Farming Systems Research : The Need for a Practical Approach

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The idea of farming systems research (FSR) is rooted in a discontent with traditional agricultural research methods. All too often, traditional research is focused on themes of little interest to farmers, or is conducted under unrepresentative conditions. Recommendations are frequently formulated in ignorance of farmers' circumstances and needs. When these recommendations are rejected, farmers are, as a consequence, dismissed as traditional or ignorant.

FSR was introduced in part to improve on traditional methods. It was seen by many as a way in which researchers could cooperate with farmers to develop useful new technology. The complex nature of farming systems was to be explicitly considered during the whole process of technology design and testing. Expectations were high that FSR could dramatically increase the effectiveness of agricultural research.

However, FSR soon came to take on many different meanings. Some researchers interpreted FSR as "the study of farming systems", but paid little attention to the formulation of recommendations on the use of new technology. Others interpreted FSR as "the design of new farming systems", not considering that farmers rarely adopt whole systems as such. Eventually, FSR came to mean any research that views the farm in a holistic manner and considers interactions in the system (CGIAR). As such, "there is little activity concerned with agricultural and rural development which cannot claim some relationship with FSR, however tenuous" (Gilbert, Norman and Winch).

As "FSR" took on more and more meanings, new concerns began to arise: Does FSR increase the effectiveness of agricultural research programs? Has FSR led to a faster flow of useful new technology to farmers? Can FSR live up to its expectations? It seems that the variety of activities being conducted in the name of FSR has caused substantial confusion and may lead to disenchantment with the approach among donor agencies and research administrators.

FSR can live up to its expectations. This is most likely to occur, however, if researchers choose to employ a kind of FSR that is explicitly oriented towards getting new techonlogy into the hands of farmers. This kind of FSR is likely to have the following characteristics:

1) It aims to generate technology to increase resource productivity for identified groups of farmers, usually in the near term.

2) It is conceptually based on a farming systems perspective, that is, it explicitly recognizes the importance of interactions in the farming system.

3) It uses on–farm research methods, that is, research is conducted in cooperation with farmers under representative conditions.

4) It recognizes the need for cost–effectiveness and rapid results.

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In order to distinguish the kind of FSR described above from other kinds, it has been referred to as "on–farm research with a farming systems perspective" (OFR/FSR) (Byerlee, Harrington and Winkelmann). This term is not graceful, but it does have the virtue of being specific to only one kind of FSR out of many.

There is clearly a conflict between the second quality of OFR/FSP (a farming systems perspective, or a holistic view of sometimes complex farming systems) and the fourth quality (the need for cost–effectiveness and rapid results). This conflict is readily resolved, however, by the recognition that farmers, particularly small farmers with few capital resources, with risk avoidance objectives and who use a cautious learning process, rarely make drastic changes in their farming systems. Rather they proceed in a stepwise manner to adopt one or two new inputs or practices at a time (Byerlee and Hesse, 1982.) As a consequence, FSR practitioners should focus their research efforts on the few–perhaps three or four–research opportunities that offer potential to increase resource productivity in a way acceptable to farmers. (In a few extraordinary circumstances, such as new irrigation infrastructure or a colonization project, the above rule may not hold.)

When FSR is interpreted as "on–farm research with a farming systems perspective", there are numerous implications for research design and implementation. Among these are the following:

1) FSR practitioners should not treat the whole farming system as variable. Some enterprises will almost always be left unchanged. For example, if farmers grow rice, corn and mungbean and also raise chickens and ducks, there is rarely a pressing need to introduce new technology for all five of these simultaneously, or, indeed, to replace these five enterprises with an entirely different set. Researchers may choose to concentrate on new technology for corn and mungbean because these offer the best opportunities to increase the productivity of farmers' resources. This will still be valid FSR as long as the effects of new corn and mungbean technology on the other enterprises is explicitly considered. FSR practitoners who are interested in farmer adoption of research results need to remember that farmers normally do not adopt systems.

