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EVALUATION

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ABBREVIATIONS AND ACRONYMS

AMDP	African Manpower Development Program
ASAU	Agricultural Statistics and Analysis Unit
CGS	Cooperative Grain Storage Project (696-0119)
CSI	Cropping Systems Improvement Project (696-0110)
FRW	Rwandan Franc (\$1.00 = FRW 91.48 during the period covered by this report)
FSM I, II	Food Storage and Marketing Project, Phases I (696-0100) and II (696-0116)
GOR	Government of Rwanda
ISPC	International Statistics Program Center (of the U.S. Bureau of Census)
LCS	Local Crop Storage Project (696-0107)
MINAGRI	Ministry of Agriculture and Livestock
MINIPLAN	Ministry of Planning
OAR/R	Office of AID Representative in Rwanda
OPG	Operational Program Grant
PDS	Project Development Support
PID	Project Identification Document
PIO/T	Project Implementation Order/Technician
PP	Project Paper
UNFPA	United Nations Fund for Population Activities

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## I. INTRODUCTION

The purpose of the Rwanda Agricultural Survey and Analysis project is to strengthen the capability and performance of the GOR in data collection, processing, analysis, planning and management in the agricultural sector. By the end of the project, OAR/R expects to have a) increased the availability and reliability of information needed to manage the agricultural sector, and b) improved capability for data collection, processing, and analysis in the Ministry of Agriculture and Livestock (MINAGRI). This project, financed in FY 1981 from the Agricultural, Rural Development and Nutrition Appropriation (Section 103 of the Foreign Assistance Act), with life-of-project contributions of \$3,706,000 from AID and \$985,000 from the GOR, is scheduled for completion in December, 1985. At the time of the evaluation, approximately \$2,876,000 of AID project funds remained for use in project implementation. The remaining amount of GOR funds was not calculated but should be adequate.

OAR/R's contribution supported the creation of an Agricultural Statistics and Analysis Unit (ASAU) within the Ministry of Agriculture. Pre-project activities which led to the successful institutional development of ASAU were funded by PDS and the GOR. These activities included the financing of an agricultural economist from Auburn University to help prepare the PID. During 1979, other specialists also visited Rwanda to undertake project design studies. These studies generated ideas that resulted in the successful design of the agricultural survey in addition to pinpointing and seeking solutions to specific data collection problems. Field measurement methods, the 1978 Population Census, and measurement instruments were all reviewed in order to determine their suitability to project needs. Moreover, during this period several ASAU staff members were identified and an ASAU office was established. In sum, this pre-project phase was highly successful and congratulations should be given to all pre-project participants--especially the REDSO and BUCEN teams, Mr. Delepierre (the Belgian resident advisor to MINIPLAN) and all Rwandan counterpart advisors.

At the time of this evaluation, the ASAU is staffed by three high-level professional Rwandans at the national level and two expatriate foreign advisors (less than half of the desired management staff has been hired). One hundred fifty five interviewers, eighteen verifiers, ten supervisors and ten assistant supervisors have also been hired for the life of the project, or approximately thirty more persons than the PP envisioned.

The Project Paper of January, 1981 called for the following input items from AID and the GOR. AID was to finance training and technical assistance, including two long-term American advisors, and short-term consultants. AID-funded commodities were to include materials for ASAU, office construction, survey equipment, and vehicles. The GOR contribution primarily finances the salaries of Rwandan staff members with the GOR's share of these support salaries increasing as the project evolves. By the end of the project the GOR will have undertaken the full salary support of the ASAU staff.

The Project Paper envisioned the following outputs: 1) the establishment of a functioning agricultural statistics and analysis unit in the Ministry of Agriculture and Livestock; 2) the formation of a trained survey and analysis staff in ASAU; 3) specifically designed computer programs and data collection procedures; 4) a pilot survey including pretesting of data collection and computer processing procedures; 5) a national agricultural survey; and 6) statistical, analytical and methodological documents for future use by MINAGRI and the Ministry of Planning (MINIPLAN). To date, items one and four have been completed. The National Agricultural Survey is now underway (item 5) and the necessary computer programs have been designed and are presently being implemented (item 3). The production of statistical, analytical and methodological documents from full survey data (item 6) will begin as soon as the initial wave of field results are reviewed and the full survey computer programs are written. Survey questionnaires, manuals, some pilot survey analytical documents, etc. have already been produced. Item 2, the formation of a trained survey and analysis staff has been partially fulfilled. Additional ASAU staff members, however, must be identified and/or sent abroad for long-term training.

## II. SUMMARY CONCLUSIONS AND RECOMMENDATIONS

### A. Summary Conclusions

#### 1. Progress Towards Achieving the Project Purposes

- (a) improved capability for data collection, processing, and analysis in the Ministry of Agriculture and Livestock (MINAGRI)

MINAGRI's capabilities for data collection, processing and analysis have been greatly enhanced through the institutionalization of the ASAU. This unit is managed by a technically competent central office staff (albeit smaller than the staff projected in the PP) that has now gained substantial experience in the collection of agricultural data and its analysis. In addition, over one hundred fifty interviewers have received training in data collection techniques and are now in the process of collecting information for the National Agricultural Survey. Yet, as shall be elaborated in Section VI, Institutional Development, without augmenting ASAU's currently undersized staff, the ASAU will be greatly handicapped in the implementation of future surveys.

- (b) increase the availability and reliability of information needed to manage the agricultural sector.

Preliminary results (from the pilot survey) are available and were the culmination of a year long data collection and analysis process. Fieldwork was undertaken on a stratified sample of 710 households, and office verification of 100% of the data was carried out in both the prefectural and central offices. Finally, while the data collection process was continuing in the field, computer editing and tabulation of the information gathered during the initial stages of the field work was undertaken.

This editing and tabulating continued through August, 1983, several months after the pilot survey was completed.

Preliminary results shed light on some of the basic characteristics of the farm household, farm size, land use and livestock ownership as well as on-farm household characteristics across agro-ecological regions. While it suffices at this point in the evaluation to stress the value of this newly acquired information, a more in-depth look at the pilot phase results will be undertaken in Section VI.H of this report.

Currently, the National Agricultural Survey is in full swing which will produce reliable and accurate information on Rwanda's agricultural sector. No major problems are foreseen that will obstruct the achievement of this project purpose.

## 2. Problems Encountered in Achieving Project Purposes and Solutions Devised.

(a) Insufficient long-term technical assistance. While both the Project Agreement and the PIO/T were signed and submitted in May, 1981, the long-term agricultural economist was not identified until November, 1982, and was not in country until August, 1983. His absence has meant that the user agencies (i.e., MINAGRI and MINIPLAN) and ASAU have not yet been able to fully develop an analytical plan.

(b) Changes in the quantity and quality of supervisory personnel. Because of the large size of the ten prefectures, ten more supervisors were needed than those which the PP provided for. Each prefecture is now staffed with a supervisor and an assistant supervisor so that interviewer-supervisor communications and control should be facilitated. A low motivation level on the part of several of the supervisors also affected some of the pilot survey's results. The training of interviewers (by the supervisors) was not always carried out as thoroughly as was possible nor was survey field supervision always adequate. Before the National Agricultural Survey began, delinquent supervisors were weeded out or quit and more highly motivated interviewers were trained to fill the vacant posts.

(c) The need for longer and more frequent training sessions. The two two-week training sessions (one for the pilot survey and one for the full survey) that the PP recommended were insufficient to ensure the proper formation of the interviewers. For the full survey, one three-week and one one-week training session will be carried out. Additional review sessions were also needed to train new interviewers to replace those lost through attrition.

(d) Interviewer morale. The lack of recognition for quality work created a morale problem among the interviewers and led to an interviewer attrition rate of 10%. This problem has been rectified by the creation of a bonus system that will reward interviewers for correctly filled out questionnaires.

(e) Unexpectedly high local operating costs. Operating costs are significantly higher than PP projections. Motorcycle maintenance costs have been much higher than expected. This problem has been addressed by the implementation of a monthly allowance system that will pay the supervisors FRW 20 (which includes per diems) for the average monthly amount of kilometers that he is expected to travel. Operating costs have also been above average because of the need to rent a house as a base for operations in the prefecture of Cyangugu, and AID's decision to underwrite the salaries of sixty interviewers in order to commence the project on time. The GOR was originally to have paid their salaries.

### 3. Problems Yet to be Resolved

(a) Computer Access. During the pilot phase of the project, a decision was made to rent time on the UNFPA NCR computer rather than to buy one. This solution avoided burdening the ASAU staff with unknown maintenance costs. To date, ASAU has not received guaranteed computer access rights although it does have informal access. Since it appears that formal recognition of computer user rights will not be forthcoming until an agreement has been reached on ASAU user-time costs, steps should be taken to reach an agreement on rental costs as soon as possible.

