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LOWELL S. HARDIN

Emerging Roles of Agricultural Economists Working in International Research Institutions such as IRRI and CIM-MYT

The International Rice Research Institute (IRRI), the first of the centres under discussion here, began its work in 1960. Today there are thirteen institutes and two associated centres in the global network (Table 1). Their programmes embrace the major crops and food animals in most of the ecological zones of the developing world.¹ These centres seek to help developing countries increase the quantity, quality, and stability of food production and thus contribute to general, widespread improvement in living standards. In pursuit of this objective, they do mission-oriented research and training while undertaking an array of catalytic initiatives to help evolve a global system for solving food production/consumption problems. This worldwide network extends from the farmer through his state and national institutions to regional and international research centres – as well as to scientific institutes and universities throughout the world. These inter-connections are sketched in the diagram on p. 480.

ORIGIN AND MISSION

The founders of the centres saw technological constraints on production as a serious barrier to agricultural and rural development in poor countries. They recognized that solutions to the problems addressed would likely call for structural and institutional changes also. But the case for focusing the power of modern production science on applied problems was and is a strong one. The technologically advanced nations, prime movers in the effort, have a real comparative advantage in this area. Under colonial regimes, research on food crops and animals had been neglected. The development assistance model in which the expatriate works alongside a counterpart in the developing country had been only moderately successful in producing research results. Further, work on food production technology is politically a less sensitive matter than is assistance directed to institutional and policy changes.

Coupled with the above was the growing belief, demonstrated by studies that were to follow, that there was underinvestment in agricultural

