

ENTERPRISE BUDGETS FOR CREDIT
PROGRAMS:

GUIDELINES FOR DEVELOPING
COUNTRIES

by

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PREFACE

This manual was prepared in the interest of improving the accuracy and reliability of farm level production data used by credit institutions in developing countries. The contents of the manual come largely from the experience gained under the Small Farm Credit Project carried out jointly by Colorado State University and Oklahoma State University in the Dominican Republic and Honduras. That work, as well as this manual, was primarily funded by the United States Agency for International Development, Washington, D.C.

All interpretations, errors, or omissions are the sole responsibility of the author and not of the supporting institutions. User comments which might improve this manual are solicited.

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1. INTRODUCTION

Many agricultural credit institutions in developing countries are having difficulty in serving the large number of small farmers that need assistance. Loan delinquency rates often are high and the handling of many small loans can be very costly. Both of these problems greatly weaken the financial viability of lending institutions and lead to continual dependency on government or outside lending institutions for funds. Most observers feel this leaves such institutions very vulnerable to outside influence. Since nearly all credit programs require some type of data from farmer-borrowers to serve as a basis for their reporting and loan decision making, it is important to gather reliable data in the most cost-effective way.

1.1. Data for Credit Institutions

Credit institutions, like all action agencies, gather various kinds of data for program operations and analyses. These data may be required by an outside funding source, say the central bank or an international lender, or they may be gathered to meet data needs within the institution itself. Such data may have been requested by management or may be used at the field office level. One type of information used by most credit institutions is farm level production data.

The primary user of production data is the credit agent located in the field office. Invariably, production data in the form of budgets

for specific crop or livestock enterprises serve as the basis for making loan decisions. These enterprise budgets, irrespective of the origin, help the office set loan limits, identify profitable enterprises, establish timing of disbursements and repayments, and provide a basis for reporting credit use and allocation to higher management.

Unfortunately, such farm production data often are not very complete or reliable. For example, only one maize enterprise budget may be used for the entire country which does not recognize the enormous variability from one region to another in terms of technological packages used or in prices paid and received. Also, systematic procedures are not in place to continually up-date such budgets and to make them more representative of the regions where they are used. Coordination with and reliance upon some other governmental unit, like a ministry of agriculture, is difficult at best, but more commonly results in data that cannot be used easily by the credit institution. Thus, credit institutions inevitably end up trying to gather their own data. These guidelines are designed to help in that task.

1.2. Objectives of these Guidelines

A credit agent typically (among other duties) must help decide who is to receive credit, for what purposes, how much to lend and when the disbursement and repayment should take place. Requiring these decisions of the credit agent assumes adequate knowledge about production needs and practices for potential and existing borrowers. Usually, the agents' knowledge is based largely on field experience and

observations and to a lesser extent on collected farm level data. This paper reviews the experiences with producing more detailed and representative enterprise budgets within the operational context of lending institutions.

The decision to focus on developing enterprise budgets for developing country credit institutions is because almost all credit programs use some kind of cost of production or enterprise budget, however simple, crude or outdated, to estimate credit requirements (investment plans) and loan limits. If a more reliable and timely system for generating the budgets were introduced, adoption by the credit institutions might be more likely.

This paper focuses primarily on meeting selected farm production data needs at the credit agent level. The objectives are to:

- Present two alternative approaches for gathering farm enterprise budget data for credit institutions,
- Review experiences with these approaches in selected developing countries,
- Recommend cost-effective approaches for gathering enterprise data, and
- Provide guidelines for implementing these suggested approaches.

An enterprise budget is a statement of the physical inputs and costs associated with the production of a specified product. Enterprise budgets are commonly presented for a single unit of land, in the case of crops, and for a specific number of animals, in the case of livestock. The simplest budgets present only the variable costs of production while the more advanced budgets will also include estimates

of fixed costs, quantities produced, income, and the returns to land, capital, labor and management. An enterprise budget is simply a means of organizing and presenting information for use in one or more types of analysis and reporting.

1.3. Organization of the Manual

This paper is organized so that readers begin with a review of its purpose and of the concepts of data collection and analysis for credit institutions. With that background, readers should be able to determine whether or not this subject fits their needs. If so, details of recommended approaches and their implementation are provided in the later sections of the manual.

This first chapter lays out the background and general objectives of the guidelines manual. Potential users are identified. Possible limitations of the paper are discussed at the end. Chapter 2 contains the conceptual framework on data collection and analysis within the context of operating credit institutions. Present data uses and problems are discussed. Potential data uses by credit institutions are developed and data needs special to credit programs and operations are formulated. In Chapter 3, seven procedural steps for preparing enterprise budgets are outlined. Alternative sources of enterprise data and their advantages and disadvantages are reviewed. Chapter 4 provides details and guidelines for using limited farmer interviews and farm records to provide useable farm enterprise data. Chapter 5 includes a summary and recommendations.

1.4. Users of Guidelines

These guidelines were written primarily for those persons in the developing countries who are responsible for designing and implementing data collection programs to improve the operations of credit institutions. It also should be of use to those with a general interest in farm level data collection activities. The users of these guidelines are expected to fall in six categories.

The first group is composed of the top decision makers and their assistants in the credit institution who decide if, and how, data are to be collected. This group needs to know the advantages and disadvantages of various collection alternatives, especially in terms of their cost-effectiveness, benefit to the institution, resource requirements, and their implied relationship with other agencies. The summary and the second chapter on the concepts of data collection and use will be of most interest to this group.

The next group of users are those responsible for administering the individuals actually doing the collection and analysis. These would be the directors or heads of the divisions responsible for the work. This user group needs to know enough about the system and its implementation to identify staff and other resources needed to complete the assignment. Like the first group, this group will not be concerned about the details of data collection and analysis.

The third group will be the regional directors and supervisors directly responsible for those doing the field work. These persons will be interested in the individual sections that provide guidelines

on implementing specific procedures.

Those actually collecting the data and doing the analysis will make up the fourth group. These might be credit agents or their assistants, contracted interviewers, and others. These people will need to understand the details of the system--forms, procedures, concepts and definition of terms, and coding of the collected data which is covered in the individual sections and appendices of these guidelines.

A fifth group includes project designers, advisors, and evaluators associated with funding agencies like USAID, the World Bank, and Central Banks, which finance and oversee projects and programs with data collection components. For this group, all parts of the manual may be of interest depending upon their specific duties.

Finally, the last group of users are composed of all others interested in data collection concepts, procedures, and problems as related to developing countries.

1.5. Limitations and Qualifications

These guidelines are based on only a limited number of observations and experiences in the developing world. In addition, considerable variability in needs and conditions among countries and credit institutions within those countries suggests considerable care must be followed in utilizing these guidelines. Therefore, it is likely that parts of the guidelines and procedures will need to be modified for specific in-country application. Data collection approaches and proce-

dures must fit local institutional, resource, and cultural conditions to be effective. Finally, data produced using these guidelines should not be used for analysis which requires a statistically representative basis for application. These guidelines were designed for specific application in agricultural lending activities where accuracy of the budgets is considered more critical than their representativeness of a population of borrowers.

2. A CONCEPTUAL FRAMEWORK

A basic premise for this manual is that loan preparation and evaluation by lending institutions can be significantly improved and costs reduced if more detailed, accurate, and reliable enterprise budgets can be provided credit agents and other personnel.

The design and implementation of a system for the routine preparation of enterprise budgets using a standard methodology offers several advantages. First, the cost of collecting data on the economics of producing many different crops and livestock in different areas and using different technologies is generally too high for any one agency to accomplish, especially when it only has a few particular uses for the data. The result, as can be observed in many countries, is that each agency designs small surveys that can be carried out quickly with a minimum of expense, or it relies on estimates of its field personnel rather than farmer interviews. Thus, the creation of a specialized enterprise budgets office can produce significant savings for the government.

Secondly, more complete budgets can improve data quality and availability. Poor data often limit the use of more advanced analytical tools and models. This, in turn, limits the development of the analytical capabilities of the employees of the agencies. The circle is complete when the analysts continue to use only the simplest analytical tools because, at the higher decision level, the cost of a specialized budgets office seems high and the benefits seem indirect,

uncertain and too far into the future. The demand for the enterprise budgets, however, is evident from the multiple but limited, attempts to prepare budgets.

Standardized, up-to-date budgets also can be used in place of individual, custom-made budgets in preparing investment plans for clients. Instead of preparing a separate plan for each borrower, as is now attempted in many countries, a standardized budget could be selected which most represented the region, crop, and level of technology for the farmer in question. If needed, minor adjustments could be made by the credit agent in consultation with the farmer. If implemented, this system could greatly reduce the amount of time the agent spends with each farmer in preparing an investment plan and would almost eliminate the need to use credit personnel to type the investment plan as part of the loan documentation.

Finally, standardizing the system and methods for producing enterprise budgets should increase the utilization of such budgets by individuals and groups outside the lending institution. Clearly documented and understood procedures should help eliminate some of the problems associated with the very simple but inadequate budgets being prepared now.

2.1. Uses of Production Data in Credit Institutions

In the context of a credit program for small farmers, four levels of data uses can be identified. Data are needed for: (1) the farmer, (2) the credit agent, (3) program analysis and policy, and (4) overall

program evaluation and guidance. Each use level has special data needs.

The data needs of small farmers depend upon their level of managerial sophistication. At the present time, few small farmers receive such data nor are they able to utilize data well. However, as farmers receive training in the use of farm plans and analysis, their need for farm level and other data increases. Certainly it is safe to say that past collection systems for farm data in most developing countries generally have not been designed for the farmer but rather were designed to meet higher level needs. Where farmer behavioral changes in management and production practices are objectives of a program, the provision of reliable data to the farmer measuring the effects of recommended innovations financed might be a very effective way of speeding up the adoption of such innovations (assuming they are to the farmers benefit, of course).

A second level of data need in a credit program is at the credit agents' level (the primary focus of this paper). Here the agent wishes to gather appropriate data to assist in evaluating the borrower. Traditionally this has meant gathering data on the farmers' assets and net worth, on income flows, past debts, and on available collateral. These are then used to evaluate the applicant in terms of credit risk and to set loan terms. The actual amount loaned often is based on a "representative" enterprise budget for the activity to be financed. In most cases these budgets are hand prepared, represent a fairly large geographic region, and assume rather high levels of technology and managerial capability. Data collection by the credit agent tends to

become formalized, ending up with both the farmer and agent spending considerable time recording data of very questionable use for program guidance and in meeting program goals and objectives. Past developing country credit studies lead to the conclusion that these data collection efforts provide little information on the role and profitability of credit use and even less on the factors affecting loan repayment.

The third data need is for program analysis and guidance. Most developing country credit institutions include a planning office, economics department or some other such office which has the responsibility for recommending credit allocation among regions, types of farmers, and types of enterprises. Thus, the office responsible for this program analysis and guidance needs direct and continual access to farm level data.

