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PUTTING FARMING SYSTEMS RESEARCH DATA COLLECTION IN PERSPECTIVE: PRACTICALITIES AND REALITIES

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One of the major goals of Farming Systems Research (FSR) is to develop among scientists, Extension workers, and policy makers, a more thorough understanding of the small-scale, limited resource family farm. The underlying assumption is that a firsthand knowledge of the "total" farming system, from the farm family's point of view, is critical to increasing the family's productivity and to improving its quality of life. It is with this body of knowledge that researchers, Extension workers, and farm family members, collectively, are able to identify major system constraints to production, design and test acceptable solutions, and ultimately recommend improved technologies to other farm households.

Data collection is a major part of all FSR activities. It begins with the initial attempt to build acceptance for a farming/production systems research approach, and continues through to the time when acceptable technologies are recommended and transferred to farm families through Extension or other educational strategies. Each phase of the FSR problem solving process is depends on quality information for decision-making (see Figure 1).

The main concern of FSR is the small-scale farm family whose goals and resources are not necessarily the same as those of the larger commercial farm unit. The data collection design must be responsive to this unique production environment, as the farm family perceives it. Simultaneously, it must be sensitive to the macro environment, that is social organization, cultural norms, land tenure, community leadership, institutional structure and government policy. While the strategy incorporates both micro and macro perspectives, it is the "bottom-up" or micro orientation that is the overriding concern.

Data collection methods must therefore be planned in response to the whole situation. They must not only meet the expressed needs of the small-scale farm family, but must also correspond with the needs of the local Extension staff, research station staff, organizational decisionmakers and national leaders. Approaches should be selected which are flexible enough to adapt to resource constraints, yet are sufficiently rigorous to produce realistic predictions about the adoption feasibility of improved on-farm practices. Above all, the design and implementation of these activities must be complementary to what is already on-going, otherwise FSR may be perceived as competitive, threatening or a waste of resources.

FSR PROBLEM SOLVING PROCESS

The FSR approach provides a framework which can be applied to solving the production problems of small-scale family farms. This is based on the assumption that small-scale, limited resource family farms usually are the recipients of a disproportionately small share of the benefits of agricultural research, Extension, and other development activities (Hildebrand and Waugh, 1983).

The FSR problem solving process can be organized into five primary activity phases. All may progress simultaneously, or activities may begin at any appropriate point. Regardless of point of departure, the process should assure that current production systems are well described and understood within the physical, agronomic and socioeconomic environment, especially from the farm family's point of view. The five phases, along with corresponding activities, are illustrated in Figure 1. They are:

1. Legitimization of the FSR approach
2. Research Site Selection
3. Problem Analysis
4. Solution Identification
5. Extension Integration

Various authors have identified comparable "stages" in the FSR process (see for example Gilbert, Norman and Winch, 1980; Shaner, Philipp and Schmehl,

1982). However, few note the importance of integrating Extension from the beginning. The legitimization phase has not been seen as an integral part of the entire problem solving and data collection process. Legitimization and organizational integration, at national and local levels, must receive careful consideration from the onset. This component should not be divorced from the data collection process.

In the initial stages, understanding and acceptance of the FSR approach are generated through participatory processes involving influentials, decision-makers, local leaders, expatriate team members and government staff. This early legitimization contributes to a more acceptable research design, inter-disciplinary attitudes among staff, early identification of a research site, understanding of real production constraints. It is the ideal time to begin to train critical program participants for responsible long term involvement.

Farm family members, local leaders, researchers from different disciplines and Extension staff form a collective team for identifying constraints and problems. A "research team" representative of this mix identifies alternative solutions, at the same time considering the consequences and trade-offs of each. Potential system improvements are tested under small farm and experiment station conditions. During experimentation, activities and outcomes are monitored by participating farm family members, local leaders, Extensionists and scientists. Acceptable solutions are integrated into a continuing Extension program directed at comparable farming system households. Supportive institutional arrangements and needed policy changes are also identified.

DESIGNING DATA COLLECTION FOR PRACTICAL NEEDS

Each phase of the problem solving process requires certain types of information. In some cases data are needed in a limited amount of time. This may imply fewer sources of information or more rapid research site selection. Decisionmakers may demand high project visibility. On the other hand, more complex technical questions concerning the economic feasibility of one method of planting versus another may demand more rigorous experimentation combined with careful monitoring of farmer behavior.

While data collection methods must provide reliable and timely information, there are points in the process when it is advantageous to adapt data collection methods to accomplish additional goals. For example, if local leaders and farm family members are expected to understand and support the program, they need to be involved in the research process. This may necessitate adapting research methods to provide meaningful learning experiences for less academic participants, and to obtain higher levels of participation from these team members. Both Extension and research staff can make unique contributions to an FSR team, however each brings a different background of experience and training. Both are essential to the outcome.

While the FSR approach is not new to the rural development field, it does demand that attention be given to certain implementation factors that might otherwise be overlooked or underemphasized. Attention to these factors can be assured through careful design of the data collection process.

Methodology should not be an end in itself; rather it should serve as a tool to facilitate the following five practical needs:

1. Systems Framework
2. Participation and Communication
3. Learning Laboratory
4. Reliable Information
5. "Bottom-Line" Decision-making

Systems Framework

The data collection design must incorporate a systems framework which, within reasonable limits, views the production problem from the point of view of the farm family, and the various interrelated disciplines represented.