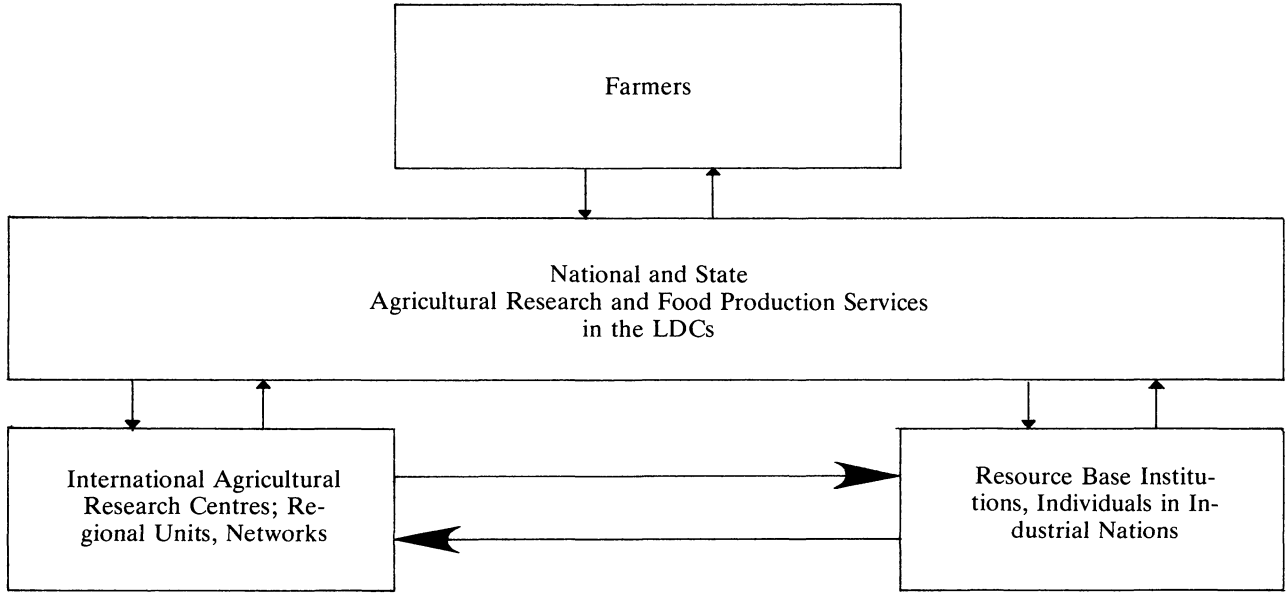


TABLE 1 *International Agricultural Research Centres, 1979*¹

Centre Starting Date ²	Principal Location	Major Programme	Senior Staff Posts Total	Posts Soc. Sci.	Core Operating Budget (\$ million)
IRRI, 1960	Philippines	Rice	58	6	13.2
CIMMYT, 1966	Mexico	Wheat, maize	78	6	14.7
IITA, 1968	Nigeria	Systems, grains legumes, roots tubers	95	2	12.9
CIAT, 1968	Colombia	Forage-beef, field beans, cassava	61	4	12.5
WARDA, 1971	Liberia	Rice	n.a.	n.a.	2.1
CIP, 1972	Peru	Potatoes	29	3	7.2
ICRISAT, 1972	India	Sorghum, millet, dry-land systems	60	7	9.0
IBPGR, 1973	Italy	Genetic materials	n.a.	n.a.	2.7
ILRAD, 1974	Kenya	Trypanosomiasis theileriasis	51	0	7.6
ILCA, 1974	Ethiopia	L'st'le production systems	44	13	7.0
ICARDA, 1976	Syria	Crop, mixed farming systems	45	2	8.8
IFPRI	Washington	International food policy	20	20	2.0

¹ In addition to the 12 institutions listed, two more centres are associated with but not directly supported by the CGIAR: Asian Vegetable Research Development Centre, Taiwan, 1971; International Fertilizer Development Centre, US, 1975. IFPRI, while created in 1975, will become a full CGIAR member in 1980 as will a thirteenth centre, International Service for National Agricultural Research (ISNAR).

² Full designations of the centres are: International Rice Research Institute; International Centre for the Improvement of Maize and Wheat; International Institute of Tropical Agriculture; West African Rice Development Association; International Potato Centre; International Crops Research Institute for the Semi-Arid Tropics; International Board for Plant Genetic Resources; International Laboratory for Research on Animal Diseases; International Livestock Centre for Africa; International Centre for Agricultural Research in Dry Areas; International Food Policy Research Institute.

Sources: *Consultative Group on International Agricultural Research*, office of William Mashler, United Nations Development Programme, New York, 1976; *An Integrative Report*, Consultative Group on International Agricultural Research, CGIAR, World Bank, Washington, 19 September 1978; personal correspondence.

research as a contributor to growth. Fortunately the first two centres, IRRI and CIMMYT, scored spectacular successes in plant breeding and improving practices for growing wheat and rice. The rapid introduction and spread of the high-yielding varieties in high potential areas suggested that a similar approach with other important tropical food crops and animals could produce equally rewarding results. Thus, the network of centres that exists today owes much to the early track record of IRRI and CIMMYT.

By 1971 it was clear that growth of the four then existing institutes plus proposed expansion in coverage and number of centres would require substantially more funds than could be provided by the founding sponsors, the Rockefeller and Ford Foundations. To deal with this problem, a new institution was invented to monitor quality standards and organize the financing of the centres. A resolving principle behind this invention was to respect both the requirements of first class research and the political necessities of donors – and then to build bridges of voluntary association between them.²

The institution created, sponsored by FAO, UNDP, and the World Bank, was the Consultative Group for International Agricultural Research (CGIAR). This international consortium now has 29 donor members – 9 multinational organizations, 17 governments, and 3 private foundations. To monitor quality standards and to aid it in its judgments, the CGIAR formed its own Technical Advisory Committee composed of distinguished international agricultural scientists and research administrators. This year, CGIAR members have made bilateral grants totalling more than \$100 million in support of the programmes of the ten centres and two related programmes in the network (ISNAR, the tenth centre, received funding for its organizational phase pointing toward a start in actual operation in 1980).

THE EVOLVING ROLE OF SOCIAL SCIENTISTS IN THE CENTRES

From the onset the scientific orientation of the centres has been on biological innovation as a means of improving production technology for particular crops and animals in tropical and subtropical environments. More recently, programmes of work have been broadened to include farming systems. Some centres have disciplinary departments. Others do not. However, all of these centres organize their scientists into problem-solving, interdisciplinary teams. Predominantly, team members are crop and animal scientists – breeders, agronomists, physiologists, soil scientists, entomologists, and agricultural engineers.

