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A REVIEW OF THE AGRICULTURAL DATA SYSTEM
AT PPMU--WITH SUGGESTIONS FOR IMPROVEMENT

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PREFACE

Our mission was to conduct an independent evaluation of the statistical program of PPMU. We have conducted that evaluation, to the extent possible in the limited time available. We reviewed work initiated by MFP, especially the Gambian Agricultural Data System (GADS) project and the price reporting project. We had discussions with statisticians in Forestry, Fisheries, Livestock Protection, Central Statistics, and an extensive discussion with the representative of CILSS concerning their data needs and problems. We also met briefly with representatives of many Ministries and Departments concerned with agricultural data. These evaluations, meetings, and discussions form the basis of this report.

The first section of the report presents our views on how an agricultural data system fits into an overall program of research management. We do not believe that these views are a required component of this report, but since so many of our discussions with others frequently touched on research issues we felt compelled to express them. The second section contains our evaluation. The final section presents alternative options for future assistance for PPMU.

In preparing this report, especially the evaluation section, we tried to follow the outline of the Terms of Reference (copy attached) handed to us on our arrival in The Gambia. This organizational framework worked well in general, although it necessarily resulted in some repetition.

Part IV, Section A, "Review PPMU objective and staff needs," is treated in the third section under "Options," rather than in the evaluation section.

We could not review the evaluation of MFP (requested in Part IV, Section B, of the Terms of Reference) because the evaluation has not been made. We did, however, review those portions of MFP work that focus on collecting primary data: the GADS program and the price reporting program. These are discussed in the final section of this report.

In the interest of clarity and objectivity, we do not discuss Terms of Reference items IV. C. and D. in this report. We believe that the objectives of the GARD project and their impact on PPMU is best worked out directly between the GARD Chief of Party and the Director of PPMU. This report, therefore, contains only our evaluation of the PPMU data system's needs and our suggestions for meeting these needs. The question of which assistance option is chosen and who ultimately provides the funds is a separate issue that the Director of PPMU should pursue with prospective donors.

AGRICULTURAL STATISTICS AND RESEARCH MANAGEMENT

An important component of research is a data system that provides in a cost-effective way the type and quality of data needed to meet the research objectives, whatever they may be. In this context, it is important to recognize that data are not simply "data." Different research projects require different types of data of varying statistical quality. Moreover, different types of data often require different data collection methods. For this preliminary report we distinguish between two types of data: survey data and experimental data. Like any taxonomical scheme, this one leaves something to be desired, but it is adequate for this report.

Experimental data are the direct outcome of the research itself. Examples are data produced by field test-plots and feeding trials, whether the experiments are conducted on farms or at experiment stations. The distinguishing feature is that the data are produced directly by the "experiment" conducted under the research project. We do not consider here the many issues involved in producing and analyzing experimental data. These issues are the proper domain of the biometrician, trained in the methods of experimental design and analysis, and the researcher conducting the experiments.

But many important questions cannot be answered by the experimental method. Some questions require a simple count: "How many farms produce groundnuts?" and "What is the distribution of farm size?" are examples. Other questions involve interpretation (or research analysis); such as, "What is the income elasticity of demand for fish?" and "What factors determine the price of rice and how much does each factor affect price?"

Survey data are needed to answer questions of this type. Such data are not produced directly by an experiment but are produced indirectly by asking questions of members of the target population identified by the problem at hand. Groundnut producers, rural compounds, and agricultural marketing cooperatives are examples of target populations. Our expertise is with survey data, and this report is restricted to an evaluation of survey data.

Two types of survey data can be identified: data used directly by researchers, and data used by policy makers in the short-run and by researchers in the long-run. An example of the former is the food consumption survey currently being conducted by IFPRI in the Sapu area. Most socioeconomic research projects require survey data for immediate analysis by researchers, and the data system must have the capability to meet these research needs. (The socioeconomic researcher may be intimately involved in producing the data; this is indeed often the case.)

Examples of the second type of survey data are the annual acreage, yield, and production estimates published by PPMU and the agricultural prices collected by the MFP. Often, the immediate users of these data are decision makers in both the public and private sectors. Timely production estimates can, for example, assist in developing potential import needs or potential commodity exports. Timely reports on market prices can assist producers in developing rational commodity sales programs.

Over time, as these data accumulate, a time-series data base becomes available to support a large number of important research projects at the market level, such as an analysis of trends, cycles, and seasonal patterns in agricultural prices, or a study of the factors affecting the price of various farm commodities.

In summary, we view short-term assistance and counterpart training in the cost-effective methods of collecting survey data to be an integral component of any effort to develop an agricultural research management system in The Gambia. Following are proposals and suggestions along these lines based on our current mission. Undoubtedly, revisions will be made from time to time as our own knowledge of and experience in The Gambia grows.