Credit program evaluation, the fourth use level, builds on the data used by the credit agent and for analysis, but is broader in scope and, as a consequence, requires considerably more data. Operationally, this function may be carried out by the same organizational unit which does the analytical and program guidance work. Program evaluation is concerned not only with the profitability and repayment of credit but with the overall impacts of the program and whether or not program goals are being reached. Data from enterprise budgets would be of use but other data also will be needed: number of loans made and distribution by crop, type and size of farm, office and region; loans per agent and office; loan repayment by crop, farm, office, and region; percentage of all farmers and small farmers being reached; impact on income and

resource distribution; use of non-farm inputs; and percentage of output marketed, among others. Because of the special needs for evaluation, it is unlikely enterprise budget data provided by credit agents would be sufficient. Thus, the methods proposed in these guidelines would need to be complemented by other data collection activities for effective evaluation.

As can be seen, the generation of farm enterprise budgets can only partially meet the data needs of these various user levels in credit institutions. Other farm data are needed and will need to be collected using these and other methods.

2.1.1. Present Data Problems

A number of problems are related to the budgets presently available in many developing countries, whether produced internally by lending institutions or externally by others.

- Budgets are not based on any uniform procedure or methodology. One budget may be the estimate of an agronomist, one may result from an ad-hoc survey and another may be a synthesis of many sources. Seldom are the methods of preparation described. Thus, a lending institution, as a potential user, has no basis for judging the accuracy or reliability of the data.
- Typically, one budget may be prepared for the whole country which ignores differences in technology, soils, climate, yields, and costs among regions. Because of the averaging across many differences, the resulting budget may not represent any one farmer in the country.
- Budgets do not provide sufficient specification or detail to allow modifications for use by lending institutions. If a budget only includes costs for a few major categories, this precludes making simple adjustments to input quality, quantity, and prices. Further, if there is no information on the timing of operations, the budget cannot be used to set loan disbursements and repayments.

- Budgets may reflect recommended rather than actual farming practices followed by the borrowers. Thus, they cannot serve as a very accurate guide for lending to most farmers.
- Budgets may be prepared for the best farmer or for the highest cost situation. This may establish the maximum lending limit but provides few data for preparing or evaluating individual investment plans.
- Release of budgets may be delayed because other activities have higher priority. Further, published budgets often must be approved by higher authorities which can lead to very large time delays. The result may be that the budgets are out-dated by the time they are released.
- Budgets may not include information on fixed costs and depreciation or on some variable costs such as equipment maintenance. Although just variable cost information may be adequate for the credit agent's work, total costs are needed for farm and program analysis.
- Inaccurate budgets (due to many of the problems already listed) may be used for projecting annual loan operations for the institution. Annual projections often are made by estimating the number of hectares for each crop to be financed and multiplying that amount by the budgeted per hectare cost to be financed. Obviously, if the budget is inaccurate, the annual projections will be unreliable and of limited use for planning.
- Finally, individual loan investment plans based on a few enterprise budgets tend to look the same over time. Furthermore, inaccurate budgets likely will lead to inaccurate investment plans upon which loans are based.

The various problems already mentioned result in little or no use of budgets to improve loan evaluation and repayment in most credit institutions. This is because the very general, out-dated, poorly detailed budgets cannot provide much guidance for evaluating a loan, making financial recommendations to the borrower, or for estimating the likely profitability and, therefore, the repayment potential of the loan. A systematic procedure for developing more detailed budgets should increase the use of such budgets.

2.1.2. Budget Use Potential

The development and use of improved enterprise budgets by credit institutions has the potential of significantly improving credit operations. Such improvement can take place at all levels of data use.

If the budgets are prepared with sufficient detail so that they can easily be up-dated by the user, then the credit agent and loan evaluation officers can prepare current investment plans for the loan applicants, or at least they can evaluate the appropriateness of the loan application based on a current budget for that enterprise and level of input use. Furthermore, the budgets can help place the farmers in cost and risk categories to set loan limits and to judge the potential for repayment.

Accurate and reliable enterprise budgets also can help in the allocation of limited loan funds. Potentially profitable areas of investment (taking risk into account) can be identified and made known to the borrower. Loan requests that are far above or below the estimated costs associated with an enterprise can be identified and adjusted. Cash requirements and returns to alternative technological packages can be estimated. All of these can lead to improved credit allocation among farmers and regions.

2.2. Other Data Sources

A question that often arises is, why can't the credit institution use enterprise and production data produced by ministries of agriculture, universities, and other groups? There are many reasons why such

data aren't commonly used by the sister credit institutions.

Data in other institutions and ministries may be selfishly guarded. Agricultural ministries are reluctant to release enterprise budget data because such data may be interpreted as officially sanctioned government price support levels. Or, such cost of production estimates may serve as a basis for organized farmer groups to petition government to artificially set minimum price levels to cover such costs. Furthermore, the responsible data collection offices may have plans to further analyze the data and publish the results to reflect favorably on their value to the government and society. If some other group prematurely releases such data, there is fear that the originating office would receive little or no recognition for their data collection work. In addition, if one agency produces cost estimates that differ from another, this may raise criticism about the competence of government or the agency producing the data.

In addition, enterprise budgets and production data produced by a ministry of agriculture or other agency may be in a form or format that must be considerably modified by the credit institution for field and internal use. Said data may be hidden in data banks holding other information collected from farmers at the same time. Also, the data may be out-dated and, unless there is sufficient physical detail in the budgets as discussed previously, no up-dating of the information would be possible.

Another problem of data from other sources may be that there is not enough crop or area specificity. Massive amounts of data gathered through farm level surveys for agricultural policy analysis often do

not include such detail or, at best, must be organized and sorted to produce an adequate level of detail for use by region and crop.

Finally, data gathered by other groups may be for a specific purpose which may differ greatly from that which the credit institution desires. Thus, the data may be of limited value for credit analysis and loan evaluation. In addition, the other groups may only collect data occasionally making it difficult for the credit institution to know when data might be available.

In summary, production and enterprise budget data produced by other agencies or institutions are potentially of value to credit institutions but a great deal of coordination and cooperation is required to assure such data are in a useable form for the credit agents and technicians. In the absence of such cooperation, a common problem in many developing countries, the credit institutions have no other alternative than setting up their own data collection and analysis systems.

2.3. Other Related Studies

Specific studies on data collection for credit programs are limited. Indeed, it has only been recently that the subject of small farm data collection for any type of development program has begun to attract attention [Kearl, MacArthur, and Uchendu]. Most of the literature on data collection concentrates either on specific case studies or on the experience of field researchers over a number of years. Several recent studies, however, have begun to examine the theoretical aspects of the subject and how data collection plays a

critical role in every aspect of program development and implementation [Hursh-Cesar and Roy, and Norman 1973, 1978]. It is interesting that most studies focusing upon farm level data collection have been conducted in Africa, Asia, and the Middle East; very little of this type of research has been undertaken in Latin America (as least in terms of it showing up in published materials).

An important area of data collection research relates to the question of how farmers and other rural residents view surveys, enumerators, and other aspects of information gathering. Barghouti (in Kears), noted that since rural people often do not comprehend the research process and its implications to their situation, they tend to view investigative activities undertaken in their communities as an invasion of privacy, or associate it with tax collection and police investigations. Others, in that same report, stress the importance of involving rural people in the planning and implementation of data collection activities. Not only will worthwhile information be gathered in this manner, but good relations also will be cultivated between the parties involved. In addition, those who are collecting the data gain a better understanding of the people and environment with which they are working.

Spencer, Collinson, Hunt and others (Dillon, Hardaker, Newman and Norman) discuss implementing farm management data collection and analysis. All of these researchers deal with problems of area stratification, sample size, development of appropriate survey instruments, and the establishment of good rapport with local leaders and those who are to participate in the study.

Friedrich and Yang deal with the organization of data collection, farm management data collection forms and formats, and various coding systems for all aspects of a farming enterprise. The handling and storage of data after collection is stressed along with the types of computer analyses that can be performed on coded data.

Studies on the theoretical aspects of data collection are limited. Uchendu raises many of the same types of questions that credit projects seek to answer. Although not directed specifically at credit issues, these questions attempt to establish the roles played by the various actors in an agricultural setting. The questions include:

What are the technical possibilities for increasing farm productivity? What is the farmer's awareness of and response to agricultural advice offered to him, and how extensive have [sic] been the move away from the traditional pattern of farming? What has been the influence of government policy and action with respect to the allocation of funds to various aspects of development ...[such as] provision of credit and subsidies...?

All of these studies provide general guidelines for collecting farm level production data. They are especially useful if a representative, sample farm survey is to be implemented. Such studies are less useful guidelines for the more limited but important enterprise budget methodologies presented in the next chapter.

3. GUIDELINES FOR PREPARING ENTERPRISE BUDGETS

3.1. Introduction

The establishment of a system to produce enterprise budgets must fit the political and institutional environment of the country in question. This means no single approach will serve the needs and conditions of all developing countries. In fact, there are probably as many different approaches to gathering farm data as there are countries. The nature and extent of existing data collection efforts in a country depends on the historical division of agency responsibilities, the strength of training in research methodology and data analysis, the demand for data by local and international agencies and donors, the extent to which field data are used in policy analysis and guidance, the stage of development of the country, and many other factors.

Nevertheless, some common steps or procedures for data collection and use should apply to any situation. These steps should be followed by any institution starting data collection for the first time, modifying an existing collection system, or when collaborating with others in data collection. The following section is developed with this purpose in mind.

