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*Micro-Level Accomplishments and Challenges for the Less Developed World**

Having taken on the job of writing this paper I found access to sources on Asia and Latin America well nigh impossible. I apologise for the African bias in the paper. It brings a strong emphasis on manpower constraints as an influence on the appropriateness of methodologies and neglect, perhaps, of social structure as an important determinant of economic activity. I trust delegates with relevant experience will help offset this bias as they see fit in the discussion.[1]

I hope we have a consensus that at the micro-level the profession should be seeking the improvement of agricultural productivity, increased employment opportunities and a wide distribution of benefits across the millions of small farmers making up the major part of the populations of LDCs. The sequence of micro-level research in farm economics is the same in developed and less developed agriculture. Investigation is followed by analysis and the sequence completed by planning and advice. However the way this sequence is institutionalised, the balance between these three phases and the methods useful in each phase varies with the circumstances of the agricultural economy and with the characteristics of the farmers under research. These circumstances and characteristics differ from developed to less developed agriculture, where a cost effective micro level sequence must deal with types of farms rather than the individual.

The paper is divided into three parts; first the context of micro-level research is briefly described, secondly some history of our efforts in this context is recalled and discussed, and thirdly some of the challenges ahead are identified.

THE CONTEXT

For those accepting the better welfare of millions of small farmers as a goal the challenge lies in the circumstances of agriculture and the charac-

* Read by Derek Byerlee in the absence of the author.

teristics of farmers in LDCs. I outline here this context which influences the choice of an effective approach to Farm Economics Research.

Fifty to ninety per cent of the total population in most LDCs are small farmers; therefore very large numbers of farmers must be covered. Development efforts must be cost effective as the other sectors are not large or strong enough to subsidise agriculture. With relatively small urban populations, market opportunities tend to be limited and homogeneous over wide geographical areas. Social homogeneity dominates eating habits and influences agricultural practices. Social customs, obligations and hierarchy may distort the effects of market forces on farmers' decision-making. Rudimentary market development creates uncertainty in crop sales and retail purchases, and thus inhibits specialisation. Price and policy instability enhances the risks attached to market dependence. Apart from the farmers themselves, government agricultural research services are the main source of new technology. Governments also operate farmer advisory services. Low levels of qualified manpower are available to these government services and the opportunity costs of using it at the farm level are very high.

Small farmers by definition operate small units. The value of annual output generally ranges between US$ 200 and US$ 600. In an environment of weather and market uncertainty they often operate complex farming systems to meet a predominant objective of day to day food supply. Food is often produced on the farm because of the vagaries of markets. The threat to basic needs from uncertainties of the weather and markets leads to risk averse behaviour and security oriented management strategies. The low level of surplus production achieved and the risk-averse nature of small farmers result in low levels of capital use. The same capital scarcity and risk aversity inhibit dramatic changes from their existing situation. Small farmers change in small steps consistent with their resource endowments and risk preferences.

This then is the context – large numbers of small farmers often operating complex farming systems to satisfy a food security objective threatened by uncertainties of markets and weather.

SOME ACCOMPLISHMENTS IN MICRO-LEVEL RESEARCH IN LDC AGRICULTURE

Let us have a look at the major thrusts of micro-level research in LDC agriculture over the last twenty-five years. With its foundation in 1939 the Indian Society of Agricultural Economics is probably the earliest professional association in a LDC. Evidence of the profession in other parts of Asia, Africa and the Caribbean began to filter through in the 1950s but in a very *ad hoc* way (Conklin 1957, Clayton 1957, Jolly 1957). I have divided early professional activities into four types. I discuss each type briefly. The first two use approaches inherited from developed countries; the Comparative Approach, in which standards derived from

surveys are used to diagnose weakness in the farm business under investigation, and the individual Farm Planning Approach, in which data from the farm are used to plan partial changes in resource allocation or to determine an optimal allocation.

