BOTSWANA CROP PRODUCTION

USAID Project No. 633-0056

An Outside Evaluation

Evaluation team

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BOTSWANA CROP PRODUCTION (056)

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List of Definitions and Acronyms

AD	-	**Agriculture Demonstrators**
AID	-	**See USAID**
ALDEP	-	Arable Lands Development Program
BAMB	-	Botswana Agricultural Marketing Board
Batswana	-	More than one person of Botswana citizenship
CCIO	-	Chief Crop Improvement Officer
CIMMYT	-	International Maize and Wheat Research Institute
CPO	-	Crop Program Officer
CSO	-	Crop Screening Officer
DLFRS	-	Dryland Farming Research Scheme
EFSAIP	-	Evaluation of Farming Systems & Agricultural Implements Project
FAO	-	Food and Agriculture Office
FAR	-	Fixed Amount Reimbursement
GOB	-	Government of Botswana
ICRISAT	-	International Crops Research Institute for the Semi-Arid Tropics
IFPP	-	Integrated Farming Pilot Project
MOA	-	Ministry of Agriculture
Motswana	-	One person of Botswana citizenship
OSARAC	-	Office of Southern Africa Regional Activities Coordination
PASA	-	Participating Agency Service Agreement
PGA	-	Project Grant Agreement
PID	-	Project Identification Document
PP	-	Project Paper
RCO	-	Regional Crop Officer
RSA	-	Republic of South Africa
US	-	United States
USDA	-	United States Department of Agriculture
USAID	-	United States Agency for International Development
WFP	-	World Food Program
P	-	Pula (the currency of Botswana)

BOTSWANA CROP PRODUCTION (056)

Evaluation Methodology

This is the first major outside evaluation of a project begun in 1976.

A collaborative approach was used in the conduct of the evaluation. A review was conducted of the financial records of the project. To the extent possible, schedules are attached to this evaluation summarizing the financial status of the project, commodities bought, construction completed and participants trained. USAID estimated cost projections to the end of the project for the above categories are also included. Discussions were held with appropriate representatives of the GOB/Ministry of Agriculture, PASA personnel and others. A sampling of field sites were visited by various members of the evaluation team and the activities and opinions of a number of Batswana were noted.

Issues as they were uncovered were discussed with all responsible parties and a draft Issues and Recommendations Paper was presented to all concerned for review. (This Paper is attached as Addendum 1 to the Evaluation Report.) A meeting was held on the Paper and the comments, suggestions, etc. of the above personnel were taken into consideration by the Evaluation Team in preparing its final report. Prior to the issuance of the final report, Major Action Decisions were reviewed by the USAID Director and the MOA Permanent Secretary.

Summary

This project has three purposes, not necessarily interrelated: 1) institution building (by staffing and training a Crop Division within the MOA in crop production programs suitable for small farmers); 2) expand crop research to supplement GOB and other donor-supported efforts, with special emphasis on sorghum; and 3) to increase the warehouse grain storage space so that the Botswana Agricultural Marketing Board (BAMB) can more efficiently perform its functions of buying, selling and storing grains and, in so doing, eliminate significant grain price flucuations, and also to provide a marketplace for small farmers.

For a series of reasons the Crop Division has never developed into the viable and dynamic unit envisioned in the PP. Notable reasons for this failure are, inter alia: the protracted delays encountered in recruiting the CCIO and CPO and their very late arrival in Botswana to assume their duties full time; and 2) the poor leadership demonstrated in moving the institution building aspects of this program forward. With the departure of the CCIO in early March 1980 - and he will not be replaced by another U.S. technician - the chances of this AID project accomplishing its principal institution building purpose are for all practical purposes impossible.

In 1978 a special task force was established by the GOB in the MOA to prepare an Arable Lands Development Program (ALDEP). This task force did not include the Crop Division although the CCIO designate was a member. ALDEP has prepared a long-term crop development plan and policies

and programs related to crop production. To date the primary function of ALDEP has been a planning one. The issue now is to how best to implement the crop development plan.

In discussions with MOA officials, consideration is being given to staffing Crop Division headquarters with five professionals and placing Regional Crop Officers (RCOs) in five of Botswana's seven regions in order to implement the crop development plan. A good many individuals to staff Crop Division headquarters and regional positions have been, we understand, tentatively identified. From AID's viewpoint the most logical alternative would be for the remainder of this project's life to provide support to further the GOB initiative emanating from ALDEP and to lay the groundwork for implementing the crop development plan.

For this AID project, the form of continued support which can be provided is clear, albiet minimal. The services of the CPO-projected to be utilized through 4/81 - should be designed so that it is maximally consistent with the GOB's crop development implementation plans. Also any remaining funds under this project which are earmarked for participant training and which can still be used to up-grade the capability of Botswana would be beneficial. The GOB and USAID should together develop a program for the CPO and a participant training program for the remaining life of this project. Other training will also be required for BAMB warehouse operations and is covered in a subsequent section.

The secondary purpose of this project appears to be successfully implemented. The CSO was already in-country working in the MOA Research Division and was funded by AID from other sources. At the onset of this project the CSO was assigned to work at the Arable Lands Research Station at Sebele, near Gaborone. A US trained professional from the MOA was assigned to work with the CSO in May 1979 and in October 1979 was appointed CSO. The research work of the CSO is in all respects on schedule (e.g. planning, number and kinds of experiments, reporting, etc.).

Screening trials have shown that few introduced varieties have the yield potential or acceptability that the local varieties possess. The expatriate CSO initiated a breeding program to incorporate other desirable characteristics needed for improving the local varieties. Since there is no qualified local staff to carry on this work, the Evaluation Team has suggested that USAID and the GOB/MOA consider using some of the funds of the proposed AID Agricultural Research Project to finance one or two breeders to continue and further the work started by the expatriate CSO. A suggested requirement is that the 2 breeders should jointly possess a demonstrated capability to breed a main and secondary crop; i.e., sorghum/millet, maize/cowpeas.

Finally, the BAMB segment of this project seems to be progressing slowly, but satisfactorily. Five one thousand metric-ton warehouses, which were included in the PP, have, in fact, been constructed and are operating with reasonable efficiency. In October 1977, OSARAC, with, AID/Washington approval, approved a GOB request to finance another six one thousand ton strategis grain warehouses. The GOB request was based on a FAO estimate that six thousand tons of strategic grain reserve were needed in Botswana as a protection against periods of drought. The GOB determined that it would be better to place the grain stock in sixteen strategic locations to make it easier to distribute grain stocks in periods of emergency shortages. Prior to the project BAMB had in operation five two thousand ton warehouses. Another

five one thousand ton warehouses were included in the PP for AID financing. The final six one thousand ton warehouses have been approved for financing under this project by OSARAC. While construction of these six warehouses to be financed by AID were delayed beyond expectation, as of March 1980 the sites for the six warehouses have been firmly established, construction has begun on all six sites, and BAMB estimates that construction of all six warehouses will have been completed by the end of September 1980. MOA officials advise that delay was due to lack of GOB funds. USAID provided all funds requested, using FAR procedures, for the six warehouses to be located on existing warehouse sites. Subsequently the GOB decided to place the strategic units at new sites with attendent additional costs (infrastructure, fencing, etc.). USAID rejected a request to finance these additional costs ($381 000). The GOB provided the necessary funds in August of 1979.