In Egypt, for example, the linkages between crop production, livestock and family well-being are apparent. The Egypt Major Cereals Improvement Project staff identifies the shortage of animal forage to be a major problem to which FSR approaches might be applied. The shortage of summer forage has a direct effect on animal nutrition and weight, therefore on animal productivity and profitability.

Berseem is by far the most important element in the livestock diet. Therefore the tendency for Egyptian farmers to devote more and more land to Berseem production conflicts with the need for increased human food crop production. The well-being of many small-scale Egyptian farm families is tied to livestock production in that smaller farms are most dependent on cash returns from livestock products. Livestock represent an important source of draft, transportation and water power, manure, milk and meat.

Family member roles and responsibilities are also linked to the problem since women in these farm families provide at least 40% of all labor in livestock production. The problem is also impacted by factors beyond the small farm setting. Government regulation of crop rotation and pricing policies affect farm families' willingness to adopt alternative land use practices, and forages and feeding patterns (Butler, 1983).

Participation and Communication

Data collection methodologies and institutional arrangements must assure responsible and collaborative involvement among farm family members, Extension workers, researchers from various disciplines and local leaders.

The FSR approach draws on basic community development principles in which participatory decision-making has been found to be an effective means of building local leadership skills, solving local problems and strengthening local support. As people perceive personal rewards for involvement, they are more likely to assume an increasing level of responsibility for methods used, findings obtained, and recommendations generated.

The underlying assumption is that all the key actors in the process possess information from which the research process can benefit. Farm family members and local leaders have years of informal research experience based on many generations of adapting for survival. Academically trained scientists can from farmers about the environment, for example, by learning local terms and classification systems, by listening and by observing. Sometimes this explains why technological solutions look reasonable to scientists but unreasonable to farmers (see Chambers, 1980).

Farm family members also develop a greater appreciation of scientists' perspectives by working closely with them. Team collaboration is a long term effort that can do a lot to reduce social distance.

Learning Laboratory

Design methods to take advantage of the unique capabilities of all team members. They should hold potential for teaching skills that will contribute to program goals. Ideally, the FSR team should eventually be able to train others in phases that follow. They should be able to apply their knowledge to new situations with a minimum of guidance. If Nationals are not trained and motivated to apply the methods, it is doubtful that institutionalization of the approach will occur.

For example, some scientists may have neither the aptitude nor the interest to conduct social surveys or informal interviews. Everyone does not have the ability to ask the right kinds of questions in the most appropriate language. While the right attitudes are important, it may require considerable training to reach the necessary skill level to execute a high quality scientific survey. It may be more productive to train these scientists in informal interviewing skills as might be applied in "rapid reconnaissance" or exploratory-type surveys.

Citizens and local leaders with no exposure to social survey or interview techniques may be better exposed, at first, to more structured survey methods, as by conducting a village census, farm record keeping, or household diary keeping.

By turning data collection methods into learning laboratories, some compromises may be necessary, for example, in scientific rigor and in time required. Begin where team members feel they are now. It may be well worth the so-called "scientific sacrifices" to develop peoples' skills, enthusiasm and motivation in order to generate needed long term support for the program. Development of Nationals' skill colleagues' for institutionalizing the methods after the expatriate team is gone should be of primary concern.

Reliable Information

The ultimate purpose of data collection is to generate accurate information on which sound and timely decisions are made. Decisions may pertain to improved technologies, but also to changes in management, institutional structure, planning strategies and policy recommendations. Reliable information is crucial to qualify decision-making.

Application of the systems approach to research brings an accompanying danger-the tendency to collect more data than is either economical or useful. Resources are probably already in short supply, therefore the research team should seize the opportunity to utilize time, money, and human energy in the most efficient way possible.

Chambers (1980b) notes the need to maintain a balance between actual use of information and the cost of gathering information. There has been a tendency toward "long-and-dirty" data collection approaches in which investigators have collected "mountains" of unused data, or toward "quick-and-dirty" approaches which suffer from reliability problems. Neither are cost-effective.

The challenge is to adapt traditional survey procedures, or other more rigorous data collection methods, to produce the kind and quality of information needed under the particular circumstances. At the same time, there is a need to keep methods practical and culturally appropriate to encourage participation from people whose contributions are greatly needed.

"Bottom-line" Decision-making

Data collection strategies are only valuable when they produce information that answers the questions being asked.

There is a danger, especially where social scientists are concerned, in focusing on broad, philosophical questions and not enough on the feasibility of proposed solutions, or on the consequences of alternatives. Information may be needed about alternatives that can be implemented in the next growing season. Decisionmakers and planners need the kind of data that will solve real production problems yet be compatible with available resources, staff attitudes and political realities.

Consider data collection methods that respond to these realities, for example approaches that produce fast turnaround of data, and interpretations that are clearly understood. Compare the trade-offs among various alternatives in order to accommodate the need for essential decision-making information.

GUIDELINES FOR SELECTING AND ADAPTING METHODS

There are a multitude of factors to consider before deciding on the best data collection design. While the problem itself is important, there is a whole array of critical questions about resources available, institutional compatibility and local acceptance that are worth examining. Some preliminary questions follow to help in planning appropriate data collection strategies.

