

**AD HOC COMMITTEE REPORT
ON THE REVIEW OF THE
AGRICULTURE, FOOD, AND NUTRITION SCIENCES DIVISION
OF THE INTERNATIONAL DEVELOPMENT RESEARCH CENTRE**

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CONCLUSIONS AND RECOMMENDATIONS

If the Agriculture, Food and Nutrition Sciences Division (AFNS) were bland and unexciting, our work would have been easier but not much fun. Our many observations, critical comments, and suggestions were stimulated by a program that is rich in content, imaginative approaches, "checkered" results, true-to-life problems, and some on-the-ground or underwater achievements; it has shown capacity to learn from experience and has great promise for the future. In short, AFNS is in a very healthy state.

The In-Depth Review of the AFNS Division submitted to the Ad Hoc Committee on 6 September 1985, placed the Division's program in the context of the world development environment, the international aid situation, the current trends in food production and other commodities, support for agriculture, and the Division's own growth path within IDRC. In general, one gets a distinct impression that AFNS knows its function within the international system of donors and national programs. The strategies it has chosen are well reasoned, and its substantive program content is obviously attuned to the needs of developing countries. The staff is aware of past weaknesses in implementation and are taking steps to remedy them. They are conscious of their successes and capitalize on them for further work. They know where they have been, where they are, and where they want to go. The Division has a dynamic, hard-working,

competent technical and support staff who know what they are doing and try to turn problematic situations into new opportunities. They cannot be faulted for lack of creativity or of vitality. They cannot be accused of irrelevance either. With the tremendous demand for AFNS support in the developing countries, which the Division is unable to adequately meet, the least the Board could do is to re-examine Centre-wide priorities with the possibility of reallocating resources to enable the Division to achieve a growth rate reflective of the world development environment.

We sincerely hope that the following recommendations will help the Division to build a future that is entirely worthy of its past.

A. Recommendations Based on the AFNS In-Depth Review

The AFNS Division has asked some important questions in the form of a choice between different alternatives in the later part of its paper. On the basis of those alternatives, we wish to make a certain number of suggestions and recommendations on five subjects:

- 1) Allocation of resources;
- 2) Responsiveness versus initiative;
- 3) Concentration of support;
- 4) Application of research results; and
- 5) Management of projects for other donors.

1) Allocation of Resources

AFNS Within IDRC. While we strongly believe that the overall importance of AFNS within IDRC should be maintained, we are less sanguine about the exact percentage share that the Division should get. Experience over the past 15 years indicates the need for more coherent support in a systems-oriented fashion. Agricultural research support, therefore, comes from units other than AFNS. Other divisions in IDRC, particularly Social Sciences (SS), Information Sciences (IS), Fellowships and Awards (FAD), Communications (COM), and Cooperative Programs (COOP), contribute their share toward the attainment of AFNS program objectives.

Among the AFNS Programs. Considering the situation in the developing world, the direct production of food remains the top priority of AFNS and funding for fisheries should increase. However, agroforestry, environmental protection, post-production systems (PPS), and the socioeconomic parameters of technology development and utilization are necessary supports to the food-production problem and concern for the rural poor.

Among Regions and Countries. To combine the efficiency of the more advanced developing countries and institutions with the needs of the weaker ones, we recommend that AFNS concentrate on research in middle-income countries but with projects specifically designed to benefit neighbouring poor countries. To this we would add a special effort and increased level of training support for the weaker institutions. It is in training where interaction between the stronger and the weaker institutions will take place - preferably within the same country, region, or continent. We can also link them in networks so that they benefit from research information.

2) Responsiveness Versus Initiative

Although responsiveness is a particular source of pride for IDRC, in practice, the process is more interactive, and slightly more steering than purely responsive to requests from developing countries. It is, therefore, an acknowledgement of reality that we endorse the existing practice:

That AFNS through its Program Officers and through support of strategic research should increase its support toward the better identification of research needs, and that it should increasingly act as a catalyst encouraging the submission of projects in those fields considered to be a priority.

This means placing "specific program officers with well-defined skills in the region where that type of project is a priority...."

These two courses of action will be desirable provided AFNS exposes itself sufficiently to the field and policy level problems of these countries and provides enough opportunity for dialogues with knowledgeable researchers and institutions in the country or the region.

