of an environmental assessment (EA) prior to use in AID-funded projects. The pesticide Thiram can be substituted for Captan for the uses intended as a seed treatment for maize, cowpeas, sorghum, millet and sunflower seed. As an example, U.S. EPA registration number 7501-17-AA is a product containing Thiram which is suitable for use in commercial slurry type seed treaters. It is imperative, however, that label precautions on disposal of excess or unused pesticide and following the cleaning of seed treatment machines be carefully followed. Under these conditions the benefit/risk ratio should essentially equal that

JOB DESCRIPTION - COMMERCIAL SEED PRODUCTION ADVISOR

a. Duration and Location

Two and a half years at Pitsane while residing in Lobatse, 10 miles away on a paved road.

b. Qualifications

encountered in the U.S.

With the commercial seed production function being shifted from the GOB's Seed Multiplication Unit at Sebele to the planned new facility at Pitsane, under management of the para-statal BAMB the GOB can easily proscribe any further use of Captan. (Similarly it may prohibit any further use of the chemical for foundation seed treatment as well.)

Senior officials in the GOB have indicated their willingness to do so but have not yet investigated all the implications of such a decision nor has any action been initiated to date to proscribe use of Captan in favor of another substance. It should be noted that there is a high level of awareness among GOB officials about protection of the environment from indiscriminate agrochemical use. Botswana generally follows the lead of the developed countries on matters such as these and relies heavily on suppliers of agricultural chemicals for current information and advice on use of agrochemicals. Substitute pesticides, including Thiram, are readily available from Botswana's traditional agrochemical suppliers in South Africa, Swaziland and Zimbabwe.

There appear to be no compelling reasons for continuing the use of Captan if it remains suspect and if other effective substitutes are acceptable.

As noted above, however, no investigation of the indications for use of another substance has yet been undertaken by the SMU or other agency of the GOB.

As indicated earlier use of Captan for fungicidal treatment of commercial seed being produced in conjunction with this project would require an environmental assessment. DS/AGR has prepared a risk/benefit analysis for the use of Captan

Provision of an AID financed Commercial Seed Production Advisor, well qualified to deal with seed treatment routines, and training to be provided to Botswana participants who ultimately will have responsibility for managing the commercial seed treatment plant will help insure that environmentally safe pesticides will be used for seed treatment, and that acceptable procedures will be followed with respect to labeling, provision of warning notifications, use of colored dyes, disposal of unused pesticide materials, clean-up of machinery and other actions to avoid hazards to people or the environment.

It is concluded that:

- (a) The project will have little direct impact on Botswana's ecosystem

or the environment. Those which do occur will have positive long run effects and are on balance considered to be desirable.

(b) Purchase of agricultural chemicals with AID funds will be for research purposes only. Their selection and use will be carefully monitored by project technical staff and no adverse environmental effects are considered likely.

(c) Use of certain chemical substances for treatment of commercial seed will be required. Effective chemicals to meet pest control requirements are available and are considered environmentally safe when used according to prescribed directions. The fungicide Captan, which has been used for seed treatment in Botswana is currently under a U.S. EPA RPAK process which may proscribe its use in the project. Effective substitute chemicals are available.

An Initial Environmental Examination recommending that a risk benefit analysis be prepared was submitted to AID/W along with the PID. This analysis is currently taking place in AID/W and should be submitted concurrently with the submission of the Project Paper.

ANNEX II: PROJECT DETAILS

SECTION D: LONG TERM TECHNICAL ASSISTANCE

Eight long term Technical Assistance positions will be funded under this Project. In addition other external funding is to be sought for another position (i.e. Sorghum Breeder). Justification for each of the posts is followed by detailed job descriptions.

1. Team Leader

The Agricultural Technology Improvement Project is being initiated to meet the needs of Botswana to increase agricultural productivity and income among small farmers, and to enhance employment in rural areas. To carry out the project a team of scientists (FSR teams) will be located at two sites, Mahalapye and Francistown. Each team will consist of an Agricultural Economist, an Agronomist, counterparts and supporting staff and some Sociology input. There will also be an Animal Scientist at Francistown. In addition there will be a Research-Extension Liaison Officer located in the DAFS and at least one research scientist to be located in the DAR.

A Team Leader (Agricultural Economist) is required to administer the project, serve as leader of the scientists, supervise the work and maintain a link with GOB, USAID/Botswana and related ongoing research projects.

2. Research-Extension Liaison Officer / Legume Agronomist

Extension activities such as channelling information for farmers, training extension workers and providing feedback from farm activity to researchers is a vital factor in achieving GOB goals of increasing crop and livestock production, and farm income. A link between research and all levels of the extension organization is needed to coordinate activities, to enhance training programs, and to encourage the flow of relevant technological information to the extension field staff and the ultimate user, the farm family. The RELO position is established to accomplish these objectives which become increasingly important to the success of the FSR program.

Legumes such as cowpeas and beans are major food crops in Botswana and are grown by most farmers. Research to improve efficiency in growing these crops is badly needed. To help fill this gap an Agronomist position should be established to organize and conduct a research program designed to improve the production of appropriate food type legumes. A full-time position would be desirable but in the light of limited funds it is suggested that the RELO spend about 30 percent of his/her time on this activity.

3. Farming Systems Research Teams

Botswana is confronted with two major challenges in rural development. One is to increase total food production to reduce the widening gap

between the demand for food crops and the unpredictable domestic supply. The other challenge is to increase rural employment and to raise the incomes of traditional farm families, most of whom subsist below the rural poverty line, \$950 for a family of six at 1974 prices. This Project is being established as part of GOB'S effort to meet these challenges.

It is estimated that 80 percent of the people living in Botswana rely primarily on agriculture for a means of livelihood. The basis of this agriculture is crop and livestock production. The major thrust of the FSR program will be on arable crops in contrast to some earlier programs which have focused on livestock production. The major target group is the approximately 44 000 farmers with one to ten hectares of land under crops and less than 40 head of cattle.

Over the five year life of this Project, the FSR teams will be making surveys and working with the small farmers on their fields. A first priority will be to explore and understand existing farming systems, and to identify constraints to crop production. Following this the teams will design and test possible improvement measures which seek to alleviate constraints, and adapt new technologies and improved farming systems. All testing will be done on farmers' fields with active participation by farmers. The teams will draw on available knowledge in Botswana and elsewhere and suggest needed research to DAR. The teams will also work with Extension Personnel in the field testing and will participate in training activities.

It is obvious that this type of program requires an interdisciplinary approach. The major disciplines involve Agronomy, Agricultural Economics, Animal Science and Sociology/Anthropology. Scientists with adequate training and experience in these disciplines will be assigned. Included will be Counterparts and support staff who will localize the effort when the Project terminates.

4. Cereal Agronomist

Sorghum and millet are two food cereals which provide major sustenance to Botswana families. They are grown by most farmers but yields are low and production does not meet the requirements of the country. Lack of moisture and production problems cause yields to vary widely from year to year. Over a ten-year period under traditional management sorghum yields for the country have averaged 274 kg/ha and millet yields 147 kg/ha. Currently cereal production research in Botswana is very limited and does not involve a comprehensive study of the many interrelated production components. A Cereal Agronomist is needed to provide an intensive commodity approach to the solutions of problems necessary to realize higher and more stable yields.

5. Sorghum Breeder

Sorghum is the major staple food for the growing population of Botswana. Improved open pollinated varieties and hybrids are essential for increasing current low yields in the harsh climate of

this country. Screening of a wide variety of germ plasm has already been done. From this it is evident that introduced germ plasm is unlikely to outperform local varieties unless it can be incorporated into a breeding program specific for Botswana conditions. There is no other foodtype Sorghum Breeding program in close proximity to Botswana. A Sorghum Breeder would be a key addition to a commodity research effort to improve the yield and quality of this essential food cereal.

6. Commercial Seed Production Advisor

An adequate supply of quality seed of adapted varieties is an important input for efficient crop production in all countries. In Botswana the production of foundation seed and commercial seed for sale to farmers is a function of the Ministry of Agriculture. The current program is in need of improvement and expansion to meet the country's needs.

Steps are now being taken to upgrade and expand production, processing and marketing of seeds primarily sorghum, maize, millet, cowpeas and beans. The production and processing of foundation seed will be handled by the Seed Multiplication Unit (SMU) of the DAR. USAID is supplying funds to replace worn out equipment and to modernize the processing unit now in use. Also improvements will be made to the seed testing laboratory. Commercial seed will be produced, processed and marketed by the Botswana Agricultural Marketing Board (BAMB). To handle this activity BAMB will construct a new building to be equipped by USAID for processing and storing commercial seed.

A Commercial Seed Production Advisor is needed to assist both the SMU and BAMB in the development of the total seed program. Advice is needed to properly equip the processing plant and establish the processing procedure. Assistance is also needed to help expand commercial seed production and to establish certification and other procedures to carry out provisions of Botswana's seed law.

JOB DESCRIPTION - TEAM LEADER

a. Duration and Location

Five year position to be located at Sebele, Gaborone.

b. Qualifications

Ph.D. in Agricultural Economics is required with experience in organizing and conducting Farming Systems Research or similar interdisciplinary research/extension programs. Leadership ability and personal characteristics to work effectively with colleagues in performing the administrative and supervisory functions for the team is important. Five or more years of professional experience in the international setting preferably involving micro-level research is necessary.

c. Duties

The main responsibilities of the Team Leader will include:

(a) Serving as administrative and program leader of the scientists conducting the FSR Project (short term and long term), including liaison with GOB and USAID/Botswana. The incumbent will report to the Ministry of Agriculture as follows:

(i) To the Director of the Agricultural Research Department through the designated coordinator for FSR for the conduct of the research elements of the Project.