1 *The use of developed country approaches in large-farm sectors.* Several LDCs have large-farm sectors within dualist agricultural economies where both the Comparative Approach and the Individual Farm Planning Approach have been applied under similar condition to those of the developed countries. Kenya for example has had a Farm Economic Survey Unit from 1957 onwards which carries out farm and enterprise cost studies and draws up standards for farms in the commercial sector. This category is not discussed further since it is irrelevant to the unique problems of small farms in LDC agriculture.

2 *The use of developed country approaches among small farmers.* Several LDCs have effected a direct transfer of approaches used in developed countries to their small farm sector. Kenya extended the Comparative Approach to its small farm sector in 1962 (MacArthur 1968) and still has District guidelines as enterprise standards against which individual farm performance can be compared, and from which farm plans can be designed. India recognised farm planning as a tool for improved productivity and launched a farm planning programme in seven IADP Districts in 1960. Even in India where the skilled manpower situation is less pressing, considerable professional controversy arose over the efficacy of planning at the level of the individual farm. Many South East Asia countries, including the Philippines, Thailand, Korea and Taiwan also have Farm Management Research and Extension services focused on the planning of the individual farm unit. In general these approaches borrowed from developed countries have been inappropriate for the same reason; professional competence is required at the level of the *individual* farm for implementation. Coverage of the small-holder sector is negligible and costs per farm unit are very high because of the large numbers of farms involved and the scarcity of skilled manpower.

3 *Research and development in methodology.* Two streams of research can be identified in the development of methodology appropriate to small farmers circumstances – one is data collection methods, the other in the application of planning techniques to analyse farm level data.

While India has a very strong base of data collection instruments underwritten by highly capable statisticians and although farm classification is inherently easier in smallholder agriculture, the sampling problems due to the multi-variate nature of Farm Management Surveys are compounded by scarce funds and personnel and by the illiterate populations under investigation. Personal interview is the only method of enumeration and is associated with high levels of observational error. It can be supplemented by objective measurement techniques (e.g. crop cutting) necessarily expensive of time and people. Much of the work in the early 1960s was used to assess which parameters in which circumstances could be collected by low cost limited visit collection techniques and which

required frequent visits throughout the agricultural season. The results of much of this work emerged in the early 1970s (Hunt 1966, Collinson 1972, Spencer 1972, Norman 1973, Kearle et al. 1976). While there is a better understanding of the circumstances under which low cost limited visit surveys can be used, there is no clear professional consensus on their usefulness for the collection of labour use and output data and indeed on the costs of errors in these variables when using the data.

Recent emphasis has placed priority on survey work drawing on anthropological methods and aimed at understanding rather than quantifying the farming system – what are farmers doing and why are they doing it that way? These methods seek a low cost/rapid approach as an essential starting point for a bread and butter contribution from the profession.

The other stream of development in methodology has emphasized planning techniques for manipulating farm level data. In the early 1950s Jolly established Unit Farm as "test-beds" for examining small farmer problems (Jolly 1952, 1957). These were repeated extensively, certainly in Africa (Collinson 1969), but were largely superseded in the early 1960s by paper models once holistic techniques for farm planning became widespread in developed countries. These experiments in farm analysis were a direct transfer from the profession in developed countries, with linear programming (Clayton 1963) and programme planning (Collinson 1963) predominant. There was perhaps more concern with the effects of uncertainty (Heyer 1972), seen to be of greater importance to small farmers, and more priority on food supplies in resource allocation. In India, Kahlon (1962) drew attention to the Representative Farm as a possible way around the implementation bottleneck for individual farm plans. Most of the experiments in the 1960s recognised this and were made on a typical farm basis at the area level.