AN ASSESSMENT OF PPMU'S STATISTICAL PROGRAM

In this section, we make some general comments on the strengths and weaknesses of the PPMU data system and then turn our attention to the specific items listed on the Terms of Reference. Because there is considerable interaction among the various items listed in the TR, there must necessarily be some repetition in the following discussion; we have tried to keep it to a minimum, even though many of the points bear repeating.

Our review revealed a mixture of 'old' and 'new' in the statistical unit of PPMU. The Director of Statistics and two or three of the senior field staff have had years of experience in conducting agricultural surveys. There is also the use of established FAO procedures for field measurement and crop cutting. While these are 'old' in the sense of being tried and tested (not in the sense of being worn out and useless), there are some modifications that should improve the effectiveness of these traditional methods. 'New' to the unit is the addition of 6 field supervisors and 36 enumerators to permanent staff positions, the contribution of CILSS in the form of mopeds, operating funds, and a new sample design. The combination of these 'old' and 'new' elements form the basis upon which can be built a workable, professional data collection system.

However, the path to that objective is littered with obstacles. During our interviews with various data users, we heard many comments concerning the reliability of the data published by PPMU. Suggestive of some the specific comments made to us during those interviews are:

- "...they keep two sets of books..."
- "...data too late to be of any use to me..."
- "...PPMU is politically motivated..."
- "...illogical and inconsistent in data analysis..."
- "...we never use their data..."

Other users said that they reluctantly used the data only because it was all that was available. Our observations suggest that many of these statements are not completely without merit. PPMU has a public relations problem to correct if it is to gain the confidence and support of data users.

I. Review National Agricultural Sample Survey

A. Review and Suggestions

1. Sample Size

Since sample size is an important determinant of the variance of estimates, we made some calculations to get some idea of the appropriateness of the current sample size. Using worksheets and summary sheets for groundnut area estimates, we computed the coefficients of variation (one standard deviation of the estimate divided by the estimate) of the estimates at the district, division, and national levels. The results were:

<u>Division</u>	<u>Coefficient of Variation</u>	<u>Range of CV's at the District Level</u>
Western	15%	20% to 123%
Lower River	22%	19% to 73%
North Bank	8%	14% to 21%
Mid North	43%	43% to 59%
Mid South	16%	16% to 124%
Upper River	18%	19% to 49%
The Gambia	7%	

As we expected, the CVs varied considerably at the district level, ranging from a low of 14 percent to a high of 124 percent. The range at the division level, a higher degree of aggregation, was from 8 percent to 43 percent. The CV for the national estimate was 7 percent.

Whether these CVs are too large depends directly on the uses made of the estimates. Estimates with high CVs may be acceptable for one use but unacceptable for another use. However, given the uses of the PPMU estimates, these coefficients of variation are too high. For example, changes in estimated production over time are more likely (on statistical grounds) to reflect sampling error than production changes--a CV of, say, 25 percent means that an estimated change of 25 percent or less in production would not be statistically significant at the .68 confidence level.

This immediately suggests that the sample size should be increased. However, there are far more important determinants of sampling variance than sample size. Perhaps most important is the sample design. This includes things such as stratification, clustering, and sampling with unequal probabilities (such as probability proportional to size). We could not in only two weeks adequately assess the current sample design to determine the potential for modifications that would improve sampling efficiency. We plan to work on this problem when we return to Wisconsin.

The second important determinant of variance is the estimator. The sample mean and the expanded sample total are used by PPMU to prepare divisional and national estimates. This is common procedure and is statistically valid. However, ratio and regression estimators, which make use of information outside the sample, are widely used in practice. These are biased estimators, but they are consistent estimators, and experience shows that generally they

are more accurate (have a smaller mean-square-error) than the conventional unbiased estimators. Below, under "benchmark farms", we offer a variation of the current sample design that will permit ratio estimation.

In addition to these statistical considerations, there are other important determinants of sample size. Timeliness of the estimates is one of these. Larger samples require more time for data collection, analysis, and summary. We have been told that the current estimates are not available to the users in time to assist them in current decision making. Increasing the sample size would not remove this problem, even though it may yield estimates with smaller variances.

Closely related is the question of available human and technical resources. We do not believe that PPMU has sufficient resources to properly handle the data it is currently collecting. To collect even more would exacerbate an already undesirable situation.

In summary, while the CVs of the current estimates appear to be too high for the uses to be made of them, increasing the sample size is not the immediate solution. Moreover, for a number of reasons discussed below, we believe there is a large, nonsampling bias in the estimates. If this is indeed the case then the CVs are not an accurate indicator of the statistical quality of the estimates. We suggest that effort be directed to the sample design, to the use of more efficient estimators, and to improving the quality and quantity of resources for data collection, analysis, and summary.

2. Sample Selection

The importance of sample selection, as a component of the sample design, was stressed above. For sampling, the nation is stratified on administrative boundaries: divisions comprise the first stratum, districts the second. A

third level of stratification is based on village size within each district. Stratification is commonly used in practice because of its potential for improving sampling efficiency and because it provides geographic dispersion of the sample. We see no problem with the first two strata used by PPMU. We are at the moment a bit uneasy about the village stratum--it is not an obvious stratum for statistical efficiency gains.