(b) Lack of Computer Programmers. Continuing delays in GOR decision making on how to organize the use of its computer and two programmers have, to date, caused some delays in the writing of ASAU's computer programs. However, in the near future, serious difficulties will ensue if two more computer programmers are not assigned to the Agricultural Survey project. The programming aspect of this project is fairly complicated. Sixteen major programs still need to be written which will later be modified for a total of fifty-three programs. Without additional programming help, the compilation of survey results will seriously lag behind schedule.

(c) Lack of a Computer Advisor for the NCR. Since three GOR surveys are currently being processed on the NCR, a computer advisor is needed to organize and monitor work. The previous UN-financed computer advisor left his post in February, 1983 and since then, no new advisor has been appointed. Computer related problems (i.e., programming, access to terminals and maintenance), may occur without proper supervision.

(d) An Understaffed Agricultural Statistics and Analysis Unit. Because of GOR skilled manpower shortages, the envisioned seven member management staff has never been obtained. Instead, only three of the seven positions have been filled, leaving critical gaps in the ASAU's management apparatus. Moreover, positions held by the present staff have not always been commensurate with training and/or responsibilities, and many of the ASAU management team are overworked.

(e) Unsatisfactory Motivation Levels Among the ASAU Management Team. Higher salaries in the private sector and/or the heavy ASAU workload have given rise to remunerative complaints. It is important that steps be taken (i.e., grade level review) to ensure that all Rwandan staff fully contribute their services to this project.

(f) Entangled Lines of Authority. Since many ASAU interviewers are regular government employees, firing decisions have been subject to lengthy civil service procedures necessitating a doubling up of interviewers until the delinquent interviewer may be fired. This doubling up procedure has resulted in inflated interviewer maintenance costs.

(g) Transport. Despite the purchase of five vehicles for the Agricultural Statistics and Analysis Unit, there is still a shortage of vehicles. Transport for staff members (i.e., between the ASAU offices and the computer center) is not always available resulting in the loss of valuable work time. Two new vehicles are presently being obtained, one for the expatriate agricultural economist and the programmers, and one to replace a well-used Peugeot, but provisions should be made for additional (future) vehicle needs.

#### B. Recommendations

Given the proposed project completion date of December, 1985, the speedy implementation of the following recommendations should result in the project's timely and successful completion:

1. Reach a formal agreement on the use of the NCR 8250 computer at the Rwanda Census Bureau. A formal agreement should be reached as to the use of the computer in terms of a costing formula (charging algorithm) and computer resources. Until now the project has been using the computer without a definite agreement. Other surveys such as the Fertility Survey, the Household Budget Survey and the Demographic Survey (also known as the Census Post-Enumeration Survey), are planning to use the NCR computer. A formal arrangement for the utilization of the computer resources should help prevent conflicts in the future.

2. Have two additional programmers working on the project. Although in the original time estimated for data processing activities three full-time programmers were considered, currently only one programmer is working on the project. Two programmers that worked on the Rwandan Population Census and who are currently employed by the Census Bureau do not have specific work assignments. Both of them not only are experienced programmers, but are also familiar with the NCR 8250 computer and the tabulation package, COCENTS, and could be used to write programs for processing the Agricultural Survey data.

3. Increase the U.S. Census Bureau programming tasks. Although the U.S. Census Bureau budget includes the writing of some of the programs in the U.S., this programming effort could be modified to include the writing of the editing programs. This would alleviate the Agricultural Survey's programming staff workload. A revision of the current U.S. Bureau of Census PASA would be required to allow for an increase in programming time.

4. Identify, hire, and send to the United States for long-term training the following persons:

- a) a computer programmer
- b) an agricultural economist or agricultural engineer
- c) a sample survey methods trainee

These persons should be identified as soon as possible and sent to the United States for long-term training without delay.

5. Send the Rwandan Chief of Project to the United States for long-term training once the final phase of the National Agricultural Survey has been completed. Another agricultural economist (or agricultural engineer) must be identified and sent abroad for training as soon as possible so that the Chief of Project's absence will not unduly hinder the functioning of the ASAU.

6. Review the GOR assigned grade levels of all ASAU management personnel. Higher salaries offered in the private sector have been adversely affecting worker morale and indirectly the ASAU project.

7. Improve programmers' motivation. There has been a lack of programmer motivation primarily because of low salaries and a heavy workload. Some form of supplemental salary would improve this situation. A meeting between AID officials, the Ministry of Agriculture and the Agriculture Survey administrative staff would help resolve this issue.

8. Hire a long-term data processing technician. Since the project is already behind schedule and the chances for getting the data processing staff needed in the immediate future are not too promising, the hiring of a data processing technician, to do programming work and to help train the Rwandan programmers, would improve the chances of meeting the ASAU's data processing schedule on time. His presence would also enable the ASAU to take on additional surveys once the field work phase of the survey has been completed.

9. Arrange for a more efficient method to transfer information between the NCR 8250 computer in the Rwanda Census Bureau and the U.S. Census Bureau computer. Currently data can only be transferred between the NCRS computer and the IBM computer used in the U.S. Census Bureau through disk cartridges because there is no tape drive in Rwanda. This is a time consuming and costly method since it requires the renting of time at a similar NCR installation in the U.S. to transfer the Rwandan data from the disk cartridge to a magnetic tape which can then be read by the computer used by the U.S. Census Bureau. It is understood that SOMECA, the local NCR representative, is planning to order a tape drive in January, 1984 which is expected to be operational around June of 1984. SOMECA would then permit the renting of time for its use. Progress on these plans should be followed. Should SOMECA decide not to acquire the tape drive, the acquisition of a tape drive for the project should be considered.

10. Reappraise the lines of authority between MINAGRI and the ASAU. The ASAU should be given more flexibility in decision making. Finally,

personnel and administrative questions which are referred to MINAGRI should be more promptly addressed.

11. A budgetary review should be undertaken in order to readjust input funding amounts where necessary. Funding provisions should be made for additional vehicle purchases.

12. Periodic meetings between the ASAU, agricultural research centers, interested ministries, etc. which now take place within the framework of the agricultural survey commission should be supplemented by the publication of a pamphlet which summarizes available results from the pilot study. Other informal meetings with potential users of ASAU's services should also be held.

13. Review periodically the project's vehicle/motorcycle needs.

### III. EVALUATION METHODOLOGY

The purpose of this interim evaluation is to measure the progress achieved under this project to date and to assess how the project's effects have contributed to the broader goal of increasing total and per capita food production and farmer income. AID records, project outputs (i.e. trained staff, completed construction of ASAU office buildings, computer programs, etc.), project reports and interviews with the ASAU and BUCEN staff have been used to form a complete picture of the project's present standing. When necessary, recommendations to remove obstacles that hinder the project's development have been made.

Since this project will perform the GOR's first nationwide agricultural survey, a long trial period was needed to perfect methodologies and to refine survey procedures. The preliminary and pilot phases were meant to be very flexible in order to adapt to changing survey problems and needs. Hence, frequent changes of project input requirements should be viewed favorably. These changes constitute a learning process that will provide for the sound development of the National Agricultural Survey.

### IV. EXTERNAL FACTORS

No major changes in project setting, socio-economic conditions or host government priorities have occurred during project implementation.

### V. SUMMARY AND STATUS OF PROJECT INPUTS

#### A. Financial

The PP stated inputs and illustrative budget are:

a) In-country and foreign training	\$ 188,000
b) Technical assistance	1,709,000
c) Commodities	305,000
d) Construction	120,000
e) Local operating costs	336,000
f) Contingency	266,000
g) Inflation (15% per annum compounded)	<u>782,000</u>
	\$3,706,000

As of July 1983, the following funds had been obligated and disbursed by AID:

	<u>Obligated</u>	<u>Disbursed</u>
a) Technical assistance	\$ 456,362	\$ 348,173
b) Training	35,800	29,715
c) Commodities	143,879	121,357
d) Construction	138,575	118,064
e) Inflation and Contingencies	<u>480,081</u>	<u>312,699</u>
	\$1,254,697	\$ 930,008

The Project Agreement was signed May 26, 1981. The Government of Rwanda's contribution has been adequate, although early into the project, USAID agreed to underwrite the salaries of many of the project's interviewers whom the GOR had originally agreed to pay. Moreover, certain input requirements were substantially underestimated, while others were overestimated. Since this imbalance is rectifiable by a reallocation of funds, the project budget should be adequate through 1985. Due to delays, this agricultural survey project will probably need to be extended into calendar year 1986. A budgetary analysis should be undertaken to determine if the project's present budget can accommodate the project's extension.

## B. Training

### 1. Proposed Long and Short-term Training

The PP calls for long-term training of five to six members of the Agricultural Statistics and Analysis Unit and two members of the Ministry of Planning (MINIPLAN) staff, over a two year period, beginning in September 1980. The African Manpower Development Project (AMDP) was to provide funding for three one-year fellowships. The following table summarizes proposed personnel, training requirements, and funding sources.