In the mid 1960s the professional focus took a new turn – the relevance of agricultural research efforts began to be called into question both in LDCs (Belshaw and Hall 1964) and in developed countries (McMeekan 1964, Davidson and Martin 1965). This was based perhaps on a growing emphasis in agricultural development theory on the importance of new agricultural technologies to break the Schultzian "steady state". This questioning of the efficacy of traditional crop by crop agricultural research was particularly strong in francophone Africa where a systems orientation emerged, for example in Senegal, as early as 1966 (Elliot 1977). This growing disillusionment was given weight by two other thrusts; one emphasising the economic logic of many small farmer practices given their circumstances (Norman 1974), the other emphasising the need to evaluate innovations in a systems context to understand their consequences for small farmers (Collinson 1968, 1972). From these three thrusts a link has been forged in the last few years, between Farming Systems Research (FSR) and adaptive agricultural experimentation. This link which is discussed later in this paper has begun to attract the attention of professionals working at the micro-level in many LDCs (Hildebrand 1976, Norman 1978, CIMMYT Economics Group 1979).

4 *Improving Theories of Agricultural Development.* A burgeoning interest in the theory of agricultural development in LDCs stimulated considerable spin-off in understanding small farmer behaviour. Micro-level research became a tool used by both planners and academics for improving plan orientation and theory. Many of these initiatives were by developed country universities (IFO, Munich Africa Study Series 1962 onwards, e.g. Ruthenburg 1968, African Rural Employment Study Series, MSU 1971). In this category might also be included the extensive adoption studies carried out in small farmer populations and throwing light on the priorities, capacities and attitudes of small farmers (Roy et al. 1968, CIMMYT 1976).

After reviewing these four categories, it seems fair to conclude that the profession has made little *direct* contribution, that is at a bread and butter level, to the improvement of incomes of the millions of small farmers dominating LDC economies. The reasons for this seem clear.

First, our profession, and of course others, had no clear target in view, and therefore no clear criteria for an appropriate approach to micro-level research. Politicians of the newly independent states had a need for visual evidence of progress. In agriculture this was manifested in machines and concrete. Research was viewed as unproductive and improvement through extension as painfully slow, and the aid agencies were dominated by the strategy of sector transformation through settlement and irrigation schemes. It took until the late 1960s to see that the structural changes and management intensity implied by machines, concrete and transformation necessarily focused all available funds and manpower on a tiny proportion of the rural population.

Second, the state of the arts in micro-level research in LDC agriculture has been rudimentary. There seems to me to have been a tremendous confusion in the profession active in LDC agriculture in the 1960s – a confusion between R & D in techniques and efforts to develop an approach for a bread and butter contribution to agricultural improvement. I must lay some of this confusion at the door of the heavy emphasis on technique in American universities over the period. A "have tool will travel" mentality was evident in graduate students converging on the LDCs on the initiative of their professors. Much of the academic interest was in micro-level research to throw light on theory and strategy in agricultural development, certainly one useful emphasis at that time. Undoubtedly however, it contributed to the fact that up until the mid 1970s the profession had little to offer smallholder agriculture in LDCs at the "bread and butter" level.

Thirdly, and still a continuing factor, is the traditional technical establishment in LDC agriculture. In many LDCs the improvement of agriculture remains synonymous with achieving higher yields per unit of land. Moreover research has been insulated from the farmer. This narrow orientation and the farmer isolation from research were inculcated by expatriates trained in the technical tradition of their homelands. Many local professionals have the same metropolitan training and, with it, the

same orientation and insularity. This is particularly damaging in the small farm sector. Large farmers have the education to sift research results for themselves and often the authority to orient research efforts to their problems. Small farmers rely entirely on "improvements" channelled to them, through the extension service, as prescriptions from a doctor. But the farmer/research link is rarely developed; the doctor never sees his patient, a lack of concern which reflects a teacher/pupil mentality permeating the predominantly technical establishments.