BAMB officials feel that storage and Pest Management Training as currently provided is inadequate. The Evaluation Team concurs and suggests that some of the anticipated remaining funds in this project should be utilized to finance: 1) a consultant to teach a 3-4 week course in grain storage operations to all BAMB Depot Managers; 2) a Warehouse Managers' short course in post-harvest technology at Kansas State University for the BAMB Marketing Manager; 3) 1 or 2 Warehouse Managers to receive practical training in the US or a third-country for short term. In sum, the result is that slow but significant progress has been made towards achieving the three objectives under this activity; namely, 1) to provide storage capacity in a drought-prone country; 2) to provide a marketplace for small farmers; and 3) to enable BAMB to stabalize prices in the grain markets in Botswana. The suggested training for BAMB officials mentioned above should further strengthen BAMB in carrying out its functions.

However, we wish to note that USAID has not made any payments to date (under Fixed Amount Reimbursement - FAR - procedures) for any construction completed under this project. Three houses financed under this project have been completed and accepted by USAID Engineers, as have three of the five original one thousand metric ton warehouses. It is quite possible that the GOB does not fully understand FAR procedures. If so, USAID should pursue this matter and every effort made to have reimbursement for completed and accepted construction work effected as promptly as practicable. It is also suggested that USAID Engineers inspect and, if appropriate, approve the construction of the remaining two warehouses.

Inputs

Financial

Annex A attached presents a summary of the proposed costs by category as contained in the PP, dated 3/17/76, the net obligations as of February 1980, USAID/Botswana estimated life of project cost requirements and remaining unobligated balance.

From the documents available at USAID it appears that $9 000 more has been obligated through Project Grant Agreements (PGA) than was legally authorized $1 751 000 obligated - $1 742 000 unauthorized). The USAID Controller is looking into the matter; however, given the fact that an

estimated unobligated balance of +141 000 will remain at the end of the project, the simplest procedure seems to just de-obligate approximately $9 000 by an amended PGA.

As was noted in our evaluation of the Range and Livestock Management Project (015), a fairly cumbersome accounting system is in effect. Financial records are dispersed between what was once OSARAC, USAID/Nairobi, AID/Washington and USAID/Botswana. Beginning April 1, 1980 most project financial documentation will reside in USAID/Botswana. The financial records of the project, while excellent under the circumstances, are by no means complete. For example, it could not be determined from USAID records why an excess of approximately $9 000 was obligated over what appears to be the maximum authorized.

The PP estimated, under following broad categories of cost, that the Pula equivalent of $1 717 000 would be contributed by the GOB to this project:

1.	General services	$ 151 000
2.	Agricultural Research Division Support	124 000
3.	Agricultural Extension Service Support	1 442 000

The USAID Controller has no record of the amounts of local currency support provided by the GOB nor the amount of such support projected through the end of life of this project. This financial information should be requested from the GOB and incorporated into USAID's financial records of this project so that these official AID records can be as complete as possible under the cirumstances. It would also be advantageous if the GOB would provide this financial information periodically to USAID.

As of February 1980 no disbursements have been made by AID, under FAR procedures, for the construction of three (3) houses or five (5) one metric ton warehouses. The three houses have been accepted as complete by USAID Engineers as were, in mid-1979, three of the five warehouses. The USAID Controller on July 11, 1979, returned a GOB reimbursement request for construction costs with an accompanying letter which explained, inter alia, FAR procedures. The letter stated that USAID would await the re-submission of the reimbursement request consistent with FAR procedures. As of February 1980 (eight months after the above-mentioned USAID letter was sent) USAID had not received a reply to its letter nor has a new reimbrusement request been submitted by the Ministry of Finance and Development Planning.

The GOB does not appear to understand just how FAR operates. This is an area where USAID should follow-up and attempt to make prompt reimbursement for construction activities which have been completed and accepted by USAID Engineers.

The preponderence of AID-financing of local currency costs relates to local construction of houses, warehouses and a workshop (see Annex A). The PP provided $341 000 and in October 1977 OSARAC approved - with AID/Washington concurrence - an additional $199 000 equivalent to finance an additional six (6) one thousand metric ton Strategic Grain Reserve Warehouses. As mentioned above and as shown in Annex A, USAID estimates

that an unutilized obligated balance of approximately $141 000 will remain at the end of this project. As a general rule, Project Officers tend to be cautuous in making financial requirements projections so that there is a 'cushion' against unforeseen or higher than anticipated costs, so that it is quite possible that the unutilized obligated balance of this project may be higher than $141 000. We suggest that USAID and the GOB discuss possible alternative project uses for these estimated remaining funds. An area where use of these funds may be possible is in training.

Personnel

AID-financed (PASA)

Annex B presents a listing of (a) PASA personnel, (b) titles, (c) arrival dates, (d) estimated departure dates, (e) estimated staffyear effort, (f) the positions where counterparts are required, and (g) where located.

The PP contemplated a total of 11½ years effort as follows:

+	Chief of Crop Division (CCIO)	3½ staff years	(2½ yrs.)
+	Crop Program Officer (CPO)	3 staff years	(2 yrs.)
	Consultants	3 consultant years	(3 mos.) 1/
	Crop Screening Officer (CSO)	2 staff years	(2 yrs.)
		11½ staff	6 yrs. 9mos.

( ) denotes staff years from Annex B.
\+ Technical Assistance directed toward institutional aspects.
1/ Two short-term visits by a Seed Specialist have occurred.

Although the Project Grant Agreement was signed in August 1976, the CCIO and CPO arrived in Botswana on permanent status in Jan 1978 and April 1979, respectively. However, the CCIO did come to Botswana twice on two TDY's in 1977 to try and lay some groundwork for implementing this project. The reasons for this inordinate delay are well documented by USAID: namely, vain efforts to locate a university to implement the project. A project with just two positions to be filled by a contractor (that of CCIO and CPO - the CSO position was staffed by an America already working in the MOA Research Division) was not, according to USAID, large enough to interest a US university. USDA was finally selected in 1977 to implement the project as part of a comprehensive OSARAC decision to utilize USDA/PASA group services for three ag projects in Botswana (Agricultural Planning, Range and Livestock Management, and Crop Production). While the effectiveness of the AID-financed PASA group will be dealt with in some detail in the Outputs section of this report, it is interesting to note the following language included in the USAID evaluation of May 1979: 'The Crops Division has suffered from poor leadership and has not developed into a dynamic unit... annual long-range plans have not been prepared (by the Crop Division). Staff positions for the new division have not been recommended by the CCIO and thus are not yet established.' As of the time of this evaluation, these remarks are generally valid. Five positions for regional agricultural crop production officers were established, but were then "frozen" by the Director of Personnel as part of a Government-wide "manpower-budgeting" exercise. A headquarters crop production officer position was established and filled but now lies vacant.

GOB-assigned project staff

The PP states that, "GOB support of the Crop Division and its program in terms of funding and personnel support will be essential.' Although not specifically stated in the PP it is inferred that counterparts would be provided for the PASA group occupying the positions of CCIO, CPO and CSO.

It was also expected that the USDA/PASA Team would make use of an informal MOA operational concept of a 'task force', whereby the Team would call on or assemble technicians as needed from other divisions to resolve problems and plan programs.