A. What questions or indicators to examine?

1. What are the precise objectives of data collection? Why are the data needed? How will data generated fit into the overall design? What are the most critical indicators about which information is desired?

2. Will the information obtained produce the desired end product? E.g., visible results, recommendations for action, acceptable improvements in technology, local community and institutional support.

3. How much detail or depth of information is absolutely essential? What level of quality is necessary?

4. Does the information already exist, or must it be collected as new information?

5. Is the cost of data collection justified (human, time, monetary)?

6. How valuable will the information ultimately be to the farm family? To decisionmakers? To government staff? To the donor? To all project team members (National and expatriate)?

7. Will the information available be timely in relation to production decisions and activities? Political deadlines? Project time schedule?

B. What methods to employ?

1. Will methods assure that there is a legitimate and representative support group to take responsibility for plans, decisions and recommendations? Does this group represent various interests, disciplines, stratification levels and types of expertise?

2. Will methods result in fairly accurate information on which planning decisions can be based? Will the findings be respected?

3. Is there a balance between excessive scientific rigor and a sufficiently systematic design which will yield reliable findings?

4. Will the methods accommodate the skills and abilities of the multidisciplinary research team, and all other people involved in the process? Is responsibility for data collection equally shared among disciplines, responsibilities and levels?

5. Will there be timely data turnaround to contribute to design of seasonal experiments, budget needs of administrators, training needs of Extension workers, and political needs of policymakers?

6. Will the methods be conducive to a participatory mode? How will methods assure collaboration in design, field implementation, analysis of findings, identification of recommendations and dissemination of findings?

7. Is the total design flexible enough to accommodate changes in the production system, in team members' observations, local community attitudes, national policies, etc.?

INTEGRATING DATA COLLECTION METHODS WITH EARLY FSR PHASES

Most research efforts can benefit from the combination of several methods. Frequently, the strengths of one method compliment the weaknesses of another. For example, direct observation of animal feeding practices add clarity to a respondent's description of the same subject. A longitudinal study, along with household diary keeping, might provide seasonal insights, as well greater understanding of the impacts of social obligations and national policies on management behaviors.

The overall data collection design should be "more like an umbrella of activity beneath which any technique may be used for gaining the desired information, and for processes of thinking about this information" (Schatzman and Strauss, 1973:14).

On the following pages, attention is directed to the potential contributions of some of these methods to FSR activities. Emphasis is on activities that precede on-farm experimentation, however, his does not diminish the importance of data collection throughout the entire process.

Hildebrand (1983a) refers to early phase activities as the "initial characterization" of the farming system. This involves the analysis of existing farming systems in close consultation with farmers. While this paper takes a broader approach to early phase activities and data collection methods than does Hildebrand, the concept of "initial characterization" is a useful one. Although other informal data collection activities probably precede it, Hildebrand emphasizes the "sondeo" or rapid reconnaissance by multidisciplinary teams as the primary means of data collection in this early phase (see Shaner, Philipp, and Schmehl, 1982).

A slightly different approach is suggested by Byerlee and Collinson (1980). Secondary information sources are reviewed as background data. This is followed by an informal or exploratory survey by an interdisciplinary team. A formal survey is implemented later as means of verifying the quantifying the data obtained in the exploratory survey.

There is an increasing amount of support for the need to design data collection approaches, particularly in the early implementation phases that minimize costs. Norman (1982) notes the importance of looking for ways to reduce time and resources, thereby utilizing methods that move the research through the various research stages, yet promote the degree of understanding that is necessary.

Figure 2 proposes alternative data collection methods that might be considered at different points in the FSR problem solving process. Each activity has the potential of generating a certain type of information, and of contributing to the other practical needs of the project.

Given the need to build national and local support and understanding of the approach, and to develop the needed commitments for institutionalization, cost-efficient methods must also be suitable for broad participation. Participation not only contributes to knowledge and understanding, but also to skill development.

1. LEGITIMIZATION OF THE FSR APPROACH

The long-term success of an FSR program is dependent on local community acceptance and understanding of FSR activities. Similarly, there is need for support at national and regional levels. Local and national leaders, decision-makers, and influentials must understand what is to take place, how it will involve them and those they represent, and what costs are rewards they may expect. The same is true of local and national Extension and research personnel who may be involved.

The best assurance that this will occur is participation--in program planning, implementation, and evaluation. Forming a "one-time only" advisory committee is not the answer. A plan must be developed to give key people responsible and continuing roles in the total process, and if necessary, to train them to fulfill these roles.

Two central data collection methods have major applicability to the FSR approach. These are (1) the ethnographic interview and (2) the key informant method. A basic understanding of these will prove valuable throughout the project since they can be adapted to meet different needs.

The Ethnographic Interview

An informal, friendly interview method has been developed and tested by anthropologists. It is a relaxed conversational approach used to get to know key people from whom information is desired. The objective is to establish a friendly relationship which will build trust and understanding between interviewer and interviewee. It results in willingness to openly discuss particular topics, situations, or events (Spradley, 1979; Agar, 1980).

Ethnographic interviewing skills require careful listening, sensitive probing, the ability to show interest in others, and the capacity to remember what is heard. Advance planning of key discussion topics is helpful. Note-taking is best left until the discussions are over, and leave has been taken.