(ii) To the Permanent Secretary, MOA-GOB and Division of Planning and Statistics for the overall coordination of the Project.

(iii) To the Director of the Agricultural Field Services Department for the extension elements of the Project.

(iv) To the Head of the Botswana Agricultural Marketing Board for matters pertaining to the Commercial Seed Production Component.

(b) Assisting in the recruitment of the Technical Assistance team and Short Term Consultants.

(c) Assisting in identifying and placing Botswana in short and long term training courses, study tours and participation in scientific symposia outside Botswana.

(d) Assisting the FSR field teams in the planning and conduct of the Project. Providing guidance to others and carrying out analysis of overall aspects of the FSR program, evaluate results, and assist in reformulating experiments.

(e) Serving as a professional link between the Botswana FSR Project and similar projects in other countries and at international research centers for the mutual benefit of those concerned.

(f) Facilitating the flow of information between the FSR teams, the research staff at Sebele, and the staff of the Division of Planning and Statistics.

(g) Maintaining appropriate communications with the Director of Agricultural Research, the Director of Agricultural Field Services and other relevant MOA officials.

(h) Working cooperatively and harmoniously with the RELO who is directly responsible for the extension phases of the project and who will perform the Assistant Team Leader responsibilities.

JOB DESCRIPTION - RESEARCH-EXTENSION LIAISON OFFICER (RELO)

a. Duration and Location

Five years with location at the Division of Agricultural Field Services, Gaborone.

b. Qualifications

Ph.D. in Agronomy with minimum of four years' experience in planning and implementing agricultural extension programs. Some international experience desirable. A strong technical background in Agronomy is essential and experience in the conduct of Agronomy research is important. General familiarity with related disciplines of Animal Science, Agricultural Engineering and Agricultural Economics is important. The individual should have personal characteristics to enable him to work effectively with the extension staff in the central office and the field and with the research staff on the station and in the field.

c. Duties

The RELO duties will include the following:

- (a) Dividing time between three types of responsibilities: Research-Extension Liaison (60 percent), Legume Agronomy research (30 percent) and Assistant Team Leader (10 percent).
- (b) Assisting in communications and flow of information between research and extension on FSR at the national level and in the field where the FSR team(s) are located.
- (c) Assisting in training extension and research personnel and farmers in FSR concepts, methods, and procedures.
- (d) Providing leadership for planning and conducting an Annual Conference on FSR cooperatively with all active FSR projects, to facilitate coordination among the projects and between research and extension.
- (e) Contributing to the arable agricultural committees that have joint representation of research and extension (i.e. Arable Agriculture Priorities Committee and the Arable Agriculture Development Committee).
- (f) Conducting Legume Agronomy research and assisting in coordinating it under a commodity concept related to FSR.
- (g) Assisting the Team Leader in the coordination and administration of the Project.

JOB DESCRIPTION - FARMING SYSTEMS AGRONOMIST

a. Duration and Location

One for five years to be located at Mahalapye and another for four years to be located at Francistown.

b. Qualifications

M.S. or Ph.D. in a field crop speciality or soil science with emphasis on production and problem solving research at the farm level. Within the context of a multidisciplinary program must have the ability to provide leadership in the identification of agronomic problems as they relate to small farm production. Must have ability to work with scientists from other countries as a member of a multidisciplinary team. International experience strongly preferred.

c. Duties

The main responsibilities of the Farming Systems Agronomist will include:

- (a) Participation in FSR research by cooperating with other team members in problem identification and research priorities.
- (b) Providing agronomic leadership in the conducting of farm level trials and tests.
- (c) Maintaining close linkages with Experiment Station research and the Extension Service through the Research Extension Liaison Officer on matters pertaining to use and extension of research findings and feedback.
- (d) Assisting in the timely processing and analysis of the results of farm level surveys, trials and tests conducted in the FSK program.
- (e) Assisting in the interpretation of results for farmers, extension workers, and policy makers through seminars, workshops and publications.
- (f) Assisting in training counterparts and identifying persons for short or long term training in-country and in other countries.
- (g) Performing special duties requested by the Team Leader.

JOB DESCRIPTION - FARMING SYSTEMS ECONOMIST

a. Duration and Location

One for five years to be located at Mahalapye and another for four years to be located at Francistown.

b. Qualifications

M.S. or Ph.D. in Agricultural Economics with specialization in Farm Management/Production Economics. Some experience in conduct of micro-level research involving farm surveys would be preferable. Preference is for scientists experienced in Farming Systems Research in the international setting. Persons with the M.S. degree and relevant experience will be considered if desirable candidates at the Ph.D. level are not available. Must have ability to work with scientists from other countries as a member of a multidisciplinary team.

c. Duties

The main responsibilities of the Farming Systems Economist will include:

- (a) Participation in the Farming Systems Research team with scientists of related disciplines (agronomy, animal science and sociology).
- (b) Participation in the planning, supervision, and implementation of farm level surveys, trials and evaluation of improved technologies for farmers.
- (c) Assisting in the timely processing and analysis of results of the farm level surveys, trials and tests of FSR.
- (d) Assisting in the interpretation of results for research and extension workers through seminars, workshops, training meetings, and publications.
- (e) Assisting in training Batswana counterparts and other Batswana staff members.
- (f) Assisting the Research-Extension Liaison Officer in training courses for extension workers.
- (g) Performing special duties requested by the Team Leader.

JOB DESCRIPTION - FARMING SYSTEMS ANIMAL SCIENTIST

a. Duration and Location

Four year position to be located at Francistown. Will involve periodic travel to the Mahalapye area.

b. Qualifications

M.S. or Ph.D. in Animal Science with specialization in nutrition including forage and/or experience on smallstock. A broad knowledge of related sciences and Agricultural Engineering as related to draft power is desirable. Must have ability to work with scientists from other countries as a member of a multidisciplinary team. Candidates with international experience are preferred. Candidates with the M.S. degree and relevant experience will be considered if suitable persons at the Ph.D. level are not available.

c. Duties

The main responsibilities of the Farming Systems Animal Scientist will include:

- (a) Participation as a member of the FSR team which also includes an Economist, an Agronomist and a Sociologist/Anthropologist.
- (b) Participation in the planning, supervision and implementation of farm level surveys, trials, and evaluation of improved technologies for the target groups of farmers.
- (c) Assembling information and designing improved strategies for solving the constraint on agricultural production due to the lack of timing and availability of animal draft.
- (d) Assisting in planning, testing and implementing improved technologies in cattle and smallstock production with target groups of farmers, with emphasis on the interface between crop production and livestock production.
- (e) Assisting in the timely processing, analysis and interpretation of results of farm level surveys, trials and tests conducted by the FSR team.
- (f) Assisting in training Batswana counterparts and other Batswana staff members.
- (g) Assisting the Research-Extension Liaison Officer in planning and conducting training courses for the extension staff.
- (h) Performing special duties as requested by the Team Leader of the project.

JOB DESCRIPTION - CEREAL AGRONOMIST

a. Duration and Location

Three years with the location to be at the Experiment Station at Sebele.

b. Qualifications

A Ph.D. degree in Agronomy with emphasis on field crop production or field-oriented soil science with some experience or an M.Sc. degree and several years experience in field crop production or field-oriented soil science. Experience as an Extension Agronomist with a joint appointment in field crop research would be desirable. The incumbent should have ability to organize and conduct research in an interdisciplinary framework, and should have the interest and ability to work with other scientists and to provide training to counterparts and others.

c. Duties

The main responsibilities of the Cereal Agronomist will include:

- (a) Organizing and conducting a comprehensive crop production research program to improve technologies for growing cereals such as sorghum, maize and millet thereby improving production efficiency and yields. The research program should give consideration and/or emphasis to production factors such as water conservation and use efficiency, tillage, soil fertility, rotation schemes, planting dates and rates, varieties and pest control and other agronomic and crop management practices.
- (b) Conducting plot and/or field trials at Sebele and other locations supporting field studies with laboratory work as necessary.
- (c) Consulting with and seeking help from related disciplines as necessary, coordinating activities through maintaining liaison with Short Term Consultants, the FSR program and other related research and extension projects.
- (d) Making results available for use on farms and providing training to counterparts and others as needed.
- (e) Performing special duties requested by the Team Leader.

JOB DESCRIPTION - SORGHUM BREEDER

a. Duration and Location

Four years at the Experiment Station at Sebele, Gaborone providing funds for this post are found outside the Project.

b. Qualifications

The Plant Breeder will be responsible for planning and conducting a breeding program in sorghum. Ph.D. in Plant Breeding is required together with at least four years' experience. Should be thoroughly conversant with sorghum breeding and production. Should have demonstrated ability to work with others in an interdisciplinary framework. Experience with millet as well as sorghum would be an advantage. International work experience and/or knowledge of sorghum breeding at international centers would be desirable. Should have personal characteristics that enable him/her to work effectively with donor agencies and related programs, and to train counterparts in Plant Breeding.

c. Duties

The Sorghum Breeder as a part of a sorghum commodity research program will establish and conduct a breeding program to help solve problems of small farmers. In the course of his/her work he/she will:

- (a) Maintain the germ plasm in open pollinated varieties that now constitute the best varieties being grown in Botswana.
- (b) Evaluate germ plasm, develop and test open pollinated varieties for release to small farmers in Botswana.
- (c) Develop and test hybrids suitable for use by commercial farmers and by small farmers when improved technology and other factors make their use feasible.
- (d) Direct the breeding program mainly toward the development of human food type varieties.
- (e) Maintain linkage with other sorghum improvement projects, the FSR program, Extension Service and others to insure developing a breeding program relevant to the needs of small farmers.
- (f) Use Short Term Consultants when needed to enhance the program.
- (g) Prepare research reports and provide appropriate training to counterparts and others.