Although Annex B shows that a counterpart has been provided to the CCIO, in reality this counterpart has worked for the most part in the Arable Lands Development Program (ALDEP). No counterpart was provided to the CPO. Fortunately, the CSO has had a counterpart who has assumed the responsibilities of CSO.

It is difficult to assess how much use was made by the USDA/PASA Team of 'task forces', and, for all practical purposes, how such use strengthened the institution building aspects of this project. From observations and discussions with Team members and MOA representatives, it appears that the use and impact of 'task forces' has been negligible.

The lack of strong GOB support for this project is due in large part to the undue delay in getting this project off the ground (e.g., the late arrivals of the CCIO and CPO) and that ALDEP has accomplished a good portion of the planning which the Crop Division was envisioned to produce under this project. This area will be dealt with more thoroughly in the Outputs section of this report.

Participant Training

Long-Term (US degree)

A complete schedule of participant training under this project, which gives the name of the trainee, place of work, educational institution attended, departure and return dates, and field of study is presented in Annex C.

The project provided funds for a total of 21 study years in the US for 9 participants (four Agronomy, three Farm Management and two Extension). As can be seen from Annex C, only two participants have been sent to the US for long-term training - one in the area of crop production and the other in plant science. At least one additional candidate was nominated for training, but was unacceptable to US universities.

USAID records document that the MOA position was that participants were available, but that the CCIO did not develop the necessary training program. By the time this report is issued the CCIO will have departed Botswana and will not be replaced by another USDA/PASA member. Also USAID-prepared life of project cost estimates make provision for training only one more participant in the US.

Whether the failure of the long-term training component of the project is due to lack of effective USAID monitoring, the poor performance of the CCIO in this area, the unavailability of GOB qualified candidates, or some

combination of the three is not the really principal issue. Rather it is during project design and development and project negotiations with the GOB that additional work in specifically identifying and scheduling participants (and perhaps insuring that the candidates have the necessary qualifications) is required. This is especially true in Botswana, where the GOB is faced with a shortage of skilled professional Batswana, expatriates staff a fairly large share of senior technical positions, and the GOB policy at present is to limit the increase of the Botswana 'civil service'. Given this ambient, any AID project with a sizeable participant training component should be most carefully designed so that a realistic and reasonable long-term training program can, in fact, be implemented.

Short-term training (US/Third World Diploma Program)

The project provided funds for a total of eight study years for four participants (two Agronomy, two Post Harvest). As can be seen from Annex C, there were two Batswana trained - one in grain storage and the other in seed improvement - under this portion of the project; however, the Evaluation Team recommends training for some BAMB officers in various facets of grain storage operations.

The Evaluation Team's comments stated above the long-term US degree section are equally valid.

In-country training

Although this is not specifically set out as a line item in the project budget presented in the PP, the Pula equivalent of $10 000 was made available by AID to support an in-country training program in storage management. Trainees completing these courses were expected to manage the five one thousand metric ton grain storage warehouses to be AID-financed under the project.

No AID local currency has been expended to date. Annex C shows that one individual attended a 2-3 month course in Grain Storage Management given by the USDA in the United States. This individual occupies the position of Deputy General Manager of the Botswana Agricultural Marketing Board (BAMB).

The five one thousand ton warehouses which are AID-financed have sufficient and able Batswana to manage them. This has been accomplished by a combination of training undertaken by BAMB and the Contractor who has built the warehouses. The Outputs section of the report will cover the proposed AID-financing of a portion of six one thousand metric ton Strategic Grain Storage Warehouses, as well as the Batswana management of those warehouses and recommended short-term training courses for BAMB managers.

Commodities

Annex A provides a general picture of the types of commodities to be procured by AID under this project, i.e., four vehicles and various types of supplies and equipment.

The USAID Field Support Office, responsible for overseeing procurement and providing requisite support services, was requested to provide a listing of commodities procured, when received, where located, and corresponging costs. This information was provided to the Evaluation Team late

in the evaluation period. This information was provided by the Evaluation Team to the USAID Controller for incorporation into official Mission project files.

Also, as mentioned in the May 1979 in-house evaluation the commodities ordered by OSARAC prior to the CSO's arrival (a small tractor and an experimental plot planter) were of no use to this project. The tractor is under-powered and the planter cannot be adapted to experimental row widths. However, these items are being used by the MOA for horticultural research. The GOB Horticulture Officer is a member of the Crop Division and reports to the CCIO.

Construction (local currency items)

The PP provided the Pula equivalent of $341 000 for:

(a) the construction of three houses,
(b) the construction of a workshop,
(c) the construction of five one thousand metric ton grain storage warehouses, and
(d) A contingency factor.

In October 1977, OSARAC approved the allocation of an additional $199 000 for the construction of six Strategic Grain Storage Warehouses. Annex D presents a list of all locations of the AID-financed warehouses.

As of February 1980, all construction had been completed, with the exception of the six one thousand metric ton Strategic Grain Storage Warehouses. However, no AID funds have been disbursed - under FAR procedures - for any of the completed construction.

In July 1979 the USAID Controller returned a reimbursement request submitted by the Ministry of Finance and Development Planning. The letter which was sent with the returned reimbursement request also contained detailed guidance regarding the use of FAR. In this letter the USAID requested that the reimbursement request be re-submitted under FAR procedures. To date no reimbursement request has been received by USAID nor has any further correspondence on this subject been initiated by the Ministry of Finance and Development Planning. It is quite possible that the GOB is not familiar with FAR and this may be the principal reason why the GOB has not re-submitted a financing request in the past eight months. The USAID Controller intends to follow-up this matter.

Outputs

Output 1: A staffed crop division

The agreement, signed in August 1976, reflected the thinking and needs of GOB in 1976. This need was considered by GOB to be urgent politically and economically. For reasons set out in the Project Evaluation of May 1979, the CCIO arrived on post in February 1978 and the CPO in May 1979. In the meantime the urgency of the GOB's need did not decline and it was decided to set up the ALDEP planning unit within the MOA, suitably manned. This was done in 1978. The institutionalization of the Crop

Division and the responsibilities of the Crop Division (see below) have been or will be covered by the ALDEP team, with the exception of the consultancy by USAID on the Seed Multiplication Unit.

Crop Division responsibilities:

1. Recommend (a) policies and programs related to crop production; (b) crop-related experiments, studies, and analyses; and (c) policies and programs in support of Botswana's needs for seed multiplication activities;

2. Prepare and implement a long-term crop development plan;

3. As a division of the Field Services Department coordinate and provide liaison with other donor-funded activities related to crops, the Agricultural Research Division, BAMB, and international crop research institutions;

4. Assemble the necessary staff from the MOA as a task force to address particular problems and design and support execution of projects;

5. Support the training of field staff in crop production operations; and

6. Evaluate crop-related activities.

The CCIO, although a successful and internationally recognized millet breeder, did not have the necessary management qualifications to carry out the scope of work. The ALDEP team was headed by an agricultural economist with many years of experience with Botswana agriculture; with this background he has been able to direct the preparation of a long-range crop plan and the program involved in implementing it.

In part the failure of the project to fulfill its work plan was caused by delays in start-up mainly due to inability to interest a University contractor. A contractor reading the PP might anticipate serious difficulties:

- insufficient technicians for the task;
- qualifications of the technicians not matching the scope of work;
- problems with identification of the technical package;
- shortage of counterparts;
- problems in training of the field staff in crop production activities.