3.2. Procedural Steps for Preparing Budgets

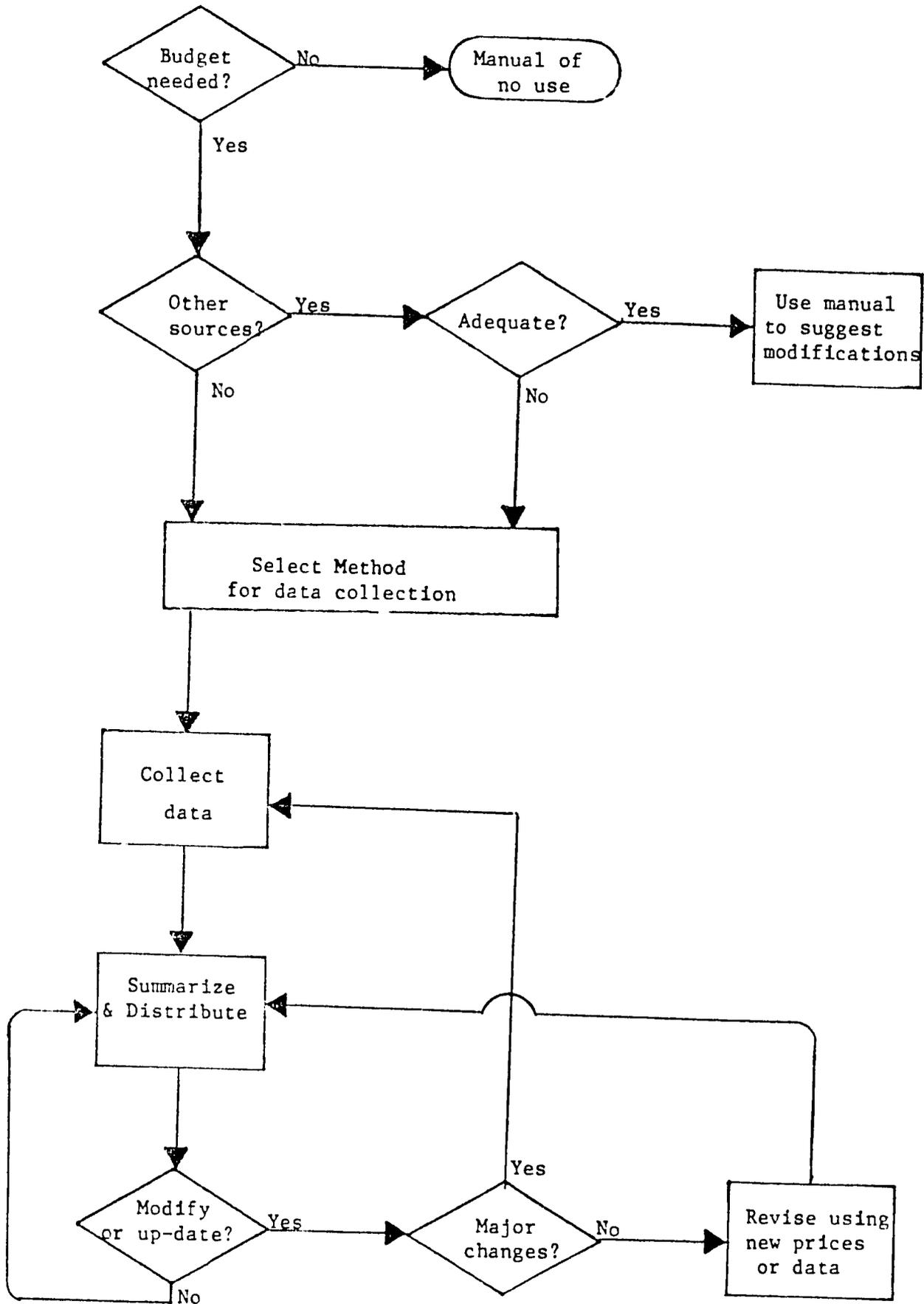
For the purposes of this manual, seven separate steps are identified and recommended when preparing enterprise budgets, be it for a

credit institution or agency, a rural development program, or a ministry of agriculture. These are: (1) determine the need for budgets and the enterprises to be studied, (2) check and evaluate other sources for existing budgets, (3) select the data collection approach(es) to be used, (4) carry out the selected collection approach(es), (5) reproduce and distribute the budgets for use, (6) review and evaluate the enterprise budgets produced, and (7) up-date existing budgets and repeat system for new budgets. A flow chart illustrating these steps in enterprise budget data collection and preparation is shown in Figure 3.1. Each of these steps will now be discussed in more detail.

3.2.1. Identify Needs and Enterprises to be Studied

The first and most important step in generating enterprise budgets is to critically evaluate the need for such budgets in the institution and to determine which enterprises have the highest priority. Producing improved enterprise budgets in a system that does not effectively use or know how to use such budgets will be a waste of time and resources. Thus, introducing a new or improved system for generating enterprise budgets must be based on the collective judgement of the decision makers in the institution that such budgets can contribute to improved policies and programs and that complementary procedures (training, timely publication and distribution, field support, etc.) accompany the preparation of budgets. In the case of a credit institution, the field credit agents, loan officers, office managers and other personnel must be trained in the use of enterprise budgets at all levels to get the greatest institutional benefit from

Figure 3.1 Steps for Preparing Enterprise Budgets



the effort.

The identification of the specific enterprises to be studied (crops, livestock, and mixed farming) is a continuous process throughout the data collection effort. However, a few major enterprises should be identified during this first step. Further refinement is done as the data collection approaches are selected and implemented. For example, maize budgets may be identified as high priority in this first phase but the actual definition of technological packages, varieties, regions, etc. will be determined at a later stage.

3.2.2. Check Other Sources

A common problem in many countries is duplication of effort. Thus, this second step is important to eliminate or at least minimize such duplication in farm level data collection. There are many potential sources of data for preparing enterprise budgets in developing countries but these sources need to be critically evaluated to see if the budgets and data are appropriate for the using institution.

Evaluation Criteria--A number of questions can be asked about the available data and budgets from other sources. First of all, is the information readily and continually available? The data may be very reliable and accurate but if getting access to such information is very time and resource consuming and must be repeated each time new data are released, then the using institution may find it difficult to justify such effort. At times, it is possible to gather data for enterprise budgets in coordination with other agencies or institutions. One group

may prepare certain budgets of primary interest while the other group would prepare budgets of most interest to them. However, agencies with such data often are very reluctant to release them for political, bureaucratic, or other reasons.

If data are available, then the next question concerns the applicability of such data and budgets. Are the data of use to the credit institution? Are they in a form to be of use? Can the budgets be modified to fit the needs of the credit institution without a lot of additional cost and effort? For example, is there sufficient specificity in the physical input data and prices to allow the budgets to be modified as quantities and prices change?

The accuracy and reliability of data and budgets is another important evaluation concern. If the agency with the data is not prepared to explain the methodology and procedures used to produce such data, then the user will have no basis upon which to evaluate the data. This means the user will have little or no confidence in using the data for preparing enterprise budgets and for loan evaluation and analysis. A clear explanation of data collection methods by all collecting agencies is a must if data collection duplication is to be avoided.

The final criterion for evaluating the usefulness of data and budgets from other sources is cost. Is it cheaper and more reliable to gather one's own enterprise data or is it more cost-effective to rely upon some other source? Or a combination?

Possible Data Sources--Most ministries or departments of agriculture have offices responsible for collecting agricultural and

rural data to serve as a basis for identifying potential investment projects and to be used in policy analysis work. Such data most commonly arise from single-visit farm surveys.

Specialized credit institutions also may collect certain types of enterprise data for loan evaluation purposes. These data may come from field credit agents' estimates or from information gathered from the farmer at the time of the loan application. Few credit institutions utilize formal interviewing and survey techniques to generate such data.

Experimental stations and other research agencies often produce enterprise budgets related to specific experiments. As an example, see Perrin. These may serve as guidelines to finance new technologies and methods of farming but are of little use for developing budgets for current and traditional systems of farming. Farming systems research, a new approach to solving small farm and traditional agriculture problems, incorporates the testing of new methods and technologies on the farm itself along with gathering data on the current system. Thus, farming system projects and programs may be a good source for enterprise data and budgets. Nonetheless, these budgets may not be generated on a continuous basis. Once the present system is understood, then the emphasis is on testing improved methodologies that will likely serve the needs of the farmers.

Governmental price stabilization or price setting agencies also may collect farm enterprise data on a periodic basis to serve as the basis for price policy. However, due to the sensitivity of such agencies to criticism about the basis for such policy, these agencies

are usually reluctant to release the data until long after the price policies have been set.

Cooperatives and other farmer associations are often good sources of data. Farm management specialists may gather enterprise data to serve as a basis for farmer recommendations. These data also may be used by the organization to set loan limits, estimate farm input and other service needs, evaluate loan applications, and to study the impact of the association on farm incomes and output.

Finally, special projects and programs may have enterprise budgets and data available from feasibility and other types of studies. For example, during the feasibility studies for irrigation projects it is common to find enterprise budgets being prepared to help project the potential benefits of the project. However, care must be taken when using these budgets because they may be overly optimistic by design to help justify the project.

3.2.3. Select Data Collection Approach

This third step assumes data and enterprise budgets from the other sources (step two) are unavailable, unuseable or incomplete (not enough data or budgets). Thus, the remaining steps must be implemented to produce the desired budgets.

There are a number of different approaches to gathering farm level data. Spencer [1972] describes four methodologies for farm management and production economics research: (1) the model farm study, (2) farm account books, (3) the cost-route method, and (4) farm business sur-

veys. These approaches vary from the more detailed, specific study of selected model farms, in the first case, to a more general, overall study of many different types of farms and enterprises using the farm business survey approach. However, this classification is not completely adequate since the categories overlap. For example, the cost-route or multi-visit method overlaps or cuts across all three of the other categories. However, an approach must be selected which will produce the most accurate and reliable budgets possible within the constraints of the institution. Further discussion of these alternative approaches is in the next chapter.

3.2.4. Implement Collection Approaches

The fourth step in preparing enterprise budgets is to carry out the data collection approaches identified in the previous step. The exact procedures to be followed depend on the approach to be implemented. Details on collecting data using an enterprise survey and enterprise records, the main focus of this manual, are outlined in the next chapter. Alternative published materials need to be reviewed if other data collection approaches are to be implemented.

3.2.5. Prepare and Distribute Budgets

The fifth step of publishing and distributing the finished enterprise budgets is critical to assure widespread use within or outside the generating institution. If significant delays occur before the budgets are released, then the budgets may be out-dated when they are released. As a result, budget use may be very limited. Some

recommendations for speeding up budget preparation are included in the next chapter. Of particular interest is the potential for using micro computers to systematically produce new budgets and to rapidly update existing budgets.

Enterprise budgets can be published in a number of ways. However, using a three-ring notebook with a loose leaflet or single page for each budget has a lot of advantages. New budgets can be added easily to an existing order, out-dated or inaccurate budget sheets can be discarded and replaced with new estimates, budgets of most interest to one user or region can be easily assembled while also providing others with a complete set, and reproduction costs may be less since only the new or modified budgets need to be published once the system is operating.

3.2.6. Evaluate Budgets

Once each set of enterprise budgets are produced it is very important to review and critically evaluate the accuracy and usefulness of each of the budgets, the sixth step. This helps assure that the enterprise budget data collection system is producing useable budgets in a cost-effective manner. Criteria for evaluating data were listed previously in the discussion for step two (section 3.2.2.). This step helps identify which budgets need to be extensively modified, requiring more field data collection, and which ones can be brought up-to-date with modifications in the office. Further, budgets with limited demand may not be revised as often as budgets which are widely

used. This is also the time when any new technological packages for existing enterprises or newly identified enterprises are specified for which new budgets are required.

3.2.7. Modify or Prepare New Budgets

The final step in preparing enterprise budgets is to up-date existing budgets in the office, where possible. These modifications might include using recent product and input price information, changing popular brand names or fertilizer mixes which essentially accomplish the same function as the original input, or any other minor change in the budget which does not substantially alter the accuracy and reliability of that specific budget. If the modification greatly alters the budget figures or technological package specified in the original budget, then it is recommended that the field budget data collection process be repeated from steps three or four so that a new enterprise budget is produced.

In summary, these seven steps, or some variation of these steps, need to be followed to produce reliable and useable enterprise budgets in a cost-effective manner. In the design of an enterprise budgets system, the demand for increasing degrees of sophistication must be matched with the ability and expense of producing the budgets. As each additional degree of sophistication is added, fewer and fewer individuals will be able to use such budgets. On the other hand, the demand for budgets will also be shifting as most users begin to see the importance of additional budget information for their analysis. Thus, the added cost of this increased sophistication must be balanced

against the benefits for the user. Following the implementation steps outlined in this chapter should help determine the level of sophistication needed by the using institutions. Two specific approaches for producing enterprise budgets which were tested in Honduras and the Dominican Republic are presented in the next chapter.