JOB DESCRIPTION - COMMERCIAL SEED PRODUCTION ADVISOR

a. Duration and Location

Two and a half years at Pitsane while residing in Lobatse, 10 miles away on a paved road.

b. Qualifications

B.Sc. degree in Agriculture with preference given to persons having the M.S. or Ph.D. Significant experience in operation and supervision of the production of foundation and certified seed; a complete knowledge of the operation of a commercial seed processing, marketing and distribution program is essential; work experience in these areas is desirable; experience in developing countries is desirable.

c. Duties

The main responsibilities of the Commercial Seed Production Advisor will include:

- (a) Supervising and coordinating the establishment of the Commercial Seed Processing Unit including the installation of the equipment.
- (b) Supervising and conducting training for the management and operation personnel for the Commercial Seed Processing Unit.
- (c) Advising the manager of the commercial seed production, processing and distribution program.
- (d) Advising and working cooperatively with the Seed Unit at Sebele in the orderly transfer of the responsibility for the commercial seed processing function from the research station to the Botswana Agricultural Marketing Board.
- (e) Advising in the development and implementation of a plan for expansion of the commercial seed growing program for improved varieties of seed adapted to Botswana's eco-zones and thus reducing the need for imported seed.
- (f) Advising on quality control procedures necessary for all seed distributed in Botswana whether seed is produced or imported.
- (g) If it is necessary to import some seeds to supplement domestic production, advising on the development of a plan and criteria for selection of specific types and lines of seed to serve the specific needs of Botswana farmers.

ANNEX II : PROJECT DETAILS

SECTION E : ILLUSTRATIVE LIST OF SHORT TERM TECHNICAL ASSISTANCE

The following list for short term Technical Assistance is illustrative and may be changed as the Project proceeds and firmer priorities are established.

<u>Specialist</u>	<u>Person Months</u>
Soil Scientist	3
Tillage Agronomist	3
Cereal Agronomist	2
Range Management	2
Sorghum Breeder	3
Agricultural Engineer	4
Agricultural Climatologist/Crop Modeller	4
Animal Scientist (draft power)	2
Weed Scientist	3
Entomologist	3
Bird Control Expert	2
Agricultural Economist	4
Sociologist/Anthropologist	6
Computer Programmer	4
Commercial Seed Production Advisor	2
US University Project Coordinator	1
External Evaluation ¹	6
Others	1
	<hr/>
	55
	<hr/>

1. Short-term Technical Assistance for evaluation will not be included in the MIAC contract.

ANNEX II: PROJECT DETAILS

SECTION F: INFORMATION CONCERNING COUNTERPARTS

Table 1: Anticipated Botswana Agricultural Graduates ^a

Year and Qualification	Botswana Agricultural College (December)	University of Botswana and Swaziland (May)
1982: Diploma	16	14
B.Sc.	—	7
1983: Diploma	30	10
B.Sc.	—	6

a. The table doesn't include Botswana studying in other countries. However apparently these are already earmarked for positions in MOA.

Table 2: Counterparts to be supplied for project

Location	Individual	Date Required		Qualification	
		First	Second ^a	Required	Sought in training
Sebele/Gaborone	Ag Economist	July '82	July '82	b	M.S.
	RELO/Legume Agronomist	July '82	July '82	b	M.S.
Mahalapye	Ag Economist	July '82	July '84	Diploma ^c	B.S.
	Agronomist	July '82	July '84	Diploma ^c	B.S.
Pitsane	Commercial Seed Prod.	Jan. '82	July '84	Diploma ^c	Short term
Francistown	Ag Economist	July '83 ^d	July '85	Diploma ^c	B.S.
	Agronomist	July '83 ^d	July '85	Diploma ^c	B.S.
	Animal Scientist	July '83	July '85	Diploma ^c	B.S.
Sebele	Cereal Agronomist	July '82 ^e	—	B.Sc.	B.S.

- The first individuals would go for further training at this time.
- It is recommended that the first individuals identified should have B.Sc. degrees and be sent off for training to an M.S. level. On or slightly before their return the Diploma/B.Sc. counterparts assigned at the start of the project in July 1982 would be transferred to counterpart positions in the Francistown project (see footnote d).
- Obviously B.Sc. degrees would be preferable in which case M.S. training would be sought.
- These would be transferred from Sebele (see footnote b).
- This individual would go for further training in order that he/she would return before the arrival of the Cereal Agronomist.

Table 3: Person years of long term training by source^a

Time of Departure	No	Field	Degree Sought	Years training	Funding source ^b	
					USAID	GOB
July 82	1	Ag Economist	M.S.	2	2	--
	2	Agronomist	M.S.	4	4	--
Jan 82	1	Seed Prodn	none	0.5	0.5	--
July 84	1	Seed Prodn	none	0.5	0.5	--
	1	Ag Economist	B.S./M.S.	2-3	2-3	--
July 85	1	Agronomist	B.S./M.S.	2-3	2-3	--
	1	Ag Economist	B.S./M.S.	2-3	2-3	--
	1	Agronomist	B.S./M.S.	2-3	2-3	--
	1	Animal Scientist	B.S./M.S.	2-3	2-3	--
July 87	2	Ag Economist	B.S./M.S.	4-6	--	4-6
	2	Agronomist	B.S./M.S.	4-6	--	4-6
	1	Animal Scientist	B.S./M.S.	2-3	--	2-3
TOTAL				<u>27-38</u>	<u>17-22</u>	<u>10-15</u>

- a. If some of the replacement counterparts could be found earlier it would be possible for some of the training scheduled for 1984 and 1985 to be shifted earlier.
- b. The figures in these columns represent years.

UNCLASSIFIED
Department of State

OUTGOING
TELEGRAM

STATE 054601

015175 410576

STATE 054601

015175 A

ACTIVITY AND TO AVOID THE SLOWDOWN IN DELIVERY OF TECHNOLOGY. FOR EXAMPLE, CONSIDERATION SHOULD BE GIVEN TO INCORPORATING EXTENSION WORK ON FSR TEAMS. MISSION PP TEAM SHOULD EVALUATE DELIVERY SYSTEM ALTERNATIVES WHICH WILL SUSTAIN/REPLICATE WORK WHEN PROJECT IS COMPLETED. PROPOSED CONTRACTOR DESIGN TEAM MEMBERS SHOULD BE QUALIFIED TO ADDRESS THIS QUESTION IN DETAIL BUT MISSION SHOULD CONSIDER UTILIZING IN-HOUSE OR GOB RESOURCES TO DO PRELIMINARY WORK IN THIS AREA WHICH WILL FACILITATE DESIGN TEAM'S WORK.

(D) PROJECT MANPOWER NEEDS AND TRAINING REQUIREMENTS: PID INDICATED MANPOWER AVAILABILITY AND TRAINING IS A MAJOR ISSUE TO BE ADDRESSED AND WORKED OUT WITH GOB AT PP DESIGN PHASE. CONSISTENT WITH BROADER COOPERATION, MANPOWER NEEDS AND TRAINING REQUIREMENTS FOR ENTIRE RESEARCH SERVICE AS IT AFFECTS DEVELOPMENT OF SMALL FARMER TECHNOLOGIES MUST ALSO BE STUDIED AT PP DESIGN STAGE. WHILE GOB LONG-TERM TRAINING PLAN IS INITIAL STEP TO DEFINE TRAINING

NEEDS, ADDITIONAL ATTENTION NEEDS TO BE GIVEN TO HOW THESE NEEDS CAN BE MET. PARTICULARLY, THE PP SHOULD INDICATE HOW SAMDP AND OTHER TRAINING ACTIVITIES FUNDED BY AID AND/OR OTHER DONORS WILL COMPLEMENT THE TRAINING ACTIVITIES PROPOSED IN THE PROJECT. THE PP SHOULD ALSO ADDRESS THE TRAINING NEEDS OF THOSE PERSONS WITH SUPERVISORY/ADMINISTRATIVE RESPONSIBILITIES AND INDICATE HOW LINKAGES WITH ACADEMIC AND TRAINING INSTITUTION CAN BE STRENGTHENED TO MEET THE MANPOWER NEEDS OF THE COUNTRY'S RESEARCH PROGRAM. LONG-RANGE TRAINING REQUIREMENTS OF THE DAR AND DAFS SHOULD ALSO BE EVALUATED.

ADEQUACY OF AD'S CURRENT TRAINING MUST BE ASSESSED AND MECHANISM FOR SUPPLEMENTAL TRAINING DEVISED.