2) FSR need not always stress the design and testing of alternative cropping patterns. Researchers who interpret FSR in terms of OFR/FSP concentrate on those few research opportunities that are most likely to lead to an increase in the productivity of farmers' resources. Sometimes these research opportunities will focus on the intensification of cropping patterns, but often they will not. Cropping pattern intensification can be relatively important when land is very scarce and when there is little room for improvement in the way farmers manage currently important crops. All too often, however, FSR practitioners test numerous "exotic" cropping patterns (with little feel for why farmers might be interested in using them), but ignore major opportunities in component technology research on current crops. In general, more work is needed on ways to rank research opportunities and set priorities.

3) Component technology research should be conducted in cooperation with farmers, using a farming systems perspective. Many researchers feel that FSR just means testing alternative cropping patterns, and that component technology research is in some way not really FSR. As noted, this frequently leads to an inadequate emphasis on component technology. Moreover, it leads to the mistaken practice of conducting on-farm component technology trials as if they were on the experiment station. Component technology trials, although physically located on farmers' fields, are often conducted without reference to farmers' circumstances, and are designed and analyzed with little reference to farming system interactions. FSR practitioners who use OFR/FSP procedures should remember that **Component technology research is a form of FSR when properly designed and implemented** This means that researchers should pre-screen experimental variables and treatments for profitability, riskiness and farming systems compatibility, and encourage farmer cooperation even in "researcher-managed" trials.

4) FSR teams should work in a defined area, with considerable flexibility to select which enterprises and practices merit priority in research. FSR teams who use OFR/FSP will rarely, if ever, design entirely new farming systems. Rather, they will focus research on those few research opportunities that are most likely to lead to new technology acceptable to farmers. The selection of priority research opportunities and experimental variables is done via the "pre-screening" process. In order to effectively pre-screen, however, researchers need the freedom to select, from current and alternative crop and livestock enterprises, those few which merit research. Before pre-screening, virtually any enterprise is a candidate for selection. After pre-screening, researchers focus on the few priority research themes associated with one (or a few) target crop or livestock activities.

Given this potentially large mandate with respect to selection of enterprises, FSR teams should restrict their research to a defined study area, roughly defined by the area one team can effectively manage. One study area may contain one or more "recommendation domains" or homogeneous farmer target groups. A study area as used by most FSR teams is considerably larger than a cropping systems site and may cover many thousands or even tens of thousands of hectares.

5) FSR in practice needs a continuous economics input-but farming systems economists need to go beyond the traditional farm management approach. The tasks of a farming systems economist in OFR/FSP are numerous. Farm surveys, particularly informal exploratory surveys, are needed to quickly assess farmers' circumstances, describe current farmers' practices and identify research opportunities. Partial budgeting and other economic tools and a good understanding of the farming system are needed in pre-screening. A knowledge of policy priorities, input and product markets, and the variability in farmers' circumstances are needed to identify target study areas and recommendation domains (Byerlee, Collinson, et. al., 1980). And, of course, an economic analysis of ex-

periments is needed, and should be combined with statistical and agronomic interpretation on an across–location basis (Perrin et. al., 1976).

Many of these tasks, particularly identifying research opportunities and pre–screening alternative experimental strategies, cannot efficiently be conducted using a traditional farm management approach. In OFR/FSP we aim to develop improved tech–nologies for farmers on the basis of an understanding of current farming systems. Such an understanding requires a broad systems perspective that integrates biological dimensions of production, heterogeneity in farmers' resources, rick factors, etc. This kind of under–standing is best obtained through direct researcher–farmer contact in the field. In contrast, the farm management approach relegates the understanding of farming systems to expost data analysis through whole farm modeling. Data is frequently obtained through frequent–visit formal farm surveys which makes it difficult to count on timely results.

In conclusion, the term "FSR" has taken on many meanings and interpreta–tions. Expectations are highest for the kind of FSR that leads to adoption of new technology by farmers. However, there is a real danger that these expectations will not be met. Researchers need to consciously select a particular FSR strategy that gets new technology into farmers' hands in a cost–effective and timely manner. Some characteristics of such an FSR strategy were listed. Central to such a strategy is a strong emphasis on setting priorities–the need to focus research or the few research opportunities that offer the best chance to increase resource productivity in a way acceptable to farmers.

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