4. ENTERPRISE SURVEYS AND FARM RECORD APPROACHES

4.1. Introduction

As explained in the previous chapter, there are many different approaches to generating enterprise budgets. The more distinguishing differences of the various approaches is: (1) whether the farmer or an outsider primarily records the data, (2) the number of visits made to the farm, and (3) the amount of detail desired. These categories are outlined below:

- * Farmer Responsible for Recording Data (mostly single visit)
 - Whole farm records (detailed)
 - Enterprise records (detailed)
- * Outsider responsible for recording data
 - Single visit
 - Farm Survey (general)
 - Census (general)
 - Enterprise Survey (detailed)
 - Reconnaissance (general)
 - Multi-visit (Cost-route method)
 - Whole farm records (detailed)
 - Enterprise records (detailed)
 - Model farm study (detailed)

Enterprise budgets can be generated under each of these methods and each has its own limitations and therefore must be evaluated with respect to the specific study to be undertaken. The two data collection methods outlined in greater detail later in this manual are the single visit enterprise survey and the multi-visit enterprise records approach.

The model farm study approach suggests a farmer be selected who most closely follows the recommended practices that should be emulated. This is similar to the farming systems research approach which mai

tains data on farm units which are testing and implementing the recommended technical packages identified by the research technicians [Shaner, et al.] A similar approach is followed by a number of agricultural research agencies in developing countries to test specific technical recommendations and packages [Hildebrand]. The model farm method may involve a single visit (a type of farm survey) or a multi-visit approach which would make it more similar to farm record-keeping.

The farm account book or farm record-keeping approach may be similar to the model farm study in terms of procedures when many visits are made by an outsider but it also includes the study of non-model or more typical farms. Farmers may record the data (as in developed countries) or outsiders may assist the farmer in entering data in the books (a multi-visit approach used in some developing countries). Farm records can be used not only for the study of farms adopting recommended packages but also for farms using traditional methods of cultivation and livestock husbandry. Farm records are widely used in the developed countries as a source of data for farm and sector analysis and for evaluating loan applications of farmers. Those same farmers are responsible for maintaining the records. Outsiders only collect and analyze the data once available. Farm record-keeping has been experimented with in a few developing countries but it is not widespread, probably because the records are similar to those used in the developed countries and aren't easily understood by the farmers in developing countries. Hatch [1980] advocates farm records which are greatly simplified using symbols and pictures to make it easy for illiterate or

semi-illiterate farmers or families to record daily activities on their own. This is an innovative approach and may have promise for developing countries interested in initiating farm record-keeping in a cost-effective manner. Farm records similar to those utilized in the industrialized nations are not practical in the developing countries where the farmer is expected to record the data alone. Farm records can be used to gather data for whole farm analysis or for a specific crop or livestock enterprise.

The general farm survey is commonly used in agricultural sector studies for policy formulation and analysis purposes. Here, a cross-section of farms are studied to obtain general characteristics of the farm or rural population. The most common survey approach is to visit the farm or sampling unit once to obtain the required data. For example, a general farm survey may be implemented to guide the development of a loan paper by the World Bank or other international lender. This helps identify major constraints faced by the agricultural sector or a specific group of farmers. The periodic national and agricultural censuses would be other examples of this approach.

An enterprise survey has some of the same characteristics as the general farm survey (single visit and outsider responsibility) but only data pertaining to a specific crop or livestock activity are gathered. Another modification of the general survey approach is the sondeo or reconnaissance technique [Hildebrand]. Here a visit is made to a locality or community by a team of professionals (multi-disciplinary) and information is gathered to identify the major technical, economic, social and other factors which constrain the improvement of agricult-

ural production, incomes, and rural welfare. In all the previously mentioned survey approaches, an outsider is primarily responsible for recording the data.

Two of these approaches, the farm survey and the farm record keeping approaches, are described in detail in this chapter. These two approaches were selected because: (1) they have been tested in two Latin American countries, Honduras and the Dominican Republic,^{a/}(2) they appear to be more reliable and cost-effective compared with other approaches which produce the same level of data detail, and (3) they are approaches which can be implemented in most developing countries. Each of these two enterprise budgeting approaches will be discussed separately since they differ significantly in their implementation.

4.2. Enterprise Budget Survey Methodology

Three survey alternatives can be considered when preparing budgets. First, budgets could be directly estimated through a survey (interview) of field technicians familiar with the crop or livestock enterprise in question. Secondly, they could be prepared from data gathered in a random survey of farmers. Finally, they could result from a more limited, non-random survey of selected farmers, the approach summarized here.

^{a/} For more detail on those experiments, see Dickey [1980]; Dickey, et al.[1981]; Dickey and Tinnermeier [1981]; and Parks, et al. [1980].

The technician survey alternative would be by far the least costly since the time and logistical requirements of farm interviews would be eliminated. However, the accuracy and reliability of the budgets would be most questionable since the experience and background of the technicians might vary considerably.

The use of farmer interviews provides a significant improvement in accuracy, but the cost is also considerably higher. The random survey approach leads to statistically representative data but it may not result in accurate data for the technological package under study. Thus, the third approach of selecting a purposive (non-random) sample was followed. Here, approximately five farmers that are believed to be following the technological package of interest are selected and interviewed. Suggested farmer selection criteria using this method are described in a later section.

Judgement about the relative accuracy of these survey methods was based on a study by Longwell [1981]. In that study rice production costs for an area using fairly homogeneous technology were estimated and compared using these three survey approaches. It was concluded that the cost estimates prepared by field technicians (credit agents) did not accurately reflect the costs faced by the farmers (as determined through a random sample survey), but that the use of a purposively selected sample of only five farmers did not result in significantly different cost estimates compared with the random survey. However, it should be pointed out that the data collection methodology

outlined in the following sections should be applicable, regardless of the survey approach selected. That is, the forms and procedures could also be used when interviewing technicians or when farmers are interviewed using a random sample.

4.2.1. Information Provided in Each Budget

A standard format is used for the enterprise budgets.^{a/} This section lists the various items on the form as shown in Figure 4.1.

**Budget Identification

The top portion of the enterprise budget sheet provides general information about the type of crop or livestock enterprise being described. Reading from left to right this information includes:

a. Region

This part identifies the region or administrative unit as defined by the using agency.

b. Budget Identification Number

The budget identification number (1-42-1334A on the figure) has the following format, A-BB-CDEFG, where the first digit (A) specifies the region studied, the second set (BB) identifies the crop, and the third set (CDEFG) specifies the technological characteristics. The use of the coding system simplifies the organization of the budget files and speeds up access if placed on a computer system. The specific number codes used in the Dominican Republic are shown in Appendix A. The technology and land classification are shown in Appendix B.

c. Name of the Crop

^{a/} The format presented is taken directly from Dickey [1980] and Dickey and Tinnermeier [1981]. This format was followed in the Dominican Republic applications [SEA, 1982].

Figure 4.1

PRODUCTION COST SYSTEM FOR DOMINICAN REPUBLIC

SEA/BAGRICOLA		COST SHEET		Crop: Bell Peppers	
Region: North		No. 1-42-1334A		Areas: North Region	
Source of Data: Interviews (5)		Date: Jan. 1981		Harvest: Apr/July 1980	
Varieties	Yields	Unit Cost	Sowing Method:	Transplanting	
"Cubanela"	1,407lbs	\$0.054/lb	Source of Water:	Pump Irrigation	
			Level Input Use:	High	
			Soil Prep. System:	Mechanized	
			Soil Classif.:	A	
One Man-Day = 8 hours/DR\$4.00					

VARIABLE PRODUCTION COSTS PER "TAREA" OF LAND (.629 ha.)

Activity, Service or Input	Month	Quantity	Unit	Unit Value	Cost												
1. Inputs																	
.1 Seed		.1772	lb	29.00	5.14												
.2 Fertilizer (15-15-15)		.014	quintal	12.50	0.18												
.3 Fertilizer (16-20-0)		.394	"	10.50	4.14												
.4 Fertilizer (Sulphate of Ammonia)		.252	"	8.50	2.14												
.5 Fertilizer (foliar)		.45	lb	1.00	0.45												
.6 Insecticide (Furadan)		.37	"	0.65	0.24												
.7 Insecticide (Huvacron)		.2212	liter	8.50	1.88												
.8 Fungicide (Dithane M-45)		.28	lb	1.50	0.42												
.9 Fungicide (Kocide)		.6712	"	2.25	1.51												
.10 Pump Costs					1.42												
.11 Fuel (gas oil)		6.74	gallon	1.00	6.74												
.12 Transport of Farm Inputs					0.09												
.13 INDRHI Water User Charges (6 mnths)		1.00	"tarea"	0.07	0.07												
2. Seedbed																	
.1 Preparation of the Seedbed	I	.35	man/day	4.00	1.40												
.2 Applic.Chem.Products (0.014 qq 15-15-15) (0.37 lbs Furadan)		.06	man/day	4.00	0.24												
.3 Watering Seeds		.057	"	4.00	0.23												
.4 Applic.Fungicide (0.28 lbs Dithane)		.06	"	4.00	0.24												
.5 Irrigation		1.89	"	4.00	7.56												
.6 Weedings		3x.083	"	4.00	1.00												
3. Soil Preparation																	
.1 Felling (mechanized)		1.00	tarea	3.00	3.00												
.2 Clearing (mechanized)		1.00	"	1.60	1.60												
.3 Harrow (mechanical)		1.00	"	1.25	1.25												
.4 Plow (horse-drawn)		1.00	"	1.25	1.25												
4. Transplanting																	
4. Transplanting	II	0.773	man/day	4.00	3.09												
5. Applic. Fertilizer (0.394 qq 16-20-0)																	
5. Applic. Fertilizer (0.394 qq 16-20-0)		0.335	"	4.00	1.34												
<table border="0" style="width: 100%;"> <tr> <td>I. Seedbed:</td> <td>\$ 10.67</td> <td>14%</td> <td>III. Labor:</td> <td>\$ 34.39</td> <td>45%</td> </tr> <tr> <td>II. Soil Prep.:</td> <td>\$ 7.10</td> <td>9%</td> <td>IV. Inputs:</td> <td>\$ 24.42</td> <td>32%</td> </tr> </table>						I. Seedbed:	\$ 10.67	14%	III. Labor:	\$ 34.39	45%	II. Soil Prep.:	\$ 7.10	9%	IV. Inputs:	\$ 24.42	32%
I. Seedbed:	\$ 10.67	14%	III. Labor:	\$ 34.39	45%												
II. Soil Prep.:	\$ 7.10	9%	IV. Inputs:	\$ 24.42	32%												

The use of a given brand name is not an official recommendation as to the use of such product. It simply reflects the information supplied by the farmers interviewed.