4. APPROPRIATENESS OF COMMERCIAL SEED PRODUCTS ACTIVITY TO PROJECT: WE ARE CONCERNED AS TO WHETHER THE COMMERCIAL SEED PRODUCTION COMPONENT SHOULD BE A PART OF THE PROJECT. RESOURCES DEVOTED TO THIS COMPONENT COMPRISE LESS THAN TEN PERCENT OF THE FUNDING REQUIREMENT AND PROJECT ACTIVITIES ARE NOT AN INTEGRAL PART OF THE TA PACKAGE WHICH IS OTHERWISE PROPOSED. WHILE THE COMMERCIAL SEED PRODUCTION PROGRAM OBVIOUSLY CONTRIBUTES TO THE OVERALL PROJECT GOAL AND WE APPRECIATE IMPORTANCE OF AND SUPPORT PROVISION OF ASSISTANCE FOR SEED ACTIVITY, WE BELIEVE THAT ITS INCLUSION MAY DIVERT THE MANAGERIAL ATTENTION FROM THE CORE ACTIVITIES OF THE PROJECT. WE ASK THAT MISSION RECONSIDER ITS FUNDING WITHIN THE RESEARCH PROJECT AS PRESENTLY CONCEIVED. AS MISSION IS AWARE, POSSIBLE ALTERNATIVES ARE (A) RURAL SECTOR OR CROP PRODUCTION PROJECT (B) FUNDING OF TA UNDER SAMDP AND COMMODITIES UNDER RURAL SECTOR GRANT, (C) AS A DISCRETE ELEMENT WITHIN THIS PROPOSED RESEARCH PROJECT TO BE CONTRACTED FOR SEPARATELY FROM THE PLANNED TITLE XII COLLABORATIVE ASSISTANCE. MISSION SHOULD PREPARE BRIEF ANALYSIS AND CABLE SUMMARY OF ARGUMENTS AND RECOMMENDED COURSE OF ACTION AT EARLIEST OPPORTUNITIES SO THAT DEFINITIVE APPROACH CAN BE AGREED UPON BEFORE PROJECT DESIGN ACTIVITIES ARE INITIATED.

5. OTHER POINTS RAISED:

(A) ENVIRONMENTAL ASSESSMENT: DS/AGR STAFF IS PREPARING REQUIRED SUPPORTING MATERIALS AND ISSUES PAPER FOR RISK-BENEFIT ANALYSIS RECOMMENDED IN ANNEX B OF PID. AFR/OR WILL TAKE APPROPRIATE FOLLOW-UP ACTION TO OBTAIN APPROVAL OF THE RISK BENEFIT ANALYSIS AT AN EARLY DATE TO OBLVIATE ANY DELAY.

(B) CONTRACTOR SELECTION: DISCUSSIONS HAVE BEEN

INITIATED WITH SER/CM CONCERNING CONTRACTOR SELECTION PRO-

CESS AND PLANS ARE WELL ALONG TO ISSUE REQUEST FOR EXPRESSIONS OF INTEREST TO SHORT LIST OF POTENTIAL TITLE XII INSTITUTIONS DEVELOPED IN CONJUNCTION WITH BIFAD. SER/CM AGREED TO INITIATE SELECTION PROCESS, UTILIZING THE DRAFT PID/PT IN THE PID TO ENABLE MISSION TO MEET PROJECT DEVELOPMENT SCHEDULE INDICATED IN PID.

(C) MEANS OF REACHING WOMEN FARMERS: WE APPRECIATE MISSION'S CONCERN THAT THE PROJECT BENEFIT WOMEN WHO HEAD OVER 30 PERCENT OF BOTOLUANA'S FARM HOLDINGS. WE ASK THAT THE PP OUTLINE A SPECIFIC APPROACH WHICH WILL ENABLE THE PROJECT TO BENEFIT WOMEN FARMERS.

(D) IMPLEMENTATION PLAN: CONSIDERABLE EMPHASIS WILL BE PLACED ON THE REVIEW OF PROJECT'S IMPLEMENTATION PLAN. SUGGEST CONCERTED EFFORT BE MADE TO ENSURE THAT PLAN IS AS COMPLETE AS POSSIBLE, DISCUSSING ALL IMPLEMENTATION ASPECTS.

(E) GOB CONTRIBUTION: IN DETERMINING GOB CONTRIBUTION PP SHOULD IDENTIFY PERSONNEL AND PERCENTAGE OF TIME DEVOTED TO PROJECT ACTIVITIES. HAIG

BEST AVAILABLE DOCUMENT

UNCLASSIFIED

MISSION ORDER
US AID Mission to Botswana

SUBJECT: Logistical Support for USDA
and Contract Personnel

5-2

ORDER No. _____

DATE 5 Nov 1979 DATE 5 Nov 1979
ISSUED _____ EFFECTIVE _____

SUPERSEDES _____

Local
AUTHORITY:

PAGE 1 OF 4 PAGES

- I. Purpose: This order establishes the policy of the USAID Mission to Botswana for provision of logistical support to contract personnel (not including OPEX or Personal Services contracts). The term "logistical support," as used in this order, is defined as being the financing of or furnishing to contractor employees and their dependents, items such as transportation, personal and household effects, household appliances, living quarters, furniture and furnishings, equipment, utilities, guard service, fuel, lawn and garden supplies, and other supporting services, including mail and medical facilities.
- II. Authority: The provisions of this order are in accordance with the authority contained in the Foreign Assistance Act of 1961, as amended, and are consistent with the policies and regulations established in the AID Handbooks and the Standardized Regulations (Government Civilians, Foreign Areas) concerning allowances, as well as the appropriate delegations of authority to the Mission Director.
- III. Policy: It is the policy of the USAID Mission to Botswana that contractor personnel employed to implement a part of the Mission program and USDA employees similarly assigned will be provided housing and basic furnishings by the Government of Botswana and all other items of logistical support will be furnished through funds provided in the project concerned and provided by the program-funded Field Support Office. In this way, no contractor or PASA agency will be required to duplicate the USAID Field Support Office operations and, to the maximum extent possible, all contract and USDA personnel can be provided with equivalent logistical support. USAID/Government of Botswana Project Agreements provide that the Government of Botswana will be responsible for providing housing, housing maintenance and repair, basic hard household furniture and equipment, and household furnishings for AID-financed technicians in accordance with standards established by the Government of Botswana for other expatriate contract personnel and Government of Botswana employees of comparable rank. Supplemental furniture, furnishings, appliances, electrical wiring, fuel, and other services will be provided by the Field Support Office to more approximate the living standard of USAID direct-hire Americans at post, up to the level permitted by the support budget agreed upon by USAID and the Government of Botswana in the Project Agreement.
- IV. Procedures: The contract Chief of Party (Administrative Liaison Officer for USAID) is the contractor's representative and is directly responsible for contract administrative matters including liaison between contract employees and the Field Support Office for logistical support. Contractor requests for advice, assistance,

MISSION ORDER NO: 5-2

PAGE 2

or guidance in the interpretation and/or application of Mission policy, or in resolving other than routine administrative problems, should originate with the contract Chief of Party (or Administrative Liaison Officer) and should be directed through the USAID Project Officer to the GSO/Field Support, Controller or Director, as appropriate. It is anticipated that essential information obtained or developed in these consultations will be shared as soon as possible thereafter with all contract or PASA personnel with a need to know.

A copy of this USAID Order and attached Annex A will be attached to each PIO/T issued by the Mission following the date of issuance of this Order.

Attachment: Annex A


Louis A. Cohen, Director

DISTRIBUTION: A, B, C, E, F.

MISSION ORDER NO: 5-2

PAGE 3

ANNEX A

Long-term contract personnel (except OPEX and Personal Services contracts) and U.S. Department of Agriculture personnel serving under PASA arrangements, funded in whole or in part by AID, in support of the USAID/Botswana program, are entitled to the logistical support, including allowances, benefits and privileges as listed hereunder. Said support will be furnished by the entity and in the manner shown.

- I. The cooperating country (Botswana) will provide the following:
 - A. Permanent housing. In the event that permanent housing is not available for use by the U.S. technician and his family at the time of arrival in Botswana, the GOB will provide full cost of suitable temporary housing until permanent housing is available. Additionally, the GOB will provide full costs of suitable temporary housing, as necessary, for a short period prior to departure from Botswana.
 - B. Basic hard furniture, household equipment, and household furnishings of the type provided other expatriate personnel and GOB employees of comparable rank.
 - C. Office space, office furniture and equipment (e.g., desks, chairs, tables, etc.), and office supplies as required in the conduct of official business.
 - D. Secretarial, interpreter, and clerical services, as required.
 - E. Job-related transportation within Botswana. Transportation between residence and place of work will not be provided.
 - F. Exemption from or reimbursement of the following:
 1. All duties and taxes imposed on and relating to the import of household and personal effects (including one personally-owned vehicle) which are the personal property of each U.S.-supplied technician or his/her family intended for their own personal and/or domestic use and are imported by the technician within a six (6) month period following his/her arrival at the post of assignment in Botswana. If any of the above effects are sold within the Southern African Customs Union area, the U.S.-supplied technician will be liable, as appropriate, under GOB law, to pay duty or taxes at the proper rates on the items sold.
 2. All export duties and taxes on the above items.
 3. All social security taxes, personal taxes, and all direct income taxes on all income of the U.S.-supplied staff received from the U.S. Government, either directly or indirectly.
- II. AID will provide for the following:
 - A. Reimbursement to the individual or firm for household utilities' costs (i.e., electricity, water and sewer, gas wood and coal -- not telephone).
 - B. The cost of residential guard service, if authorized by USAID.