Managers and sponsors of the centres have adopted a straightforward working proposition: if a variety, practice or production system can be developed that in the eyes of the farmer is superior to what he is now using, it will be adopted. The technology will spread because it is better. But better must be defined in terms of the decision-making criteria employed by farm families – criteria that are not always understood and appreciated by scientists or by policy-makers.

The spread of high-yielding varieties (HYVs) demonstrates that if the gains to be had are great, diffusion can be rapid. It is estimated that by 1976–77 HYVs of wheat and rice were grown on over 135 million hectares in developing nations in Asia, Near East, Africa and Latin America. Thus HYVs represented 44 per cent of the wheat and 34 per

cent of the rice hectareage planted in these regions.³ Few would argue that social scientists made major contributions to the biological research that produced the high-yielding varieties. What then is the role of the agricultural economists and social science colleagues in these biological research centres? As I hear centre economists speaking, they seek to help:

- 1 Identify and assess the factors constraining production increases;
- 2 Design improved research-training procedures as well as technologies that may lessen those constraints;
- 3 Predetermine the probable social and economic consequences of proposed technological changes.

Note that this formulation of objectives underlines *helping* to identify, to design, and to predetermine. The centres are involved in creative endeavours: inventing and designing; adapting plants, animals, chemicals, machines and equipment; fitting them into existing production systems or evolving new ones; bearing the risk that what they come up with may not work; hoping for a bit of serendipity to help them along. In these processes, the effective centre economist is a partner who symbiotically interacts with the physical and biological scientists. He applies his skills and tools in an effort to increase the payoff realized on the total investment in the centre. He comes to know and understand a great deal about soil–plant–moisture interrelationships, about agronomy, genetics, pests and pathogens. He does not hive himself off and independently pursue his personal, professional and scholarly interests. For he, too, is a member of a mission-oriented team.

COMMON PERCEPTIONS OF CENTRE ECONOMISTS

No two of the international agricultural centres are alike. There is a healthy degree of pluralism and experimentation in their organization and structure – even beyond that dictated by their separate missions and the environments within which they work. This is reflected in the professional mix of the staff, including the proportion budgeted for social scientists. Irrespective of their numbers, it is my understanding that centre economists tend to share several common viewpoints.⁴

First, they recognize that in exploring and capitalizing on their special opportunity to work intimately alongside first class biological scientists they have a comparative advantage. If one does not view such close association as an advantage, that person would probably find work on a centre staff unattractive.

Second, they participate in the process that creates technical advances of a biological, chemical or mechanical nature. They prefer to enter this process on an *ex ante* basis. Biophysical scientists seldom take kindly to social scientists who, absent at the design and implementation stage, come in for the evaluation to tell others what they did wrong. In appropriate ways social scientists become involved in the conception of changes

that may result in advances. In doing so they too become accountable for the outcome.

Third, they view the constraints they seek to deal with to be of three broad types. Least tractable are the physical–environmental constraints (climatic extremes of cold and hot or wet and dry, infertile or toxic soils) most of which either are uncontrollable by man or require technologies for their removal that are presently uneconomic or still to be developed. More manageable are the physical and biological constraints (moisture limitations or excesses, diseases and insects) which are subject to at least partial removal or control if appropriate technology can be developed and applied. The third set of constraining factors is of a socio-economic character (timely availability of the correct inputs, management of irrigation systems, tenure arrangements, credit, incentives) largely institutional in character and subject to management and control by man.

While initiatives to cope with constraints of the first two types are often the primary province of the biophysical scientists, social scientists are expected to provide leadership in identifying and dealing with constraints of the third type.

Fourth, centre economists recognize that many of the problems being addressed transcend political boundaries and often require international co-operation and collaboration for successful resolution. Especially is this the case in addressing constraints of an institutional and policy character. It is the responsible citizens of their own countries, not the expatriates, who must ultimately make policy changes. Through collaborative projects, exchange of information, conferences, and networks of like-minded scientists resident and working in their own countries, attention can be focused on common problems. In this manner, consideration of policy changes can be catalyzed.

In centre efforts to link into Third World communities of like-minded scientists, the economists often face an even more difficult task than do the plant breeders or agronomists. Political sensitivity to institutional and policy matters is but one of the issues. Relative to the production scientists, interested economists are often in even shorter supply. Continuity of tenure of economists in ministry of agriculture research systems is often short, in part because alternative employment opportunities, inside and outside the country, are so attractive. Where there are nuclei of agricultural economists in universities, their links to agricultural research establishments are often tenuous. Therefore, special, innovative arrangements are frequently required to interest and bring together working groups within many LDCs as well as to link them to colleagues across national borders.