We are also concerned with the method of selecting the sample villages. It is not clear to us that a random selection is used, or if it is, whether the selection procedure is correct. Perhaps of greater consequence is our concern that the method of sample selection does not support the estimation procedure used. Specifically, we do not believe that variance estimates can be legitimately computed from the sample data. This is a serious concern and should be investigated further. It is important to note that this selection process was initiated in 1985 at the suggestion of CILSS. We will query them further to seek a justification of these procedures.

3. Benchmark Farms

We take "benchmark farms" to refer to a panel (a term used in sampling literature) from which data are collected each year. Statistical theory predicts and experience confirms that there are a number of statistical problems with this data collection method. At a practical level, respondent fatigue is a serious problem--people get tired of answering essentially the same questions year after year. PPMU should not move to panel data.

However, a variation of this merits consideration. This is a rotating sample design where maybe one-third or one-half of the sample is rotated each year. This minimizes respondent fatigue and, more important, it permits ratio

estimation, a procedure that can greatly improve the accuracy of estimates. First, as mentioned above, ratio estimators commonly have smaller mean-square-errors. Second, ratio estimators provide more accurate estimates of change than do the direct expansion estimators currently used by PPMU. In a given year, two independent estimates of, say, area planted are obtained. The entire sample provides a direct expansion estimate of total area for the current year. The non-rotated part provides an estimate of the change from the previous year, which added to the previous year's total area estimate provides an estimate of the total for the current year. Careful evaluation and use of these two independent sample estimates of total area can substantially improve the statistical precision of the estimate.

4. Annual Cycle of Data Collection

A detailed work plan must be developed in preparation for each enumeration year. Defining the work to be done each month would result in better management controls on data collection and, of equal importance, improve the timeliness of the estimates.

An added payoff would be more efficient use of enumerators. The work plan would identify times during the year when enumerators are available for special surveys for collecting data needed by PPMU planners and researchers or by other ministries and departments of the government. If PPMU is to meet its mandate, it must be prepared to provide this service to professionals in the two Ministries to which it is responsible, as well as to others who have specific and legitimate data needs.

5. Data Analysis

The workflow in the office must be organized to speed up data processing and to allow for a systematic check of all computations. Using tabulation

sheets, instead of making computations on both sides of blank sheets of paper, would greatly reduce the chances of computation errors and make data checking easier. This more systematic handling of data and computations would substantially reduce the amount of clerical time currently required to write out titles, draw lines for computations, and the like. It would also make it easier to keep track of what has been done and what remains to be done. For summaries, listing sheets with district and divisional estimates should be prepared. Finally, we suggest that the procedures be reviewed with regard to the number of significant digits needed and to eliminate unnecessary decimal places--carrying three or four decimals is usually not necessary.

The availability of computers would facilitate computations, especially the more complicated ones, provide quick verification of the results, and make the output look more professional. A high-level spreadsheet, such as Lotus, which has some built-in mathematical and statistical functions, would handle many of PPMU's tasks quickly and efficiently. A fairly competent computer programmer and one or more highly skilled operators will be needed.

Presently, the senior field supervisor also supervises all in-house summarization and estimation procedures. In a slightly revised management scheme we would prefer to separate data collection tasks from the tabulation process. This will allow for completely objective handling of the raw data.

B. Assist With Development of Training Programs

Training is, we believe, needed at all levels, from top supervision and field supervisors on management procedures to field enumerators on how to conduct interviews, use the questionnaire properly, and field edit the data collected. Three immediate needs are apparent:

- 1) develop a training agenda for different staff levels
- 2) prepare training manuals
- 3) prepare an enumerator's manual

We met with the principal planner of PPMU to suggest training agenda for the field supervisors that could be implemented by Management Development Institute (MDI). This training should encourage consistency and facilitate communication from PPMU headquarters to the field staff on a regular basis. We also suggest that each monthly meeting with field supervisors involve some aspect of training, and that on their return to the field the supervisors assemble their respective enumerators for an update on field procedures. In order to work successfully, this hierarchical supervisory system must be adhered to, with enumerators being responsible to their immediate field supervisor rather than to the senior field supervisor.

C. Means of Improving Accuracy, Scope, and Integration

Much can be done to improve the overall quality of the work. The importance of training at all levels as the key to improving data quality was discussed above and need not be mentioned again.

A top priority item, and one that will substantially improve the timeliness of the data, is to establish a survey work plan that prescribes due dates. This work plan should specify what is to be done each month and state the date when the work is to be completed. To enforce this, a penalty, one that is clearly understood by all employees, must be applied in any instance where the deadline is not met. A professional data system cannot operate without discipline. The six field supervisors will be key people in maintaining the flow of work.