#### Training Component of Agricultural Survey Project

<u>ASAU</u>	<u>Proposed (Months)</u>	<u>Actual (Months)</u>	<u>Funding Source</u>
2 Agricultural Economists	18 (per person)	*	AID
General Survey Manager	12	*	AMDP
Field Survey Manager	N/A	*	N/A
Statistician	12	14	AID

Systems Analyst	12	19	AMDP
Programmer	12	*	AMDP

MINIPLAN

2 Statisticians	24 (per person)	0	AID
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\* Position has not been filled as of July, 1983.  
N/A - Training was not provided for in the PP.

The PP did not anticipate long-term training for the Field Survey Manager. It also stated that the Mathematical Statistician might not need to be trained abroad.

The PP called for short-term training for ASAU and MINIPLAN personnel, consisting of seminars, short-term courses and on-the-job training in the United States and third countries. Ten prefectural supervisors and one hundred forty-three commune-level agronomes were to receive four weeks in-service training annually.

2. Actual Long and Short-term Training

Despite the fact that only three out of the envisioned seven member staff of ASAU have been hired, training expenses have been large. Contrary to PP expectations, several prefectural supervisors required basic training in agricultural statistics and attended an AMDP funded statistics course at the New Mexico State University. Due to time constraints and the lack of a full ASAU staff, the Chief of Project did not receive long-term training abroad. However, he and three other prefectural supervisors attended a three week agricultural statistics course in Zaire. The two remaining members of ASAU's staff, the Mathematical Statistician who is now Operations Manager and the Systems Analyst acquired long-term training at ISPC. Their training, however, extended beyond the PP projected 12 month period, since both men also received two months of English training in the United States. The Mathematical Statistician spent a total of fourteen months in the United States in order to study English and to obtain a one year certificate in Agricultural Surveys and Censuses. The Systems Analyst also spent fourteen months abroad studying English and computer data systems which was followed by five months on the job training at BUCEN. His training was also supplemented at a later date (1983) by a short seminar course in The Cameroons.

C. Management and Field Personnel

Provided below is a table listing actual ASAU personnel.

ASAU Staff Members

Central Office

Proposed:

2 Agricultural Economists

Actual\*:

1 Agricultural Economist who also acts as Project Director

1 General Survey Manager	
1 Field Survey Manager	
1 Statistician	1 Statistician
1 Systems Analyst	1 Systems Analyst
1 Programmer	

Field

Proposed:

10 Prefectural Supervisors  
143 Commune-level Agronomes (interviewers)

Actual\*:

10 Prefectural Supervisors  
10 Assistant Supervisors  
150 Commune-level interviewers  
18 Verifiers

\*As of July 1983.

Since ASAU is understaffed (one agricultural economist, the field survey manager and the computer programmer positions have not yet been filled), the responsibilities of the present staff members have become blurred. Everyone must perform tasks which are not directly related to the position he/she occupies. While this arrangement has burdened this tiny staff with additional work, it has also required each member to develop a more complete and in-depth knowledge of the project than would otherwise have been the case.

Until now, the project has not been unduly hindered by its small staff, since BUCEN has shouldered a great deal of ASAU's workload. However, major difficulties will arise if a second computer programmer is not hired in the near future. Project members, both at ASA<sup>11</sup> and BUCEN are cognizant of this glaring personnel deficiency but have been unable to obtain an additional programmer.

Fortunately, the Rwandan Bureau of Census does have two computer programmers. The Chief of Project has been trying to get them officially assigned to the project, but he has not yet received a definite response about the programmers availability from the Rwandan Bureau of Census. Nonetheless, the assignment of these programmers to this survey project is absolutely necessary in order for the survey's data to be processed on time. Nor will BUCEN, which has already programmed its workload for the coming year, be able to shoulder much more of the agriculture survey's computer work. Thus, if two more computer programmers are not assigned to the project immediately, the anxiously awaited National Survey results will take literally years to produce. (Best and worst case scenarios dependent on computer programmers availability will be laid out in Section VI.C. of this report.)

1. General Problems and Solutions

Many changes in the quantity and responsibilities of the field personnel have been made since the project's inception. The PP originally provided for ten prefectural supervisors and one hundred forty three commune-

level agronomes. However, the numbers in these two groups were too small to ensure the proper implementation of the pilot survey. Supervision problems required the creation of assistant supervisory posts, while training difficulties also necessitated a reevaluation of PP specifications. Implementation of the project has varied from that outlined in the PP in response to the following training and personnel problems:

- a) the need to return questionnaires to the interviewers for error correction more frequently than anticipated;
- b) a serious decline in interviewer morale after the first two months of the pilot phase. Insufficient salaries and the demanding level of work were the primary causes of this phenomenon; and
- c) a 10% attrition rate.

The creation of a bonus system for well prepared questionnaires, which is now in effect, should solve these problems. This system will bestow a bonus upon the interviewer ranging from FRW 500 to 3,000 (depending on the difficulty of the questionnaire) for each questionnaire which is correctly filled out. There are six different questionnaires in all and because some questionnaires are filled out more than once, each interviewer will submit a total of ten questionnaires. The interviewer will be penalized FRW 100 for each mistake made. This new system should counteract the morale and attrition problem by rewarding the interviewer for quality work.

The 10% attrition rate during the pilot phase was caused by heavy interviewer workloads and a lack of pay differentials. While this problem should be solved by the new bonus system, it has, in the past, required additional training sessions. New interviewers had to be trained to replace the old, thus raising training costs.

The two two-week training sessions were also insufficient to ensure the correct filling out of the questionnaires. The time lag between training and questionnaire use was too great and led to unnecessary mistakes. To rectify this situation one three-week training session was conducted for the supervisors and the interviewers during the full survey phase to be followed, at a later date, by a one-week review session for the interviewers. Classroom space for these sessions, however, will be difficult to find. Only schools seem to have the requisite facilities; but since their classroom space is not always available, training sessions must be worked around school holiday schedules.

Finally, the ASAU staff fall into three different categories: members of the permanent civil service, persons working on contract with MINAGRI, and persons working on contract with ASAU. At the project's beginning in late 1980 eighty interviewers were paid directly by ASAU/USAID since the MINAGRI had not hired a large portion of the required interviewers. ASAU/USAID agreed to underwrite their salaries in order to get the survey

underway. Presently, only twenty-six of the one hundred sixty-five interviewers are directly paid by ASAU/USAID. The rest of the interviewers are paid by government ministries which means that they may not be fired without first obtaining ministerial approval, even when their work is clearly inadequate. To obtain a government paid interviewer's dismissal, documentation of his poor performance must be acquired which usually takes three to six months. Meanwhile, to ensure that the agricultural survey is correctly carried out, another interviewer must be hired to work alongside the original interviewer. Thus, for several months two persons hold the same position creating additional personnel costs.

## 2. Supervision: Changes Made

During the pilot phase, field supervision was problematic because the prefectural supervisors were required to supervise large tracts of territory. In addition, there was a lack of communication between the central ASAU officers and the prefectural officers. Dan Clay (BUCEN) recommended in his October, 1982 trip report that three regional offices be created to oversee the work of the prefectural supervisors. This recommendation, however, was rejected as being too expensive. Cars, gasoline, housing, etc. would have had to be supplied to these new staff members, thus running up the personnel and commodity expenses of the survey. As these costs are already above PP projected levels, another option was selected. Ten assistant supervisors, who were chosen from among the commune-level agronomes, were assigned to work with the prefectural supervisors. This doubling up of the supervisory positions will halve the supervisors' workload and should increase agronome-supervisor and supervisor-center communications and control.

### D. Long-term Technical Assistance

The PP called for two long-term U.S. advisors for the life of the project: an agricultural economist who would be the expatriate counterpart to the Rwandan head of ASAU, and an agricultural survey manager. The latter of these two positions was filled in November, 1981 by a Belgian advisor upon GOR request. Although his contract was originally for two years (until November, 1983), this advisor has decided to remain with the project until March, 1986, thus assuring management continuity.

Management continuity is especially important to this project, since the American agricultural economist position was vacant during the preliminary and pilot phases of the project. Although the small core of current staff members was able to successfully complete these initial phases, they did not possess all of the technical skills nor have sufficient time to properly direct the project's development. Even BUCEN, which was able to take the analysis phase a long way, admitted that they should not undertake some of the more complex analyses that would be carried out during the full survey phase.

The American agricultural economist arrived in August 1983, just after the full field survey had gotten underway. By this date, the interviewers had already received their training, the survey manuals had been

revised and printed, and the interviewers were in the field. The Chief of Project had hoped that it could have been arranged for the American advisor to arrive by at least May, 1983, before the full survey's initial training session. This arrival date would have given him the opportunity to obtain firsthand knowledge of the details of the survey's work and to become acquainted with the field staff.