3) Concentration of Support

With the vast experience that AFNS has had, they have a more informed basis for relative concentration of support. More than anybody else, the Division's own program staff are best qualified to judge on how to effect this concentration. They can use various options such as project linking, clustering of groups to be supported, and developing a minimum number of projects (three to six in one country), thus avoiding the one-country-one-project situation that now exists.

The deployment of Program Officers (POs) would be adjusted accordingly. In addition, benefits of networks, access to information, and training should be open to most countries even though they do not have active projects.

After the next 5-year period, all countries with fewer than three projects and those where project implementation has been extremely difficult could also be put aside.

4) Application of Research Results

To promote more effective application of research results, AFNS should not just support the pilot implementation phase but explore different approaches to farmer participation in the research process. Extension staff and nongovernmental organizations (NGOs) must be deliberately involved in this process because they will have much to contribute. Incidentally, the SS and Health Sciences (HS) divisions are supporting many participatory projects from which AFNS can learn much. We also recommend that a special item in all AFNS project budgets be reserved specifically for dissemination of results.

5) Management of Projects for Other Donors

Management of projects for other donors, both the Canadian International Development Agency (CIDA) and non-national organizations, has been a very positive role for AFNS within the international development community. It has contributed immensely to IDRC's international image. When opportunities arise that will not lead AFNS astray from its own objectives, AFNS should take them on, especially if they would contribute

toward an enhanced role for IDRC in agricultural research leadership. However, the Division should refrain from taking on too much additional responsibility that could distort its priorities and substantially alter the quality and character of its mandate and performance. AFNS, and in effect IDRC, must not lose its identity in the process.

B. Recommendations Based on Our Own Analysis

1) Follow-up Studies

Follow-up studies to determine how research results can be more effectively utilized need to be done. Where technologies have been adopted, impact must be analyzed not only to find out how intended beneficiaries have been affected but also to provide feedback to the research system. Support for such studies can be built into the budget of the research projects. Larger studies might be pursued in collaboration with the Office of Planning and Evaluation (OPE) or other divisions.

2) DAPs and Small Grants

To be much more responsive to research opportunities, ideas, and promising or "proven" researchers, AFNS needs to have more Divisional Activity Project (DAP) money as well as small grants. "Small is beautiful" if it is flexible and timely.

3) Interaction with Other Divisions

The systems approach that permeates the Division's program must also be reflected in a greater interactive relationship with other divisions. The Office of the Vice-President Research Programs can serve as the structure for facilitating cross-divisional activities or, at least, more sharing of information about projects of mutual concern. Furthermore, workload credits could be provided for time spent on such activities as an additional incentive.

4) Research and Publications by Program Officers

POs can have their own research and produce publications by "mining the gold mine" of experience in research management and the storehouse of technical research results available to them. To do this, some research assistance might be needed. This relatively inexpensive investment especially in the regions will contribute not only to the professional growth of the POs but also to IDRC's collective technical credibility in the international agricultural research community.

5) Follow-up on Training

Because the research projects belong to AFNS but training is administered by FAD, some arrangement must be made with respect to monitoring, follow-up, and strategic research support to returnees from training programs.

6) Impact on Women

In keeping with the agricultural reality and with the spirit of the 15th anniversary message of the President - "IDRC views development as a process for the benefit of people: in largest number, rural, in greatest need, women - we encourage AFNS to consider also, perhaps in cooperation with the SS Division, the impact of agricultural technology and farming systems on women.

7) Professional Development of POs

Besides sabbatical leaves, AFNS should explore other arrangements that will help keep POs professionally alive.

8) Nutrition Research in AFNS

The nutrition part of AFNS must be re-examined for options other than its location in Post Production Systems (PPS). Consultation with the UN Sub-Committee on Nutrition will be useful in defining what its thrust might be.

9) Incentives for Project Recipients

Centre-wide policies and practices on incentives for research project recipients should be reviewed to develop some consistency or at least some reasonable explanation for the disparities across divisions, across programs within one division, between institutions, and between projects.

10) Women in AFNS

The number of women in the professional staff of AFNS should be increased. A reasonable target to reach within 5 years would be 20% of professional staff.

11) Agricultural Economics Program

Because of its small size, the Agricultural Economics Program (AEP) should initially concentrate on two major areas of support: on the economics of production and utilization systems based on natural resources and on the economics of technology introduction. Its service role to AFNS' technically oriented projects should receive priority attention.