The questionnaire used for the National Agricultural Sample Survey (NASS) needs extensive revision. It is much too long, collects data of questionable value (such as labor input data based on annual recall), and collects a lot of data that, as best as we can determine, is not summarized and published. We suggest operating on the principle that "If you don't publish it, don't collect it."

We recommend that the scope of the survey be reduced, for now at least, to emphasize the collection of high quality crop data. This would facilitate data collection, processing, analysis, and publication. The overall quality would be improved because of the concentration of a few procedures. Once the improved procedures have been established, the questionnaire could be expanded.

One important advantage of imposing a survey work plan and reducing the scope of the NASS is making more efficient use of the field enumerators. With a careful time budget, PPMU would be in a position to provide a much needed service to the agricultural community at large, namely the capacity to conduct special surveys. We understand that this is one function that PPMU is expected to provide.

Our preliminary review of the field, or area, measurement data suggests that enumerators are required to measure too many fields. We found a number of instances where the number of fields measured differed, sometimes substantially, from the number of fields listed on the summary sheets. In addition, a number of spot checks raised the question of how accurate the measurements were. The sample measures are expanded up to the national level, so "small" errors in the field become "large" errors at the national level, not only in acreage estimates but also, and perhaps more important, in

production estimates. We do not at this time have recommendations, but we are investigating some alternative sampling procedures that might cut back on the enumerator workload while at the same time providing acceptable estimates.

Yield estimating procedures also need evaluation. A major problem that should be rectified as soon as possible is the scale used for weighing the crop sample. Enumerators are currently using a 100 kg. scale to read weights as low as 2 kg. This is difficult not only because the scale is unlikely to give accurate measures at such an extreme but also because enumerators must interpolate between the finest gradation on the scale, .5 kg. We noticed a large number of sample weights ending with .25, .5, and .75. This may seem like a trivial matter, but it is not. The weight for one cutting is expanded 400 times to arrive at the estimate of yield per hectare. Accurate measurements in the field are mandatory. We recommend the immediate procurement of 36 scales with 10-15 kg. maximum capacity.

We understand that field supervisors are supposed to check the questionnaires in the field before sending them to Banjul. We cannot provide documentation, but based on casual perusal of a number of questionnaires we wonder whether adequate field checking is done. We found many instances where numbers were struck out and replaced with another number, but there was no way of knowing which was correct or who made the change and for what reason. The field supervisors must be given specific instructions and training on how to field edit and how to conduct quality checks.

In summary, we believe that improvement in the quality of the work can be achieved by imposing an integrated survey work plan, by developing good training programs, by revising the questionnaire, and by improving field procedures and supervision. Based on our experience, we are painfully aware

of all the biases that creep into estimates because of insufficient attention paid to these aspects of data collection. Attention typically focuses on statistical methods and sample size. But most applied sampling statisticians will say that while statistics are important, the quality of estimates rises or falls on field procedures.

D. Improvements in questionnaire design

We have already stressed the need to redesign the questionnaire used for the NASS. Here we mention a few specific things that can be done, but the list is not exhaustive.

A number of sections on the 1985/86 questionnaire involve data that are better collected by special surveys of one type or another. These sections should be deleted. Examples are the labor input data and the firewood-use data.

Questions should not be asked that cannot or will not be answered by the respondent. Such questions frustrate the interviewer and antagonize the respondent, and this often results in lowering the quality of the subsequent data obtained from the respondent.

The questionnaire should include enumerator instructions to remind the enumerator what is desired or how to ask the question. This, coupled with adequate enumerator training, will result in greater uniformity in the data collected across enumerators. In addition, transition statements should be included on the questionnaire for the enumerator to read to the respondent. These statements are necessary to inform the respondent that the subject matter of the questions is going to change.

Use should be made of the 'yes/no' skip technique where possible to avoid asking questions that do not pertain to a particular respondent. Sufficient white space on the borders of the questionnaire is necessary to permit enumerators to record comments to be incorporated after the interview is completed.

If possible, questionnaires used for different purposes should be color coded. This can speed up work in the office, as clerks can find the right questionnaire quickly and reduce the chance of misfiling questionnaires. If color coding is not possible, the headings of the questionnaires should be easy to identify. In our review, we found it difficult to distinguish quickly between the different questionnaires.

Ideally, questionnaires should be prepared on a computer with a word processing program. This permits needed changes to be made quickly and easily. Also needed is a good mimeograph machine that can produce high quality copies of the questionnaire. We saw a number of questionnaires that had missing words, incomplete sentences, and the like. Enumerators must have complete and clearly readable questionnaires. We are prepared to work on questionnaire design in a computerized word processing format through interchanges of revisions between PPMU and Wisconsin.

In anticipation of computer availability, the questionnaire should be designed with data entry in mind. It is often possible to develop a design that permits data entry directly from the field questionnaire. It is also important to have the questionnaire adequately identified using a simple but complete numerical identification scheme for divisions, districts, villages, and sample dabadas. Individual pages of a questionnaire should also have ample identification to permit correct reassembly should the pages get separated.