ANNEX A (continued)

- II. C. The costs of supplemental basic furniture, equipment, appliances, and household items not provided by GOB.
- D. The cost of rest and recuperation travel of U.S. citizen contract or PASA employees and eligible dependents, as authorized by USAID.
- E. Allowances authorized by the contract standard provisions, consistent with AID Handbooks and regulations.
- F. The cost of installing a lawn at new houses.
- G. The cost of providing adequate electrical wiring, as required.
- H. The costs involved in providing contract personnel with AID-sponsored orientation prior to overseas travel will be reimbursable under the contract.
- I. Costs of telephone installation, where feasible.
- III. General:
- A. PASA-USDA personnel may use the Department of State pouch facility for official and personal mail. Contract personnel may use the Department of State pouch facility for official mail and for personal first class letter mail. Arrangements should be made with the local post office for other mail.
- B. Contract and PASA-JSDA personnel may open personal accounts with a local bank for accommodation exchange purposes and to pay local personal bills.
- C. PASA-USDA personnel and their authorized dependents have the same full use of the Peace Corps/U.S. Mission medical unit as do all other USG direct-hire American employees. Contract personnel who are U.S. citizens (under direct AID contracts, not Botswana Government contracts) and their authorized dependents may use the Peace Corps medical unit only for emergencies and routine inoculations, excluding evacuation or hospitalization, and entrance, in-service, fitness for duty, and separation medical examinations. These medical services should be obtained from private physicians and the cost thereof may be billed to AID under the contract.
- D. Contract personnel serving in Botswana will be entitled to only those holidays authorized by the GOB. PASA personnel must be paid for U.S. holidays worked.
- E. Commercial travel to Botswana and transportation to Botswana of contract personnel, their dependents, and their household and personal effects will be arranged by the contractor.

ANNEX III : FINANCIAL EXHIBITS

SECTION A : CALCULATION OF AID EXPENDITURES

Because of the varying number of Technical Assistance Personnel from year to year the annual costs vary. Tables 1, 2 and 3 give the cost per Technical Assistance person per year. Table 4 gives additional information on contract and support costs.

Table 1. Cost per Technical Assistance person for Fiscal Year 1982 with four long term Technical Assistance personnel (US dollars).

	<u>Contract Costs</u>	<u>Support Costs</u>
Salary	41 000	
Differential (10%)	4 100	
On campus salaries--coordination and support ^a	10 000	
Fringe benefits (20%)	11 020	
Insurance (10% off campus)	4 510	
Overhead--on campus (58%)	5 800	
--off campus (35%)	15 785	
Office equipment and support ^b	4 050	
Other miscellaneous costs ^b	3 456	
Travel to post -- including shipments ^{bc} annualized over five years	<u>5 319</u>	
	105 040	
Education allowances		8 000
Education travel		1 400
R and R Travel		5 000
Utilities		4 200
Security guard		4 440
Household maintenance		1 000
Medical		1 000
One time cost for travel and housing annualized over five years ^c		11 490
Proportionate share of general cost		1 470
Vehicle and maintenance		3 000
Administrative Assistant (16 000 US dollars)		<u>4 000</u>
		45 000
TOTAL	<u>150 040</u>	

a. Based on 40 000 US dollars for one full time equivalent.

b. Includes off-campus overhead.

c. See Table 4 for detailed breakdown.

Table 2. Cost per Technical Assistance person for Fiscal Year 1983 with seven long term Technical Assistance personnel (US dollars).

	<u>Contract Costs</u>	<u>Support Costs</u>
Salary	41 000	
Differential (10%)	4 100	
On campus salaries -- coordination and support ^a	5 714	
Fringe benefits (20%)	10 163	
Insurance (10% off campus)	4 510	
Overhead -- on campus (58%)	3 314	
-- off campus (35%) ^b	15 785	
Office equipment and support ^b	4 050	
Other miscellaneous costs	3 456	
Travel to post -- including shipments ^{bc} annualized over five years	<u>5 319</u>	
	97 411	
Education allowances		8 000
Education travel		1 400
R and R travel		5 000
Utilities		4 200
Security guard		4 440
Household maintenance		1 000
Medical		1 000
One time cost for travel and housing annualized over five years ^c		11 490
Proportionate share of general cost		1 470
Vehicle maintenance		400
Administrative Assistant (16 000 US dollars)		<u>2 286</u>
		40 680
TOTAL	<u>138 097</u>	

- a. Based on 40 000 US dollars for one full-time equivalent.
b. Includes off-campus overhead.
c. See Table 4 for detailed breakdown.

Table 3. Cost per Technical Assistance person for Fiscal Year 1984 to 1986 with eight long term Technical Assistance personnel (US dollars).

	<u>Contract Costs</u>	<u>Support Costs</u>
Salary	41 000	
Differential (10%)	4 100	
On campus salaries -- coordination and support	5 000	
Fringe benefits	10 020	
Insurance (10% off campus)	4 510	
Overhead -- on campus (58%)	2 900	
-- off campus (35%) ^b	15 785	
Office equipment and support ^b	4 050	
Other miscellaneous costs	3 456	
Travel to post -- including shipments ^{bc} annualized over five years	<u>5 319</u>	
	96 140	
Education allowances		8 000
Education travel		1 400
R and R travel		5 000
Utilities		4 200
Security guard		4 440
Household maintenance		1 000
Medical		1 000
One time cost for travel and housing ^c annualized over five years		11 490
Proportionate share of general cost		1 470
Vehicle maintenance		400
Administrative Assistant (16 000 US dollars)		<u>2 000</u>
		40 400
TOTAL	<u>136 540</u>	

a. Based on 40 000 US dollars for one full-time equivalent.

b. Includes off-campus overhead.

c. See Table 4 for detailed Breakdown.

Table 4. Breakdown of contract and support costs (US dollars).

(a) Contract costs -- travel to post.

	<u>Cost</u>
Travel and per diem -- 4 at 1 500 dollars	6 000
Unaccompanied baggage -- 4 at 750 dollars	3 000
Household effects	7 200
Automobile shipment	2 500
Passport, shots, etc.	<u>1 000</u>
	19 700
Annualized over five years	3 940
Including off-campus overhead (35%)	5 319

(b) Support costs -- one time costs for travel and housing

	<u>Cost</u>
Housing renovation	7 000
Supplemental furniture and equipment	12 000
Drapery allowances	750
Home leave and return - mid-project:	
Travel (4 at 1 500 dollars x 2)	12 000
Unaccompanied air baggage (4 at 750 dollars x 2)	6 000
Return at end of contract:	
Travel (4 at 1 500 dollars x 2)	6 000
Unaccompanied air baggage (4 at 750 dollars x 2)	3 000
Household effects	7 200
Automobile	2 500
Miscellaneous	<u>1 000</u>
	57 450
Annualized over five years	11 490

Table 1: Additional Established Posts Required by Year and Source
by GOB to Service the Project

(a) By year^a

Position	Rank	1982	1983	1984	1985	1986	Total
Counterparts:							
MSc level	PR3	--	--	3	--	--	3
BSc level	PR4	3	--	(-3)	--	2	2
Diploma level	T3	5	3	1	3	(-2)	10
Support staff:							
Ag Supervisor	T4	3	3	--	--	--	6
Ag Demonstrator	T5	2	--	1	--	--	3
Statistical Assistant	GA5/6	9	7	--	--	--	16
Secretary	S3/4	3	1	--	--	--	4
Driver ^b	Group 4	1	1	--	--	--	2

- a. Figures in brackets indicate transfer of positions to higher ranks due to promotion.
- b. This position is not an established one since it is Industrial Class level.

(b) By source^a

Position	Rank	DAR	DAFS	DPS	BAMB	Total
Counterparts:						
MSc level	PR3	1	1	1	--	3
BSc level	PR4	2(1)	1(1)	2(1)		2
Diploma level	T3	4(1)	2	4(1)	2	10
Support staff:						
Ag Supervisor	T4	--	6	--	--	6
Ag Demonstrator	T5	2	--	--	1	3
Statistical Assistant	GA5/6	9	7	--	--	16
Secretary	S3/4	3	--	--	1	4
Driver ^b	Group 4	2	--	--	--	2

- a. Figures in brackets represent positions transferred due to promotion. The last column represents the net change.
- b. The position is not an established one since it is Industrial Class level.

ANNEX III: FINANCIAL EXHIBITS

SECTION C: PARTICIPANT TRAINING PROGRAM COSTS

	<u>GOB</u>	<u>AID</u>
	\$	\$
Travel:		
Return airfare: US-Africa	2 000	
Advance per diem		50
US to training site-training site to US exit point		50
Participant fees and maintenance:		
Tuition/fees		4 000
Room/board		5 375
Monthly allowance		6 400
Books/supplies		500
Insurance (health and accident)		300
Clothing		250
Household equipment		300
Incidentals (e.g. physical exams)		150
Conferences:		
Orientation		550
Enrichment conference		800
University Contractor fee (includes overhead)		<u>1 275</u>
TOTAL	<u>\$2 000</u>	<u>\$20 000</u>

ANNEX IV : ENGINEERING EXHIBITS

SECTION A : EQUIPMENT LIST FOR SEED BUILDING

The design capacity of the seed processing plant is planned at 2 000 metric tons per season. Normally processing would begin in May extending to late October or early November. Assuming 20 working days per month (allowing for holidays, downtime for maintenance, breakdown and repair) for a six month period the plant would be expected to operate for 120 days per season. Assuming an eight hour work day this would require a processing capacity of 16.67 metric tons daily or about 2.1 metric tons per hour. Equipment specifications are usually given in "bushels per hour" suggesting that an 82 bu/hr rated capacity would be required to handle the targeted work load if the plant operated at rated capacity continuously for the period indicated above. To cover inefficiencies in operation, waiting-time etc. equipment rated at approximately 100 bushel per hour for maize and sorghum should be installed.

Figure 1 is a schematic diagram of the plant and indicates the flow of seed material for cleaning, grading, treatment, and packaging. Receiving and holding bins would control the flow of throughput and permit staged or partial operation of the system so that all units need not be operating at the same time. It is planned that the holding bins be fabricated locally if possible or obtained from a neighboring country. All other equipment would be procured in the U.S.