Ethnographic interviewing techniques have applicability throughout most FSR activities. The are basic to all informal survey work (see for example Rhoades, 1982), and they can supplement the weaknesses of other methods.

The skills are prerequisite to carrying out the key informant method, one of the most helpful methods of data collection in early legitimization activities.

Key Informant Method

A few carefully selected local people can serve as valuable informants about the local area or about an organization. This participatory approach can also help to legitimize the FSR program. If knowledgeable people are selected,

they can provide indispensable information about local farming systems, production problems, climatic change, historic events, social expectations, and community leadership. The same approach can provide valuable insights into Extension or research staff training, organizational structure and national policy.

Selection of informants is critical. They must be willing and able to relate to interviewers, able to articulate their knowledge, and be informed about agricultural problems, the community and associated organizations. At the institutional level, they must have sufficient experience to be knowledgeable about all organizational levels and policies. This technique can be integrated with other methods, such as directed surveys or observation, to decrease the possibility of bias or data distortion.

RESEARCH SITE SELECTION

Once the criteria have been established to guide decisions about research area selection, information will be needed on which to base these decisions. Again, key informants in the local area can be helpful. Other methods should also be considered.

Existing Data

All available secondary information should be reviewed. This means searching out census and statistical reports, development project papers, business forecasts, government documents, village administration records, office reports and files, and student papers or theses. Obtain data on climate, soils, markets, prices, and credit. Look at local newspapers, if available. Even old photographs can reveal a lot. Agronomists should not confine themselves to agronomic studies. Neither should anthropologists look only at social science materials.

Maps and Aerial Photos

Land use maps, aerial photos, and relief maps can provide a quick overview of large geographical areas. This will help locate roads, waterways, settlements, and variations in soil type and topography. Open rangeland can be identified as can field sizes and types.

Windshield/Horseback Observation

After reviewing existing data, the team should move around the area by vehicle or horseback. The purpose is to overview the area in a few days making broad, sweeping observations of terrain, soil, farm size, productivity, infrastructure (roads, transportation, markets, trade centers), crops and animals, farming practices, and social centers.

Talk to farm family members and local leaders along the road, in the fields, at the market, and in the shops. If possible, see if the team can reach any consensus about farming system clusters or zones. Look for similar patterns or systems which will help group similar production systems together.

3. PROBLEM ANALYSIS

Allow adequate time for accomplishment of the preceding two phases. Proper legitimization and an acceptable research site will go a long way to ease the process of describing and understanding the specific farming system. If farm families understand the purpose of the research, and begin to identify with it through their own participation, the value of the data will be enhanced. Include the perspectives of local and regional Extension staff, researchers from experiment stations as well as those who are more field oriented, and middle and upper-level administrators.

Problem analysis refers to understanding the total production system and how each subsystem is related to the others. It includes identification and prioritization of constraints and problems, and diagnosis of causes.

Different people may see the problem in different ways, and in some cases, there may be a strong perception that there is no problem. This can occur when representatives of one discipline (i.e., crops research) feel that problem identification in their area of expertise is a threat to the quality of research that has been conducted to date. On the other hand, scientists may feel they already know the problem, arguing that this phase should be omitted.

It may require a considerable amount of dialogue to eventually "start where people are," at the same time proceeding with a more intensive problem analysis which includes understanding small-scale farm family members' goals, their adaptive research experience, and external factors that have a direct bearing on major problems. This doesn't mean carrying out an endless study of the total micro and macro system, however it does imply the need to understand the "big picture". Eventually a subsystem problem (or problems) need to be identified so that alternative solutions and the consequences of each can be examined. It is necessary to go through this analysis before setting goals and designing methods for the Solution Identification phase.

It is at this phase that most of the methodological debate arises. The questions center on the pros and cons of implementing a less formal "sondeo" or rapid reconnaissance approach, or a more formal scientific or baseline survey. While each approach, or its modified version, can make certain contributions to problem analysis, it is important to understand the purposes of each, what each can and cannot do, and the prerequisites that assure the most productive use of the technique.

The "Sondeo" or Rapid Reconnaissance

This modified survey approach is sometimes referred to as an exploratory survey, rapid rural appraisal, rapid reconnaissance or "sondeo." All have some elements in common. The purpose is to generate rich, insightful data about the total production system in a relatively short period of time. This responds to the need for a low cost-low resource approach, and the need for assuring that a systems approach is incorporated. The "sondeo" can also incorporate a broad base of participation and communication into the problem analysis phase.

The "sondeo" relies on ethnographic interview skills. A minimum of notes are used during the discussions. Small multidiciplinary teams, of which farm family members are an integral part, do the interviewing. After the interviews are over, the team attempts to reach agreement about what has been discussed or observed. The informal interview should describe the current production system, include an understanding of why this has evolved, clarify family goals and aspirations, highlight possible constraints to production, and point to potential solutions.

"Sondeo" teams are composed of mixed-interest pairs, for example an agronomist and an economist. The teams scatter, meeting at mid-day, discussing and interpreting findings, then switching partners for the afternoon's interviews, and reaching consensus again. Approximately four days are spent this way with a minimum of four interview discussion sessions. individuals summarize their own findings, returning to fill in data gaps as necessary. Eventually, a group report is developed (Shaner, Philipp, and Schmehl 1982:289-293).