E. Assist in Integration of Computers into Data Analysis

There is no question that computer services would greatly enhance the productivity and quality of PPMU's operation, and we support strongly the proposition that such services be made available to PPMU. However, we have some reservations regarding the current situation.

Computer facilities must be kept in a dust-free, low humidity environment with a dependable supply of electricity. We understand that the PPMU building is to be rewired, so we recommend that computers not be moved there until the proper physical environment is assured.

We also recommend that until computer programmer and operator positions can be incorporated into the PPMU budget and well-trained personnel are hired to fill these positions, a joint arrangement be worked out with GARD whereby at least two of the MFP computers be maintained in their current facility and operated by the present staff. These staff people and computer facilities should be available to both PPMU and GARD for their data processing needs.

We think this may be a very workable arrangement, as it gives both organizations immediate access to the combination of experienced staff and equipment that would otherwise not be available to either group. With a relatively small investment for a voltage stabilizer, the COMPAQ computer could be moved to PPMU and used for both word processing and small data analysis projects.

Our greatest overall concern is with the availability of human resources to efficiently operate a computer system. There is the pervasive feeling that once a computer is in-house all problems will go away. This is not the case. Computers without appropriate software, without proficient programmers to design and adapt the software, and without skilled operators to run the software are of little use to anybody.

II. Conducting an Agricultural Census

There has never been an agricultural census conducted in The Gambia. The closest to a census was a national agricultural survey done in 1974/75. It was based on a fairly large sample and collected a lot of micro-data, characteristic of census data. But it was not summarized and published in the standard cross-tab format used with census data. Hence, little is known about the structure of the agricultural sector regarding such important things as the distribution of farms by location, size, and type of enterprise.

We cannot deny in principle the need for an agricultural census. It provides a periodic, statistical description of the agricultural sector, a picture needed by planners, policy makers, and the like. Moreover, it provides, in principle, a periodic benchmark for evaluating and fine tuning the sample design used for collecting data during the intercensal years.

However, conducting a census is a monumental task. We will not belabor this point here; we just list a number of the more important requirements for conducting a good census:

- Substantial planning is required, perhaps a year is minimum.
- High quality maps, and related items, are required to identify enumeration areas and to allow enumerators to locate them in the field.
- Enumerator training is a large task, requiring extensive planning and a substantial amount of time for training a large staff of enumerators.
- Transportation must be readily available.
- Extensive management skills are required to coordinate all of the above.
- Substantial computer facilities and computer operators are needed to enter, edit, analyze, summarize, and publish the wealth of data produced by the census.

In summary, conducting a census requires an enormous amount of human, financial, and technical resources if it is to be done correctly. We do not believe that PPMU should conduct an agricultural census. It simply does not have the resources to do so. If a census is needed, it should be funded and carried out by some other agency.

III. Reporting Agricultural Data and Research

A and B. Annual Statistical Bulletin and Periodic Reports

These two reporting activities must be coordinated to improve the integrity of the published statistics and to gain the confidence of data users. We propose the following reporting scheme.

At appropriate times during the year, such as at the end of the harvest season for early crops, PPMU would publish estimates of area, yield, and production. These reports should be identified as PPMU publications and, of equal importance, should clearly state that these are preliminary estimates that are subject to a later revision when the annual statistical bulletin (see below) is published. The idea is to make clear to the data user that what he is reading is preliminary based on the field work just completed, and to make clear that the estimates may need to be revised prior to final publication in the annual bulletin. The point is to give data users early access to the data and to make sure the data user does not end up feeling that two sets of estimates are circulating.

An annual statistical bulletin should be published, perhaps around the first of February when all the data for the full crop year are available. This bulletin should include not only data produced by PPMU but also data assembled from other agencies, such as Fisheries, Forestry, Livestock

Protection, GPMB, and MEPID. Additional information to include are prices, meteorological data, imports, exports, and indicators of general economic activity.

We urge that this bulletin be prepared and approved by a committee called Agricultural Statistical Evaluation Committee (ASEC). This committee would be made up of statisticians and representatives of the various Ministries and Departments concerned with the agricultural sector and chaired by a PPMU professional. This committee, as a single body, would review all statistical series to be published in the annual bulletin, including especially the preliminary estimates published during the previous year by PPMU. The guiding criteria for this committee are establishing internal consistency and statistical validity and reliability for all published data. No data should be published until these criteria are met.

We suggest that the annual bulletin be issued under a PPMU cover. The first page should contain a message to the user indicating that this is an official publication approved by ASEC and that it may contain revisions of earlier reports. (If revisions have been made, they should be so identified in the tables.) The names and organizational affiliation of the members of ASEC should also be included. Every effort should be made to eliminate any question in the user's mind regarding the source of the data and how they were put together for publication.