Fifth, centre economists judge that the odds are rather slim for achieving major breakthroughs of the type scored early on by CIMMYT and IRRI. Incremental gains rather than quantum jumps are anticipated. In order to achieve these incremental gains it is necessary to understand the behaviour of farm families, their circumstances, and their decision-making processes. To this end, the social scientists are involved in diag-

nosis, articulation of the right researchable questions from the farms and villages back to the scientists, and in interaction with centre management in decision-making on budgetary and resource allocation questions.

Sixth, the centre economists share the CGIAR's concern for the poor as reflected in statements such as the following.

The recent advances in international agricultural research have not yet materially affected the substantial majority of farmers in the developing world who have limited resources. This has led to the conclusion that the Consultative Group must devote more of its effort toward the generation of technology suitable for the small farmer; that is, the resource-poor farmer with a limited access to the good land, purchased inputs, irrigation facilities, and the other elements on which the technological advances of the past decade, particularly in rice and wheat production, have depended.⁵

Most centre economists would agree that successful efforts to raise farmer incomes through technological innovation and incentive policies (e.g., the development and diffusion of HYVs) that increase total food production and productivity have resulted in mixed growth, welfare and equity consequences. There is a growing consensus that these efforts have tended to:

Increase the total availability of food protein and energy – even where advances in cereal production technology proceeded more rapidly than with food legumes, vegetables and animals – thus reducing the overt or aggregate food “gap”;

Make possible, as some cushion of domestic production is generated, experiments with nutrition enhancing, employment generating programmes for the malnourished, such as food for work efforts now being undertaken in several states in India;

Slow the rate of increase in food prices to consumers, thus lower income groups (rural and urban) who spend a high proportion of their total income on food grains or their equivalent, are principal beneficiaries (a positive distributional consequence);

Modestly increase direct labour use per hectare, thus somewhat expand the demand for labour (generally reflected more in employment generation than in a rise in wage rates);

Expand off-farm employment opportunities in situations where due to larger farm incomes demand is increased for local farm supply, marketing and agriculturally related non-farm businesses and services (as has been the case in the Punjab);

Increase wage and income differentials between high potential and resource-poor areas (Appalachia effect);

Widen the gap between the *absolute* levels of farm income of small holders and operators of larger units in areas where the innovations are technologically and economically superior to traditional practices. While farm size and farm tenure *per se* have not been a serious constraint on the adoption of improved high-yielding

varieties, there is typically a lag in adoption rates associated with farm size. Size remains a multiplier (of profits or losses);

Result in greater gains for land owners than for tenants or labourers due to the elastic supply of labour relative to the supply of land.

ISSUES AND IMPLICATIONS

In the discussion above I have commented briefly on the origin and mission of the centres, the perceived roles of the social scientists, some of the views thought to be held by the economists in the centres, as well as identifying some of the social and economic consequences of their work. Based on this background we now direct our attention to network-wide issues that may be of particular concern to economists. These we group under the general headings of clientele and priorities.

Clientele

With respect to clientele the most direct users of the economists' work are within the centres themselves – the biological scientists, the administrators and policy-makers. The expertise of well qualified social scientists certainly needs to be brought to bear on the centres' resource management and allocation process. This involves undertaking programme analysis and planning tasks. It also requires professional skill and sensitivity if one is not to be seen as making prejudicial judgements on the work of others. In one centre the social scientists report that almost one-half of their efforts are directed towards the what-to-do decisions bearing on resource allocation and use.

Outside of the centres, other economists, planners, developers and resource managers are direct or indirect users of the social scientists' product. Centre biologists distribute new seeds, suggest practices and techniques. By analogy, economists share procedures, techniques and processes, as well as findings from their studies and trials. These off-campus clientele groups include collaborators or prospective co-workers in other less technologically advanced countries, as well as colleagues in international agencies and academics who monitor and help interpret ongoing work.