Figure 4.1 (Continued)

SEA/BAGRICOLA	COST SHEET	Crop: Bell Peppers
Region:	No. 1-42-1334A	
Source of Data:	Date: Jan. 1981	Areas: North Region
<u>Varieties</u>	<u>Yields</u>	<u>Unit Cost</u>
_____	_____	_____
_____	_____	_____
One Man-Day = _____ hours/DR\$	Sowing Method: Transplanting	Source of Water: Pump Irrigation
	Level Input Use: High	Soil Prep. System: Mechanized
	Soil Classif.: A	

VARIABLE PRODUCTION COSTS PER "TAREA" OF LAND

Activity, Service or Input	Month	Quantity	Unit	Unit Value	Cost
6. Irrigation		2x.179	man/day	4.00	1.43
7. Applic.Chem.Products (0.0553 liters Nuvacron) (0.1678 lbs Kocide) (0.1125 lbs foliar)		0.1163	"	4.00	0.47
8. Weeding		0.952	"	4.00	3.81
9. Applic.Chem.Products (0.0553 liters Nuvacron) (0.1678 lbs Kocide) (0.1125 lbs foliar)		0.1163	"	4.00	0.47
10. Applic. Fertilizer (.242 qq Sulphate)		.23	"	4.00	0.92
11. Irrigation		2x.179	"	4.00	1.43
12. Use of Cultivator (horse-drawn)		1.00	tarea	1.20	1.20
13. Weeding		.952	man/day	4.00	3.81
14. Harvest		2.814	sack	1.00	2.81
15. Irrigation	IV	.179	man/day	4.00	0.72
16. Applic.Chem.Products (2x.0553 liters Nuvacron) (2x.1678 lbs Kocide) (2x.1125 lbs foliar)		2x.1163	"	4.00	0.92
17. Harvest		2.814	sack	1.00	2.81
18. Irrigation	V	.179	man/day	4.00	0.72
19. Harvest		2x2.814	sack	1.00	5.63
20. Harvest	VI	2.814	sack	1.00	2.81
					76.58

I. Seedbed: \$ _____ % III. Labor: \$ _____ %
 II. Soil Prep.: \$ _____ % IV. Inputs: \$ _____ %

The use of a given brand name is not an official recommendation as to the use of such product. It simply reflects the information supplied by the farmers interviewed.

Source:

d. Source of Data

This item indicates if the data came from farmer interviews, from revision of previous budgets, or from another agency.

e. Date Enterprise Budget Prepared

f. Area Represented

The areas of applicability may be towns, provinces, regions or well-defined areas. The area of applicability could include areas in which no interviews were performed if, in the opinion of the researchers, the cost of producing the crop with the same technology would not be significantly different. The area will normally be a sub-unit of the region specified under item "a".

g. Harvest Month(s)

The crop cycle (season) in which the costs were incurred is identified by indicating the months in which the interviewed farmers harvested their crop.

h. Crop Varieties, Yields and Per Unit Costs

This section includes additional summary information about the variety planted and the average yields and per unit costs of production based on the farmer interviews. This provides a quick reference point for such data. However, care should be taken when using such averages since they are based only on a few farmer interviews.

i. Technology

Standard descriptors are used for the five technology categories: (1) sowing or planting method, (2) source of water, (3) chemical input use level, (4) soil preparation system, and (5) soil or land classification system (U.S. Department of Agriculture or similar system).

j. Standard Work-day and Wage Rate

If needed, the number of hours in a normal work-day and the average wage rate is reported. The wage should include the cost of any meals or other services provided by the operator.

**Variable Production Costs

The main part of the budget sheet includes a listing of the acti-

vities, services and inputs used to produce the crop under study. The organization of this information may vary greatly depending on the needs and customs of the preparing and using institution. The system applied in the Dominican Republic had these characteristics:

a. Chronological Ordering of the Line Items

The first part includes all of the physical inputs used in producing the crop. All subsequent line items are reported in chronological order with the month of the activity on the line of the first activity of the month. The months are numbered consecutively beginning with "I" for the first month. Actual names of each month could be used if desired. Activities that are performed several times in a month are reported using one line item and an indication of the number of times the activity is performed along with the quantity (man-days) specified for a single performance of the activity. Activities that begin in one month and continue into the following month are listed in the month when first started.

b. Use of Inputs

For chemical input applications, the number of applications, the quantity per application and the name of the product (in parentheses) are reported for each product. The quantity, unit cost and total cost values pertain to the specific application and not to the total purchased (if not used up completely).

c. Rules for Problem Costs

Irrigation water fees--Payments for irrigation water user fees are computed using the official rates rather than as reported by farmers. Such rates are usually based on farm size and the type of irrigation used (flooding, sprinkler, etc.). Sometimes a flat fee per land unit is used.

Input transportation costs--The cost of transporting purchased inputs is included in the budget using a single line item.

Product price--Normally this is the market price of the product minus harvest, on-farm transportation and marketing costs. The official government price for a product usually is not very representative of what farmers actually receive.

Labor costs--The cost of manual production activities are reported in man-days. When an activity is paid on a per land unit basis (say by hectare rather than a daily wage), the total amount paid is divided by the normal daily wage for that activity to determine the number of man-days worked. When the work is performed under a reciprocal group labor system in which no money changes hands, the number of man-days is estimated in the interview and the normal daily wage rate is used to compute the cost. An exception to this rule would be when the hired laborer is actually performing a custom service that requires his own equipment (e.g., a backpack sprayer). These custom services are normally paid on a per land unit basis (hectare or other unit) and are recorded that way in the budget.

**Summary Section

The distribution of per tarea costs among four categories is shown on the bottom of the enterprise budget sheet. These categories are consistent with the summary data desired in the Dominican Republic. Different categories could be developed to meet the needs of other implementing institutions, to provide summary data to international donors providing loan operating funds, or to meet other needs at higher administrative levels.

4.2.2. Farmer Selection Criteria

A minimum of five interviews are required for the tabulation of a budget. The number of interviews should be increased for those crop and technology combinations that are grown by a large number of farmers or that are grown on a large number of hectares within the area of applicability specified for the budget. The selection of farmers to be interviewed will be based largely upon the judgement of the technicians and change agents working in the region. It is recommended that

farmers selected for interviewing should be:

- Persons that have grown the crop with the specified technology during the specific crop cycle.
- Persons that are representative of the farmers that grow the crop with the specified technology. This means that they should not be the largest nor the smallest farmers, in terms of both farm and field size, nor should they be the most progressive or the most backward. In the field staff training, special emphasis needs to be placed on the comparison of the interview candidate with the set of farmers that use the specific combination of technological characteristics that have been specified for the budget.
- Persons that have grown the crop with the specified technology in different parts of the "area" of applicability.
- Persons that appear to have a reliable recall of the information required by the interview. In the field staff training, special emphasis must be placed on the fact that a belief on the part of the interviewer that the farmer should not have cultivated his crop in the manner that he reports does not constitute grounds for the rejection of the interview. The only justification for the rejection of an interview is if the interviewer does not believe that the farmer really did what he claims to have done or if it is clear that the farmer is not representative of the technological package being studied.

4.2.3. Interviewing Procedures (See accompanying Figure 4.2)

Adequate and complete training of the persons doing the farmer interviews is critical to the success of any enterprise budgeting system. Well-trained interviewers will generally produce reliable data while the poorly trained will produce very questionable if not unreliable data. Role playing and practice farmer interviews are effective training techniques. The following suggestions should be of use in training and guiding farmer interviews:

1. After initial greetings with the farmer the interviewer should briefly state the purpose of the interview. The use of a standard (memorized) statement may be attempted. This introduction should state that the information gathered will not be

used for loan or tax collection purposes and that the information provided by the farmer will be combined with information from other farmers so that an average may be computed. If a series of enterprise budgets have already been prepared, it would be appropriate to show the farmer the results of the data collected.

2. Although a full determination of the technology used by the farmer cannot be made until the interview is almost complete, a few short questions can be asked at the beginning to see if the interview should take place. If the farmer has not used the specified technology, the interviewer should thank the farmer for his time and leave. If the interviewer is aware of the technological combinations specified for other budgets and if the farmer has used one of the other combinations, he could perform the interview and notify his immediate supervisor to that effect.
3. The information requested at the top of the form should be complete before questioning the farmer about the specific activities of his crop.
4. The interviewer should ask if the farmer has kept some form of written records on his crop. If so, he should suggest that the farmer get the records and consult them during the interview.
5. If the farmer has used several different fields in growing the crop, the interviewer should determine whether the farmer can respond with greater ease if the questions are made for a single field or for the several fields combined. If the farmer must add up the costs and quantities for each field in order to obtain the total, it may be preferable to limit the interview to just one of the various fields.
6. The interview should be done for the entire field (or crop). The computation of the per hectare quantities and costs should be performed when the interviewer returns to the office. If the questioning is done on a per hectare basis, the farmer will often report what he usually spends on a hectare basis rather than what he actually spent on the field in question.
7. In determining the activities or tasks performed on the crop, the interviewer should limit the questions to the following:
 - a. "What was the first thing you did to grow your _____?"
 - b. "After the _____, what did you do?"
 - c. If it appears that the farmer has forgotten an activity, the following question may be asked only once and in a very casual manner:
"Didn't you _____?" The repetition of this question

will normally result in the farmers agreement that he did do it, even if he didn't. This must be avoided.

Once the farmer has specified the activity that was performed, the interviewer will often have to request the information on the quantity, the unit price and the total cost for both the activity itself and any input required. At no time should the interviewer use any numbers in questioning, since the farmer may decide to make the interviewer happy by agreeing with the suggested quantity, unit price or cost.

Due to the various forms in which a laborer may be hired, or for the contracting of a particular activity, it is usually wise to ask how payment was made for the activity before requesting the information on quantities, unit prices and total cost. If the laborers were hired by the day, the interviewer will ask how many men worked each day and the daily wage rate paid (total cost is computed later). If the work was contracted on a per hectare or other basis (in which the contractor hires and supervises the laborers), the interviewer will ask how much he paid per hectare (or other land unit used) and then determine what the normal daily wage rate is for that particular activity (the number of man-days is estimated later). If the activity was performed by a group of farmers (including the farmer) on a reciprocal work arrangement, the interviewer will determine the number of man-days actually worked and the normal daily wage rate for the particular activity. If the activity was special, like fumigation, the interviewer must determine whose equipment was used and how many other people (often boys) were used to carry water or other inputs to the man that was doing the work (e.g., spraying).

8. For all the manual activities, the interviewer should find out if the farmer himself participated, and if so, whether his labor is included in the quantities reported. Most of the farmers in the Dominican Republic will not report the time they spend supervising hired laborers, even when they occasionally work alongside the laborer.
9. For those activities that were performed with animal or machine drawn implements, the interviewer must determine how they were performed and on what basis they were paid. This will often require a determination of the ownership of the animals, machines and implements.
10. Harvest activities need to be identified in as much detail as possible since there may be differences in the activities performed, the grouping of activities for the purpose of payments and the basis for payment. Particular attention must be paid to the transportation activities at harvest time.

Again, the off-farm transportation costs should not be included in the enterprise budgets.

11. At the end of the interview, the farmer is asked how much he produced on the field(s). If a local unit of measure is reported, the interviewer should record the information as given and then find out the conversion factor between the local unit and a standard unit of measure (pounds or kilograms). If the production is reported in a standard unit, it may be recorded directly on the second section of the line. The yield per unit (tarea in the example), may be computed after the interview.