Table 1 outlines some of the potentials and limitations of the "sondeo" or rapid reconnaissance approach. The degree to which these apply depend on how the method is organized, who is involved, the quality of training preceding implementation, and the individual characteristics of team members.

Table 1. The Potentials and Limitations of the "Sondeo" or Rapid Reconnaissance Approach

The "Sondeo" or Rapid Reconnaissance	
Can	Cannot
. Provide deep understanding of specific situation, i.e., one farming system	. Be generalized to large population
. Be analyzed by group consensus	. Be applied to random sample
. Be done by people with diverse backgrounds and experiences	. Be done without good leadership, organization and training
. Incorporate "bottom-up" or micro perspective (or vise-versa)	. Guarantee confidentiality
. Result in biased information	. Generate all the answers, i.e., quantitative
. Provide rapid data turnaround	. Provide quantitative data for statistical analysis
. Get side-tracked with extraneous information	. Guarantee objectivity
. Be low cost	. Assure that all perspectives and situations are reflected
. Facilitate participation and communication	. Guarantee equal treatment to all respondents
. Provide qualitative data	

The major prerequisites assuring successful application of this technique are:

- Advance legitimization
- Team members' skills in ethnographic interviewing
- Selection of team members (including key informants)
- Training of team members
- Team members' knowledge of research site(s), e.g., agronomic, climatic, socioeconomic, physical environment
- Ability of team to reach agreement in a short time period
- Availability of team members for intensive field work

The Baseline Survey

Surveys, in their pure form, are intended to describe the distribution of people in a population who have one or more designated characteristics. This is done by first identifying a population of interest, and second, by collecting information from a subset determined to represent the entire population.

A survey is a more formal approach to data collection, although the technique can be modified in many ways to produce the desired information. For example, a survey can be conducted by personal interview, mail, telephone or a combination of these approaches. Generally, surveys are prepared ahead of time in a structured questionnaire-type format. Surveys are designed to obtain respondents' opinions or attitudes about particular events, situations, or experiences. Responses can be elicited in either open or closed-ended questions. All respondents get the same questions. The length of the survey, the sample size, and the question being asked will determine the type of analysis procedures necessary.

Baseline surveys have frequently been conducted in affiliation with large agricultural development projects. They generate a vast amount of information about a wide variety of topics, and they cover wide geographical areas. The Lesotho Basic Agricultural Services Program (BASP), within the Planning and Evaluation Division of the Ministry of Agriculture, implemented a baseline survey which included data about the household, farm resources, cropping practices and production, and marketing. It sampled two ecological areas and

35,000 families. The purposes of this survey were to provide: (1) conventional benchmark data describing the structure of smallholder farms in terms of resources and organization and to determine production output, yield, and income, and (2) information on production techniques and input/output relationships (Steele and Winch, 1981).

There are some circumstances when a baseline survey is justified, for example when there is little or no existing information about an area. A baseline survey may be required to help evaluate project benefits. In some circumstances there are other purposes for a baseline survey. The Lesotho Farming Systems Research Project conducted a baseline survey in 1980 which was intended:

1. To provide a quantifiable description of farming practices, including marketing, extension and family nutrition, in three different ecological the each ranging in size from 14,800-23,500 acres

2. To provide a current description of area population

3. To identify production constraints

4. To identify better methods of providing agricultural technical information to farmers

5. To create an on-the-job training laboratory in field survey methods

6. To increase area farmer involvement in, and understanding of, the project (Butler, 1982).

In the Lesotho situation, there was little existing information about the three ecological areas in which the FSR program was initiated, therefore, the first two purposes are reasonable expectations. The baseline survey also served a useful purpose in training staff in survey methods, and in giving selected personnel first hand experience in survey design, interviewer training methods, field supervision, and data analysis. Complete statistical analysis became difficult to carry out in-country, resulting in transfer of the task to the Washington State University campus.

Some of the other purposes can be questioned. Probably too much was expected of this one method. Other methods, such as use of key informants, diary keeping, or the "sondeo", might have been used to greater advantage after skills in survey methods had been learned. It is doubtful that the "sondeo" could have been carried out in the early stages of program implementation with a similar high level of National staff involvement. This is partly due to the limited availability of trained agricultural research personnel.

The Lesotho baseline survey not only was difficult to analyze under local conditions, but the amount of time required for this process (almost one year) added to the improbability that the information will ever be put to effective use. The entire process of survey design, training, implementation and analysis consumed approximately 21 months and a comparable high percentage of social science staff time. Part of the potential for data use was diminished by project staff turnover before data analysis was complete.

Major potentials and limitations of the baseline survey are outlined on Table 2. The greatest difficulty in utilizing this technique in FSR settings are associated with the uniqueness of the working environment. Normally, there are difficulties associated with cross-cultural communication. These become even more difficult to deal with in a survey instrument. Some people are sensitive to being excessively surveyed. Others are unaccustomed to having their privacy invaded. Therefore, the baseline survey requires more rapport-building than is probably practical. Another major difficulty lies with local resource limitations. Frequently these constraints prevent timely data turnaround. This is a major handicap where early visibility is a must.