The status on this output as outlined in the May 1979 evaluation remains unchanged.

Output 2: Arable farming system

Botswana will have a substantial research base, proven in trials and demonstrations in many parts of the country, on which to build a national cereal and crop program. This technology will be institutionalized.

At the time of the PP the proposed arable lands technology included a four year rotation of sorghum, cowpeas, millet and fallow. The fallow was unacceptable to the farmers, and sole (single) crops are not commonly grown. The proportion of the different crops grown depends upon the farm family labor supply and food needs. So an inflexible rotation will not fit a high percentage of farmers.

The second practice was autumn (June-July) plowing followed by use of a planter early in spring (Oct -Nov.). Autumn plowing requires a supply of water for people and cattle on the lands. The use of a planter tends to be a risky procedure, because of the uniformity of seed depth and thus simultaneous emergence of plants. If the rains are poorly timed the whole crop is likely to fail. The experience of one farmer shows that use of third furrow or broadcast planting can, with the right support, produce yields 5-10 times average while retaining a low level of risk.

The "package" then requires hand thinning and several machine weedings, assuming that draft power is available. Hand thinning is not popular because farmers do not like to destroy plants that have emerged.

Top dressing with nitrogen is recommended. The results of fertilizer application are uncertain. Routine top dressing with nitrogen is no longer recommended but it might be profitable on a good stand if rainfall has been satisfactory up to the date when the nitrogen would normally be applied.

Cultivation with animal drawn equipment or a hand hoe is recommended if the soil becomes capped, restricting the infiltration of rain.

Many of these constraints to the adoption of this system were set out in the PP (pp 22-25). The new system as described in this evaluation report overcomes many of the constraints.

Botswana has a quite variable rainy season, both in the amount and distribution of rainfall, including the date of the first effective rain and the last rain. It is clear that the production and income from crop production under these circumstances is highly variable, and that livestock provide an easier and less variable source of income. Therefore, farmers have developed systems of crop production that reduce the risk of failure to produce food.

Spring plowing is used to improve the infiltration of rainfall and to reduce run-off, and also as a main means of weed control. Broadcasting a large amount of seed before turning over the soil and mixing several crops on the same field provide germination over a considerable period of time so that some of the plants can benefit from the optimal rainfall conditions and there is little chance that reseeding will be necessary. If the crop is planted in a row at uniform depths there is a chance that the rainfall distribution will be such that all seeding fails and has to be replaced. Furthermore, a single seeding at the wrong time may produce a crop that matures at a time when it is very vulnerable to bird damage. The best of the local varieties are well suited to these traditional practices, and their yields have not been exceeded by introduced varieties.[1/]

[1/] Comment by CSO: This entire paragraph appears to be written to support broadcast seeding over row planting. The statement "...there is little chance that reseeding will be necessary" is misleading. In my experience I have seen few broadcast farmers' fields that had sufficient plant stands. The next statement, "If the crop is planted...and has to be replaced..." is also misleading. There is always a risk, but a farmer is certainly not going to plant into dry soil. The next statement "Furthermore, a single seeding at the wrong time...bird damage" is correct for broadcast as well as row planting.

Research by DLRFS and EFSAIP and extension by IFPP have developed and tested improved systems of production which do not increase risk but substantially increase yields. This work suggests that the mixtures of crops, a cereal and a legume, provide a higher yield than a single crop.[2/] Fall (autumn) plowing is a yield-increasing practice especially if it can be followed by spring plowing. Planting in a row, rather than broadcast, makes effective weeding easier. However, using a conventional seeder requires improved seedbed preparation and increases the risk that the seeding will fail, because of its greater uniformity in depth of placement of the seed. It is impossible to predict this optimum time of seeding in any given year so multiple planting dates are still used.

Planting the seed in a line into the bottom of the furrow gives row cropping while maintaining a less uniform distribution of seed to reduce the risk of seeding failing. The crop needs thinning and one weeding at least.

This system makes good use of the rainfall and does not increase the risk of loss from a bad distribution of rain or a plague of birds. It increases the crop yield even in years of low rainfall. The return per day of labor is also increased. The plasticity of the best local varieties, sorghum in particular, and its sensitivity to day length tends to compensate for the different dates of planting and to bring the crop to harvest at the same time.

A range of machinery is available to accomplish this system. However, it is probable that the traditional plow, with a planter attached to it for every other or every third row seeding, and a cultivator, is sufficient. The tool frames, Versatool and Makgonatsotlhe, are not necessary and the latter is becoming too expensive for farmer use.

The best traditional varieties are widely grown and are generally better adapted at present than introduced varieties. So there is no incentive to grow varieties of sorghum and millet other than the traditional ones.

The profitability of fertilizer seems to be less clear. There is a tendency to consider that at least replacement dressings of phosphate are needed to replace the phosphate removed in the crop. Thus phosphate fertilizers are usually added. Nitrogen is sometimes applied as a side-dressing if the precipitation is satisfactory.

The evaluation team concludes that there is a set of techniques from which a farmer can select and gradually 'modernize' his crop production system. The extra resources of land and labor freed by the increase in productivity can be used to produce maize and sunflower seed, the two most common cash crops. The maize can be used for import substitution until the average annual production of maize and sorghum is almost doubled.

Adoption of these practices requires access to draft oxen or donkeys and simple equipment, otherwise there are no other limitations on the population that could adopt them. In some ares whole villages are constrained

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[2/] Comment by CSO: This statement is based on data from one location for one season. Also planting was made later than is optimum for sorghum. As a result the mixed planting of sorghum and cowpeas had an advantage over sorghum planted alone.

by lack of water at the lands. Provision of water is one of the elements included in ALDEP.

These practices are being extended to farmers in one area by IFPP and subsidized planters are being made available to farmers by ALDEP. Success, to the extent that these practices are adopted on a wide scale, will depend on the effectiveness of the Crop Division and MOA in implementing the ALDEP crop production plan and the effectiveness of BAMB in the marketplace.

The CCIO in 1978/79 and CPO in 1979/80 have developed a series of demonstrations including row planting, fertilization and weeding, prepared the protocols and inputs, and made them available to the extension service (ADs).

Very few results were obtained from the 1978/79 season because it was a "bad year for crops", with drought conditions throughout most of the country. The few results that were returned to the CCIO were difficult to evaluate because they were confounded by two practices (weeding and fertilizer) which often shows a high level of interaction.

In the 1979/80 crop season, six protocols were developed on the practices shown below:

Type A - Broadcast planting versus row planting
Type B - Use of commercial fertilizer with row planting
Type C - Top dressing with additional fertilizer during the growing season and row planting
Type D - Use of Kraal manure on broadcast or row planting.
Type E - Stooking vs. traditional harvest
Type F - Other husbandry practices or crops the AD, with concurrence of the DAO, wishes to investigate

Eleven districts submitted preliminary reports; twenty-three districts did not. The number of each type demonstration reported is shown below:

Type A	23
Type B	82
Type C	21
Type D	6
Type E	--
Type F	9
	141

Type B and C are demonstrations based on the benefits of fertilizer, a high cost input of doubtful economic value to the subsistence farmers and probably inappropriate for a wide scale extension effort. Nevertheless, 73% of total demonstrations were of this type.[3/]

3/ Comment by CSO:
Soil analyses of samples taken at different locations throughout Botswana show that generally all soils in Botswana are severely deficient in phosphorus. Also experiment have shown a beneficial crop response to phosphorus fertilization of the soil. Demonstration Type B has more chance of success than any of the others. Demonstration Type C is questionable with sorghum but not with maize. There is no doubt whatsoever that if the subsistence farmer in Botswana is to increase grain yields substantially, the judicious use of fertilizers is a prime requisite.