The American agricultural economist's responsibilities will include: preparation of lists of tables to be prepared by computer programmer along with the details to be shown on tables, discussion with user agencies about their data and analysis needs, statistical analysis of the data, and assistance concerning data collection procedures while the Belgian advisor is on extended home leave (in late 1983 and early 1984).

Since AID was responsible for supplying this project with an agricultural economist, it is important to review AID's actions to fulfill this obligation. The following table summarizes the major events of the search.

<u>Action</u>	<u>Date</u>
Recruiting process initiated	November 1979
Candidate identified	July 1980
Candidate declines position	December 1980
PP approval	January 1981
Project Agreement signed	May 1981
PIO/T submitted	May 1981
Long-term advisor identified	November 1982
GOR concurrence - with immediate arrival requested	December 1982
Long-term advisor's expected arrival	March 1983
Long-term advisor in-country	August 1983

Therefore, USAID will contribute, through calendar year 1985, only 29 months of what was to have been 70 months of long-term technical assistance. During this interim period, the BUCEN and ASAU staff were obliged to take time off from other duties to provide a preliminary analysis of the data collected during the pilot survey.

#### E. Short-term Technical Assistance

Short-term technical assistance was provided for in the PP throughout the life of the projects (90 months over 5 years), mostly from BUCEN. These consultants were to oversee the survey's implementation, data processing, analysis, etc. Consultants with specialties in rural sociology, agronomy, and project evaluation were also provided for on a limited basis.

While the BUCEN staff has had more input into this project than anticipated, their help has been timely, efficient and invaluable in filling in the gaps caused by the lack of an American agricultural economist and the smallness of the ASAU staff. So far, BUCEN's workload has been approximately

30% greater than that specified in the PP and further supplemental BUCEN assistance to write the three most complex of the project's nineteen computer programs is required.

#### F. Commodities

AID funds have been used to purchase five vehicles: one jeep-type Suzuki, three Peugeots, one 4-wheel drive Toyota and one Peugeot pick-up. Presently ASAU has prepared a revised vehicle use plan to justify the purchase of two vehicles, one for the American agricultural economist and programmers and one to replace a heavily-used two year old Peugeot. Budgetary/waiver provisions for additional medium-term vehicle purchases should also be made, as certain ASAU vehicles may need replacement before project completion date.

The 11 Honda XL185s which were supposed to last for the life of the project had to be replaced after a year and a half. Rwanda's rugged terrain and the long distances which the regional supervisors were required to cover led to the motorcycle's rapid deterioration. Spare parts were also difficult to obtain. Hence, of the original 11 motorcycles provided to the field supervisors, eight were taken back and sold by the project management in July, 1983 by a procedure which called for sealed bids. One motorcycle remains to be sold. Twenty new Yamaha motorcycles have been ordered for the prefectural supervisors and their assistants and are now in use.

Other commodity procurement problems included minor difficulties in the securing of 180 sets of survey equipment for the commune-level agronomes. Fifty percent had to be replaced because of loss and breakage. BUCEN requested that measuring tapes for the full survey be ordered from the United States in February, 1983 but due to ASAU administrative delays, the request was not promptly expedited; the tapes didn't arrive until August, 1983. Hence, a second set of tapes had to be bought elsewhere to allow the survey to begin on schedule.

Finally, the one hundred forty two bicycles that were purchased at the beginning of the survey were unsuitable for transport in many parts of Rwanda. Forty percent of the bikes were sold with three-quarters of the proceeds from the sale accruing to ASAU. The remaining sum was returned to the interviewers to pay for their increased travel expenses. During the full survey phase, new interviewers who would like to avail themselves of bicycle transport must advance FRW 5,000 to ASAU which will then purchase the bike with this money plus its own contribution of FRW 10,000. This new procedure will provide only those interviewers who sincerely need bicycle transport with it.

#### G. The Micro-computer

The PP provided for the purchase of a micro-computer and independent data entry equipment to supplement the Rwandan Census Bureau's (BNFP) computer. Access to this NCR computer was considered unreliable because of competing demands and frequent down time. The PP allocated \$75,000 for the purchase of the computer and auxiliary software.

In 1982, however, a comparative study was made comparing the cost of: renting the NCR from SOMECA, the cost of buying an NCR for project use, and the cost of maintaining the hardware and personnel for the UN NCR center. It was decided that while it might be more economical to buy and maintain an NCR than to rent one, the renting of the Bureau of Census' NCR was the most problem free alternative. No computer, therefore, was purchased. Meanwhile access to the BNEP computer was never formally granted to the agricultural survey staff, although informal access has been possible. Nonetheless, ASAU does not have an official letter in hand guaranteeing ASAU user rights and such a letter should be obtained in the near future to ensure sufficient computer availability for the ASAU programmer. This and other computer related problems will be developed more fully in Sections VI.C. and D.

#### H. Construction

The construction of the ASAU offices has proceeded as planned. The ASAU staff has been housed in their new offices since July, 1983, although there is no running water or electricity. Running water should be obtained in the near future from the Kigali water distribution system. The project may build a small elevated cistern to assure adequate water pressure. Efforts are underway to obtain electricity. FRW 8.8 million is necessary to install the needed transformer and run electrical lines to the ASAU office buildings and to the five users in the immediate area. The ASAU is now holding discussions with other potential electricity users in the area to come up with a cost sharing formula for electricity.

#### I. Operating Costs

This category includes field operating expenses such as: per diems; travel expenses; the purchase of minor supplies; vehicle maintenance, the rental of temporary ASAU office space; etc. Due to unexpected events and miscalculation, projected operating costs have been severely underestimated. Vehicle maintenance costs have overrun PP projections and will continue to do so in the future. Twenty motorcycles will need fuel, maintenance, etc. during the full survey phase in lieu of the envisioned eleven. During the pilot survey, motorcycle maintenance costs were also higher than estimated. Supervisors received an average of FRW 36,987 per month for fuel, vehicle maintenance and per diem. The proceeds from the sale of the original 11 motorcycles (which was not specified in the PP) plus sums paid by the supervisors towards the purchase of the motorbikes, were able to partially defray the costs of purchasing new motorbikes for the full survey. In the future, in order to reduce these operating costs, the supervisors and their assistants will be paid fixed monthly amounts based on the expected average kilometers to be traveled. A fixed sum of FRW 20 per kilometer is to include all expenses including per diem. The implementation of this new system should reduce monthly expenses per person by approximately one-third, to FRW 24,000 per month. (There are, however, two supervisory personnel in each prefecture for the full survey while there was just one under the pilot survey.)

Operating costs have also been larger than projected because USAID underwrote the salaries of many of the interviewers. This additional AID expense was approximately FRW 9 million. Furthermore, offices were rented in the Cyangugu Prefecture which were not originally envisioned in the PP. The rental of these offices was necessary because of the formidable distance between this prefecture and the Central Offices.

J. Contingency and Inflation

Substantial sums of money were set aside in the PP for these two categories. Less than one-third of this money has been spent to date. These funds will be used to the extent necessary to cover budgetary shortfalls in other input categories. Money saved due to the late arrival of the U.S. agricultural economist and the payment of the other expatriate advisor's salary by the Belgian Government is also available for reallocation.

K. Future Budgetary Needs

Although the project's present funding level appears to be sufficient, OAR/R should review its financial commitments and reallocate line obligations as necessary. In particular, attention should be paid to the categories of: operating costs, commodities, and short-term technical assistance, which will probably need to have their funding levels increased.

VI. INSTITUTIONAL DEVELOPMENT

A. New and Functioning Statistics and Analysis Unit at MINAGRI

While a Statistics and Analysis Unit has been set up and is functioning as a part of MINAGRI, its ability to function at an optimal level has been hindered by vacant ASAU staff positions. Four of the projected ASAU staff positions still remain unfilled and at present little effort is being made to obtain the requisite number of employees. These employees, however, are necessary to ensure the proper functioning of the project once the foreign advisors leave. Devoid of this outside technical support and operating with its presently undersized staff, the present ASAU unit will most likely have severe difficulties in implementing other successful agricultural surveys.

B. Trained Survey and Analysis Staff

1. Central Office Staff

As previously mentioned in the Input section of this report, approximately half of the ASAU management staff has not been hired. The positions of: one agricultural economist, computer programmer, general survey manager and field survey manager, have not yet been filled. This personnel shortage will become critical once the USAID supported agricultural survey is completed. The present ASAU team, although technically competent, will operate at great handicap if several positions are not filled (i.e., programmer, agricultural economist, sampling methods specialist) in the near future.

Furthermore, present ASAU staff members are not always appropriately trained for the positions they hold. For example, the position presently held by the Operations Manager does not conform with his training as a mathematical statistician. But because of the severe ASAU personnel shortage he was assigned to another management position which did not exactly match his job skills.