A spare parts inventory including extra sets of screens for the cleaner and graders, buckets for the elevators, and other items required for routine maintenance and replacement would be procured to insure that the plant can be kept in effective operating condition.

Additionally supporting equipment for use in the plant for seed sampling and testing, bag handling and loading, plant maintenance, and office operation would also be procured.

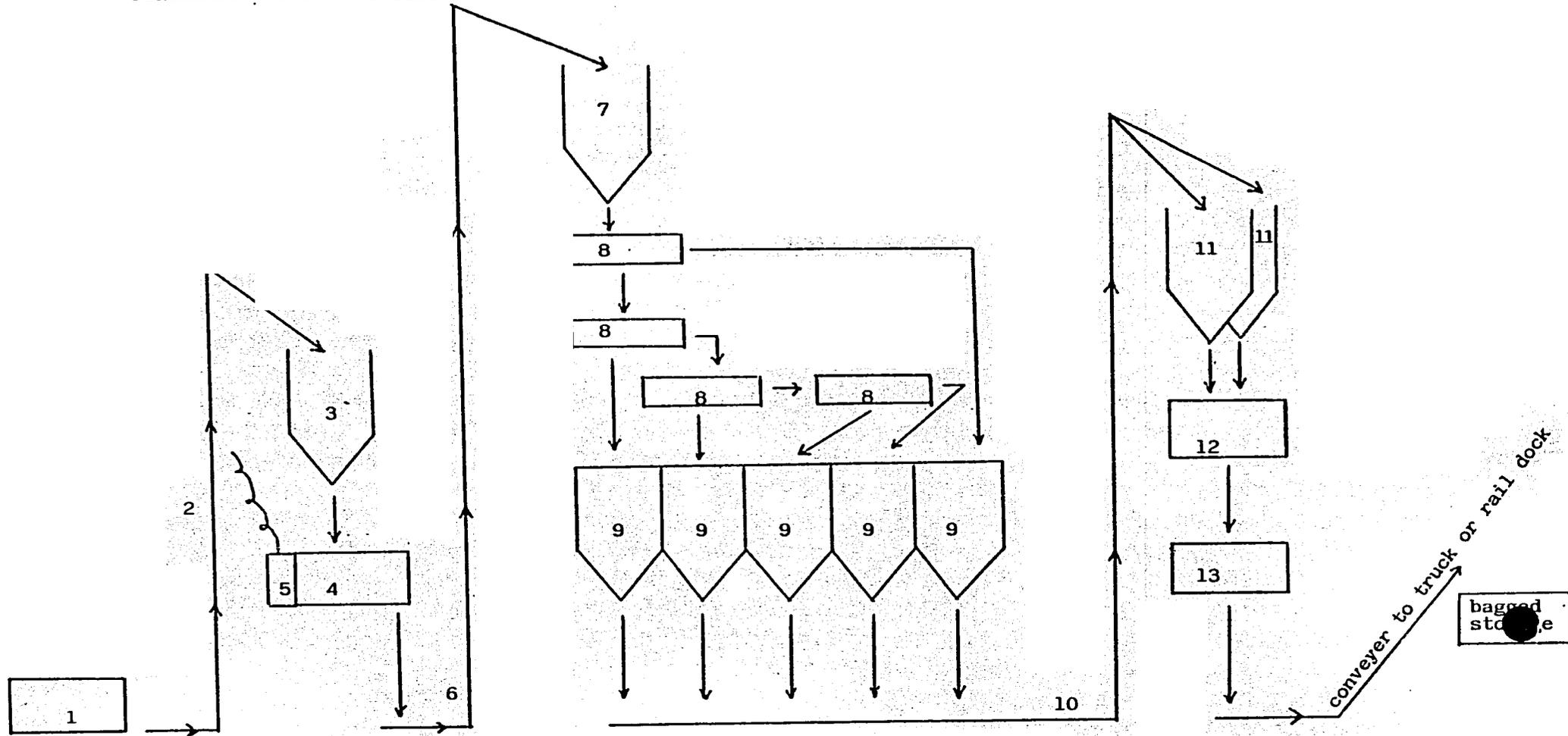
It is proposed that all major items be obtained from U.S. suppliers who would also be required to provide service assistance in installation of the equipment, electrical hookup, testing and commissioning of the plant, troubleshooting and warranty service on labor and parts for the first year of plant operation. The suppliers representative would also be required to provide training and instruction on operation and maintenance of major equipment items.

The attached list identifies major items of seed processing equipment and various classes of other support equipment for the plant, and includes estimates of cost. The cost estimates are based on aggregated information for a somewhat smaller facility which the GOB is installing at the Agricultural Experiment Station in support of their Foundation Seed Production Program.

<u>Item or Sketch Reference Number</u>	<u>Description</u>	<u>Type of Purchase or Manufacturer</u>	<u>Estimated Cost</u>
1	Intake Hopper with steel grate flanged outlet, slide	To be fabricated on site	6 000
2	Conveyer - elevator system belt and bucket type with head and foot units 220V electric motor	U S purchase	4 000
3	Holding Bin with inlet connection, reinforcing ribs, inspection window, flanged outlet	To be fabricated	3 500
4	Seed Cleaner with full set of cleaning sieves, feed hopper, 220/440 volt 3 phase motor (Model 298 Clipper or Equivalent)	U S purchase	25 000
5	Exhaust system for Cleaner with trunking, bends, weather cowl 220V electric motor	U S purchase	3 000
6	Conveyer elevator system similar to 2 above	U S purchase	4 000
7	Holding bin similar to item 3 above but larger	To be fabricated	11 000
8	Precision grade complete with screens, vibrating trough, 220V electric motor drive and feed hopper (Carter 1 VT Model or Equivalent) 4 each units @ \$4 500	U S purchase	18 000
9	Holding bins similar to item 3. 5 each @ \$3 500	To be fabricated	17 500
10	Conveyer - elevator system similar to 2 above but longer	U S purchase	6 000
11	Holding Bin similar as item 3 only larger 2 each @ \$5 000	To be fabricated	10 000
12	Seed treater, film coater tank	U S purchase	15 000
13	Packaging - bagging system with weighing unit, sewing heads	U S purchase	8 000

14	Spare parts inventory for Nos 2, 4, 5, 6, 8, 10, 12, 13, above @ 10% of acquisition cost 8 300 say \$9 000	U S purchase	9 000
15	Steel or aluminium spouting and fittings to interconnect machinery and bins in accord with schematic design	U S purchase	5 000
16	Seed testing Equipment (illustra- tive) sampling tubs, dockage sieves, sample divider with pans, weight tester, thermometer, sampling scale, other miscellaneous items	U S purchase	3 000
17	Handling and maintaining equipment (illustrative) fork lift or hydraulic pallet dollys, bag conveyers, bag carts, platform scales, movable platform dollys, dock boards, truck loading plates, R R car mover, wheel chocks, steel platform and ladders, miscellaneous hand and maintenance tools	U S purchase	30 000
18	Office equipment (illustrative) desks, chairs, filing cabinets, shelf typewriter, adding machine, electric calculator, spare parts inventory storage miscellaneous small items	U S or local purchase	6 000
19	Ocean and Inland freight on items 2, 4, 5, 6, 8, 10, 12, 13, 14, 15, 16, 17, 18 estimated @ 40% of \$136 000 = 54 400 say \$55 000		55 000
20	Electrical works including in- stallation of control panels, switches, relays wiring etc.	To be provided by suppliers service agent or his subcon- tractor	20 000
21	Installation, commissioning, testing of plant and required service and troubleshooting for initial season of operation, including training and instruc- tion to staff on operation and maintenance of plant	To be provided by suppliers service agent	45 000
	Sub Total		304 000
22	Contingency @ 5% = 15 200 say 16 000		<u>16 000</u>
	Total cost of equipping plant		<u>320 000</u>

FIGURE
DIAGRAMATIC SKETCH OF SEED PROCESSING PLANT



1. Intake hopper
2. Conveyer-elevator
3. Holding bin
4. Seed Cleaner
5. Exhaust system for cleaner
6. Conveyer-elevator
7. Holding bin

8. Precision graders
9. Seed bins each
10. Conveyer-elevator
11. Holding bin
12. Seed treater
13. Packing and bagging unit

WAIVERS

I. Waivers Required

A. A Procurement source and origin waiver from A.I.D. Geographic Code 941 to Code 935 for the procurement of approximately \$387,000 of commodities.

B. A waiver of nationality requirements from A.I.D. Geographic Code 941 to Code 935 for the procurement of approximately \$37,500 in services.

III. Justification for Waiver for Source and Origin of Commodities

A. Summary Waiver Information

Cooperating Country:	Botswana
Authorizing Document:	Project Authorization
Project:	Agriculture Technology Improvement
Nature of Funding:	Grant
Description:	Research Fund Supplies Spares for Vehicles Office Equipment (typewriters, calculators) Miscellaneous Equipment
Probable Source:	South Africa, Botswana
Total Value: (Approximate)	\$387,000

B. Discussion

Commodities for which a source and origin waiver is being requested fall into two categories: (1) project commodities and (2) commodities for contractor support.

1. Project Commodities

Typewriters, calculators, and other office equipment listed in the Project Paper (\$60,000)

Spare parts for vehicles brought by the GOB (\$22,500)

- 2 -

Small amounts of farm inputs for on-farm research efforts (seed, fertilizer, implements, etc.), see Annex III D (\$200,000).