Other techniques shown by IFPP to have greater rates of return, such as third furrow row planting or machine planting and autumn plowing, are not being well demonstrated even though in the case of row planting the protocol is available and the risk to the farmer is no greater than with the use of the traditional practice.

For the extension effort to succeed (i.e., the adoption of the improved technique by farmers) arable lands must have the full support of the Crops Division, including the full-time effort of the CPO, and be well executed by the regions and districts and in particular by the ADs.

The CPO must be the liaison between the researchers (including IFPP) and the extension staff. His responsibility should include the development of simple demonstration programs where the benefits of a practice can be shown easily at field days, and the preparation of flyers for the general public and/or as a reference for the extension staff explaining how a practice is done.

However, if, as has been stated, the ADs themselves are skeptical of the value of the improved practices, the extension program is doomed to failure before it starts Therefore, the first job of the CPO is to convince the ADs, that the practice is viable through a series of demonstrations he plants and field days he organizes for the extension staff. These same demonstrations can be used to teach the ADs how to demonstrate the practice.

Although the CPO has been involved with much of the above it is recommended that the GOB take the necessary steps to insure that the present scope of work of the CPO is fully consistent with MOA's crop production plan as developed by ALDEP.

Crop Screening

The research component as outlined in the inputs section included construction of a crop research workshop, procurement of crop processing equipment, and two years of technical assistance.

The technician, a crop screening officer (CSO), is provided by this project for a two year tour (Appendix B). The CSO arrived in February 1977 (as an OPEX technician under another AID project) and assumed responsibility for screening trials in the field.

The screening includes three major crops, sorghum, maize, and millet, as well as cowpeas, mungbeans and sunflower. Screening of soybeans, chick peas, pigeon peas, jugo beans (Vouandzia),lima beans and haricot beans was also started, but has been dropped either because the crop did not have a potential under Botswana conditions (e.g., droughts made soybeans unsuitable for Botswana) or because of the lesser importance of these crops.

More than 300 maize varieties from Botswana, neighboring countries, and CIMMYT* have been screened. The most popular "local" variety, Kalahari Early Pearl, (introduced some time ago from RSA) has proved to be more reliable in its yield and on average to outyield the introduced varieties and hybrids.

Almost 2,000 varieties of sorghum have been screened, coming from ICRISAT**, Mexico (cold tolerant varieties), Kenya, RSA and Texas A & M and Purdue Universities. As with maize, the best local variety, Segolane, outperforms the introduced varieties "year-in year-out". A collection of forty-five local varieties were collected for screening but the trial failed and needs to be repeated.

In millet about fifty varieties have been screened, including 10-15 local varieties and varieties from ICRISAT. Serere 6A on average performs as well or better.

In cowpeas the situation is somewhat different, IITA varieties outyielded the local variety, Blackeye, (also imported some time ago); however, Blackeye peas are preferred by the consumers. Rhenoster, another "local" variety, not as well liked as Blackeye, is of interest because of its upright and determinate habit and it has a little resistance to the hemicious weed, Electra.

From the beginning of his tour, in addition to a very adequate and a large screening program, the CSO started sorghum and maize breeding programs. Two to three hundred sorghum head selections were made for testing in the following year. Segolane has been crossed into 137 elite lines from ICRISAT and the F2 generation are being grown in 1979-80. Several other programs are underway using Segolane as a basis, including a male sterile line of Segolane to be used as the female parent in the production of commercial hybrid varieties.

Recurrent selection for earliness and standability in sixteen maize populations from CIMMYT, Botswana and Kenya has resulted in considerable progress. An early synthetic variety produced from 6 hybrids and varieties has been developed and is ready for extensive testing in field trials. Eighty one potential inbred lines are now in the third generation of selfing (inbreeding). These have potential use as parents for locally produced hybrid varieties.

Presently, the GOB does not have the local expertise to continue this program after the end of the CSO's tour. However, all of the breeding material is cataloged and in cold storage, so that a successor will be able to resume the program in the proposed plant breeding activity which we recommend be included in the AID Agricultural Research Project.

Consultancy on Seed Program of Botswana

Dr. Elvin F. Frolik made two visits to Botswana (March 5-17, and July 9-21, 1978) in order to evaluate the work of the existing Seed Multiplication Unit (SMU) and to recommend the changes needed to improve and expand the activities. The existing system was reported to be operating satisfactorily, but Dr. Frolik recommended that to meet the expanding

* International Center (in Mexico) for Improvement of Maize and Wheat

** International Center for Research in the Semi-Arid Tropics (Hyderabad).

need for quality seed, seed multiplication at the commercial level should be established outside the agricultural research department and that the organisation producing the foundation seed, which could be in research, should be separate from that producing the commercial seed.

The GOB seems to have accepted the recommendation and is moving towards setting up an agency to produce commercial seed, which will require equipping a new seed processing plant and provision of technical assistance and training to run it.

The introduction of a precision planter in the ALDEP also requires grading of maize seed by size, which was not feasible in 1978. Dr. Frolik recommended a modification to the SMU plant to permit maize seed grading.

The evaluation team considers that the consultancy on the seed program in Botswana was an effective step in the GOB seed multiplication system. It is possible that it may result in a request to USAID support for the new commercial seed processing plant.

The scope of the program that is being developed by USAID should be such that the GOB/MOA will be able to continue it with reasonable assurance of economic benefit. The program should be closely integrated with the existing screening and agronomy programs.

Output 3: Trained Technicians

Four participants were sent for training under this project (Annex C). The reason for the small number have already been discussed in Inputs section.

One long-term training participant (B.S. in Plant Science) was identified by the CSO. Presumably, he will return to work in arable land research. Other staff working with the CSO were given short-term training at ICRISAT and CIMMYT, evidently under different funding.

The other long-term training participant will be returning in June 1980 with training in agronomy. He will return to the Field Services Department to work in extension.

The two participants sent for short-term training are working in the seed multiplication unit and BAMB, organizations which provide inputs and markets for the agricultural community.

The BAMB deputy general manager attended a short-course in grain storage and technology. Other training of BAMB staff by this project was not considered necessary because other agencies were providing it.

However, new staff are being hired to manage the six warehouses (partially funded by USAID) under construction. Also additional headquarters staff have been hired.

The BAMB general manager feels that all depot managers could use additional training in grain storage management. Also, as the deputy general manager is the only person with any in-depth training in storage and post-harvest technology at BAMB, other staff should be provided with this training to add depth to the staff. The Evaluation Team concurs that such training would be beneficial and is so recommending.

Output 4: Financing of 5 x 1000 metric ton and partial financing of 6 x 1000 metric ton grain storage warehouses with in-country training of staff.

The stated purpose of this activity was:

1. to provide storage capacity in a drought prone country;

2. to provide a marketplace where small farmers could sell - perhaps through intermediaries - excess agricultural products to BAMB;

3. to enable BAMB to stabilize the (grain) markets in Botswana through its purchasing, selling and storage activities.