But mismatched persons to positions have only created a minor human resource problem when compared to a generally high level of project member dissatisfaction. Because government salaries are substantially lower than equivalent salaries in the private sector, there have been severe morale problems. The computer programmers who work for the Rwandan Bureau of Census also seem unwilling to join the ASAU team without receiving greater monetary rewards.

Admittedly, problems have been encountered in staffing ASAU because of a lack of sufficiently qualified personnel in Rwanda. It has been and will be a difficult task, therefore, to find another qualified person to fill the second agricultural economist position. In addition, higher salaries in the private sector tend to attract those persons who do have the necessary capabilities. A large number of A-2 level agronomes are now being trained in Rwanda, although their services are in great demand. A new policy has recently been initiated by the Rwandan Government which strives to place three A-2 level agronomes in each of the ten prefectures. This means that the available supply of these technicians is being drained off into another form of government service. This situation is expected to endure through the medium-term.

Because of the shortage of available personnel to join the ASAU survey team, the training of the present ASAU staff has also often been insufficient. The Chief of Project was hired as one of the two agricultural economists but he was unable to receive long-term technical training abroad because his presence was required in Rwanda to oversee the project's direction. It is expected, however, that he will go to the United States for this long-term training once the agricultural survey project is completed. But in order for his absence not to cause severe disruptions, another agricultural economist (or agricultural engineer) must be identified and sent abroad for long-term training as soon as possible. His return to Rwanda could then coincide or predate the present Chief of Project's departure.

## 2. Supervisors

Although the formation of the prefectural supervisors did run into some snags, many training problems were solved before the commencement of the National Agricultural Survey. Since these supervisors are responsible for the training of the one hundred fifty five interviewers, their training must be impeccable to avoid passing their training weaknesses on to the trainees. Therefore, the supervisors must be highly motivated to ensure that they will successfully carry out the interviewer training sessions.

The supervisors, during the pilot phase, were not equally motivated which led to variations in regional data output. The prefectures of Cyangugu, Kigali and Kibungo had poor data output which was largely attributable to poor prefectural supervision. Two of the ten supervisors (located in Kigali and Cyangugu) had to be fired and another in the Gisenyi Prefecture left the survey team to become a bourgomaster. Currently, all of the prefectural supervisors seem to be highly effective except for one. There have been few training problems during the full survey phase.

### 3. Interviewers

As was previously mentioned in the Input section of this report, difficulties were encountered in the training of the interviewers. Morale problems and high interviewer attrition rates have been solved by the institution of a bonus system.

Other pilot phase problems (which have affected the interviewer's performance) have also been worked out. During the pilot phase of the survey, many interviewers (25%) were hired who did not originate from the commune and/or the prefecture to which they were assigned. Cultural problems affected their output. Meanwhile, morale was low because no additional salary provisions were made for the relocation costs which these interviewers incurred. Fortunately, this situation has been rectified for the National Agricultural Survey and should no longer affect the interviewers' morale. Ninety five percent of the interviewers now work within their own commune and the remaining five percent work within their prefecture. In addition, the survey was initiated three months earlier than planned partially in order for the interviewers to find appropriate accommodations, when necessary.

### C. Additional Human Resources Needed

#### 1. Two Computer Programmers from the Rwandan Bureau of Census

Vivian Toro drew up a tentative computer programming schedule while she was in Rwanda in September 1983. This schedule, which is based on a best case scenario, assumes that the first six computer programs, which must be completed before data entry can begin, will be completed by the end of December. The following paragraph summarizes this best case scenario and outlines the personnel and administrative changes that must occur in order for this scenario to be valid. Hopefully this summary in addition to the worst case scenario, also presented below, will make it clear why the assignment of two more computer programmers to the project is essential.

a. Best Case Scenario: Ms. Toro has calculated that the writing of the first six programs and their modifications will take approximately fifty five person weeks. Assuming that the ASAU programmer is relieved of his administrative responsibilities (i.e., the writing of summary reports on administrative meetings, arrangements for the use of the NCR computer, etc.) and also his Saturday "umuganda" work, and further assuming that two other programmers who worked on the Rwandan Population Census and

who currently are employed by the Bureau of Census but do not have specific work assignments, are assigned to the Agricultural Survey project, it would be possible for the six computer programs and modifications to be written by the end of December. Data entry could then begin and the project would be on schedule.

b. Worst Case Scenario: Assuming that no other computer programmer is assigned to work on the agricultural survey project and that the ASAU programmer is not relieved of his administrative and "umuganda" work, it will take at least fifty five weeks for the first six programs and their modifications to be written. Calculating from October 1st, then, data entry would not begin until September 1984 meaning that the project would be at least nine months behind schedule. Finally the ASAU programmer would also be responsible for writing seven other computer programs and their modifications which will take approximately sixty person weeks. Thus, without additional programmers, the sixteen computer programs and their modifications would be finished, at the earliest, in June, 1985; only then would the analysis of the data phase of the project be able to begin meaning that the project completion date would extend into calendar year 1988.

Both of the above scenarios assume that three of the computer programs are written in Washington by BUCEN (i.e., the range edit, the consistency edit and the recode) but the finalization of this arrangement with BUCEN has not yet been made.

Thus, as should be evident from the above scenarios, the successful and timely completion of this project is dependent on the assignment of two trained computer programmers to the project without delay.

## 2. A Data Processing Advisor

The above scenarios also assume that all of the computer programmers working for the agricultural survey have unhindered access to the Rwandan Bureau of Census' two programming terminals. (There are a total of seven terminals but five of these terminals are used for data entry). With three other surveys (i.e., the Fertility Survey, the Household Budget Survey and the Demographic Survey) planning to use the NCR computer in the near future, it is also crucial that a long-term advisor be hired to assist in and monitor the programming work. A French computer advisor is expected to arrive soon as part of French technical assistance for the Household Budget Survey. The French report that the French expert will help to organize computer usage time. If he does not undertake this task, the American-financed advisor should be prepared to help organize computer usage time. Since the project is already behind schedule and the chances for getting the data processing staff needed in the immediate future are not too promising (i.e., the best case scenario), the assignment of a data processing advisor to the NCR computer would improve the chances of meeting the data processing schedule on time. The agricultural survey project should not be responsible for this advisor's salary.

3. A Newly Trained Computer Programmer

Identify and send a computer programmer to the United States for long-term training, who upon his return will be assigned to the agricultural survey project.

4. A Second Agricultural Economist

The PP originally provided for two Rwandan agricultural economists. While a person was hired to fill one of these positions, he never received the PP envisioned long-term training abroad since his services were needed as Chief of Project. Thus, while the agricultural survey project needs a second agricultural economist to help with data analysis, etc., the need for his identification and placement in long-term training abroad has increased since the Chief of Project should be sent for long-term training once the agricultural survey project is finished. The second agricultural economist will be needed to fill in for the Chief of Project while he is gone and to undertake some of the work of the expatriate advisor after the project's completion.

5. A Sample Survey Methods Person

For the National Agricultural Survey, much of the sample survey methods decisions were made in Washington with the help of BUCEN. These decisions principally involved the sample frame selection, survey procedures, design of the questionnaires, etc. A Rwandan has been trained as a mathematical statistician and he will be able to prepare sample frames, help calculate variances, etc. However, someone with training in questionnaire design is needed for the project. A qualified Rwandan should be identified and sent to the United States for long-term training as a sample survey specialist. His presence on the agricultural survey team will ensure that the Agricultural Survey and Analysis Unit is capable of planning and implementing new surveys with its own personnel.

D. Specifically Designed Computer Programs and Data Collection Procedures

Prior to the commencement of the National Agricultural Survey, data collection documents (i.e., the survey questionnaires, interviewer and supervisor manuals, and error correction manuals) were all completed. Furthermore, most of the pilot survey data has been processed and analyzed. The household and field measurement data were processed in the United States with the help of the Rwandan programmer who was, at that time, receiving on-the-job training at BUCEN, while the production data for the first half of the pilot survey were processed in Rwanda. (The production data for the last half of the pilot survey have not been tabulated.)

Nineteen programs are needed for the full survey, of which sixteen still need to be written. These sixteen core programs will then be modified to obtain a total of fifty-three survey programs. The Rwanda programmer is presently writing the first six of these programs which are critical to the successful completion of the agricultural survey. Without these programs,

no data entry will be possible. Assuming that the best case scenario described in the "Human Resources Needed" section of this evaluation is obtained (i.e., the Rwandan programmer is relieved of his "umuganda" in order to perform additional survey programming and other computer programmers are assigned to the project), these programs could be finished in December. However, without these administrative and personnel changes, the programs will not be finished before early fall which would severely retard the processing of the survey data. Furthermore, due to prior resource commitments, BUCEN may not be able to undertake much more additional agricultural survey programming. (BUCEN should be requested though to write the three most difficult programs - the range edit, the consistency edit and the recode). Thus, the immediate assignment of two more computer programmers to this project is essential to keep to the planned schedule.