After recording the amount actually harvested, the interviewer should ask if his harvest was normal. If he responds that it was not normal, the interviewer should find out what a normal yield would be for the field(s) when the farmer uses the same production technology, and record this information on the second line of the production section (lower part of the interview form). Only the actual yield information is used in tabulating the budget. The normal yield question was included to permit comparisons with other sources of yield data.

4.2.4. Tabulation Procedures

The initial step in tabulating the data from the farmer interviews is the verification of the per hectare (or tarea in this example) quantities and costs for each line item for each farmer interview. These last two columns of the interview form are to be completed after the interview, by dividing the quantity and the cost, for each line item, by the number of land units (hectares, etc.) in the field. Four digits to the right of the decimal point should be used until the final enterprise budget sheet is prepared and all numbers are rounded to two places. The sum of the per tarea costs should equal the average per tarea cost, as calculated by dividing the sum of the line item costs by the number of taareas. Small differences can be ignored. If these figures are not similar, then an error in calculation has occurred.

The tabulation form (see Figure 4.3 on next page) is completed by selecting the appropriate line items, in the same general order as found in the interviews, using the detail lines as required by each line item type. The five basic line item types and their detail lines are as follows:

- | | |
|---|--|
| 1. Inputs | a. Brand, formula or variety
b. Quantity per land unit
c. Unit price
d. Per land unit cost |
| 2. Manual labor | a. Man-days per land unit
b. Daily wage rate
c. Per land unit cost |
| 3. Input applications

(For inputs applied in a single application, lines a, b, and c may be omitted) | a. Number of applications
b. Quantity per land unit, 1st application
c. Quantity per land unit, 2nd application
d. Months in which applied
e. Total man-days (all applications)
f. Daily wage rate
g. Per land unit cost |
| 4. Custom service | a. Per land unit cost |
| 5. Animal traction | a. Days per land unit
b. Daily cost
c. Per land unit cost |

Each interview should be assigned a number and the data should be transferred to the corresponding column on the tabulation form. Before computing the "average" and "model" columns for any of the items, all of the data from each interview should be transferred to the tabulation form. The per land unit cost detail lines should be summed for each interview and checked with the total on the interview form itself. The need for this step derives from the need to combine costs from different lines of the interview form into a single amount for the tabulation form.

The average per land unit cost for each item is computed using the number of interviews as the divisor. This includes the values of \$0.00 for the farmers that did not reflect the particular line item. However, when a clear indication of interviewer error occurs, the average per land unit cost, of the interviews that did not report the line item, may be attributed to that interview. The belief of the tabulator

that a farmer should have performed an activity is not an acceptable justification to include it. However, if the farmer purchased fertilizer, but the interview form does not list the cost of its application, the application cost may be estimated by using the average of the other farmers that did apply fertilizer of that particular type.

The average unit price for each item is computed using only the unit prices from the interviews that used the particular product or performed the particular activity that will be reported in the final budget. If the same product is purchased in differing units of measure, the appropriate conversions should be made to the unit of measure that was most commonly used. The per land unit quantity to be used in the final budget must therefore be the average per land unit quantity divided by the average unit price. This per land unit quantity may or may not be equal to the average of the individual per land unit quantities as reported in the interviews. This criterion is expected under two conditions. First, when a manual labor line item is reported with only one or two of the farmers paying a wage rate different from the normal wage rate, the average unit price will be the average of the normal daily wage rates, ignoring the differences reported for the line item. When a majority of the respondents report paying a different wage rate, then the average of the reported wage rates will be used. Secondly, harvested yield will be reported directly and the per unit costs of the related harvesting activities will be computed by dividing the per land unit cost by the average yield.

Line items that are not found in a majority of the interviews are not reflected in the final enterprise budget. However, the costs incurred by the farmers reporting the particular line item will be combined with the costs of a similar or related line item. Care must be taken in selecting the line item with which to combine such costs so that the addition does not significantly distort the per land unit quantities and costs. For example, if two of five farmers report the use of a fungicide while four of the five report the use of insecticide, the fungicide would have been added in with the cost of the insecticide and listed as a general category of pesticide.

In exceptional cases only, a line item that appears only on one interview may be eliminated if such an action would make the interview fit the technological characteristics specified for the budget. For example, if one farmer applied granular fertilizer (at a cost of many dollars per land unit) while the other farmers applied foliar fertilizer (at a cost of a few cents per land unit), the line item for the granular fertilizer would be ignored and the average per land unit cost of the foliar fertilizer would be attributed to that farmer's interview as well. If such an elimination and attribution is for a line item that would have significantly affected the farmer's yields (as in the example), then the average yield for the budget should be calculated without including the yield of the interview in which the higher cost was eliminated (granular fertilizer in this example).

Minor adjustments may be made in the rounded per land unit costs to be reported in the final budget sheet to increase the acceptance of the budgets by individuals not familiar with simple numerical averages.

In summary, five or more farmer interviews are implemented for each of the technological packages under study. An interview form is used for each one of those interviews. Then, the data from each of the interviews is summarized on the tabulation form with line item entries being adjusted to make the assumptions and characteristics consistent with the technological package. Averages for each line item are then calculated from the five or more interviews to produce the final enterprise sheet representing that package.

4.2.5. Modifications and Alternative Approaches

The enterprise budget format presented in the previous sections worked well in one country but could be easily modified for other applications or for specific country or agency needs. However, it is very important that enough specificity or detail is included with any modification so that the budget accurately represents a technological package and can be adjusted with changes in input and product prices.

In Honduras, after specifying the homogeneous areas to be studied, it was decided that the crop budgets would be further classified within each area according to yield per unit of land. Yield categories of low, medium, and high were subjectively determined for each crop. Five farmers were selected for interview in the area who had recently obtained similar yields in each category. The implicit assumption of this approach is that each yield level effectively represents a fairly common technological package--the lower the yield, the fewer inputs

used and the higher the yield, the more inputs used. Data on production practices and costs of services and materials were obtained from the five farmers and the final budget was an arithmetic mean of the five interviews for that yield category [Parks, No. 80-1, 1980]. An example of one of the budgets is shown as Figure 4.4.

The Honduran budgets also included a number of other differences compared with the methodology presented previously. For example, activities were grouped into logical categories rather than in chronological order. Equipment and other similar costs were annualized to obtain a more complete estimate of total costs. This addition is important if the farmer does have a lot of equipment, fences, etc. However, small farmers often have little invested in such materials and estimating such annualized costs may not be needed.

A third alternative budget format is similar to that used in Egypt (see Appendix Table C-1). In that country, variable costs and fixed costs are calculated to provide an estimate of returns above all costs [Abdel]. The labor and water distributions by month also are included in the budget to provide data for Linear Programming (analysis of farm operations and alternatives, normally with a computer).

As can be seen, there are a lot of different ways in which to organize and format enterprise budgets. Nevertheless, the procedures outlined in this section can be used for any of the formats, providing the interview, tabulation and other forms and instructions are consistent with the desired formats.

Figure 4.4 EXAMPLE OF A CROP ENTERPRISE BUDGET--HONDURAS

Banco Nacional de Desarrollo Agrícola
Investment Plan No. 08021

Activity: Beans with maize, low yield (1200 kg./Mz)

Region: Danli, El Paraiso

No. Manzanas_____

Prepared by:

Labor Use (6 hour day)	Total Units	Lps/* Unit	Total Cost	Own Cost
Aug	1.5	3.50	5.25	_____
Aug Carry water	6.2	3.50	21.70	_____
Aug Apply herbicide	2.0	3.50	7.00	_____
Sept Double & deleaf maiz	3.5	3.50	12.25	_____
Sept Plant	6.7	3.50	23.45	_____
Oct Apply insecticide	7.2	3.50	25.20	_____
Oct 1st cleaning--Azadon	8.2	3.50	28.70	_____
Nov 2nd cleaning--Azadon	7.1	3.50	24.85	_____
Nov Apply insecticide	1.8	3.50	6.30	_____
Dec	7.2	3.50	25.20	_____
Dec	5.0	3.50	30.00	_____
Dec Transport	0.4	3.50	1.40	_____
Other Services Contracted				
Aug Oxen to carry water	0.2	12.00	3.00	_____
Dec	0.5	12.00	6.00	_____
Materials				
Aug Herbicide	2.0 Lt	14.50	29.00	_____
Aug Herbicide	2.0 Lt	5.65	11.30	_____
Sept Improved seed	60.0 Lb	0.40	24.00	_____
Oct Insecticide	25.0 Lb	0.80	20.00	_____
Nov Insecticide	12.0 Oz	2.13	25.50	_____
Sub-total			330.10	_____
Other Costs				
Interest on operating capital @ 12%			10.61	_____
Interest on fixed capital			4.96	_____
Depreciation on equipment			13.05	_____
Equipment repair & maintenance			6.33	_____
Total cost			365.05	_____

4.3. Farm Enterprise Record Keeping Methodology

4.3.1. Introduction

Farm records are widely used in the developed countries as a source of data for farm and sector analysis and for evaluating loan applications of farmers. A complete farm record is a history of a farmer's operation which provides data on production costs and returns, input use, production output, changes in inventories and resources, levels of efficiency and on his financial position, among other things. Income, net worth, and cash flow statements are commonly prepared from such records. Examples of complete record keeping systems for rural households in developing countries would be the work in Botswana and in the Philippines [Fox, Purcell, Alcachupas, and Hayami]. However, the suggested use of farm records is presented only as an alternative to farm surveys for gathering enterprise budget data. Thus, only certain parts of a complete farm record keeping system are used.

4.3.2. The Farm Record Book

The simplified record book suggested in this section is based on the experiments with more complete farm records in Honduras and the Dominican Republic.^{a/} It is assumed that a local para-professional will visit each farmer on a regular basis to assure activities are recorded correctly. At the end of the season, the data are summarized to produce the enterprise budget sheet in a manner similar to that

^{a/} For more detail on the respective complete farm record systems see Parks [No. 80-3, 1980] and Tinnermeier, et al. [1981].

followed when data are gathered through farmer interviews (method outlined in section 4.2.). Since data are being gathered for a specific enterprise, only a portion of the actual farm record book is used.

A simple design which provides for a relatively open format for the recording of all of the work activities, purchases and uses of inputs, sales of products, etc. on a single page for each crop or enterprise is shown in Figure 4.5. The format is similar to that of a cash record in which the expenses are recorded in one column and the income is recorded in a separate column. However, non-cash or labor activities also should be recorded on this same sheet but without any entry in the expense or income columns. A separate sheet for expenses, receipts, and labor use also could be used (as was done in Honduras) if more detail or division of information is desired.

A similar crop enterprise record system also was used in a separate project in Guatemala [Hildebrand, 1979]. That project grew in four years (1975-1980) to include 34 different sets of crop or crop system records with a total of 583 separate crop records. A simple, daily work sheet for the crop was completed by the farmer or someone in his family, if possible. Periodic visits of the technician completed the work sheet and gathered additional data not recorded by the farmer. That information was then summarized into enterprise budgets in a manner similar to that followed in Honduras and the Dominican Republic as explained in this manual.