BAMB has a 29,000 metric ton bulk storage (silos) at Pitsane, 5 x 2000 metric ton sack warehouses and 5 x 1000 metric ton sack warehouses, the last were financed by USAID. Six more 1000 metric ton units are being built with USAID assistance and are expected to be in use in Sept. 1980.

The warehouses enable BAMB to store about fifty thousand metric tons of grain in sacks and are an essential part of a national marketing organization. They also serve to store imported grain to be sold. However, BAMB does not have a monopoly on the import of grain and meal.

1. The FAO, at the request of GOB, estimated the need for strategic grain storage against drought at 6,000 tons. The GOB then requested donors to fund the additional storage (six warehouses and the initial stock) at existing warehouse sites. At a later date (1977) the GOB decided that it would be better to disperse the strategic stock, making it easier to distribute in case of emergency.

The reserve stock, 6,000 tons of US yellow sorghum supplied under the WFP, is now in Botswana. It started to arrive in Dec. 1979 and is in the process of being distributed to the sixteen warehouses in quantities in proportion to the target population in the area served by the warehouse. The reserve is expected to be turned over every two years, replacing it with domestic or imported grain. Cost of maintaining the reserve is estimated at P67 500 a year. This is clearly within the capacity of GOB to pay. The strategic storage need is thus being satisfactorily met.

2. The BAMB network of warehouses provides a means for servicing the market throughout the country. The system has an excess of capacity for today's level of production; BAMB purchased about 12 500 tons of the 1977 harvest, 13 646 tons in 1978, and only 1 607 tons in 1979. The BAMB network is essential to the success of the ALDEP program, which expects to increase production of cereals, pulses and oil seeds. Because seventeen warehouses cannot provide for all the marketing needs of Botswana crop farmers, cooperatives and others are being authorised to collaborate with BAMB in providing a market throughout the country. BAMB does, therefore, provide a network which supports a marketplace where farmers large and small can sell excess agricultural crops.

3. BAMB announces buying prices of grain each April, following the announcing of prices in RSA, which sets the price for the region. A single price is set for 70 kg sacks for each commodity, applicable for the whole year and the whole country. It is based on the price in RSA plus freight

for maize, sorghum and wheat and on the world market price for pulses, sunflower seed and groundnuts. In the future, prices in Botswana will be announced in June, before planting, and the GOB has provided a revolving stabilizing fund to make up for any differences in the Botswana price set in June and the RSA price set in the following April (just before harvest).

Prices set by BAMB have continued to rise each year, but this obviously has a limit. Prices for sorghum have been as follows:

Year	P/ton
1974/5	P 52.78
1975/6	P 57.78
1976/7	P 65.55
1977/8	P 88.14
1978/9	P 92.57
1979/80	P118.50

The BAMB fiscal year ends on March 31, so each price covers the harvest of the first of the two years, i.e., 1979/80 covers the April-May 1979 harvest. Since 1977 an allowance has been made for sacks.

These prices have attracted the grain from commercial as well as small farmers, thus avoiding transport cost for exporting the commercial producer's crop to RSA and reimporting a similar quantity.

BAMB prices provide a floor price for grain throughout the country. This is not to say that village prices will not exceed BAMB prices at certain seasons of the year. In this way BAMB prices reduce the fluctuation in grain prices in Botswana. So BAMB can be said to stabilize the prices on the markets for arable crops in Botswana.

Five 1 000 metric ton warehouses financed by USAID are operational. According to the BAMB General Manager, the six additional 1 000 metric ton warehouses which are partially financed by USAID (with the remaining costs provided by the GOB) are expected to be completed by September 1980.

The Gaborone depot was inspected. The operation seemed to be well organized. Grain brought in by rail was being unloaded and stacked outside on poles, then covered with tarpaulins. The grain stored this way appeared to be in good condition. It is an effective way to handle short-term surpluses until distribution to other warehouses can be arranged.

Inside the warehouse, the bags of grain were neatly stacked on poles. They appeared to be in good condition. No insects were obvious, nor was there any damage seen. The floors were clean and residue where insects could breed was not allowed to collect. The grain is fumigated as needed to control insects.

In our discussions with the BAMB General Manager, he requested additional assistance to help train staff. He requested an in-country short course in grain storage management for all depot managers, short course training in practical warehouse management for one or two warehouse managers, and a three month short course in storage and post harvest technology at KSU for the marketing manager. The evaluation team recommends AID finance this training from residual project funds.

Purpose and Goal

The purpose of this project is three-fold:

1. **institution building (by staffing and training a Crop Division within the MOA);**

2. **expand crop research to supplement GOB and other supported efforts, with special emphasis on sorghum, and**

3. **increase the grain storage capacity so that BAMB can more efficiently perform its function of buying, selling and storing grains (thereby "stabilizing" prices), and also to provide a market place for small farmers.**

The project goal is the development and spread of a crop system with particular emphasis on sorghum that will be more productive per unit of input and minimize risks.

As mentioned in the Summary and in other sections throughout this report, this projects's contribution to the development of a viable institution (i.e., the Crop Division) has been neglible. However, much has been achieved outside this project; notably by ALDEP which has produced a crop development plan and policies and programs related to Crop Production, and the MOA does have a plan for continuing a Crop Division to implement the crop production plan. MOA officials are considering staffing such a "Crop Division" with five individuals at the headquarters level and placing five RCO's in five of Botswana's seven regions. The MOA has tentatively identified, we understand, a number of individuals to staff some of these positions. Even though this project has contributed minimally to the attainment of this principal purpose, the Evaluation Team considered that the most favorable use of project finances and human resources would be to support the initiative generated by ALDEP in developing an institution to implement the crop production plan. Consequently, recommendations included in this report are directed to this end and consist of maximizing the contribution of the expatriate CPO in carrying forward the ALDEP initiative and to make a strong effort to use any remaining funds to accomplish as much training of participants as possible.

The reasons why this principal purpose was not successfully achieved by this project has been summarized in other sections of this report and does not require reiteration here. Both USAID and the GOB are aware of those reasons, as evidenced by their inclusion in previous in-house evaluation reports. It is hoped that the shortcomings which have lead to the relative failure of this principal purpose have been recognized by USAID and that this experience will minimize repetition of those errors in the future design and implementation of similar AID projects in Botswana.

The other two purposes of this project (research and BAMB) have progressed satisfactorily. The efforts of the expatriate CSO in achieving the "research" purpose has been most successful and upon his departure a trained Motswana counterpart will carry on the work, as envisioned in the PP. An added plus is the fact that the expatriate CSO, on his own initiative, started a breeding program to incorporate other desirable characteristics needed for improving local varieties. The Evaluation Team considers that

this impetus (although outside this present project) should be built upon in the future and recommends that USAID and the GOB consider financing one or two Breeders in the proposed AID Agricultural Research project (which is presently in the PID stage).

The BAMB segment of the project purpose has proceeded satisfactorily, albeit slowly. Construction activities under this project have significantly contributed to providing increased storage space. With the completion of an additional - partially AID-financed - six one thousand metric ton strategic warehouses in September 1980, Botswana should have sufficiently large grain storage capacity to meet its needs for the foreseeable future and to serve as strategic locations for distribution of grain stocks in times of emergency shortages occasioned by droughts. However, there may be a need for additional small depots for buying and selling.