Finally, to aid in the timely and efficient processing of data, a tape drive should be rented or bought for one of the NCR computers in Rwanda. Currently data can only be transferred between the NCR computer and the IBM computer used in the U.S. Census Bureau through disk cartridges because there is no tape drive in Rwanda. This is a time consuming and costly method since it requires the renting of time at a similar NCR installation in the U.S. to transfer the data from the disk cartridge to a magnetic tape which can be read by the computer used by the U.S. Census Bureau. It is understood that SOMECA, the local NCR representative, is planning to order a tape drive in January 1984 which is expected to be operational around June of 1984. SOMECA would then permit the renting of time for its use. Progress on these plans should be followed. Should SOMECA decide not to acquire the tape drive, the acquisition of a tape drive for the project should be considered.

#### E. Pre-testing Data Collection Procedures and Pilot Survey

These two phases of the project - the survey preparation phase and the pilot survey phase - have been completed. The survey preparation phase was implemented during the first year of this five year project. During this year a great deal of effort was put into training ASAU staff members and in developing many of the methods and materials necessary for the subsequent phases of the project. In particular, emphasis was placed on such activities as questionnaire construction and pretesting, the drafting of the interviewers' and supervisors' manuals, field organization, sample development, informing local authorities in the field, and the recruitment of interviewers. Because of the thoroughness of the work undertaken during this preparatory phase, the pilot survey was able to start off on a solid footing.

The second phase of the project sequence, the pilot phase, lasted for roughly one year. During this phase the commune level interviewers filled out a household questionnaire which asked farmers about the ages and education levels of all members of their households. Questions were also asked about the division of labor by type of activity and by crop, and inventories were taken of farm equipment and of livestock. Information was also obtained on animal husbandry and marketing practices. This initial interview session was followed by the measurement of each farm's size. (For

this survey a special methodology for calculating farm size was developed and is based on the angle and perimeter measurements of each parcel operated by the farmer.) A listing was then made of all of the fields located on the farm. From this list a sample of fields was randomly selected for more detailed investigation. The total number of fields selected during the pilot survey was 4,040. At the field level information was gathered on such items as: the field's distance from the residence, its slope, soil protection and improvement, land tenure, how the field was used (cultivated, fallow, pasture...), and if it was cultivated, what crops were grown and in what crop rotations. Once information was in from the sample fields, interviewers began the job of registering total farm production for fourteen different crops. Interviewers worked closely with the farmers in keeping a running tally of crops harvested on the farm. In order to ensure that farmers used a common measurement unit, they were supplied with standard sized graduated buckets and storage sacks. By and large the farmers were very willing to cooperate with ASAU in this effort. Finally, since both production and land use varies enormously from the first to the second agricultural season, information was collected independently for the two seasons. Similarly, data such as poultry, egg, and milk production, as well as some marketing practices was gathered on quarterly intervals because it is subject to substantial variation throughout the course of the year.

During the five month gap between the completion of the pilot survey and the commencement of the full survey, much of the pilot survey data was processed.

#### F. Pilot Survey Sample Design

For the pilot survey the sample design from the Census Post Enumeration Survey (PES) was used but with some ad hoc substitution to provide the desired geographic coverage. Because of these substitutions, it was impossible to determine the exact probability of the selection of any given household and therefore exact variances and standard deviations could not be calculated. This approach was sufficient for the pilot survey in light of its objectives and budgetary constraints. The National Agricultural Survey, however, will not invoke any ad hoc substitution so as to avoid the aforementioned problems. A stratified sample approach is being used for the full survey.

#### G. Changes Made in Data Collection Procedures Prior to the National Agricultural Survey

A question by question review of the various survey instruments tested during the pilot survey was undertaken and a great number of revisions were made. Although the majority of these modifications were small, involving wording, syntax and other such changes, there were several changes of greater importance. It was found that recording crop production obtained from the sample fields was more difficult and time consuming than recording total farm production irrespective of fields. Therefore, this latter method was chosen.

The second major change involved the addition of backup households to the interviewers' original household list. Originally, these two items were separated in order to obtain more accurate census information. For example, if one of the households on the interviewers' list is not found, the interviewers are required to find out if the family has left for the day, if it has moved, or if it is absent due to some other cause. The separation of this list and the backup list ensured that the interviewer would return to the household several times to obtain the pertinent information rather than just passing on to the backup household. This method, however, proved to be unsuitable. Too much time was wasted between the discovery that a family was no longer available for the survey and the supervisor's replacement of that household by another. To solve this problem, the two lists were joined.

Finally, because of innumerable field measurement calculation difficulties, it was decided that the interviewers would take the appropriate field measurements but that they would no longer perform the measurement calculations. This task has been given to Central Office personnel.

#### H. Statistical, Methodological and Analytical Documents

##### 1. Pilot Survey Results

Tabulation of pilot questionnaires was undertaken in the fall of 1981 and a preliminary analysis of available data has almost been completed. Production data for the pilot survey were keyed and developed in Rwanda, while all other data (i.e., household and field measurement) were processed in the United States with the help of ASAU's computer programmer who, at that time, was receiving on-the-job training at BUCEN.

During this tabulation process, only a small subset of the many variables in the questionnaires was focused on. In particular, some of the basic characteristics of the household as well as farm size, land use, and livestock ownership were looked at. Inasmuch as these pilot data were based on sample observations not drawn using bonafide probability techniques, the reliability of the findings could not be determined, and hence inferences from the data are to some degree speculative. However, these tentative conclusions are suggestive or indicative of what is occurring in Rwanda's agricultural sector and should be usefully employed in Rwanda to help guide agricultural planning and research while awaiting the results of the full survey.

The data from the initial pilot survey were analyzed at the national level and, whenever possible, by a broad agro-ecological regional classification. These regions are twelve in number and for the pilot survey were grouped into three larger zones (good, average and poor agricultural areas) on the basis of their relative suitability for agriculture. Finally, by disaggregating information on such topics as farm size, land use and livestock ownership by this broad regional classification, a general understanding of how Rwandan agriculture varies from one agro-ecological context to the next was developed.

Listed below are some of the general categories looked at and a brief summary of some preliminary pilot survey results. More detailed analysis of pilot survey findings can be obtained from Daniel C. Clay's report entitled Some Preliminary Results From the Pilot Survey of Agriculture in Rwanda.

a. The Farm Population

The distribution of farm households across the three agro-ecological regions was looked at in order to determine the percentage of households living in good, average and poor regions. These percentages were 17.7%, 36.8% and 45.5% respectively. It is estimated that the country's farm households are comprised of 5,733,466 individuals or 5.3 persons per household on the average. In disaggregating by age, it was found that 46.6% of this farm population are children (less than 15 years of age), and 48.7% are adults of working age. Finally, the household size at the regional level was studied and it was noted that its size varies with land quality. Relatively larger households are found on "good" land, while the household size is smaller (by about one person) in areas where agriculture is considered "average" or "poor".

b. Characteristics of the Household Head

Most farm households are headed by men with only one in every five households headed by a woman who is, in most cases, elderly. At present, it seems that 57.8% of the household heads have had no school training whatsoever, but it is expected that, in future years, the education level among household heads will grow significantly.

c. Farm Size and Fragmentation of Land Holdings

The gathering of this information was time consuming and difficult as landholdings are frequently divided into several parcels. Area measurements were extrapolated to estimate the total land owned by the nation's 1,082,334 farmers is 1,361,877 hectares. These figures demonstrate that the average farm size is 1.26 hectares. However, it is speculated that farmers in the poor agricultural regions own more land than their counterparts in the two other regions in order to meet subsistence requirements. It seems, therefore, that regional differences in farm size may be linked to differences in overall productivity as well as to differences in household size. Further investigation will be done in this area.