If a baseline survey does seem to be a useful FSR problem analysis technique, it will be more helpful to the FSR program if:

- Purposes are limited
- Directed to one population, production subsystem, or problem area
- Length is limited
- Responsibility for survey is assumed by a multidisciplinary steering committee, rather than a single discipline
- The organizer has a strong background in local languages and cultures

Table 2. The Potentials and Limitations of the Baseline Survey Approach

The Baseline Survey	
Can	Cannot
. Be generalized to large population	. Provide problem depth and insight generated by personal rapport
. Provide wide range of information about population characteristics	. Guarantee accuracy/reliability of recall data (one time perspective)
. Random sample	. Guarantee participation of all respondents selected
. Be statistically analyzed (quantitative)	. Be analyzed by untrained personnel
. Involve entire population	. Assure high level team participation (i.e., cross-discipline, cross-social strata)
. Achieve confidentiality	
. Be conducted by non-academics	. Assure reliability without quality leadership/organization
. Be expensive (time input)	. Always assure fast data turnaround
. Be inexpensive (population represented)	. Always assure that the right questions are asked the right way
. Be subject to cross-cultural communication problems	. Be easily adapted to problems of developing nations (technology, education, infrastructure)
. Be adapted to resources, problem, desired responses, etc.	

Observation

Systematic observation methods supplement data obtained by interview or family record keeping. For example, an observer who spends a lot of time with a family may learn what influences the family's decisions about when to plant, to whom to give gifts, or where to graze livestock. More can be learned about use of indigenous plants, social networks and cultural norms. Frequently, this kind of data is not generated by a structured survey or informal interview because the survey designer or interviewer does not know the right questions to ask.

Observation can be conducted (a) as a full participant in the farm family's activities, (b) through systematic visits to the farm at selected times, or (c) as an unknown observer who attempts to "eavesdrop" without people being aware they are being observed.

Like any other method, observations must be planned in advance. You must know what you are looking for. Webb et al (1966) describes some of the more subtle indicators that can be observed. For example, clothing, manners, or foods consumed might describe social status. Body gestures or movements, and facial expressions depict emotions such as tiredness, illness, frustration, and competence. Body language may differ between sexes, age groups, or social classes. Physical location of homes or fields may signify social status. Seating arrangements and group conversational patterns may do the same.

4. SOLUTION IDENTIFICATION

One of the major goals of FSR is to identify improved technologies or practices that the farm family is willing and able to accept. The views of the farm family are central to the research process, therefore, the search for problem solutions must, according to Norman (1982), be done in such a way as to determine:

1. The necessary conditions under which the farm family will be able to adopt the changed practice, for example, technical feasibility, social acceptability and compatibility with community/national institutions.

2. Sufficient conditions under which the farm family will be willing to adopt the changed practices, for example, the need for compatibility between family goals and attitudes, the new practice and the current production system.

The primary means of generating data about the acceptability of alternative practices is through on-farm experiments. The design of this activity will vary with local conditions, and with current state of basic research. It may be appropriate, for example, to include the experiment station as one research

site in addition to small-scale limited resource farm sites. This is especially important if the area has a history of experiment station work directed to local production problems, and a well developed research institutional structure.

Other data collection activities can be advantageously combined with on-farm experiments to further assess social and economic feasibility. Experiments can be monitored with systematic observation, family diary keeping or extension agent case studies. Continuing farm or enterprise records can provide a longitudinal picture of labor and other resource availability, and crop production and yield. Participant observation techniques combine well with record keeping when household or community information is desired, for example among pastoral populations, and in relation to livestock production and range management. Traditional experiments may have less value in these circumstances.

On-Farm Experiments

The purpose of on-farm research is to involve farm family members in the generation, evaluation and dissemination of improved production practices. The aim is to conduct a major portion of the biological research in the local area, ideally on small-scale limited resource farms, with farm family members assuming major management and decisionmaking responsibilities. Although experiments frequently begin as "researcher-managed" trials, eventually the goal is to have farmers manage the experiments themselves "in order to assess the acceptability of the technology when it is completely under their control" (Hildebrand, 1983b).

Hildebrand (1983b) outlines a flexible sequence of FSR/E[2/] steps into which on-farm trials fit. The author notes the parallel between this sequence and the informal adaptive research that farm families have always done. The major steps are:

[2/] FSR/E is a term developed by the Farming Systems Support Project to describe the Farming System Research and Extension Approach. This is contrasted to FSIP or the Farming Systems Approach to Policy and Infrastructure Support.

1. Initial characterization and analysis of existing farming systems.

2. Planning and design of early phase work, including biological research and continuing agro-socioeconomic characterization.

3. Selection, generation, and evaluation of technologies, including (a) commodity and discipline research on experiment stations and in laboratories; (b) researcher-managed on-farm trials with farmer participation. Researcher-managed on-farm trials can include exploratory trials, site-specific trials, regional agronomic trials and agro-socioeconomic trials, (c) farmer-managed trials incorporating farmer evaluation of acceptability, refined partitioning of recommendation domains by researchers and initiation of technology transfer activities.

4. Information accumulation and analysis including (a) agro-technical data from on-farm/on-station trials, and (b) farm enterprise records.

5. Re-evaluation of research information.

6. Extension of acceptable technology.

On-farm experiments are not intended to be a substitute for research station or laboratory research. Rather, this is a way of extending the value of these findings to users, and a means of improving two-way communication between small-scale farm families, researchers, and Extension workers. This is more likely to occur if researchers, Extension workers, and farmers are involved from the onset in experiment design, implementation, and monitoring.