12) Networking

Because networking is a major mechanism used by the Division, how these networks actually function and what they have been able to achieve must be reviewed, especially for those which have been operating for several years.

13) Support to International and Regional Research Centres

In view of IDRC's strong commitment to the development of national research capacity, AFNS should re-examine the research support that goes to the international and regional research centres in terms of their contribution to this commitment.

1.0**INTRODUCTION**

The need for research on crops, livestock, fisheries, forestry, post-production systems, and the economics of these commodities and systems in the developing countries requires no lengthy justification. In this sense, the AFNS Division has an easy task. The challenge lies in the translation of real-life problems into researchable ones, the results from which could be applied in the solution of practical problems. Only then, can the life of the rural poor be made a little better. Here, the expectations are great.

Every project portfolio that we go through for each Board meeting contains a well-reasoned set of intentions that program staff have painstakingly prepared, sometimes in anticipation of Board reactions - including the Board members' professional idiosyncracies. From experience, some of these statements of intent have been questioned but none have ever been disapproved. Because there are no presentations specifically designed to inform the Board about what has happened to those intentions, the Ad Hoc Committee reviews can serve in a small way to highlight for us the complexities that stand between promise and performance.

The mandate given by the Board to the Ad Hoc Committee can be divided into three parts.

First, to review AFNS's mandate, past performance, and strategic intentions. More specifically, the Ad Hoc Committee shall be required:

- To review the past performance of the Division in terms of priority identification, program development and delivery, as documented in the In-Depth Review paper prepared by the Division and according to information obtained by such other means as the Ad Hoc Committee may deem appropriate;
- To review the research needs and opportunities identified by the Division as guiding its strategic plans;
- To suggest modifications, as appropriate, to the Division's mandate to improve its responsiveness to research needs and opportunities;
- To review the priorities assigned by Division management to the different programs of the Division; and
- To comment, as necessary on any major management issues that impinge on the effectiveness of the Division's activities in fulfillment of Centre objectives.

Second, the Ad Hoc Committee shall also monitor the treatment of specific policy issues suggested to AFNS by the President's Committee in early January.

Third, the Ad Hoc Committee shall submit its report, together with its recommendations, to the Board of Governors at its March 1986 meeting (it being understood that this report, together with the Division's In-Depth Review document, will constitute the basic documents for the Board's review of the Division).

1.1 Review Procedure

To carry out this review of AFNS, we read stacks of project documents including reports of consultants, trip reports, and technical reports. We interviewed all the staff members during

their annual staff meeting in Ottawa in June 1985 and we visited several projects in the Philippines, Colombia, Panama, and Costa Rica (notes on project visits are given in Appendix B).

In addition to interviews with relevant staff members from other IDRC divisions - SS, HS, IS, FAD, and OPE - we also attended part of two conferences that were partly or fully funded by AFNS.

The AFNS In-Depth Review document submitted to us on 6 September 1985, and which accompanies this report, was the take-off point for this review.

1.2 Our Report

Because AFNS is already such a strong division (in more ways than one), the review found no reason for earth-shaking structural, methodological, or programmatic changes. The Division staff seem to have thought about all the significant issues that we also perceived as important. Our comments, observations, and recommendations are, therefore, more in the nature of potential "refinements," possible alternative approaches, new problem areas to explore, additional institutional lessons to learn, reinforcement of exciting prospects, and inquiries about specific ideas and activities.

We have written this report in the spirit expressed eloquently by one staff member: "We can live with criticism but not neglect." We do not want AFNS to feel neglected.

The report is in six main parts - Conclusions and recommendations; Introduction; The AFNS programs and objectives; Comments on program content, objectives, and plans for the future; and Project assessment; Appendices.

2.0

THE AFNS PROGRAMS AND OBJECTIVES

The Division has five major programs: Crops and Animal Production Systems (CAPS), Forestry, Fisheries, Agricultural Economics (AEP), and Post-Production Systems (PPS). These are described in the following sections in terms of their project groups and objectives of each program. The program objectives are given here because they are the basic statements that define the activities of the Division:

2.1 Crops and Animal Production Systems

CAPS is divided into 13 project groups and 7 new research areas:

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|-------------------------------------|-------------------------------------|
| 1) Cereal crops; | 11) Cropping systems; |
| 2) Oil-seed crops; | 12) Animal production systems; |
| 3) Grain-legume crops; | 13) Farming systems; |
| 4) Root crops; | 14) Irrigation; |
| 5) Perennial Crop-based systems; | 15) Agroforestry; |
| 6) Other crops; | 16) Animal power; |
| 7) Land climate; | 17) Horticulture; |
| 8) Pasture and forage improvements; | 18) Small ruminants; |
| 9) By-product utilization; | 19) Integrated pest management; and |
| 10) Minor animal species; | 20) Biotechnology. |

The primary objective of the CAPS program is "to support appropriate research on crops and livestock production and thereby contribute to improving the welfare of people in developing countries. Priority is given to research that will benefit small-scale subsistence farmers, who frequently lack access to adequate land, water, financial, and other resources,

and who have been largely unaffected by the technological advances of recent years. As an adjunct to this main objective, the CAPS program seeks to strengthen the indigenous research capability of scientists and institutions in developing countries.

CAPS gives special emphasis to the semi-arid tropical regions of the world, where many of the poorest people live, and where the results of past agricultural research efforts have had the least effect. As a result, sub-Saharan Africa accounts for a higher proportion of the CAPS budget than the other regions."

2.2 Fisheries

The Fisheries program includes Aquaculture and mariculture and Artisanal fisheries including by-catch projects.

"The basic objective of the Fisheries program is to increase the production of fish in the world through applied research support in a manner to benefit the rural poor.

In addition to the direct benefit of producing more fish or fish products, each project within the program seeks to develop the institutional and human research capabilities through the project. Although this is not the major priority of IDRC support, the objective of institutional and staff development is recognized as a major element in the long-term solution of many problems of developing countries.

Other underlying objectives include developing and highlighting new fisheries opportunities for future large

development or implementation through extension services on a national or regional level. Regional exchange of information and technology developed with IDRC support is always sought and open access is assured."

2.3 Forestry

The Forestry program will concentrate on four major research fields during the next 5 years:

- 1) Integrated forest production systems;
- 2) Fuelwood and energy applications;
- 3) Management and regeneration of natural forests; and
- 4) Forest product utilization.

In addition to the four major areas of concentration, the objectives of the forestry program for the next five years are

- To concentrate on social rather than industrial forestry development;
- Within these four major fields, to support the solution of problems by the development of low-input technologies, and to develop faster and low-cost applied research methodologies;
- To strengthen national research capacities by supporting national institutions and the training of local research scientists with particular emphasis on Africa;
- To encourage increased communication and collaboration among institutions and researchers by networking and sponsoring of relevant meetings and travel; and
- To further the "twinning" of Canadian and national research agencies of Third World countries through IDRC's Cooperative Programs.

The Forestry program also states that:

Because of the mandate of IDRC of directing its efforts towards helping the rural poor, some elements of socio-economic research need to be an integral part of the forestry program. This is necessary to identify the needs, constraints, and the acceptance of changes of the target group, and to foresee developments and understand future needs.

2.4 Post-Production Systems

Disciplines within PPS were regrouped in 1983 and there are now three broad categories of activities:

- a) Food processing, utilization, and nutrition;
- b) Food handling, storage, and drying; and
- c) Equipment design, adaptation, and testing.

The broad objectives of the PPS program are to make more and better food available to poor rural and urban consumers and augment employment and incomes in small agro-industrial enterprises. More specific objectives are:

- To reduce food losses through the development and promotion of improved storage, handling, and drying technology and associated management systems;
- To improve food quality and quantity by developing, testing, and promoting better processes for stabilization of perishables and creation of new products reflecting consumer preferences and needs;
- To promote research and development of technologies that save and enhance food, food saving beginning with traditional processes and products;

- To promote improvement of small agro-industrial enterprises and to create, through them, a new source of local employment and income in rural areas and service to agricultural production and consumers; and
- To promote improvement of post-production research capability and institutional development by encouraging training and team work among researchers of various disciplines in systematic problem definition for integrated food systems.

2.5 Agricultural Economics Program

The AEP, which was organized in 1984 as a full program, has identified three main areas of support:

- a) Economics of production and utilization systems based on natural resources,
- b) Economics of technology introduction, and
- c) Economics of resource allocation for agricultural research.

Activities within this new program will analyze the production, distribution, and consumption of goods and services, and focus on the problems of the rural-based households where 70% of the people of developing countries live.