In addition to farm household size, the fragmentation of farm land was also investigated. It is estimated that the average farmer operates five independent parcels of land but it is not known what the fragmentation rate of landholdings is. Furthermore, it will probably be another five years or so down the road before objective information can be made available to determine such rates of change. Across agro-ecological regions, some noteworthy observations have also been made. Findings reveal that the fragmentation of landholdings is most severe where farms are relatively small. Similarly, in the "poor" region where farms are large and family size is smaller, the problems of fragmentation appear to be less pronounced. One

interpretation of this relationship is that as the inheritance process continues, farms are divided into smaller and smaller fragments of land. Since these smaller parcels are not sufficient in size for households to live on, farmers are forced to seek pieces of unused land wherever they can find them.

d. General Land Use

The use of these farms by farmers was also studied with the categories of general use including: fields in crops, fallow fields, uncultivated fields (pasture, woods, abandoned), area used for residence compound, and a residual category for all other uses. During the second season, 62.8% of farmer holdings were used to cultivate crops and approximately one-fifth of the land was idle for fallowing purposes. Furthermore, the proportion of land under cultivation appears to be positively associated with agro-ecological regions. "Good" agricultural regions had a higher percentage of land under cultivation (70%) than "poor" regions (56%).

e. Land Under Cultivation

Under this rubric, the primary comparison was between areas planted in single versus mixed crops. It seems that in all cases, about half the cultivated land is planted in single crops while the other half is planted in mixed crops. Detailed information on crops planted, and the percentage of land cultivated by type of crops (single and mixed) was also produced.

f. Livestock Ownership

This section looks at the total number of livestock by agricultural region. In order to simplify the discussion, livestock of all ages and of both the sexes were grouped by major type. For example, cows, bulls, calves, etc. are included under the heading of "cattle". The survey's four principal groups are: cattle, hogs, goats and sheep. Goats are the most numerous of the four principal types of livestock found in Rwanda and can be found on 56.4% of the country's farms. Cattle are the second most numerous group but can be found on only one quarter of the farms. In other words, roughly three-quarters of the households own no cattle. Sheep, which tend to be distributed evenly across agro-ecological regions, are located in 25.2% of the farms. On those farms with sheep, an average of 3.53 head are found. Finally, hogs are the least numerous of the four principal types of livestock and although they are found on only 17.7% of the households, three fourths of those who raise hogs have only one.

g. Production Data

The processing and analysis of this data has not yet been completed, although results from the first half of the pilot survey are available.

## 2. Methodology Changes Prior to the Full Survey

While the grouping of the pilot survey data into three agro-ecological zones was useful for carrying out the analysis of pilot survey data, during the full survey a different approach will be used which will focus more directly on the effects of altitude and/or rainfall.

## 3. National Agricultural Survey

The National Agricultural Survey began three months earlier than expected in order to ensure that the initial household questionnaires will be properly filled out, to allow the interviewers to find suitable housing, and to let the interviewers become acquainted with their area. There should be ample time to complete the National Agricultural Survey and no major data collection problems are envisioned. As previously mentioned, however, major data processing problems will occur if two more programmers are not immediately assigned to this project.

## VII. PURPOSE

"The purpose of this project is to strengthen the capability and performance of the GOR in data collection, processing, analysis, planning and management in the agricultural sector. By the end of the project we will expect to have a) increased the availability and reliability of information needed to manage the agricultural sector, and b) improved capability for data collection, processing and analysis in the Ministry of Agriculture (MINAGRI)."

While the purpose of the OAR/Rwanda development project will be attained in the short-run (i.e., relevant data will be produced for making agricultural planning and management decisions), the present ASAU staff may find it difficult to replicate another such survey on its own and/or to carry out other useful data collection/analysis activities. A full ASAU staff is necessary for this branch of MINAGRI to function optimally.

## VIII. GOAL

"The project will serve in a tangible way Rwanda's top agricultural goal: to increase total and per capita food production and farm income. The main contribution of this project will be more relevant and more accurate agricultural data that can be utilized by the GOR in making more effective use of its limited resources, both through better planning and through improved ability to anticipate problems and crises of food shortfalls."

## IX. RELATIONSHIP OF ASAU TO OTHER AID-FINANCED PROJECTS

In concurrence with its CDSS, OAR/R has been stressing agricultural development projects to increase food production and farmer income. The ASAU project is only one of several agricultural projects which have recently been

completed or are presently underway. The ASAU project is, however, one of the essential elements of OAR/R's portfolio since this project generates basic agricultural data that will be used by all other projects and the GOR to analyze and improve upon Rwanda's agricultural sector. Other AID sponsored projects include:

<u>Project Title and Number</u>	<u>Status</u>
Cooperative Grain Storage (696-0108) (LOP: \$327,000)	CLUSA OPG; pilot project completed in December 1982
Food Storage and Marketing, Phase I (696-0100) (LOP: \$716,000)	Initiated in 1975; completed in December 1982
Food Storage and Marketing, Phase II (696-0116) (LOP: \$2,100,000)	On-going
Agricultural Education (696-0109) (LOP: \$5,126,000)	On-going
Cooperative Training Center (696-0119) (LOP: \$3,706,000)	On-going
Cropping Systems Improvement (696-0110) (estimated LOP: \$12,000,000)	PP design scheduled in late 1983- early 1984

As can be seen from the above array, all of OAR/R's agricultural projects are interlinked and depend heavily on the results of the agriculture survey to supplement their data base. Specifically, data from the National Agricultural Survey will be of essential importance to the proposed Cropping Systems Improvement project. The purpose of this project is to develop a farming systems approach to research and extension in Rwanda. Factors which influence farmer decision making (i.e., family size, field size, crops planted, etc.) will be generated by the agricultural survey and be fed into the data base of the CSI project.

Under FSM, GREMARWA was established and became operational to intervene in food crop marketing by buying and selling beans and sorghum. The purpose of the intervention is to assure maximum producer prices and supplies and minimum consumer prices. Under Phase II, GREMARWA's ability to function with increasing effectiveness and efficiency is continuing to be supported. In addition, a major research effort is being undertaken on storage problems (especially related to beans). This FSM research will be combined with Local Crop Storage research on the same subject and will be carried out as one coordinated effort. For both of these projects (the FSM and the LCS), the data collected by the National Agricultural Survey will again form the foundation of this research work. For the first time, researchers will have accurate knowledge on the amount of beans and sorghum planted seasonally and annually, farmer income levels, household size, etc. This data will also paint a clearer picture of the characteristics of potential and real FSM and LCS actors.

The LCS project has three purposes: 1) to establish a food storage and marketing system at the local level for cereals and pulses which is more favorable to small farmers; 2) to reduce seasonal and regional price fluctuations and to ensure fair weights; and 3) to reduce storage losses. Of these three objectives, the National Agricultural Survey can provide valuable information on regional and seasonal crop production which contributes to foodcrop price fluctuations.

Under the Cooperative Training Center project, a Cooperative Training and Research Center has been built to provide (a) a facility (in Kigali) for cooperatives to organize and conduct their own training courses, (b) short and long-term training for cooperative, ministry and extension personnel in cooperative organization, management and accounting and (c) research, documentation and information services for the continued development of the cooperative movement. AID inputs, provided by CLUSA through an OPG, include the services of a Cooperative Education Advisor, equipment and furnishings for the Center, scholarship support and a budget subsidy for the first five years of the Center's operation. The Government of Switzerland has financed the construction of the Center and is supporting the Research and Publications Unit.

As can be seen from the above project summaries, the information generated by the National Agricultural Survey will be used extensively in the promotion of Rwanda's agricultural development. In particular, this data will contribute to the successful development and implementation of AID sponsored projects. The institutionalization, therefore, of an Agricultural Statistics and Analysis Unit has been timely and valuable.

#### X. BENEFICIARIES

The indirect beneficiaries of this project are the rural poor. Women and the bottom 40% of the population are expected to be the prime beneficiaries. The PP states "that in the near term the stream of information generated on agricultural conditions throughout the country should help keep the GOR better informed about where and when there may be seasonal food shortfalls, and hence provide it with the information necessary to assist in coping with such shortfalls. Clearly, the poorer members of the rural communities will benefit significantly in terms of relief from food shortfalls." In the long run, the rural poor may indirectly benefit from better informed policy making in the agricultural sector. At present, given the survey's early stage, the benefits accruing to the indirect beneficiaries have been minimal.

The direct beneficiaries are those members of the ASAU staff who have received long-term training abroad and in-country training. Their skills have been enormously augmented by this training and by on-the-job experience. Those supervisors and interviewers who received in-country training have also directly benefited from this survey project.

## XI. UNPLANNED EFFECTS

No unplanned social, environmental, health, technical or economic effects were identified during the course of this evaluation.

## XII. LESSONS LEARNED

This OAR/Rwanda agricultural survey project is one of the most advanced such projects in Africa. As there were few prior agricultural survey projects from which experience can be drawn, this project has had to be developed on a day-by-day, trial-by-error basis. Considering this fact, substantial progress has been made and valuable insights into difficulties that may afflict other such projects have been gained. With this in mind, let us now turn to the lessons learned.

Perhaps the most important lesson which has been learned from this project is that longer training sessions were needed. Rather than the two year foreign training period set up by the PP, a three to four year period would have been more appropriate. This extended training period would have given the ASAU staff members sufficient time to complete all of the requisite training. For example, with a longer training period, the Chief of Project would have been able to complete his training as an agricultural economist. More time would also have been useful for the identification of other missing ASAU staff members since once the survey project was underway there was little time to devote to the filling of vacant positions.

Perhaps more GOR support should have been elicited in this domaine. The Government's policy of assigning three agronomes to each prefecture for regular agricultural projects made it more difficult for the government to assign agronomes to the ASAU survey project. It seems that the government's high level of interest in developing the agricultural sector has created severe skilled labor shortages. In the future, more attention should be paid to skilled labor availability. Suboptimal results will occur in all agricultural projects if the country's resources are spread too thin.