2. Commodities for Contractor Support

Housing renovation, supplemental furnishing and equipment, and draperies listed in the Project Paper, Annex II A, p. 1 under "Support Costs--One--Time costs for Travel and Housing". Total \$105,000.

Most of the above items will be purchased off the shelf in Botswana over the term of the Project. However, almost all of these will have their origin in countries included in A.I.D. Geographic Code 935.

Handbook I, Supplement B., paragraph 5B4b provides a list of criteria for waiving the authorized procurement sources under a project. These criteria include:

that "(2) The commodity is not available from countries included in the authorized geographic code "; and

"(7) such other circumstances as are determined to be critical to the success of project objectives."

Office equipment compatible with the electrical current in Botswana is not available from the United States. Nor are spare parts or repair services available for equipment manufactured Code 941 countries. Likewise, the GOB purchased vehicles will be of Code 935 origin and will require spare parts of the same origin. The farm inputs for the special research fund will not be identified until the Project begins implementation, and then they will be needed in small quantities making large orders impractical. Moreover, storage space is limited. Likewise, the amount of materials needed for housing renovation is too small to make procurement from the United States practical. Those materials available locally are of Code 935 origin.

III. Justification for Waiver of Nationality Requirements for Services

A. Summary Waiver Information:

Cooperating Country:	Botswana
Authorizing Document:	Project Authorization
Project:	Agriculture Technology Improvement
Nature of Funding:	Grant
Description:	Residential utilities, security guards, household maintenance, medical costs and general repair and main- tenance of project equipment

WAIVERS

I. Waivers Required

A. A procurement source and origin waiver from A.I.D. Geographic Code 941 to Code 935 for the procurement of approximately \$387 000 of commodities.

B. A waiver of nationality requirements from A.I.D. Geographic Code 941 to Code 935 for the procurement of approximately \$37 500 of services.

II. Justification for Waiver for Source and Origin of Commodities

A. Summary Waiver Information

Cooperating Country:	Botswana
Authorizing Document:	Project Authorization
Project:	Agriculture Technology Improvement
Nature of Funding:	Grant
Description:	Research Fund Supplies Spares for Vehicles Office Equipment (typewriters, calculators) Miscellaneous Equipment
Probable Source:	South Africa Botswana
Total Value: (Approximate)	\$387 000

B. Discussion

Commodities for which a source and origin waiver is being requested fall into two categories: (1) project commodities and (2) commodities for contractor support.

1. Project Commodities

Typewriters, calculators, and other office equipment listed in the Project Paper (\$60 000)

Spare parts for vehicles bought by the GOB (\$22 500)

Small amounts of farm inputs for on-farm research efforts (seed, fertilizer, implements, etc.), see Annex III D (\$200 000).

Housing renovation, supplemental furnishing and equipment, and draperies listed in the Project Paper, Annex II A, p. 1 under "Support Costs--ne--time costs for Travel and Housing". Total \$105 000.

Most of the above items will be purchased off the shelf in Botswana and over the term of the Project. However, almost all of these will have their origin in countries included in A.I.D. Geographic Code 935.

Many of these items are electrical in nature and U.S. equipment is not compatible. There is a complete lack of repair service and spare parts for U.S. products in Botswana. Further, the long lead time involved to procure from the U.S. those few items which are available from the U.S. would seriously delay the implementation of the Project. Many items, such as those for the special research fund will not be identified until the Project begins implementation, and then they will be needed in small quantities making large orders impractical. Moreover, storage space is limited. Consequently, purchase off-shelf is ideal. Chapter 13 of Handbook I, Supplement B now requires a geographic source/origin waiver for off-shelf procurement of Code 935 commodities over \$250 000. Therefore this waiver is requested under the criteria numbers 2 and 7 on page 5-7 of Handbook I Supplement B8.

III. Justification for Waiver of Nationality Requirements for Services

A. Summary Waiver Information

Cooperating Country:	Botswana
Authorizing Document:	Project Authorization
Project:	Agriculture Technology Improvement
Nature of Funding:	Grant
Description:	Residential utilities, security guards, household maintenance, medical costs and general repair and main- tenance of project equipment
Probable Source:	South Africa
Total Value: (Approximate)	\$37 500

B. Discussion

Services for which a waiver of nationality requirements is being requested are contract and support services such as security guard service, household maintenance and medical costs listed under Annex III A - 1 of the Project Paper. Total \$37 500.

All of these services will be procured either from South Africa or from South African owned firms. In the case of security guard service and household maintenance, these services are routinely provided by South African firms operating in Botswana. The general repair and maintenance of equipment for items manufactured in South Africa is generally done by South African firms operating both in Botswana and South Africa. It is not possible to distinguish between South African firms operating in Botswana and Botswana owned firms. Thus, tests of beneficial ownership discussed in Handbook 1B:12 cannot be applied. Accordingly, a waiver is required for all project financed.

Additionally, for the small amount of services required, it is not feasible to require U.S. firms to provide them, since U.S. firms providing these services do not operate in Botswana. Also, no Code 941 firm would be interested since the services required are of limited magnitude and would not generate any interest.

III. Justification for Waiver of Nationality Requirements for Services (Cont.)

Probable Source:	South Africa
Total Value: (Approximate)	\$37,500

B. Discussion

Services for which a waiver of nationality requirements is being requested are contract and support services such as security guard service, household maintenance and medical costs listed under Annex III A - 1 of the Project Paper. Total \$37,500.

All of these services will be procured either from South Africa or from South African owned firms. In the case of security guard service and household maintenance, these services are routinely provided by South African firms operating in Botswana. The general repair and maintenance of equipment for items manufactured in South Africa is generally done by South African firms operating both in Botswana and South Africa. It is not possible to distinguish between South African firms operating in Botswana and Botswana owned firms. Thus, tests of beneficial ownership discussed in Handbook 1B: 12 cannot be applied. Accordingly, a waiver is required for all project financed services.

Additionally, for the small amount of services required, it is not feasible to require U.S. firms to provide them, since U.S. firms providing these services do not operate in Botswana. Also, no Code 941 firm would be interested since the services required are of limited magnitude and would not generate any interest.

DRAFT PROJECT AUTHORIZATION

Name of Country: Botswana
Name of Project: Agricultural Technology Improvement Project
Number of Project: 633-0221

1. Pursuant to Section 531 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Agricultural Technology Improvement Project for Botswana ('Cooperating Country') involving planned obligations of not to exceed \$9 180 000 in grant funds over a six year period from date of authorization, subject to the availability of funds in accordance with the AID OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. I also authorize a seven year life of project.

2. The project consists of (a) working with the Ministry of Agriculture in the Cooperating Country to establish and institutionalize a Farming Systems Research Program through the provision of technical assistance, training and some commodities, and (b) support for the Cooperating Country's seed processing program through the provision of equipment.

3. The Project Agreement which may be negotiated and executed by the officer to whom such authority is delegated in accordance with AID regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as AID may deem appropriate.

a. Source and Origin of Goods and Services

Except as provided in paragraph (d) below, goods and services financed by AID under the project shall have their source and origin in the Cooperating Country or in countries included in the AID Geographic Code 941 except as AID may otherwise agree in writing.

b. Conditions Precedent

The Project Agreement shall contain a substance as follows:

Prior to the disbursement, or to the issuance of documentation pursuant to which disbursement will be made, of funds for the purchase of seed equipment, the Cooperating Country will furnish to AID in form and substance satisfactory to AID (a) evidence that a contract has been signed with a purchasing service agent for the procurement of the equipment; or (b) tender documents and an executed contract for the procurement of the equipment.

c. Covenants

The Project Agreement shall contain covenants in substance as follows:

1. Establishment of Positions. The Cooperating Country agrees to establish and fill the new positions as set forth in Annex A to the Project Agreement (pp of the Project Paper).

2. Participants. The Cooperating Country agrees that candidates for participant training will be selected on a timely basis as set forth in the implementation plan in Annex A to the Project Agreement.

3. Counterparts. The Cooperating Country agrees to assign counterparts to each of the technical assistance personnel in the number and manner specified in Annex A to the Project Agreement.

4. Housing and Office Space. The Cooperating Country agrees that no technical assistance personnel will arrive in Botswana unless suitable housing and office space are available, unless AID agrees in writing.

5. 5. Research Strategy. The Cooperating Country during the first year of the project agrees to review its agricultural research priorities and prepare a research strategy statement to serve as a guide for planning further research programs. The cooperating country further covenants to review their research strategy periodically to ensure that the research staff, resources and funds are being utilized appropriately.

d. Waivers

Based upon the justifications in Annex VB to the Project Paper and AID Delegations of authority, I hereby,

1. Waive the requirement set forth in Handbook I, Supplement B, Chapter 5 that commodities procured with grant funds have their source and origin in countries included in AID Geographic Code 941 and Botswana to permit the procurement of vehicle spare parts in the approximate cost of of \$22 500, office equipment in the approximate cost of \$60 000, research fund commodities in the approximate cost of \$200 000 and support commodities in the approximate cost of \$105 000, which have their source and origin in countries included in AID Geographic Code 935.

2. Certify that exclusion of procurement of these commodities from Free World countries other than the Cooperating Country and countries included in Code 941 would seriously impede attainment of US foreign policy objectives and the objectives of the foreign assistance program.

3. Waive the requirement set forth in Handbook I, Supplement B, Chapter 5, that the suppliers of services have their nationality in Geographic Code 941 countries to permit is waived to permit the procurement of services in the approximate amount of \$37,500 from supplies having their nationality in countries included in AID Geographic Code 935.