Knowledge about alternative practices will be more naturally transferred through this collaborative team participation. Extension of knowledge and technology should not be relegated to the last step.

Farm/Enterprise Records

The value of farm or enterprise record keeping is strongly supported by Hildebrand (1983a) and other agricultural economists associated with FSR.

According to Shaner et al (1982:214), farm records are "for FSR&D, the type of accounts kept by members of the farm household on specified activities associated with individual crops or animal types. Input and output activities are often kept daily, with farmers sometimes receiving help from the field team's technical assistants."

Whether a field assistant or a farm family member maintains the records, they represent a systematic means of recording quantifiable data over time. Records can be maintained on a wide variety of production and management activities such as work done by month or season, people involved in the tasks, equipment used, wages or commodities paid out, inputs applied and acreage (fields) involved, and crop results. If well organized and clearly understood by the recorders, the technique can be a useful tool for helping in the search for more appropriate practices and technologies.

In the Lesotho Farming Systems Research Project, Plath (1981) conducted a farm records program in which he trained field assistants to maintain records on 117 farmers residing in three ecological areas. These assistants did not possess a high level of agricultural training. Most had a diploma or less, however, they were versed in local agricultural matters and they had excellent farmer rapport. Visits were made to farmers once or twice a week. This helped ease the potential problems of farmer recall, motivation to keep records, and illiteracy.

Probably farm record keeping is most effective when limited to specific subsystems or enterprise systems, and when combined with other data collection methods. For example, records could be productively kept in association with on-farm experiments, or they could substitute for a baseline survey and be initiated following a "sondeo." Table 3 outlines some of the strengths and limitations of this approach.

Table 3. The Potentials and Limitations of Farm Record or Enterprise Record Keeping

Farm or Enterprise Records	
Can	Cannot
. Be statistically analyzed (quantitative)	. Be generalized to large population unless participants are randomly selected
. Can involve farm family members and other local people	. Be done without good organization and leadership (requires training)
. Can provide the farmer with an analysis of his/her production system	. Assure farmers' willingness to participate (rewards may be lacking)
. Be effectively combined with other data collection methods, e.g., "sondeo," experiments	. Provide the depth needed to answer all the "whys"
. Be limited to specific enterprise or subsystems	. Guarantee reliability of recall data
. Be adapted for less literate participants (see Shaner et al, 1981)	. Easily be adapted to interdisciplinary team effort
. Help identify constraints, problems, alternative solutions	. Provide fast data turnaround

5. EXTENSION INTEGRATION

The integration of Extension should begin at the onset of the FSR program. The effective accomplishment of this will depend a great deal on data collection. This will help to identify existing capabilities and attitudes of Extension staff. It will help identify new or adapted Extension roles in the FSR program, and areas of needed training and support.

Data collected through the "sondeo" or other farmer-oriented survey techniques can be helpful in the design of educational strategies. The Extension worker, who has first-hand knowledge of the farm family's situation, and of community organization, can be an asset on the research team in assuring that participatory learning experiences are built in continuously at each phase of the problem solving process.

Informal techniques such as organized group discussions (i.e., nominal group process) or key informant panels can provide quick and useful information about how people see problems and solutions, and about existing levels of knowledge and skills. Life histories collected from early adopter farmers, or less successful farmers, can identify appropriate training methods, reasons for nonacceptance of specific recommendations, important leadership patterns which could influence adoption. The "sondeo" can be used to assess potential designs for experiments, and the consequences of these.

This kind of data is critical to the entire process of FSR program planning and evaluation. Since Extension workers are sensitive to local people's needs and community norms, they can help to assure that methods are designed to include appropriate farm family members, such as women, and influential local leaders. These methods, if well designed, can be multi-purpose. They can provide reliable information and they can impart valuable skills and knowledge to those who participate.

CONCLUSIONS

All farming systems activities involve data collection of some kind. In order to meet the primary objectives of the approach, and to correspond with FSR philosophies, data collection must be planned and carried out in cost-efficient and human resource-efficient ways. Methods must produce useful information, but with reasonable time and energy inputs. At the same time, they must facilitate the practical needs of the FSR program.

This paper has attempted to present the FSR approach as a practical problem solving process which can be adapted to the realities of implementation. No two implementation settings are alike. An area's history of experience is vastly different. As a result, it gives rise to unique national and local institutional structures. The social and cultural situation demands certain approaches to involvement. For example, the concept of "bottom-up participation" may appear to be in direct conflict with social and cultural norms. This may necessitate compromises in method or it may indicate the limited nature of our observations. The current political atmosphere, as in Southern Africa, may stimulate revised public attitudes about participation, for

example, more Nationals and more women assuming major leadership roles and responsibilities.

Five practical needs are identified which should be integrated into the data collection design. Whatever the method of data collection, the technique should be viewed as a tool to facilitate:

1. Systems Framework
2. Participation and Communication
3. Learning Laboratory
4. Reliable Information
5. "Bottom-Line" Decision-Making

The strengths and limitations of each alternative data collection method should be weighed to assess the potential contributions that each can make. It is dangerous to become "married" to one method. A combination of methods tends to be the best approach. This endorses the value of the multidisciplinary team input to design. This includes farm family members. If the approach doesn't make sense to <u>all</u> team members, this is a sure sign of the need to revise the strategy.