BAMB has indicated to the Evaluation Team that it wishes to strengthen its operations and requested short-term training for a number of its Managers, both in-country and in the US. The Evaluation Team supports this BAMB request. Nevertheless, BAMB is conducting its buying, selling and storage functions satisfactorily. BAMB establishes prices which provide a floor for grain prices throughout the country. In this way BAMB prices reduce fluctuations in grain prices in Botswana. As BAMB can be said to be accomplishing the price stabilization portion of the project's "BAMB" purpose.

Regarding the achievement of the above mentioned goal, this project's contribution to such end has been very minimal. In the body of this report is contained a description of a crop system ("technological package") which appears promising. The future success of transferring such a crop system to the small farmer so that he can be more productive per unit of input, while minimizing his risks, is dependent on implementation of the crop production plan developed by ALDEP. As stated above, the MOA has tentative plans to fully staff a Crop Division, which is essential to the full implementation of the crop production plan. USAID will undoubtedly be most interested in these future development, even though AID may not be a major contributor.

Beneficiaries

The ultimate beneficiaries were identified in the Project Paper as small farmers. They were expected to indirectly benefit from (a) an increase in the capability of the MOA to develop and expand Crop Research activities and crop production programs suitable for small farmers and (b) an increase in the capacity of the Botswana Agricultural Marketing Board to store and market grains produced by them. The anthropologist on the PP team provided a very accurate analysis of changes in farmers' behavior which were required under the technological package then proposed by the MOA. The technological package being advocated by the dry land farming unit of the MOA was based upon a system of winter plowing, crop rotation and use of the Makgonatsotle tool carrier. The PP anthropologist pointed out constraints to adoption of the proposed package by low income farmers and made some suggestions for overcoming potential problems. He also pointed out that research and experimental efforts would need to continue to address the problems.

One of the objectives of the Integrated Farming Pilot Project (IFPP) at Pelolshetlha, financed by ODM., is to test an integrated approach to agricultural development. This initially was projected to include the extension of the dry land farming practices recommended by MOA. Recognizing the difficulties which they would encounter in expecting farmers to follow the whole package of practices, the IFPP decided that in the first season farmers who wished to participate would be taught the use of the Makgonatsotle tool carrier, autumn plowing, fertilizing, row planting and weeding. As they progressed, the IFPP found many weaknesses in the construction of the Makgonatsotle tool carrier.

They also began to focus more on an improved traditional system. Since a shortage of water in the lands area mitigates against farmers remaining to carry out autumn plowing and returning for early plowing in the spring, IFPP has also embarked on a water project.[1/]

A survey of farmers' attitudes and practices was conducted in June 1979. It included a sample of non-participating farming households to compare and contrast practices and attitudes. Since the non-participants came from the project area, care should be taken in interpreting the data, since they are aware of recommended practices and hence may have adopted some due to the IFPP influence without being a participant. Table 1 shows that the IFPP has had a great impact on farmers adopting improved practices. The data indicate that the practices advocated by the IFPP are consistent with the socio-economic situation of the farmers, since the information shows that behavioral changes have occurred. Moreover, among the participating farmers 56 percent as compared with 25 percent of the sample non-participants expressed willingness to settle permanently in the lands area;[2/] i.e., spend more time there, if water were available for human consumption.

TABLE 1

Survey of Farming Practices, IFPP

	1975 Baseline Study		1979 Participants		1979 Non-Participants	
	(No.)	%	(No.)	%	(No.)	%
Farmers who winter plowed last season	(143)	37	(32)	64	(6)	25
Farmers intending to winter plow in future	-	-	(59)	100	(23)	96
Row planting	(189)	49	(49)	98	(14)	58
Use own seed	(234)	100	(9)	18	(11)	46
Use of kraal manure	-	-	(40)	8	(16)	67
Weed 2 - 3 times	-	9	(28)	56	(4)	17

Source

Y. Merafe, "A Survey of Farmers' Attitudes Towards the IFPP and its Development Components".

1/ Generally, the people have land rights in three distinct areas: the village, lands (agricultural) and cattle area. Household members move between these areas.

2/ In this case the lands are about 40 km. away.

Thus the anthropologist on the Project Paper Team was quite correct in noting that a viable package had not been developed which was ready for a massive extension effort. The project, however, had no input into experimenting with a practical package, but one appears to be forthcoming from the IFPP for a particular climatic/soils zone and is combined with the realization of the important role livestock plays in a household economy.

The increase in BAMB's capacity to store and market grains and the establishment of a floor price benefits the samll-scale producers. The minimum quantity for buying or selling is one 70 kilo bag. While the small producer has access to a market through BAMB for his/her crops, it is the larger producers who can more readily take advantage of the opportunity. The small-scale farmer often does not produce enough to meet household consumption needs. For example, in 1979 with a poor agricultural season, an average of 55 percent of the area planted was harvested. The same year, about one-third of the households with farm land did not plant crops. Even with a better agricultural season, small farmers sell or exchange very little of their harvest. Selling usually takes place in the local vicinity. Grain is frequently used for beer brewing, the selling of which provides women a source of income.

The 17 BAMB depots, some of which are used for storing strategic food reserves, provide an important source of grain. Moreover, BAMB plans to set up a network of agencies for selling and buying. Increased access to grain at a standardized annual price is probably the major benefit which the small producers obtain from the BAMB program. Some are also benefitting from the availability of fertilizer, seeds and some livestock inputs which are sold at the depots.

BOTSWANA CROP PRODUCTION (056)

Summary of Evaluation Team's Findings

Issues and Recommendations

It is estimated that at the end of the life of this project there will remain an estimated unexpended obligated balance of $141 000.

Recommendation 1

That USAID and the GOB discuss possible alternative project uses for the remaining funds. The area of training appears to hold some promise.

Issue 2

The most recent duly signed Project Grant Agreement (PGA) shows an estimated final contribution date of 12/30/81. Under present circumstances, payments should not be made after 6/30/82. Since it appears some AID-financed services or training may be required beyong 6/30/82, a Grant Agreement Amendment should be issues extending the estimated final contribution date for this project.

Recommendation 2

USAID and GOB should determine a reasonable estimated final contribution date for this project and formalize such determination by the issuance of a Grant Agreement Amendment.

Issue 3

As of February 1980, no disbursements had been made by AID, under Fixed Amount Reimbursement (FAR) procedures, for the construction of three (3) houses or five (5) one metric ton warehouses. The three houses have been accepted as complete by USAID Engineers as were, in mid-1979, three of the five warehouses. It is possible that the delay by the GOB may be due in part to the fact that FAR procedures may not be fully understood by the GOB.

Recommendation 3

That the Ministry of Finance and Development Planning submit a reimbursement request for completed construction under this project. If FAR procedures are not fully understood by the Ministry, this should be communicated to USAID promptly. In that event, representatives of USAID and the Ministry can meet and FAR procedures explained in detail.

Issue 4

USAID has no record of the amounts of local currency support by category provided by the GOB to this project, nor the amount of such support projected through the end of life of this project. The GOB has agreed in Project Grant Agreements (PGA) to provide such local currency support and, for reasons of good financial management, this financial information should be provided to USAID.