The profession with little conviction as to its role, uncertain of the validity of its techniques and with numbers very thin on the ground, had little to offer over the sixties and seventies. But all innovations are proved by "fire and water" and perhaps the trials of the sixties and seventies have provided us with a sound basis for the years ahead. I turn now to the opportunities and challenges for the profession to make a direct contribution to the improved well-being of small farmers across LDC agriculture in the future.

OPPORTUNITIES AND CHALLENGES IN MICRO–LEVEL RESEARCH

1 *The Contribution*. Farming Systems Research is the key to our contribution for the future. It brings the small farmers' perspectives to the planning of zone oriented adaptive experiments to provide appropriate content for area based agricultural development programmes. It begins with the assumption that the farmer manages his resources to give a balance of production, with his knowledge and ability, which meets his priorities. Almost inevitably, at some point in the system, the allocation of resources to one commodity implies a compromise in the management of other commodities and other resources.[2]

FSR seeks to understand these compromises. It describes what farmers are doing and why they are doing it that way. Its holistic perspective is also the farmers' perspective as a decision-maker. It describes compromises being made and the resources imposing them. FSR focuses adaptive agricultural experimentation by identifying areas of management where the farmer is flexible and where improved management will contribute to higher productivity in the system as a whole. Wider sources of improved productivity can be tapped. Manipulating the level or timing of land, labour or capital commitments may allow a larger area to be managed, greater cropping intensity, higher value crop combininations or higher yields. As an extreme a new crop variety with lower yields than existing varieties but with a pattern of resource absorption over the agricultural year complementary to other system activities, may improve system productivity more effectively than a new crop variety with higher yields but a conflicting resource absorption pattern. For example FSR in one area demonstrated several benefits of a maize variety maturing in 90 days compared to a higher yielding maize variety used by farmers but maturing

in 120 days. First, because of a mid-season rainfall trough there would be less risk to the earlier variety of drought at flowering. This reduced risk would enable farmers to switch from insurance crops such as sorghum to their preferred food crop, maize, and to cash crops. Finally the earlier maize variety would increase the probability of a legume crop planted on residual moisture after maize (CIMMYT, 1977).

So the perspective of the decision-making inherent in FSR gives wider sources of farm improvements. Adaptive experimentation, whether in crops, animals or machines, focused by FSR is immediately problem oriented and solutions or opportunities investigated are within the capacity of target farmers. Positive results from experimentation are likely to be rapidly absorbed. Because it is integrative in character FSR needs to draw on the natural sciences for technical relationships and insights – hence the emphasis on the link with agricultural experiments and experimenters. It is a link which appears to me to offer a major advance in the generation of technology relevant to the needs and capacities of the millions of LDC small farmers.

I will outline the sequence of an approach for FSR to make this bread and butter contribution to improving small farmer productivity in LDCs.[3]

1 Zoning: farmers with the same problems and potentials are grouped to allow cost-effective Research and Development efforts. Major groups reflect homogeneous farming systems with respect to present technology and resource endowments. Identified groups form a framework on to which policy objectives can be brought to bear to decide priorities for research and development.

2 Exploratory survey: within each identified target group the farming systems economists and the relevant technical specialists conduct informal discussions with target group farmers. Discussion aims at understanding the farming system and then identifying areas of management which could be modified to improve farm productivity. The economist and agronomist have complementary roles in establishing hypotheses of feasible and compatible management improvements. The economist analyses farmer priorities and the impact of resource limitation and risk on present management strategies for meeting priorities. The agronomist analyses crop potential and the likely effects of management variations on crop performance under local conditions. The economist specifies critical areas of resource absorption and offers guidelines to improved productivity such as reduced labour use or higher yields. The agronomist offers changes in management practices which he believes would have favourable effects on these critical areas. The economist evaluates the compatibility of these changes with the priorities and constraints manifested in present management strategy. This interaction is the core of the whole sequence in identifying appropriate experimental content.