4.3.3. Data Entry Procedures

The data entry form is fairly easy to use. The name of the enterprise and its starting date is indicated at the top of the form. Also, the number of hectares or other common units of land area in the crop is recorded. If the exact size of the field is unknown, actual measurement of the field should be done so the data truly reflect the land area under study. The page number indicates if there is more than one page for this enterprise record.

In the main part of the data entry form each activity is recorded as it occurs, from the initial seedbed preparation through harvest. The date, nature of the activity, its origin (if an input), quantity, unit of measure used, price per unit, and total expense or income is recorded for each activity. For family labor use, only the date, description of the work, the amount, and the unit of measure would be recorded.

It is advisable that daily entries be made (providing an activity for that enterprise took place that day) but this is possible only when the participating farmer or a family member is literate enough to do the daily recording. Otherwise, the data are recorded with the para-professional (interviewer) during their weekly visit.

4.3.4. Use of Trained Para-professional

Farm record keeping is certainly an expensive way of gathering data for use by credit or other institutions if an outsider is used. For small, often illiterate farmers, a system of record keeping can only function if there is an outsider to help with organizing and

recording the data through weekly visits. This outsider, or para-professional, is probably the key factor in operating a successful farm records or enterprise records program. Therefore, the para-professional should be selected before the farmers.

The competence and training of the para-professional are the most important factors affecting the accuracy of the records. General knowledge of agriculture and of area farmers is a definite asset. In Honduras, the most successful para-professional was a school teacher. In the Dominican Republic, a daughter (who was beginning university training) of one of the farmers worked well. In another test, a farmer with only primary education was effective. Thus, competence and general knowledge of agriculture are more important than having a lot of formal education.

The individual cooperating farmer also is important for obtaining reliable and accurate data. If the farmer or a son or daughter can record some of the data themselves, this greatly reduces the load of the outsider. Furthermore, the participating farmer must be sufficiently interested in helping record the weekly information or the results will be unsatisfactory. Motivating farmers to continue participating is a challenge since records are not needed for tax or other purposes as in the developed countries. Tying farm record keeping with the provision of credit is probably one of the strongest participation motivators available in developing countries.

4.3.5. Data Summaries

As indicated previously, once the crop season is finished the

process of preparing the enterprise budgets is fairly similar to that followed when the data are obtained through one-time farmer interviews. The data from each of the farm records is placed on the tabulation form (Figure 4.3). An additional step to consolidate the data into similar groups (listing of inputs, for example) may be needed depending on how dispersed the entries are on the data entry form (farm record sheet). From that point on the procedures will be the same as when using farmer interviews.

4.3.6. Problems

Farm and enterprise record keeping requires a great deal of discipline on the part of the farmer (or family) and the supervising institution. Some farmers aren't interested in their economic gains or losses and will quickly lose interest in continuing. Others simply find the process to be too demanding and forget to record all of the activities.

Also, the para-professionals and the supervisors from the supporting institution often lose interest over time since the work is very detailed and requires considerable individual dedication. The continuing cost of maintaining a farm or enterprise record keeping system and paying the para-professionals is another factor that can lead to disinterest over time. Nevertheless, farm record keeping does have some advantages over single-visit surveys as is discussed in the next section.

4.4. Comparison of the Two Approaches

Each of the two systems for gathering farm level enterprise data, single-visit surveys and farm records, has advantages and disadvantages. Some of these characteristics will now be reviewed.

++Accuracy and Reliability of Budget Data

Farm records (when adequately organized and managed) are usually expected to produce quite accurate and reliable data, especially for certain data. For example, accurate and reliable data on labor and water use and the timing of such use are almost impossible to obtain through one-visit questionnaires. When such coefficients are to be used in policy analysis and production/response models, labor and water use estimates from farm surveys may lead to very erroneous conclusions due to inaccuracy of the coefficients themselves. Also, special or new crops or livestock activities can be studied by using records whereas they may be missed by surveys.

Of course, the accuracy and reliability of both the surveys and farm records primarily depends on the human elements in the system--the farmer and the interviewer/para-professional. The farmer and the professionals must be sufficiently motivated to provide and record the data adequately or neither system will produce accurate and reliable data. However, given the same level of training and motivation, it is likely that the more intensive farm record approach will produce the better data. This is because less recall of past events is required of the farmer since activities are recorded at the time they happen. Also, errors in entry or of omission can be more easily corrected each

week with the record approach as compared with the single-visit, farmer interview approach. On the other hand, the record approach is much more costly to implement.

++Relative Costs

The greatest difference in costs between the two approaches will be in gathering data at the farm level. Because very few small farmers can maintain farm or enterprise records on their own, weekly or periodic visits by a para-professional are required. Thus, the record approach is considerably more expensive as compared with the farm survey where an interviewer visits the farmer just once (unless he can't be found and a re-visit is necessary). The outside para-professional may well cost \$200-400 per month on a part-time basis and can handle 10-15 farm records. This cost can be important where farm enterprise records are desired in a number of regions. Of course, the actual cost of a para-professional will vary greatly depending upon the country and the background/training of the individual hired. A qualified farmer may cost much less than a local teacher with a university degree.

Once the data are gathered from the farmers, the costs of summarizing the data and producing the enterprise budgets will be about the same since similar procedures can be followed.

++Institutional Requirements

Once the farm level data are gathered under either of the two systems discussed, the institutional requirements of staff, materials and equipment for summarizing the data into enterprise budgets and

ensuring their distribution will be about the same. Persons familiar with agronomic and farm management characteristics will need to review the field data, check for errors or omissions, group the data into logical categories for presentation, and prepare the final budgets. This work can be done at regional or national offices in accordance with available personnel.

At the local level, the single-visit survey (interview) method will tend to concentrate human resources and equipment in one area or region, for a few weeks or months, dedicated primarily to carrying out the interviews. Thus, considerable strain may be placed on the institution to provide such personnel and equipment (vehicles, for example) when there are competing demands for their use in other programs. In contrast, the enterprise record system will only require periodic visits to the para-professional by the supervising technician which can be more easily fit into the other activities and responsibilities of his job.

Also, because well-qualified interviewers knowledgeable about agriculture are critical to a good farmer interview, there may be pressure on the institution to select most of the interviewers from its limited pool of technicians. If so, this could place considerable strain on the institution because other activities needing those same technicians might have higher priorities for administrators. Since para-professionals can be used for enterprise records, with only periodic visits of the trained technician, this system will likely cause less internal conflict in terms of allocating scarce personnel.

Finally, the annual release of new or revised enterprise budgets may subject the institution to criticism if those budgets differ from other data sources or from other officially published budgets. Thus, the institution will need to be prepared to respond to such criticisms and establish internal measures to periodically check the accuracy and reliability of its data collection system and of the resulting budgets.

++Training Implications

Again, as stated in the institutional requirement section, the main difference in training needs will be at the farm level. If the interview method is used, either personnel within the institution will need to be trained in interviewing techniques or outside persons already trained for farmer interviews will need to be contracted. It is especially important that such training take place or the data collected may be poor. The suggestions on interviewing procedures in section 4.2.3. should be incorporated into any training program.

For farm records the training will need to focus on just a few persons (para-professionals, teachers, or farmers) who will be working part-time to help the farmers record their daily or periodic entries in the record book. These persons will need to be trained in proper methods of recording the data and methods of assuring all data are being gathered.

For both approaches, a minimum knowledge of agriculture and the crops being studied is required to assure good and complete data entry. Some of this knowledge can be gained through intensive training but it is most desirable to select interviewers and para-professionals to keep

records who already are quite knowledgeable about agriculture and the area being studied.

++Likely Continuation

It appears that the periodic one-visit interview approach probably has the chance of maintaining adequate support for continuation. Institutional resources and personnel are only required periodically and might be able to be fit into other obligations and programs without undue stress. On the other hand, the records require continual employment of the para-professionals, at least during the entire growing season. Many institutions may find it difficult to support such continuous work when there are limited budgets and resources. Given this experience, any institution starting a record keeping system should be made clearly aware of the need for continuous monitoring of the farmer.

5. SUMMARY AND CONCLUSIONS

This manual was prepared for developing countries and credit institutions wishing to improve their procedures for gathering farm level production data for use in lending activities. The paper focuses primarily on meeting selected farm production data needs (enterprise budgets) at the credit agent level. Data needs for sector analysis and other higher level needs are not considered to any great extent.

The common problems of preparing and using enterprise budgets in developing countries is discussed in Chapter 2. Many of the present ad hoc procedures result in questionable budgets in terms of reliability and accuracy. Even so, they are widely used by the field credit agents as a guide for preparing investment plans and for setting up loan disbursement and repayment schedules. This manual is meant to help improve those procedures.

In Chapter 3, some general guidelines for preparing enterprise budgets are presented. Seven separate steps are identified and recommended for anyone wishing to start or revise a data collection system. These steps are: (1) determine the need for budgets and the enterprises to be studied, (2) check and evaluate other sources for existing budgets, (3) select the data collection approach(es) to be used if other sources are not adequate, (4) implement the selected approach(es), (5) reproduce and distribute the budgets in a timely manner, (6) review and evaluate the budgets produced, and (7) up-date existing budgets and create new budgets repeating the process.

The main part of the manual is found in Chapter 4 where two of many possible approaches, a limited farm survey and a simplified enterprise record system, are presented in detail. Variations of both of these approaches were tested in Honduras and the Dominican Republic during the period 1975-1982.

The limited farm survey approach involves a number of steps. First, the enterprises (crops and livestock) and their common technological packages are identified. These are determined for each of the regions or areas which tend to be more homogeneous in soil and climatic characteristics. Then five or more farmers are selected who represent those technological packages. A final check is made at the beginning of the interview to assure that the farmer does, in fact, represent that package. Data from the interviews are checked for errors and omission and then averaged to include in the final enterprise budget for that crop, technological package, and area. Finally, these budgets are modified each year to reflect changes in prices. If there has been a major change in the use of inputs or in the technological package, then farmer interviews are repeated using the previously mentioned procedures.

The enterprise record systems differs from the interviews in that a para-professional makes periodic visits (usually weekly) to the farm to help the farmer record all the activities relating to that crop in the record book. These visits continue throughout the production cycle for that crop or livestock enterprise. The record suggested is actually just a one page form where all the labor, expenses, sales,

etc. are recorded in chronological order. These data are then grouped into categories which are summarized in the final enterprise budget. The summarizing of the data and the preparation of the final enterprise budget is very similar under both approaches.

Each of these two approaches for collecting data for enterprise budgets has its advantages and disadvantages. The farm interviews only need to be carried out once a year whereas the records are maintained weekly over the period of the crop cycle. The personnel used for the interviews can be utilized elsewhere during other times while the para-professionals need to be in the same area where the enterprise record keeping is taking place. As a consequence, the cost of collecting data at the farm level is likely higher than when one-visit interviews are used. On the other hand, the accuracy and reliability of the record data are likely better with the records since considerably less recall of past events is required of the farmer. Data on labor and water use by activity and time are expected to be relatively good using records while such data from one-visit interviews should be highly suspect. In the final analysis, the implementing institution will need to weight the advantages and disadvantages of each approach in terms of the needs and resources of the institution itself.