Centres have not always seen a need for social science. Early on, the demands for the work of such staff members came more from certain donors than from management. As a result, the utility of the economist, more than that of the biological scientist, has been under test. All clientele groups appear increasingly to recognize, however, that social scientists are coming up with insights regarding constraints to, and consequences of, technological change that are not readily available from other sources.

Today, the question of serving both in-house and outside clientele groups is not at issue. What may be at issue are the questions of: (a) how many resources a specific centre should invest in social scientists relative

to other disciplines and (b) what mix of social scientists to employ. Answers vary in accordance with the centre's mission. One centre, ILRAD, has no social scientists. At the other extreme, ILCA's 44-person senior research staff includes two social anthropologists, an economic geographer, and ten economists and agricultural economists. Typically the centres employ 40 to 60 senior scientists including three to five social scientists. If they are supported with technicians, enumerators and junior staff and trainees, this proportion of social scientists is probably about right. It seems probable, however, that in the future, greater use will be made of non-economic social scientists. This leads us to the matter of the social scientists' own priorities.

Some questions of priorities

Questions that could be addressed in this area are many. Is the focus to be on production – or on the larger set of production-consumption problems? If the latter, one plunges immediately into the socio-political as well as economic analysis of growth, equity and distributional issues. While many see biological centres as relatively ineffective instruments for reshaping skewed income distribution patterns, distributional and related poverty issues are central concerns.

From the research viewpoint it is yet to be demonstrated that one can invent improved technologies whose benefits are exclusively captured by the low-income, small, or resource-poor farmer. However, research and infrastructure investments can be tilted in the direction of the resource-poor, including efforts to develop improved technologies in areas environmentally disadvantaged. Such an orientation usually calls for *ex ante* analysis of the probable social as well as the economic consequences of the investments. Usual economic benefit-cost analyses based on efficiency criteria show up unfavourably when research addressed to resource-poor situations is compared with that directed to more favourable environments. Thus the centres are called upon to make estimates of the social as well as the economic consequences of their own work and of the investments of others.

In this connection IRRI's efforts to measure the trade-offs between economic efficiency and equity considerations are instructive. By their calculations potential net benefits to research (efficiency objective) would be maximized were they to allocate their South and Southeastern Asia efforts 40 per cent to irrigation, 26 per cent to rainfed, 12 per cent to deep water, 12 per cent to cold temperature, and 4 per cent to upland rice production regions. When the area devoted to rice culture and the numbers of producers (rather than the sole criterion of increasing total output) are factored in, the research resource allocation can change. Using the latter criteria rather than the efficiency objective only, IRRI is placing greater emphasis on upland, rain-fed and deep water rice than would likely be justified on the basis of total output alone.⁶

Another important question may be introduced by reflecting a moment on the centres' role in fostering institutional change. Ruttan⁷ reasons that

the demand for knowledge in economics and other social sciences is derived from a demand for more effective institutional performance. In the food production–consumption area, as some of the technical constraints are removed, institutional constraints emerge as increasingly significant. Knowledge leading to more effective institutions (defined to include both behaviour rules and decision-making units or organizations) results in lowered costs of institutional innovation and enhanced performance – just as advances in knowledge in biological sciences and agricultural technology reduce the costs of technological innovation.

The importance of induced institutional change is cited here as an illustration of a more general priorities issue. Much relatively basic work remains to be done more adequately to conceptualize and understand the process of institutional change and development. With respect to this and other problems, decisions have to be reached concerning how much attention centre researchers devote to relatively basic work on theory and methodology. Such work can be an important dimension of the scientist's continued professional growth. Without an opportunity for some staff members modestly to engage in relatively basic work, first class social science capacity may not develop. Therefore, while the centres are applied institutions, room needs to be left for modest involvement in relevant rather basic conceptual work of the type that springs from the real-world laboratory in which the centres are purposely located.

A third priorities question relates to the breadth of centres' and therefore necessarily the social scientists' programme of work. Do they engage a broad range of development problems or do they concentrate on selected commodities and the systems involved in their production and distribution? The ongoing debate on this issue is not to be resolved here. It is my view, however, that for high quality standards to be established and maintained, concentration of effort is required. The centres have resources, facilities, and non-political working environments superior to those available to most scientists in the newly developing countries. The intent is to create working conditions conducive to excellence. Undue diffusion of research and training efforts will surely undermine the reach for excellence that is within the grasp of the well programmed and managed centre.