3 Verification survey. A formal single visit farm survey is carried out among the target population to verify that the understanding gained in the exploratory survey is indeed generally true for the target popula-

tion. Hypotheses on resource allocation compromises and risk avoiding management strategies are tested, and farmers' attitudes towards conclusions on possible management improvements are sought. The incidence across the population of characteristics, opinions on resource use and constraints, the hazards and attitudes towards management improvements, are plotted in frequency distributions. Quantification is limited to key parameters needed to test hypotheses which can be measured usually by recall in the course of a single two-hour farm interview.

4 Planning local specific experiments. The exploratory and verification survey provide the content for adaptive experimentation designed to improve productivity on farms in the target group.

(a) Practices in which target farmers' management is flexible and in which *ex ante* evaluation suggests improvements in productivity could be expected; these make up the experimental variables.

(b) The degree of flexibility, for example the level of capital likely to be made available where purchased inputs are involved, sets the feasible range of treatments for those variables.

(c) The description of present management including location, soil type used and practices employed is the basis for the management of the non-experimental variables in the experiment. The Control treatment is farmer practice.

We urgently need a consensus on how to make a bread and butter contribution in the small farm sector of LDCs. We have had twenty years' R & D – surely we have enough experience to synthesise a relevant approach. Of course professional discussion is vital to crystallize detailed methodologies, but let it focus on this pertinent and pressing issue, and let constructive argument build on a basis which has a consensus. Farming System Economists are extremely thin on the ground. Without a consensus we will not gain the authority necessary to influence the establishments, particularly on the vital question of research orientation.

There is a great deal of confusion about FSR. A recent review of FSR at international research centres reflected the professional chaos over the subject; most centres doing different things and none doing FSR as the Review team defined it (CGIAR (1978)). Donor agencies are increasingly interested in FSR but many donor activities, and the pre-occupation with monitoring and evaluation is a good example, still assume that the technology being offered to farmers is good for them. Effort is wholly focused on the delivery system. Moreover, emphasis is often placed on developing new Farming Systems. Except in the very narrow sense that a shift in one variable gives a changed and therefore a new system, this is misconceived. Farmers operate farming systems, they do not adopt them.

Looking to the future there seem to be three "balances" to be addressed in further experience.

First, there is a grey area in the balance between "understanding" and "quantification". Can quantification only add to our understanding or

can it make a more concrete contribution? Perhaps understanding should identify key areas of existing systems and quantification be limited to relationships within these key areas. This would obviate the need for whole farm modelling and limit the data collection needs.

Second, understanding the whole system in detail in burdensome in terms of field investigation, particularly in detailing the management of each crop. One version of the approach outlined pre-identifies the key crop or enterprise, usually that absorbing most of the limiting resources, and focuses effort on this enterprise on the grounds that this offers the best change of manipulating the system. Fieldwork concentrates on explaining how the system compromises the management of that one enterprise. This approach is consistent with the commodity orientation of many technical research programmes. Does this method, which allows cheaper and quicker fieldwork penalise the approach too much?

A third balance, mentioned earlier, is between the top down movement of policy, based on national considerations and the bottom up movement of local, especially farmer, considerations. National and local interests must be reconciled to find local acceptance; devices for reconciliation are price changes, subsidies, credit and infrastructural change. Guidance is needed on reconciling these two flows and on effectively institutionalising the interface.

Finally, in research organisation and in training major challenges are evident. Location specific circumstances of farmers require a location specific research orientation toward specific groups of farmers. This implies major changes in research organisation in many LDCs. A two tier organisation suggests itself with an economist working with two or three technical specialists at the local level. These local researchers are generalists dealing with whatever enterprise represents a development opportunity for local farmers. They are backed up by regionally located, discipline oriented, centres with specialists who are called in to work on technical problems arising in the course of the location specific work.