The expected benefit from this review and coordination scheme is, we believe, enormous. This preview of the data can establish agreement prior to publication (in contrast to the current procedure where the numbers are first published and then responsible agencies respond to them) resulting in one recognized source of data. Having this agreement prior to publication would

go a long way toward establishing faith and trust in the reliability of the published data.

We recognize that considerable coordination and cooperation among several governmental organizations is mandatory if this scheme is to work. Achieving this will be a large task. But it must be done; the agricultural sector of The Gambia desperately needs a consistent and continuing set of agricultural data possessing the highest possible degree of integrity.

C. PPMU as Repository of Agricultural Data

PPMU has an excellent start toward being a repository of agricultural data in its documents section. The documentarian seems dedicated to building a good collection of data and publications, and he should be supported in this endeavor. We believe a part-time assistant may be needed to do many of the routine activities, such as filing, so the director may correctly devote his time to the important task of indexing incoming publications.

One problem we see now is the accessibility of the documents to researchers and other users. The current policy is to allow only limited circulation of documents. We support this policy. Holdings will quickly deteriorate otherwise. However, it does require that a user expend considerable time copying needed material. A photocopy machine would improve this situation immediately.

IV. Assess Needs of PPMU and GARD for Continued Assistance

A. Review MFP work and evaluation

We evaluated two programs initiated by MFP to determine the advisability of continuing them, with slight modifications if necessary, within PPMU. Each is discussed below.

1. Gambia Agricultural Data System (GADS)

GADS is fundamentally an agricultural budget system designed to collect and analyze (in a farm budget framework) detailed, micro-level farm data. Such micro-level data are of value to a number of users, such as planners and researchers with various interests. We believe that microdata must be produced to meet these needs. In addition, some of the data currently collected by the NASS, especially the farm labor input data, can better be collected by a GADS-type system. Not only would the resulting data be of much higher quality (the data are based on direct observation rather than on annual recall), it would also reduce the scope of the current questionnaire used for the NASS. Because the nature of data collection and the special skills and supervision required, we think that GADS should be operated separately from the NASS.

In light of the expected continuation of some form of Farming Systems Research (FSR), we propose structuring the operation of GADS in such a way that it will be partly integrated with the FSR program. We have not had enough time to develop a specific organizational structure and an operating procedure to bring about the necessary coordination. However, we suggest how we think the coordinated program might work.

Microdata would be collected from two categories of farms: farms using traditional methods ("control group") and farms involved in the FSR program ("experimental group"). The resulting data set should provide an effective way for assessing the impact of the FSR research projects. Because the computer program written for GADS is very flexible in terms of the range of inputs it will accept and outputs it will provide, researchers could evaluate experimental results for different levels or combinations of inputs for specific farm enterprises separately or in combination with other farm enterprises. Finally, the program computes the "bottom line", namely the net worth of the farmer. This is a useful, quick summary statistic of the effect of a particular farm plan on the overall farm enterprise. Such a summary measure can help researchers decide on the best direction for subsequent study.

But the GADS system should not be completely absorbed by FSR. As mentioned above, others besides researchers need micro-level farm data on traditional agriculture. We do think that a joint effort between statisticians and FSR researchers could result in a plan for selecting farmers such that the "control group"--"experimental group" comparison would be statistically valid, while at the same time the "control group" would provide microdata of a statistical quality sufficient to satisfy the needs of other data users.

Perhaps this proposal is naive, perhaps it cannot be effected. We fully recognize the high degree of coordination and cooperation necessary to make it work. We also recognize the potential for contamination of the research resulting from the "demonstration effect" that may pass innovations from the experimental group to the control group, thus biasing the measurement of

change between the two groups. But the idea is, in our opinion, deserving of careful consideration. Much needs to be known about agriculture in The Gambia and resources for acquiring that knowledge are limited. Decision makers must look for cost-effective ways of collecting data.

2. Price Reporting System

The MFP project initiated an agricultural price reporting system for livestock (cattle, sheep, goats) and for field crops, excluding those with government controlled prices. Prices for grains, fish, and seasonal produce from the six key markets of Banjul, Serrekunda, Brikama, Farafenni, Bansang, and Basse are reported each Monday on Radio Gambia. The broadcast lasts 10-12 minutes, and is offered three times a week.

The price data are collected each month and brought to the MFP office for analysis. A report for the first year of the program, titled A Handbook of Graphs and Tables of Market Prices of Selected Agricultural Products in the Gambia, 1984-85, will soon be published by PPMU.

The price reporting program has been well received. An informal survey of radio listeners by Radio Gambia revealed that farmers listen to the report on a regular basis and appreciate receiving the price information. The extent to which farmers use this information to develop marketing strategies is not known at this time. Others, such as researchers and planners, have found the price data very useful.