The serious application of the procedures and methods outlined in this manual should help developing country credit institutions (or others interested in farm level data collection) to improve the accuracy and reliability of their enterprise budgets. The system allows for continual up-dating of the budgets as prices and inputs change in a cost-effective manner. If so, it should be one step

forward in improving the operations and effectiveness of credit institutions serving small farm agriculture.

Appendix A

The Budget Identification Number Codes

The budget identification numbers have the following format:
A-BB-CDEFG*

The first digit (A) specifies the Region of the Secretariat of Agriculture. The second set of digits (BB) specifies the crop. The third set of digits (CDEFG) specify the technological characteristics. The asterisk is added at the end if a special characteristic is specified. The use of a coding system simplifies the organization of the budget files. The particular codes are listed in Table 2.

Table 2. Budget Identification Number Codes

<p>A. <u>REGIONS</u></p> <p>1. North</p> <p>2. Northeast</p> <p>3. Northwest</p> <p>4. Central</p> <p>5. Southwest</p> <p>6. South</p> <p>7. East</p> <p>8. Northcentral</p>	<p><u>Vegetables</u></p> <p>40. Salad Tomatoes</p> <p>41. Processing Tomatoes</p> <p>42. Peppers</p> <p>43. Garlic</p> <p>44. Squash</p> <p>45. Eggplant</p> <p>46. Onions</p> <p>47. Spring Onions</p> <p>48. Lettuce</p> <p>49. Okra</p> <p>50. Cucumbers</p> <p>51. Beets</p> <p>52. Cabbage</p> <p>53. Carrots</p> <p>54. Green Peas</p> <p><u>Fruits</u></p> <p>60. Plantain</p> <p>61. Bananas</p> <p>62. Papaya</p> <p>63. Pineapple</p> <p><u>Miscellaneous</u></p> <p>70. Tobacco</p>	<p>E. <u>INPUT USE LEVEL</u></p> <p>0. None</p> <p>1. Low</p> <p>2. Medium</p> <p>3. High</p>
<p>B. <u>CROPS</u></p> <p><u>Grains</u></p> <p>10. Rice</p> <p>11. Corn</p> <p>12. Sorghum</p> <p><u>Legumes</u></p> <p>20. Red Beans</p> <p>21. Black Beans</p> <p>22. White Beans</p> <p>23. Red, Black or White Beans</p> <p>24. Pigeon Peas</p> <p>25. Peanuts</p> <p>26. Chick Peas</p> <p>27. Vetch</p> <p>28. Cowpeas</p> <p><u>Tubers and Roots</u></p> <p>30. Potatoes</p> <p>31. Yucca or Cassava</p> <p>32. Yautia (Araceae)</p> <p>33. <u>Name</u> (a yam)</p> <p>34. <u>Mapuey</u> (a yam)</p> <p>35. Ginger</p> <p>36. Sweet Potatoes</p>	<p>C. <u>PLANTING METHOD</u></p> <p>0. Direct (no seedbed)</p> <p>1. Transplanting (Use of seedbed)</p> <p>2. Sprout or Shoot Method (Ratoon)</p> <p>D. <u>SOURCE OF WATER</u></p> <p>0. Dryland Farming</p> <p>1. Swamp Farming</p> <p>2. Gravity Irrigation</p> <p>3. Pump Irrigation</p> <p>4. Sprinkler Irrigation</p>	<p>F. <u>LAND PREPARATION SYSTEM</u></p> <p>0. None</p> <p>1. Manual</p> <p>2. Animal Traction</p> <p>3. Semi-Mechanized</p> <p>4. Mechanized</p> <p>G. <u>LAND USE CAPABILITY CLASS</u></p> <p>1. I</p> <p>2. II</p> <p>3. III</p> <p>4. IV</p> <p>A. I or II</p> <p>B. III or IV</p> <p>H. <u>SPECIAL CHARACTERISTICS</u></p> <p>Examples:</p> <p>For Rice: Tall-stem : Dwarf</p> <p>For Pineapple : Single Row : Double Row</p> <p>For Sorghum or Rice: Mechanical Harvesting (Manual Harvesting is otherwise assumed)</p>

APPENDIX B

Definitions for Technology and Land Quality

This section includes the technology and land classification definitions used in the Dominican Republic to illustrate possible criteria which could be used to identify alternative technological packages for which enterprise budgets will be prepared.

Planting System (Fourth digit or item C in number code)

- | | |
|---------------------------|---|
| 0. Direct Planting | The farmer does not use a seedbed. The seeds, plants or cuttings are planted directly in the field. |
| 1. Transplanting | The seeds are planted in a seedbed, and the resulting seedlings are transplanted into the field. |
| 2. Sprout or shoot method | All or part of each plant is left in the ground at the time of the harvest. The resulting plants are then cultivated for later harvest. |

Source of Water (Item D in code)

- | | |
|-----------------------|---|
| 0. Dryland farming | Crop is cultivated in well-drained soils that depend entirely on rain-water. |
| 1. Swamp farming | Crop is cultivated in poorly drained soils that depend entirely on rainfall or flooding from nearby rivers. |
| 2. Gravity irrigation | Crop is irrigated with water from irrigation ditches without use of pumps. |
| 3. Pump irrigation | The farmer uses pumps to raise the water to the level of the field but the water is distributed by gravity. |
| 4. Sprinkler | The farmer pumps the water to the field through pipes and sprinklers. |

Input Use Level (Item E in code)

- | | |
|-----------|---|
| 0. None | No chemical products whatsoever are used. |
| 1. Low | Less than 40% of the officially recommended quantity of <u>each</u> product is actually used. |
| 2. Medium | Between 40% and 75% of the officially recommended quantity of <u>each</u> product is applied, or a combination of high is some inputs and low or none in other chemical inputs is used. |
| 3. High | Over 75% of the officially recommended quantity of <u>each</u> product is applied. |

It should be noted that this input use category requires some flexibility on the part of the person responsible for tabulating the data. Failure of a given farmer to use pesticides in the recommended quantities constitutes a low level of input use. However, if the same farmer applied the recommended quantity of fertilizer, he would be classified as having a "medium" input use level. To be classified as "high", over 75% of the recommended quantity of each product must be used.

Land Preparation System (Item F in code)

Land preparation is limited to those activities that actually move the soil prior to planting. Land clearing and similar activities in virgin soils are not included since this constitutes more of a medium or long-term investment and should not be in an enterprise budget representing seasonal production costs. This category includes activities like clearing of brush, and plowing before the seedbed is prepared. Costs for the final seedbed work like smoothing, ditching, ridging, and the seeding itself are not included in land preparation costs.

- | | |
|--------------------|--|
| 0. None | No earth-moving activities are performed. For example, pigeon peas may be planted on hillsides by making a hole, dropping in the seed, and covering in a single operation. |
| 1. Manual | All work is performed by hand. |
| 2. Animal traction | Most of the work is performed using animals and the rest is done by hand. |

3. Semi-mechanized Most of the work is performed by machines but the cost of the work performed by hand or by animals still accounts for over 25% of the total land preparation costs.
4. Mechanized Over 75% of the land preparation costs are for mechanized operations.

Land Use Capability Classes (Item G in code)

This category is included because soil quality has a definite effect on the cost of producing and given crop. While there are many different classification systems, the U.S. Soil Conservation Service's Land Use Capability Class System was used in the Dominican Republic. According to that system, all soils are classified in one of eight land use capability classes. The first four classes of soils are suitable for crops, pastures or forests while the last four classes are suitable only for pastures or forests. Class I soils require no soil conservation practices, while those in Classes II through IV do require soil conservation practices, with the need increasing in each subsequent class.

For purposes of the enterprise budgets, soils do not need to be classified with extreme accuracy but the use of a standard system is needed so each interviewer doesn't use his own criteria for classifying the soils.

Special Characteristics

Certain production systems have special technological variations that are not included in the five previously defined technology and land use categories. When such "special characteristics" need to be specified, they are added to the standard technology specifications appearing in the upper right hand corner of the budget sheet and an asterisk is added at the end of the budget identification number to indicate a special case.

Appendix Table C-1

CROP ENTERPRISE COST STUDY *
Maize at El Hammam, Giza Governorate,
Summer 1981. (1)

EGYPT WATER USE & MANAGEMENT PROJECT

Prepared by: El Shinnawi
 File Name: MB108C
 Date Prepared: June 1982

ECONOMICS DISCIPLINE

Item	Unit	Number of Units	Value Per Unit L.E.	Income or Cost L.E.
Income				
Maize				
Maize Stalks	Ardeb Bundle	10.0 400.0	15.000 0.860	150.0 24.0
Total Income				174.0
Variable Costs				
Planting				
Seed	Kela	1.9	1.500	2.9
Labor for Planting	Man Hour	17.3	0.250	4.3
Harvesting	Man Hour	82.0	0.250	20.5
Chemical Fertilizer (2)				
Ammonium Nitrate (33.5-0-0)	Kilogram	462.0	0.105	48.5
Labor to Spread Fertilizer	Man Hour	11.1	0.250	2.8
Irrigation				
Labor to Spread Water	Man Hour	30.0	0.250	7.5
Pump Rental	Pump Hour	30.0	0.500	15.0
Harvesting				
Labor for Harvesting	Man Hour	27.0	0.250	6.8
Transportation				
Labor to Load & Drive An.	Man Hour	24.0	0.250	6.0
Donkey Rental	Animal Hour	24.0	0.100	2.4
Total Variable Costs				116.6
Return Above Variable Costs				57.4
Fixed Costs				
Land Rent (3)	Month	4.0	7.000	28.0
Management Charge	Month	4.0	1.000	4.0
Total Fixed Costs				32.0
Grand Total Costs				148.6
Return Above All Costs				25.4

FOOTNOTES:

- * This study for an area of one feddan.
 EWUP Farm Record Data for El Mansuriya, 1980-1981.
 (1) Maize following broadbeans without tillage. Planted from June 1 to 15 and harvested from September 10 to 30.
 (2) The price of fertilizer is the average price for fertilizer purchased from the cooperative and the free market.
 (3) The rental rate for land is computed as seven times taxes (legal rental rate).

	LABOR DISTRIBUTION			WATER DISTRIBUTION, CU METERS			
	Man Hours	Women Hours	Boy/Carl Hours	First Irrig.	Second Irrig.	Third Irrig.	Fourth Irrig.
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
January	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0
June	83	0	0	0	0	0	0
July	45	0	0	220	216	0	0
August	8	0	0	270	180	270	180
September	56	0	0	270	180	270	0
October	0	0	0	0	180	0	0
Total	191	0	0	Total Water Applied = 2574 Cu Meters			

Ratio of Return over Variable Costs to Water Applied = 0.0223

Ratio of Return over All Costs to Water Applied = 0.0099

FOOTNOTES:

- * Water distribution quantities are based on EWUP engineering measurements.

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