The approach outlined for Farming Systems Research implies a systems perspective on the part of both the economist and the local technical scientists. Agriculturalists should be encouraged to generalise. They need to understand how small farmers' priorities and circumstances influence each aspect of their farm management. The production economics involved needs a dilution of anthropology and sociology. Agronomists need an environmental perspective; the ability to evaluate the suitability of a range of crops and to analyse crop performance and management. All disciplines need a strong awareness of the stochastic perspective and its importance in farmers' decision-making. Such a changed orientation offers a serious challenge to agricultural economics teaching at universities and colleges.

The evidence is overwhelming. Small farmers enthusiastically absorb new techniques that improve their lot. I believe we are close to a mechan-

ism for radically increasing the opportunities available to them. A little extra professional effort at the "bread and butter" level could clinch it.

NOTES

[1] Thanks are due to Derek Byerlee and David Norman for their comments which have improved the structure and flow of the paper.

[2] For example, commodity oriented research at one research centre showed the optimal planting time for six crops, grown by local farmers to be the first week after the rains. Working by hand with hoes, local farm families could prepare about one-third of a hectare for planting within the first week. If they had stopped planting then they would have earned perhaps one-fifth of current income levels. In practice they continue to plant over a three-month period.

[3] Other references with a similar sequence and orientation are Hildebrand (1976) Norman (1978) CIMMYT Economics Group (1979).

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DISCUSSION OPENING – D.W. NORMAN

The important paper written by Dr Collinson provides an overview of work by agricultural economists in the developing parts of the world during the last two decades. He is – with his very extensive experience particularly in the East Africa area – in an excellent position to undertake such a task. Those of us who have also had somewhat similar experiences can, I am sure, relate to the frustrations that come through in the paper.

The underlying theme of the paper is one of acceptance of the realities of the local situation in the developing parts of the world and attuning the methods and roles of agricultural economists to them. This is being reinforced by: (a) the increasing commitment of many governments in such countries to help the large numbers of small farmers, and (b) the increasing accountability for funds spent on research. The increasing frustration with the gap between experimental station results and those at the farm level has led to an increasing trend to focus attention on interdisciplinary work with technical scientists, this being consummated in the so called Farming System Research (FSR) approach. The rationale for this approach, which is characterized by the inclusion of the farmer in the research process, has been further enhanced by an increasing realization of the value of many practices currently undertaken by farmers and the need to develop technologies that will be compatible with the realities of their situation.

I have no basic disagreement with Dr Collinson's paper. Rather than dwell on the accomplishments of agricultural economists at the micro level which to date would appear to be somewhat limited, I would like to raise a few issues and challenges – some of which Dr Collinson mentions – that I believe are pertinent in legitimatizing and making the role of agricultural economists at the farm level more effective in the next decade.

1 *The issue of Farming Systems Research*

I share with Dr Collinson the belief that the successful application of this

approach could be a critically important ingredient in the development of relevant improved technology that will result in the improvement of the welfare of small farm households, in societies where farmers can voluntarily decide whether or not to change their farming systems. There are however problems of a philosophical, methodological, implementation and credibility nature that are likely, initially at least, to inhibit its potential impact. Very briefly philosophical objections are likely to some extent to be a function of the difficulty of solving the other problems. The methodological problems basically stem from characteristics that are somewhat unique to FSR. These consist of the notion of the technology developed being a variable rather than a parameter, the research process being holistic rather than reductionist in nature necessitates considerable interdisciplinary co-operation, and the inclusion of the farmer himself in the research process. Although I agree with Dr Collinson that it is likely that a consensus could fairly easily be reached in terms of cost effective ways of solving methodological problems, there are to my mind some major problems in its successful implementation. These include needed adjustments in institutional arrangements for undertaking such research which cross both discipline and commodity boundaries, the issue of training, and the relationship between international and national research institutions in terms of responsibilities for undertaking FSR. Agricultural economists have a particularly important role to play relating to the contributions of sociologists/anthropologists and technical scientists. In order to provide such a function it is important that they understand what other disciplines are doing and are able to communicate with them in the context of their disciplines. Unfortunately, apart from institutions located in the developing world itself, there are to my knowledge, no institutions in the high income countries – where most of the advanced degrees are still earned – where training programmes have been implemented to answer this need. Finally there is the problem of credibility in terms of ensuring financial and manpower support in the long run. The evolutionary nature of FSR is not likely to give such spectacular results as has, for example, been achieved with Green Revolution technology. However such results may be more pervasive and more equitably distributed.