We strongly recommend that PPMU continue this important program. In a very short time an excellent time-series data base of agricultural prices will be available not only for PPMU's planning and research agenda but also for planners and analysts in other governmental agencies. Market researchers, having knowledge of trends, seasonals, and cycles in farm prices will be able

to assist farmers in developing optimal marketing plans. Moreover, since prices are collected from six different markets, researchers can analyze spatial price relations. Finally, as market analysts know, price is the single best indicator of supply and demand conditions in a market. Collecting and analyzing weekly prices from spatially separated markets provide the basis for continual monitoring of the agricultural market in The Gambia.

Leadership for the price reporting program can and should be provided by the PPMU professional who just returned with a B.S. degree in Agricultural Marketing. We have not had time to assess fully the added resources that PPMU will need to absorb this program. But it must be continued.

ASSISTANCE NEEDS AND OPTIONS

The following two sections itemize specific technical and professional areas where assistance is needed. Our suggestions of how these needs may be met are outlined in three alternative courses of action. For each, we specify the resources required to meet the objective and attempt to define the expected benefits forthcoming. Finally we note the level of assistance needed for the continuance of the two MFP projects.

I. Technical Issues within PPMU's Data System

- Sample design
- Establish an integrated national survey work plan
- Questionnaire design
- Supervisor and enumerator training
- Management of surveys
- Conduct research on and improve data collection methodology

- Establishing re-enumeration and quality checking procedures
- Procedures for data tabulation, evaluation, and analysis
- Integrate computers into survey and analysis procedures
- Publish periodic and annual statistical series.

II. Professional Assistance Required

- Advice on the overall coordination of the data system between data users and data producers
- Direction in reviewing data needs and establishing data collection priorities within a limited budget
- Assistance in recruiting and selecting participants with an aptitude for mathematics and statistics for training
- Advice and assistance with coordinating data flow within and between PPMU's various sections
- Consultation on data issues in other sections of the Ministries of Agriculture and Water Resources and Environment
- Oversight of the estimating procedures and publishing of data - serve as chair of ASEC
- Bring an air of professionalism, reliability, and integrity to the agricultural data system.

A. Assistance Option 1: Resident Technical Advisor in Agricultural Statistics

Because of the lack of confidence in the data published by PPMU and because of the technical shortcomings discussed in Section II of this report, we believe it is necessary to obtain the leadership and guidance of an

experienced agricultural statistician with the ability to address both the technical and professional issues listed above.

A minimum of three years is probably needed for this position. This could vary, however, depending on PPMU's ability to recruit and train individuals with an aptitude for mathematics and statistics to fill the following four key positions:

1. Director of Statistics--manager, budgeter, knowledge of data needs, and data collection requirements
2. Senior Statistician--Master's level of training in mathematical statistics
3. Survey Manager--skills in survey management and data collection procedures
4. Data Analysis Coordinator--skills in mathematical statistical procedures with ability to direct the use of microcomputers

It may be reasonable to expect the PPMU statistical unit to stand on its own within two years after the placement of these four people. During the interim the TA would have accomplished or at least established the foundation for most of the technical and professional requirements listed above.

Depending on the breadth of experience of the TA, various short-term technical visits and various training programs for PPMU personnel would be required. A detailed proposal for long- and short-term participant training is presented in Appendix Table 2. We also recommend some commodity support as itemized in Appendix Table 3.

The most optimistic outcome of this proposal would be that the TA would become a professional force within the PPMU capable of hastening the establishment of a data system that would provide accurate, timely, and relevant agricultural data for The Gambia.

B. Assistance Option 2: Resident Research Associate

The next best option for providing assistance is a resident Research Associate for a period of two or three years. This person would not have the experience and skills of the TA discussed under option 1. As a result, we suggest a heavier commitment to supplemental short-term technical assistance. A complete list of possible TDY missions by Johnson and Rowe is presented in Appendix Table 1. However, only those visits specifically needed to supplement the skills of the RA would be made. The participant training and commodity support would essentially be the same as Option 1.

The outcome from this option is expected to address nearly all of the technical issues listed above. Most of the professional issues would go unanswered.

C. Assistance Option 3: Short-Term Assistance Only

This option assumes no resident statistician but fairly extensive use of short-term technical missions. Appendix Table 1 presents the commitment that Johnson and Rowe are willing to make by way of assistance to PPMU. Note that in this option, the first two years involve intensive work, but the assistance would begin to taper off by the third year. We further recognize that the schedule may need to be modified and the subject matter may change based on

the growth and changing needs of the statistics unit. Participant training and commodity support would be recommended according to Appendix Tables 2 and 3.

Assistance under this option would address most of the technical issues. In the absence of a resident statistician, however, the degree to which this assistance would be implemented and sustained by PPMU is unknown. The professional needs of the PPMU, as outlined above, cannot be met by short-term training visits.

D. Assistance Necessary to Continue the MFP Projects in PPMU.

As we indicated in our evaluation of the MFP programs, we strongly recommend that the GADS system and the price reporting program be continued. To discontinue these programs would not only be a serious loss of a capital investment already made but also be a serious loss of precisely the fundamental types of data that are required for planning and promoting the future of agriculture in The Gambia.