4. Certify the interests of the United States are best served by permitting the procurement of these services from Free World countries other than the Cooperating Country and countries included in Code 941.

ANNEX V : LEGAL EXHIBITS

SECTION D : 5c(1) - COUNTRY CHECKLIST

Listed below are, first, statutory criteria applicable generally to FAA funds, and then criteria applicable to individual fund sources: Development Assistance and Economic Support Fund.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy?

- a. No such determination
- b. The project is designed to improve the welfare of small farmers and increase national food production through the development, extension, and adaption of relevant technology.

Yes

2. FAA Sec. 113. Has particular attention been given those programs, projects, and activities which tend to integrate women into the national economies of developing countries, thus improving their status and assisting the total development effort?

3. FAA Sec. 481. Has it been determined that the government of the recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?

No such determination has been made

4. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not dominated or controlled by the international Communist movement?

Yes

5. FAA Sec. 620(c). If assistance is to a government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen

No

for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) the debt is not denied or contested by such government?

6. FAA Sec. 620(e)(1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No

7. FAA Sec. 620(a), 620(f), 620D; Continuing Resolution Sec. 511, 512 and 513; ISDCA of 1980 Secs. 717 and 721. Is recipient country a Communist country? Will assistance be provided to Angola, Cambodia, Cuba, Laos or Vietnam? (Food and humanitarian assistance distributed directly to the people of Cambodia are excepted). Will assistance be provided to Afghanistan or Mozambique without a waiver? Are funds for El Salvador to be used for planning for compensation, or for the purpose of compensation, for the confiscation, nationalization, acquisition or expropriation of any agricultural or banking enterprise, or property or stock thereof? No

8. FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? No

9. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property? Security and protection measures appear to be adequate

10. FAA Sec. 620(k). Does the program furnish assistance in excess of \$100,000,000 for the construction of a productive enterprise, except for productive enterprises in Egypt that were described in the Congressional Presentation materials for FY 1977, FY 1980 or FY 1981? No
11. FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason? No such denial has been considered
12. FAA Sec. 620(m). Is the country an economically developed nation capable of sustaining its own defense burden and economic growth and, if so, does it meet any of the exceptions to FAA Section 620(m)? No
13. FAA Sec. 620(o); Fishermen's Protective Act of 1967, as amended, Sec. 5. If country has seized, or imposed any penalty or sanction against any U.S. fishing activities in international waters,
 a. has any deduction required by the Fishermen's Protective Act been made?
 b. has complete denial of assistance been considered by AID Administrator? No
14. FAA Sec. 620(g); Continuing Resolution Sec. 518. (a) Is the government of the recipient country in default for more than six months on interest or principal of any AID loan to the country?
 (b) Is the country in default exceeding one year on interest or principal on any U.S. loan under a program for which the Continuing Resolution appropriates funds?
 a. No
 b. No
15. FAA Sec. 620(s). If contemplated assistance is development loan or from Economic Support Fund, has the Administrator taken into account the percentage of the country's budget which is for military expenditures, the amount of foreign exchange spent on military equipment and the amount
 Until 1977 Botswana had no army, only a small police force. In 1977 a small defense force (army) was organized. For 1979-80, police and internal security expenditures represented approximately 6% of the GOB budget or about 4% of GDP. Less than 8% of foreign exchange reserves were spent on military equipment in the 1979-80 period and no money was spent on sophisticated weapons systems.

spent for the purchase of sophisticated weapons systems? (An affirmative answer may refer to the record of the annual "Taking into Consideration" memo: "Yes, taken into account by the Administrator at time of approval of Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

16. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?

No, not applicable

17. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget?

There are no arrears

18. FAA Sec. 620A; Continuing Resolution Sec. 521. Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed an act of international terrorism? Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed a war crime?

We have no knowledge of any such action

19. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. who is present in such country to carry out economic development programs under the FAA?

No

20. FAA Sec. 669, 670. Has the country, after August 3, 1977, delivered or received nuclear enrichment or re-processing equipment, materials, or technology, without specified arrangements or safeguards? Has it detonated a nuclear device after August 3, 1977, although not a "nuclear-weapon State" under the nonproliferation treaty?

We have no knowledge of any such delivery or receipt.

B. FUNDING SOURCE CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria.

a. FAA Sec. 102(b)(4). Have criteria been established and taken into account to assess commitment progress of the country in effectively involving the poor in development, on such indexes as: (1) increase in agricultural productivity through small-farm labor intensive agriculture, (2) reduced infant mortality, (3) control of population growth, (4) equality of income distribution, (5) reduction of unemployment and (6) increased literacy.

Yes

b. FAA Sec. 104(d)(1). If appropriate, is this development (including Sahel) activity designed to build motivation for smaller families through modification of economic and social conditions supportive of the desire for large families in programs such as education in and out of school, nutrition, disease control, maternal and child health services, agricultural production, rural development, assistance to urban poor and through community-based development programs which give recognition to people motivated to limit the size of their families?

Non-applicable

2. Economic Support Fund Country Criteria.

a. FAA Sec. 502B. Has the country (a) engaged in a consistent pattern of gross violations of internationally recognized human rights or (b) made such significant improvements in its human rights record that furnishing such assistance is in the national interest?

No

b. FAA Sec. 532(f). Will ESF assistance be provided to Syria?

No

c. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?

No grant commodities will be sold and thus no sales proceeds will be generated.

d. FAA Sec. 620B. Will ESF be furnished to Argentina? No

5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual funding sources: Development Assistance (with a subcategory for criteria applicable only to loans); and Economic Support Fund.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1. Continuing Resolution Unnumbered; FAA Sec. 634A; Sec. 653(b).

(a) Describe how authorizing and appropriations Committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure)?

a. The congress was notified utilizing normal congressional notification procedures.

b. Yes

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

a. Yes

b. Yes

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

None required

4. FAA Sec. 611(b); Continuing Resolution Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973?

This is not a water or water-related land resource construction project.

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?

Not required because there is no construction element.

6. FAA Sec. 209. Is project susceptible of execution as part of regional or multi-lateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.

No

7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

The project is designed 1) To improve the capacity of the GOB's Ministry of Agriculture's Department of Agricultural Research to develop technologies appropriate for small farmer needs, 2) To improve the capability of the extension service to transfer technologies which can be utilized by small farmers, 3) To strengthen and institutionalize the linkage between the research and extension departments and, 4) To insure that adequate supplies of needed seed for major agricultural crops are available for distribution to Botswana farmers.

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

The project will fund U.S. technical assistance and seed processing equipment.

9. FAA Sec. 612(b), 636(h); Continuing Resolution Sec. 508. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.

GOB will contribute approximately 25.4% of project costs.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

Botswana is not an excess foreign currency country.

11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes

12. Continuing Resolution Sec. 522. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity? Not applicable

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries. N/A

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: (include only applicable paragraph which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.) N/A

(1) (103) for agriculture, rural development or nutrition; if so (a) extent to which activity is specifically designed to increase productivity and income of rural poor; 103A if for agricultural research, full account shall be taken of the needs of small farmers, and extensive use of field testing to adapt basic research to local conditions shall be made; (b) extent to which assistance is used in coordination with programs carried out under Sec. 104 to help improve nutrition of the people of developing countries through encouragement of increased production of crops with greater nutritional value, improvement of planning, research, and education with respect to nutrition, particularly with reference to improvement and expanded use of indigenously produced foodstuffs; and the undertaking of pilot or demonstration of programs explicitly addressing the problem of malnutrition of poor and vulnerable people; and (c) extent to which activity increases national food security by improving food policies and management and by strengthening national food reserves, with particular concern for the needs of the poor, through measures encouraging domestic production, building national food reserves, expanding available storage facilities, reducing post harvest food losses, and improving food distribution.

(2) (104) for population planning under sec. 104(b) or health under sec. 104(c); if so, (i) extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children, using paramedical and auxiliary medical personnel, clinics and health posts, commercial distribution systems and other modes of community research.

(4) (105) for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development; and (ii) extent to which assistance provides advanced education and training of people in developing coun-

tries in such disciplines as are required for planning and implementation of public and private development activities.

(5) (106; ISDCA of 1980, Sec. 304) for energy, private voluntary organizations, and selected development activities; if so, extent to which activity is: (i) (a) concerned with data collection and analysis, the training of skilled personnel, research on and development of suitable energy sources, and pilot projects to test new methods of energy production; (b) facilitative of geological and geophysical survey work to locate potential oil, natural gas, and coal reserves and to encourage exploration for potential oil, natural gas, and coal reserves; and (c) a cooperative program in energy production and conservation through research and development and use of small scale, decentralized, renewable energy sources for rural areas;

(ii) technical cooperation and development, especially with U.S. private and voluntary or regional and international development, organizations;

(iii) research into, and evaluation of, economic development process and techniques;

(iv) reconstruction after natural or manmade disaster;

(v) for special development problems, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(vi) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

c. (107) is appropriate effort placed on use of appropriate technology? (relatively smaller, cost-saving, labor using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor.)

N/A

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be

N/A

furnished (or has the latter cost-sharing requirement been waived for a "relatively least developed" country)?

e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"? N/A

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government. N/A

g. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth? N/A

2. Development Assistance Project Criteria (Loans Only)

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest. N/A

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan? N/A

3. Project Criteria Solely for Economic Support Fund

a. FAA Sec. 531(a). Will this assistance promote economic or political stability? To the extent possible, does it reflect the policy directions of FAA Section 102? N/A

b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities. N/A

10