CONCLUDING COMMENTS

The world now knows quite a bit about how to organize and operate a relatively successful, international agricultural research centre of the type we have been discussing. We also see productive and important roles for economists, anthropologists and sociologists as members of centre multidisciplinary research and training teams. What we are learning about multidisciplinary, problem-solving research processes is not the primary product of the institutes, but it is an important one. What we know far less about is how national or state research and extension programmes can

better capitalize on the investment in the international centres.

In no sense was it intended that the international centres were to be or become substitutes for national programmes. As indicated in the diagram on the first page of this paper, farmers and villagers interact with their own local, state and national research and extension system. It is through the provision of materials to and the conduct of collaborative or technical assistance efforts with the national systems that the products of the centres' work reach rural people. Rarely are these products ready for direct consumption or use. At a minimum, local adaptation is usually required. Despite this sometimes tenuous linkage between the international centre and farmers, the work of the centres is evaluated in terms of the changes that occur in crop yields, food consumption, and human welfare. Thus the demands now being placed on national programmes – from inside their own countries and from outside entities such as the international centres – are enormous.

To help nations desiring such assistance a new international service is soon to be made available.⁸ It is the CGIAR-sponsored International Service for National Agricultural Research (ISNAR). Its function will be to help countries strengthen their national research systems. Modest initial diagnostic help will be available on call. Beyond that point users will pay for the service provided drawing upon their own or upon donor funds.

This new service is being created in partial response to the pressures national programmes feel to develop more rapidly. It is also designed as a component of the CGIAR network designed systematically to draw on the work of the international centres while relieving them of some of the demands being placed on them for technical assistance.

Just what this development will mean to social scientists is unclear. Conceivably it could enhance opportunities for collaborative, field level informal R & D work now being pioneered by IRR, CIMMYT, CIP, and ICRISAT.⁹

I conclude with comments on the role of national research and related programmes because they are crucial to the effectiveness of the international system that is evolving. And one of the weakest components of national systems often is their capacity for socio-economic analysis. My sense is that this situation is now being recognized in several countries. The organization of the international centres and the programmes of work of the social scientists there are not in themselves models for national systems to emulate. Next to the farmers themselves, professionals working in national programmes are the largest group of actors in the international network.¹⁰ They, and this includes the social scientists, look to the centres to help them link to and learn from one another.

REFERENCES AND NOTES

¹ Consultative Group on International Agricultural Research "Report of the Review Committee", CGIAR Secretariat, World Bank, Washington 1977.

² McGeorge Bundy "The President's Review", Ford Foundation Annual Report, New York 1977.

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⁴ Based upon helpful correspondence with former or present centre economists: Vernon W. Ruttan, Randolph Barker, and Robert W. Herdt, IRRI; Donald Winkelmann, CIMMYT; Fred Winch, IITA; Gustavo A. Nores, CIAT; Douglas Horton, CIP; James G. Ryan, ICRISAT; Hans E. Jahnke, ILCA; and David Nygaard, ICARDA. Their contributions are gratefully acknowledged.

⁵ Consultative Group on International Agricultural Research "An Integrative Report", CGIAR Secretariat, World Bank, Washington 1978.

⁶ See Randolph Barker's paper presented at this conference.

⁷ V.W. Ruttan "New Rice Technology and Agricultural Development Policy" in "Economic Consequences of the New Rice Technology", IRRI, 1978. Also see Hans P. Binswanger and Vernon W. Ruttan *Induced Innovation*, Part IV, Johns Hopkins University Press, Baltimore and London, 1978.

⁸ Consultative Group for International Agricultural Research "Report of the Task Force on International Assistance for Strengthening National Agricultural Research", CGIAR Secretariat, World Bank, Washington 1978.

⁹ These centres are developing manuals for the conduct of agro-economic, farm-level collaborative research. Also see the paper by Derek Byerlee and colleagues, this conference.

¹⁰ For an analysis of the future of the centres see Vernon W. Ruttan's "The International Agricultural Research Institute as a Source of Agricultural Development", *Agricultural Administration*, Vol. 5, No. 4., Reading October 1978.