2 *The issue of income growth and distribution*

The Schultzian emphasis on allocative efficiency – efficient but poor farmers – unquestionably helped legitimize expenditure of substantial amounts of funds on the development of improved technology. This obviously is desirable. However, although production increases as a result of adoption of improved technology have substantially increased the incomes of some farmers, it is apparent that in many locations incomes have become more unequally distributed. The FSR approach may partially correct this through stimulating the development of relevant improved technologies for all types of farmers. However, it is now becoming apparent that our preoccupation with allocative efficiency has

tended to blind us to differences in technical efficiency among farmers which appear to contribute to differences in incomes within communities. Reasons for such differences cannot be blamed solely on differences in managerial ability or motivation. In addition technical, economic and social characteristics and relationships can contribute to such differences. Thus strategies other than simply the development of relevant improved technology may be able to contribute to improving the incomes of poorer farmers and decreasing the unequal distribution of incomes. I believe agricultural economists in conjunction with other disciplines have a major role to play in analysing the causes for differences in technical efficiency and for devising practical strategies to minimise them, and hence improve the welfare of poorer farmers.

3 *The issue of private versus social interests*
A major problem in many parts of the developing world is the increasing prevalence of short-run private returns or benefits which result in long-run social costs. For example, mining of the land resource in the short run without replacing lost soil nutrients can result in an irreversible decline in its potential contribution in the long run. The challenge is of course to devise improved technologies and strategies that will encourage convergence rather than divergence between the interests of the individual and society. Agricultural economics along with other disciplines have a vital role in resolving such an issue.

4 *The issue of a linkage between micro and macro*
Dr Collinson has already mentioned this issue. FSR involves working from the farmer upwards. Development strategists are also increasingly advocating some decentralisation. Although anthropologists/sociologists and political scientists probably have the most critical roles to play in the interface area between government and the local community, I believe the agricultural economist still has a contribution to make. Such a role goes beyond the farm management area to include work in terms of institutions.

5 *The issue of reward systems for agricultural economists*
Unfortunately, there has been a tendency for agricultural economists trained in and/or originating from high income countries to relate to peer groups within those countries. As a result, as Dr Collinson quite rightly points out, reward systems have tended to be based on R & D and not on bread and butter issues that are relevant to the societies in which they are working. This is even more true in terms of work in fringe areas such as the interdisciplinary type work advocated in the FSR approach. This reward system has to change if agricultural economists are going to be more relevant to the needs of developing countries.

It seems to me that agricultural economists at the micro level in the developing world need to address themselves to these issues and chal-

lenges if they are to play a significant role in contributing to improving on a sustainable basis the welfare of small farmers in the developing countries of the world.

GENERAL DISCUSSION – RAPPORTEUR: FELIX I. NWEKE

Most of the participants in the discussion felt that the paper greatly underestimated micro-level accomplishments in the 1960s. It was through the efforts of the profession in the 1960s that the problems of the small farmers came to be appreciated and became priority issues in policy. Some speakers hoped that in advocating FSR the paper was not suggesting that other approaches be neglected. Detailed micro-level studies would complement FSR to enhance the profession's accomplishments. The difficulties likely to be experienced in convincing other agricultural scientists to go along with the approach, as well as the problems of bias likely to arise from non-sampling error possible with the approach, were among other issues that were also raised.

Participants in the discussion included Judith Heyer, Ramesh C. Agrawal, David A.G. Green, A.S. Kahlon and Howard Osborn.