Unfortunately, PPMU cannot continue these programs without assistance. We believe that PPMU has the high-quality professionals needed to continue and improve these programs. However, to maintain continuity, to avoid troublesome gaps in the data series, say nothing of losing data users' confidence in the programs, PPMU needs immediate financial assistance. Approximately nine interviewers plus supervisors are currently used in these programs and, given the investment already made in their training and experience, they must be retained. PPMU does not have the budget to immediately handle these costs, nor will they be able to add the enumerators to their employment roster for

the next several years. We hope that a donor can be found that is able to provide a minimum of \$10,000 for at least each of the next two years to allow PPMU time to make the needed budget adjustment.

APPENDIX TABLE 1

Schedule of Short Term Training Trips

Trips Month/Year	Sample Design	Questionnaire Design	Training	Field Procedures	Summary Analysis	Computerization	Publication
April '86		<----- Rowe -----> <-- 1 Week --->	<- 2 Weeks->				
Sept '86				Johnson <- 1 Week-->			
Oct '86				<----- Rowe -----> <- 1 Week-->	<----- 2 Weeks ----->		
Jan '87					<----- Rowe -----> <----- 3 Weeks ----->		
Mar '87		Rowe <-- 1 Week --->	Rowe + <- 3 Weeks->				
Mar '87	Johnson <- 1 Week-->		Johnson + <- 3 Weeks->				
Oct '87				<----- Rowe -----> <- 1 Week-->	<----- 3 Weeks ----->		

* Johnson & Rowe together for two week incountry training session.

Future trips as needed: Expect 4 weeks each for Johnson and Rowe each year for remainder of project.

Summary of Johnson and Rowe Input for the Life of the Project

Year	Johnson		Rowe		Total	
	Trips	Weeks	Trips	Weeks	Trips	Weeks
Initial Evaluation	1	4	1	4	2	8
1986	1	4	2	6	3	7
1987	1	4	3	11	4	15
1988	1	4	1	4	2	8
1989	1	4	1	4	2	8
1990	1	4	1	4	2	8
Total	6	21	9	33	15	54

APPENDIX TABLE 2

Participant Training

<u>Date</u>	<u>Number of Participants</u>	<u>Training</u>	<u>Number Months</u>	<u>Person/ Month</u>
9/86-6/89 or 9/87-6/90	1	BS in Ag Stat/Ag Econ	36	36
3/87	10-15	Two-week Data Analysis taught in The Gambia by Johnson and Rowe	10-15	5-7.5
6/87	1	Data Systems Short Course, Madison	1.5	1.5
9/87-7/88	1	ISPC Statistics Training, Washington	11	11
9/87-6/89	1	MS, Mathematical Statistics	24	24
6/88	1	Data Systems Short Course, Madison	1.5	1.5
6/89	1	Microcomputer Short Course	1.5	1.5
6/90	1	Data Systems Short Course, Madison	1.5	1.5
		Total	88.5 - 93.5	83.5- 86.0
		Total Trips		8

APPENDIX TABLE 3

Additional Support Needed

Computer software and voltage stabilizer	\$2,000
Mimeograph	\$2,000
Stencil Cutter (photo copier)	\$2,000
Scales 40 @ \$50	\$2,000
GADS and Price enumerators 2 years @ \$10,000	\$20,000

Total	\$28,000

The Gambia would be expected to commit funds for expendables necessary to conduct surveys:

- Gas
- Vehicle maintenance
- Salaries, bush allowances
- Paper, ink, pencils
- Compasses, tapes
- Cloth crop cutting bags, etc.

Attachment A.

Terms of Reference For A. C. Johnson, Jr. and J. Rowe

- I. Consult regarding the conduct of the National Sample Survey.
 - A. Review and make suggestions regarding
 1. Size of sample
 2. Sample selection
 3. Possible use of benchmark farms
 4. Annual cycle of data collection
 5. Data analysis
 - B. Assist with development of training programs and materials
 - C. Propose means of improving accuracy, scope and integration of data collection
 - D. Propose improvements to questionnaire design
 - E. Assist in integration of computers into data analysis

- II. Consult regarding the feasibility and methodology of conducting an agricultural census.
 - A. Last census was 1973, is another needed?
 - B. Cost related to degree of data reliability
 - C. Organize a timetable for the effort
 - D. Alternate means of obtaining similar information
 - E. Means of reporting

- III. Consult regarding the reporting of agricultural statistics and research data.
 - A. Development of an annual statistical bulletin, content and format
 - B. Development of monthly or quarterly newsletters
 - C. Recommendations regarding development of PPMU as a central repository of agricultural data

- IV. Assess needs of PPMU and GARD for continued Agricultural Economics assistance.
 - A. Review PPMU objectives and staff needs
 - B. Review MFP work and evaluation
 - C. Review GARD objectives and staff needs
 - D. Assist in development of an integrated assistance plan.