DISCUSSION OPENING – JOHN W. LONGWORTH

Dr Hardin is to be congratulated upon a most clear and enthusiastic presentation. The major thrust of his paper is straightforward and I shall not waste time summarising his comments. Let me quickly turn to seeking highlights and controversial points for further discussion.

First Dr Hardin emphasized early in the paper that when these international centres were being set up the emphasis had always been on food production technology rather than institutional and policy change, the latter being a most difficult and sensitive area. Yet, as Hardin points out, the third set of constraining factors are socio-economic in nature. More often than not the removal of these constraints calls for institutional and policy change.

Second, in the light of the need for research in this sensitive area of institutional and policy change, there is a need to stress the training and educational role of the agricultural economists (and social scientists in general) at the international centres. At IRRI in particular, a strong working relationship seems to have developed with UP, Los Banos. The long term contribution to institutional and policy change via human capital formation should not be overlooked.

Third, Dr Hardin has stressed the need for a strong commitment to multi-disciplinary and applied work as a prerequisite for a successful input by a social scientist at an international centre. He is suggesting that "muddy boots" rather than "esoteric theory" is what is required. One

might feel that few Agricultural Economics Departments in the United States have the capacity to produce this type of person. On the other hand, the traditional "Agricultural Science first – then Economics" approach to University training, which is the norm in Australia, might be expected to produce graduates more attuned to the needs of the international centres.

Fourth, a most important and fundamental issue raised in Dr Hardin's paper (and many others at this conference) is the issue of research priorities as between output efficiency and equity. What weight should research planners give to distributional issues as distinct from output increasing issues? This is undoubtedly one of the major questions facing people working at the international centres. Perhaps we should discuss it in the context of Dr Hardin's paper.

Fifth, another controversial aspect of Dr Hardin's paper concerns his view that 3 to 5 social scientists in a total staff of 40 to 60 is probably about the right proportion. Is there a case for more social scientists? Implicitly Hardin thinks there is! He suggests the importance of research to understand and reduce the socio-economic liaison to rural development. He stresses the need for a better understanding of institutional and policy change. He lists the wide range of social science skills required in addition to the skills normally expected of an agricultural economist. Despite recognizing the need for a greater social science input at the international centres, Dr Hardin still feels that with less than 10 per cent of the scientific staff trained in the social sciences, the mixture is about right! While those present could not be considered as disinterested in regard to this issue, it may be worthwhile discussing it further.

GENERAL DISCUSSION – RAPPORTEUR: EARL D. KELLOGG

Some concern was expressed regarding the proportion of staff at international centres being only 10 per cent since many of the important problems involved social science concerns. The reason for this was that the centres were originally focused on agricultural technology generation to increase yields. The early successes in some crops, drawn from worldwide research resources, tended to reinforce the technical agricultural research bias. Since the new international centre, IFPRI, had all social scientists, the proportion of social scientists at the present was over 10 per cent. As social scientists continue to contribute and problems become more focused on equity and consequent concerns, social scientist numbers will increase gradually. This trend is being reinforced by donors who want their contributions to be focused on the rural poor. Anthropology was mentioned as a discipline becoming more important in certain centres' work. The lack of social scientists in leadership roles in the centres was also discussed. At present, two social scientists are directors – Bill Gamble at IITA and John Mellor at IFPRI.

The importance of agricultural economists working with other agricul-

tural scientists was emphasized, since problem definitions were being formulated that required mutual observation and diagnosis. Concern was expressed at the implication that applied research by agricultural economists in the centres was not being recognized by the profession. Since this research was so important, perhaps the profession ought to review the criteria used to give recognition. Some time is needed for centre agricultural economists to be involved in theoretical and methodological considerations to keep up to date in the profession. However, it appears that professional recognition and rewards are increasing for centre economists.

Comments were made that the paper had not given enough recognition to the considerable training going on at the centres. It was pointed out that 30 per cent of the budgets went into training activities. Although the centres do not grant degrees, many are located near universities with agricultural interests which provide opportunities for complementary activities. This close proximity, however, does raise problems of equity between centres' and universities' staff in terms of benefit and income levels.

Participants in the discussion included Ramesh C. Agrawal, John Timmons and Michel Petit.