Recommendation 4

That the Ministry of Finance and Development Planning provide the USAID/Controller with a financial summary of GOB local currency expenditures to date in support of this project. Thereafter, this financial information should be provided to USAID periodically.

Issue 5

The CPO appears to be under-utilized by the MOA. For whatever reason, the role of the CPO has been limited to a small amount of testing/demonstration of crop production techniques which are still experimental. The CPO should probably play a wider role in the testing, formation and dissemination of crop production recommendations which emanate from the MOA.

Recommendation 5

That the GOB take the necessary steps to insure that the present job description of the CPO is consistent with MOA's crop production plan as developed by ALDEP.

Issue 6

Screening trials have shown that few introduced varieties have the yield potential or acceptability that the local varieties possess. A breeding program was initiated by the expatriate CSO to incorporate other desirable characteristics needed for improving the local variety. Unfortunately, there is no qualified local staff to carry on the work.

Recommendation 6

That USAID and the GOB/MOA give consideration to utilize some of the funds from the proposed AID Agricultural Research Project to acquire one or two breeders* for the period of that project. These expatriate breeders should possess the demonstrated capability to breed a main and secondary crop, i.e., sorghum/millet, maize/cowpeas.

Issue 7

It is estimated by BAMB that the six additional storage depots (to be partially funded by AID under this project) will be completed in 1980. BAMB officials advise that Manager trainees will begin in-service training in April 1980. Storage and Pest Management training is considered to be inadequate as currently provided by BAMB.

Recommendation 7

USAID and GOB give consideration to utilize some of the remaining funds in the project to provide a consultant to teach a three to four-week course on grain storage doperation in-country for all BAMB Depot Managers; to provide funds for a three-month short course training for the BAMB Marketing Manager in storage and post-harvest technology at Kansas State University; and for 1 or 2 warehouse managers to get 6 months or an appropriate length of practical training in a US or third country grain warehouse operation.

* a senior and a junior breeder

Botswana Crop Production (056)

Schedule of Obligations and

Estimated Life of Proj. Cost Requirements

(in $000's)

Category		Per PP dtd. 3/17/76	Net Obligations through 2/1/80	Est. Requirements thru end of Proj.	Unobligated Balance
Technical Assistance		$1 041	$ 873	$ 855	$ 18
Participant Training		222	215	180	35
A. Seven for 3 yrs. - US	$182				
B. Four for 2 yrs.-Africa	40				
Commodities		138	138	118	20
1. Four (4) Vehicles					
2. Equipment -					
(i) Trng. Supplies & Equip.					
(ii) Research & Lab. Equip.					
(iii) Office Supplies & Equip.					
Local Costs					
a. Construction of 3 houses	72	341	525[1/]	457[1/]	68
b. Construction Crop Research Workshop	15				
c. Construction 5 Grain Storage Warehouses	140				
d. Budget Support	80				
e. Contingency	34				
		$1 742	$1 751	$1 610	$141

[1/] OSARAC, with AID/W approval, agreed to provide $199 000 for the construction of six (6) Strategic Grain Reserve Warehouses. This is in addition to the five (5) - One Metric Ton Warehouses provided for in the PP.

Schedule of Arrival & Departure of PASA Group (056) & Other Information

Name	Speciality	Arrival Date	Est. Departure Date	Total Man-Years	Counterpart Needed	Where Located
George James	CPO	4/27/79	4/27/81	2	X	Gaborone
LeRoy Peters	CCIO	1/1/78	3/1/80	2	--	Gaborone
Max Boling	CSO	1/1/79[1/]	1/1/81	2	--	Sebele
				6		

1/ Was in-country two years prior to this date working as CSO in the MOA Research Division and he was financed by AID from other sources.

Annex C

Botswana Crop Production (056)

Participant Training Schedule

	Name	Place of Work	School Attended	Date Departed	Date Returned	Field of Study
1.	S. Taukobong	Botswana Agric. Market Bd.	USDA	June 1978	Aug. 1978	Grain Storage
2.	R. Seatla	Botswana Agric. College	USDA	May 1979	Aug. 1979	Seed Improvement
			Project 056 (Participants in Training)			
1.	O. Mmolawa	Min. of Agric.	Western Illinois University	Feb. 1978	June 1980	Crop Production
2.	E. Modiakgotla	Min. of Agric.	Western Illinois University	Aug. 1978	Dec. 1981	Plant Science

Note: Provision has been made in Life of Project Cost Estimates by USAID for training one more participant in the US.

Botswana Crop Production (056)
List of Locations of Grain Storage Warehouses 1/
Which May be Financed in Whole or in Part by AID

A. Five Warehouses Completed and included in Original PP

1. Selebi-Pikwe
2. Tutume
3. Nata
4. Tsetsebjwe
5. Mosopa

B. Six Strategic Grain Storage Warehouses not included in Original PP

1. Kanye
2. Serowe
3. Kasane
4. Letlhakane
5. Hukunsui
6. Ghanzi

Note: Although these six warehouses were approved for AID-financing by OSARAC (with A.I.D./Washington concurrence) in Oct. 1977, BAMB now estimates that the six warehouses will be completed in Sept. 1980.

1/ All warehouses in this schedule are of one thousand metric ton capacity.

BOTSWANA CROP PRODUCTION (056)

List of People Contacted

During Evaluation

P R Mulligan, General Manager, Botswana Agricultural Marketing Board

G Garrod, Land Use and Extension, IFPP

R Wheeler, Animal Production Officer, IFPP

R Jones, Ag. Economist, IFPP

D Jones, Rural Development Specialist, MOA

P Nelson, Director, Field Services, MOA

F Pullen, Principal Agricultural Officer, MOA

M Boling, Crops Research Officer, Sebele

D Harspool, Ag. Engineer, EFSAIP

C W F Lightfoot, Systems Agronomist, EFSAIP

C Richards, Extension Agronomist, EFSAIP

M Jones, DLRFS

G James, Crops Program Officer, MOA

L Peters, Chief Crops Improvement Officer, MOA

K Morris, IVS, Horticulture Officer, MOA

L Histand, Horticultural Officer, IVS, MOA

R Purcell, Economist, ALDEP

H J Thomas, Systems Implementation Specialist, ALDEP

K Oland, Director of Agricultural Research

T Tokabong, Agronomist, ALDEP

V Amann, Chief Agricultural Economist

W Kelly, Agricultural Statistics

M J Odell, Jr., Director, Rural Sociology Unit, MOA

A Willet, former RAO, Central Region

R S Fox, Farm Management Economist

L Mazh, Crops Research Officer, MOA

Dr. Arnold, DVM, EDF Small Ruminant Project

P Kjaer-Olsen, Anthropologist

Botswana Crop Production (056)
Estimated Cost of Evaluation Team's Recommendations*

		Estimated Cost
1.	Consultant from Kansas State University for two (2) staff months to teach a three to four week training course for BAMB Depot Managers.	$14,000
2.	Two BAMB Warehouse Managers to the U.S. or third country (e.g., Kenya) for approximately three (3) months to gain practical training in grain storage warehouse operations.	24,000
3.	BAMB Marketing Manager to Kansas State University for a three (3) month short course on grain storage and post-harvest technology.	8,000
	Sub-total	46,000
4.	Estimated remaining unexpened obligated balance available for training or other project uses.	86,000
		$132,000

*Cost Estimates Provided by USAID Education Office