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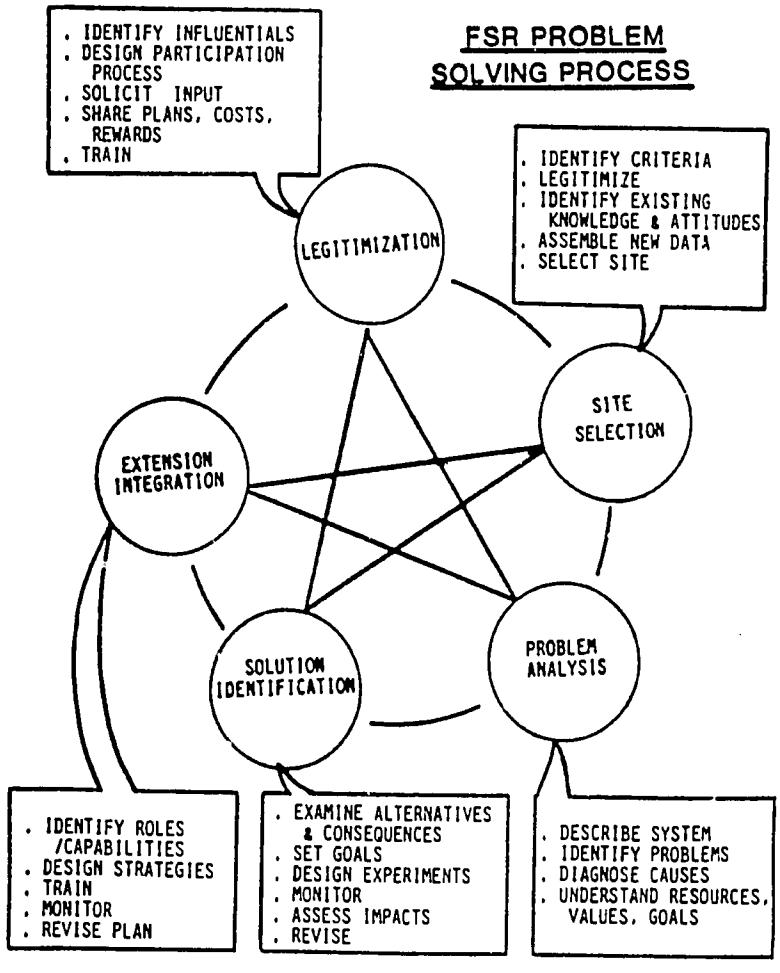

Figure 1. Farming systems research problem solving process. There is no definite sequence to these interrelated activities. Some may proceed simultaneously while others may receive less attention depending upon the state of existing knowledge and organization. The Extension phase should be integrated from the onset, not left to the end when specific recommendations become available.

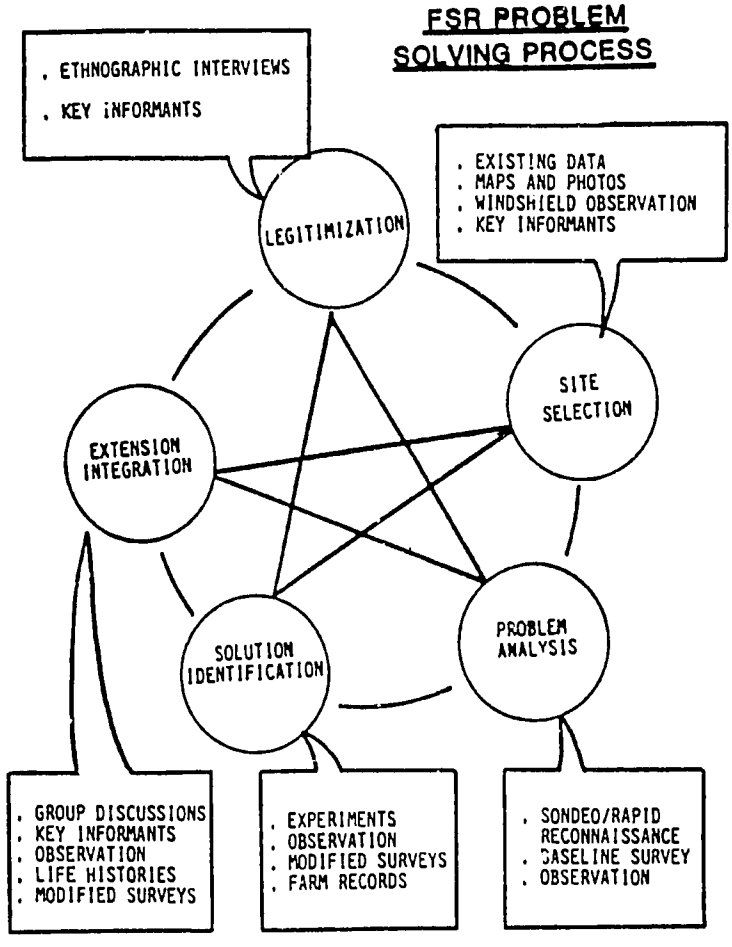

Figure 2. Alternative data collection methods that may be considered in the FSR problem solving process.