The bonus system seems to be a valuable device for increasing the motivation of the interviewers. Since the output of the interviewers is easily quantifiable, making quality control possible, this system gives reward where reward is due, alleviates interviewer morale problems and high attrition rates. Future projects which involve a high level of "piece work" should implement such a system at the beginning of the project rather than waiting for personnel problems to arise that demand an immediate solution.

Finally, interviewer equipment costs and per diem were excessive, necessitating the implementation of a motorcycle control system. Supervisors are now to be allotted FRW 20 per kilometer based on an average of the distance which he/she must travel. Also, in order to encourage the users of the motorcycles to maintain them properly, a lease contract has been proposed that stipulates motorcycle ownership for the supervisor at the end of the survey. This contract specifies that FRW 6,700 be withheld from the

supervisor's monthly allowance which covers travel and maintenance expenses. From August, 1982 to November, 1984, when the survey field work is expected to finish, a total of FRW 107,200 will have been paid by the owner of the motorcycle. The balance will be considered a bonus to the supervisor upon the successful completion of the survey.

In sum, many unexpected problems which occurred during the initial phase of the Agricultural Survey project were rectified before the commencement of the full survey. The resolution of these problems was not always easy; certainly the management personnel of the ASAU office should be commended, in this respect, for their ingenuity.

### XIII. SPECIAL COMMENTS

As the National Agricultural Survey enters its final stages and can, at this point in time, be considered a success, it is important for the Agricultural Statistics and Analysis Unit to begin looking towards the future. Since one of ASAU's purposes is to increase the availability and reliability of information needed to manage the agricultural sector, efforts should be made to increase institutional linkages. Channels for pilot and full survey information dissemination should be established. Towards this end, periodic meetings should be set up between the ASAU, pertinent ministries, agricultural research centers, etc. These meetings could supplement the periodic meetings which now take place in the Coordinative Commission of the Agricultural Survey project which consists of the Secretary General of MINAGRI, Director General of the Statistics Section of MINIPLAN, etc. The meetings would give the participants a chance to review newly acquired agricultural information as well as comment on survey methods, results, etc. Furthermore, during these periodic meetings, interested agricultural institutions could transmit their informational and data needs to the ASAU staff.

Finally, although the processing of the full survey data will not be completed for several years, the ASAU staff should proceed with its plans to persuade other government agencies and donors to utilize the services of ASAU for surveys. The survey part of the project will soon be completed and it would be wise to mobilize the interviewers for a new project soon after the National Agricultural Survey data is collected. Possibilities include an agricultural survey for OAR/R's Local Crop Storage project. The LCS July, 1983 evaluation states:

The second information gap concerns the extent to which private traders are profiteering by either tinkering with their scales or using inexact and inaccurate weights. A project assumption is that farmers are routinely cheated on weight estimates of their grain when both selling to and buying from private traders. The problem is addressed by introducing systemic and reliable weighing procedures at the LCS cooperatives. The extent of the problem is not known, however, but could be ascertained by comparing the weight and quantity of a farmer's grain before sale with the weight recorded by the private trader when he

offers to buy the farmer's grain. It is suggested that survey personnel from the Agricultural Survey and Analysis Project could be requested to gather this data on a routine basis when recording farmer/producer sales.

Other possible ASAU surveys include: one for the World Bank, in the Lake Kivu region, on coffee production and cultivation and one for OAR/R's Cropping Systems Improvement project on the extension and production of research crops. However, in order to take on new projects, the ASAU must overcome its current shortage of computer programmers.

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EXECUTIVE SUMMARY

Rwanda Agricultural Survey and Analysis (696-0115)

1. WHAT CONSTRAINTS DOES THIS PROJECT ATTEMPT TO OVERCOME AND WHO DOES IT CONSTRAIN?

The purpose of the Rwanda Agricultural Survey and Analysis, approved January, 1981 for \$3,706,000 is to strengthen the capability and performance of the Government of Rwanda in data collection, processing, analysis, planning and management in the agricultural sector. By the end of this project OAR/Rwanda expects to have a) increased the availability and reliability of information needed to manage the agricultural sector, and b) improved the capability for data collection, processing and analysis in the Ministry of Agriculture and Livestock (MINAGRI).

The PP states that "the level of investment in agriculture is significant and indicates GOR and donor concern for this sector. Nevertheless, while donor financing in agriculture is increasing, it remains relatively low when viewed in terms of Rwanda's population size and its bleak economic outlook. In order to formulate sound policies and to determine the appropriate composition and level of investment needed in the agricultural sector, the GOR needs a fund of information that is not presently available. In addition to the lack of reliable information for medium and long-term planning, the GOR does not have, at present, the human and organizational resources that would permit it to monitor current development at the farm level and feed information to its planning body for short-term policy making and emergency planning." This project, therefore, attempts to overcome these above mentioned constraints in order to enable GOR planners to determine with greater precision what types of agricultural development projects should be carried out. In addition, it will provide the GOR with baseline data on the agricultural sector which will be used to determine the overall success of the GOR's agricultural program and will assist in the evaluation of individual projects.

2. WHAT TECHNOLOGY DOES THE PROJECT PROMOTE TO RELIEVE THIS CONSTRAINT?

Since the primary purpose of this project is to form a well-running Agricultural Statistics and Analysis Unit, the basic technology being transferred consists of data collection and analysis methods.

3. WHAT TECHNOLOGY DOES THE PROJECT ATTEMPT TO REPLACE?

The project attempts to increase the institutional capacity in Rwanda to collect and analyze agricultural data. The newly created data collection methods will replace the "seat of the pants" estimation technology which has been used in the past to make estimates of agricultural production.

4. WHY DO PROJECT PLANNERS BELIEVE THAT INTENDED BENEFICIARIES WILL ADOPT THE PROPOSED TECHNOLOGY?

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The direct beneficiaries of this project are the officials in the Ministry of Agriculture who have requested help in the development of their capabilities to collect and analyze agricultural data. This request for assistance reflected an interest by the President in better agricultural data as well as an interest on the part of the Ministry of Agriculture and the Ministry of Plan. It is felt, therefore, that the government officials will adopt the proposed procedures.

5. WHAT CHARACTERISTICS DO THE INTENDED BENEFICIARIES EXHIBIT THAT HAVE RELEVANCE TO THEIR ADOPTING THE PROPOSED TECHNOLOGY?

Since the direct beneficiaries of this project (i.e., the Government ministries who will use the information) have requested help in this realm and are providing financial and personnel support to the project, it can be assumed that they will make the utmost use of the information provided by it. Other OAR/R agricultural projects will also benefit from more accurate agricultural data. The indirect beneficiaries (the rural poor) should also benefit in terms of better government planning of agricultural resource use.

6. WHAT ADOPTION RATE HAS THIS PROJECT OR PREVIOUS PROJECTS ACHIEVED IN TRANSFERRING THE PROPOSED TECHNOLOGY?

As this project is not yet complete and it is one of the first of its kind, no answer is readily available. It can be assumed, however, that the user agencies will make immediate use of the generated information.

7. WILL THE PROJECT SET IN MOTION FORCES THAT WILL INDUCE FURTHER EXPLORATION OF THE CONSTRAINT AND IMPROVEMENTS TO THE TECHNOLOGICAL PACKAGE PROPOSED TO OVERCOME IT?

The purpose of this project is to set in motion forces, i.e., the Agricultural Statistics and Analysis Unit (ASAU) that will induce further exploration of Rwanda's agricultural sector. From this information, more rational agricultural decisions will be made. As the ASAU staff members and user agencies gain more experience in data collection procedures and needs, hopefully they will discover ways of improving the data collection and analysis process.

8. DO THE PRIVATE INPUT SUPPLIERS HAVE AN INCENTIVE TO EXAMINE THE CONSTRAINTS ADDRESSED BY THE PROJECT AND COME UP WITH SOLUTIONS?

The role of private input suppliers in this project is not significant.

9. WHAT DELIVERY SYSTEM DOES THE PROJECT EMPLOY TO TRANSFER THE NEW TECHNOLOGY TO INTENDED BENEFICIARIES?

The project's purpose is to set up an agricultural information gathering unit staffed by qualified Rwandan personnel. Foreign technical advisors are responsible for transferring the new technology to the Rwandans who staff the ASAU. Data analyses will be supplied to the appropriate ministries who will then use it in accordance with their needs.

10. WHAT TRAINING TECHNIQUES DOES THE PROJECT USE TO DEVELOP THE DELIVERY SYSTEM?

The project has used a combination of training outside Rwanda (long-term in the U.S. and short-term in Africa) and in-country training. The in-country training has used the "training-of-trainers" technique, i.e., the national staff and foreign advisors trained the supervisors in both substantive and teacher training matters and each supervisor then trained the interviewers in his prefecture.

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