The objectives of the program are:

- To support agricultural research and development activities that strengthen the capability of rural households and communities to meet their development goals;
- To increase the efficiency with which agricultural scientists and their institutions are conducting research to meet the needs of rural communities; and
- To initiate and collaborate on new research relevant to the needs of the rural community.

3.0 COMMENTS ON PROGRAM CONTENT, OBJECTIVES,
AND PLANS FOR THE FUTURE

Our review of program content and objectives lead us to the following observations and comments on identifiable trends and on plans for the future.

3.1 Trend Towards Systems Research

There has been a marked trend away from specific subject research and toward systems research. For example, animal sciences and crops and cropping systems have now become the CAPS program, which includes Farming systems as a project group. Even the new substantive areas - irrigation, agroforestry, small ruminants, animal power, integrated pest management, horticulture, and biotechnology - are to be considered in the context of cropping/farming systems.

In the case of PPS, the focus is on the "food system rather than on isolated specific commodities, techniques, processes, and technologies. These are components of all projects but researchers are encouraged to view them in the context of the larger food system. They are encouraged to define, specifically, what problem they wish to solve, whose problem it is, and its significance". Each of the PPS sub-programs relates to "a specific commodity or group of commodities the major ones being cereals, roots and tubers, legumes, oilseeds, bananas and plantains, and other nutritionally important commodities such as fish, fruits, and vegetables".

Although this integrated approach is a most desirable direction to take, we are not so naive as to think it will be a bed of roses. Practically all researchers have been trained in a particular discipline, therefore identifying, conceptualizing, and operationalizing a particular research problem in the context of a system does not come naturally. We must, therefore, be prepared to build into the projects the education, reorientation, and resources needed for the researchers to acquire this perspective.

PPS acknowledges that some difficulties are inherent in the integrated approach and concludes that "it is easier to write a systems approach into a project summary than to actually carry it out in poor, needy country environments. Despite the difficulties of promoting a systems, applied, research and development (R&D) approach, it has been found to be essential".

It would be helpful, however, if IDRC could be a role model in this regard in terms of greater interdivisional interaction and collaboration so that the Centre, in the eyes of researchers in developing countries, is not seen as five Centres.

3.2 Impact on Women

Despite the systems view that permeates the Division, PPS is the only program that specifically mentioned that "the potential impact of proposed changes in processes and technology on women's work and well-being is considered in the assessment of all PPS-supported projects." Incidentally, AFNS seems to have always been a one-woman division as far as professional staff is concerned.

It is intriguing to extrapolate beyond this from the CAPS presentation:

There is a sense in which the program officers are IDRC. They are the people who interact with the men and women of the developing world [underscoring supplied].

Because the people are all men, except for one, and because program officers are IDRC, then IDRC as projected by AFNS is male. It would be desirable for AFNS, to have a few more women among its professional staff. A target of 20% of the professional staff, to be reached during the next 5 years, does not seem to be unreasonable.

3.3 Socioeconomic Dimension

Implicit and explicit in the four programs of AFNS is the need to include the socioeconomic dimension and the user-orientation in the systems definition of research problems.

An example of an explicit statement comes from the Forestry program:

Because of the mandate of IDRC of directing its efforts towards helping the rural poor, some elements of socio-economic research need to be an integral part of the forestry program. This is necessary to identify the needs, constraints, and the acceptance of changes of the target group, and to foresee developments and understand future needs.

The Fisheries program realized quite early the importance of other factors:

Useful research results have been produced in most projects but their extension to users has been

limited. To deal with this problem, two new aspects have been given much more importance. These are to emphasize aquacultural systems of a level of complexity appropriate to the target group; and to carry out well designed pilot studies where the interactions between the potential beneficiaries and the new culture system are examined at an early project stage....

It appears that many systems that are technically feasible have come up against social and economic problems. More attention must be given to develop systems that are appropriate to a particular socio-cultural milieu, and to include the potential users early in the development process.

PPS also came to the same conclusion.

A number of lessons have been learned in the process of finding technological answers to post-harvest production problems. Narrowly defined technical problems tend to be easier to solve, but if the needs of the end user in a complex system are disregarded, the work is often of limited use.

CAPS mentions this aspect in their future plans.

New projects will put more emphasis on multi-disciplinary research involving plant, animal, and social scientists. Such a systems approach will identify target populations from the start, and will involve on-farm research as a key element....

The principal methodology improvements to be sought over the next years will be in the area of trying to forge a closer collaboration between researchers and farmers in designing and evaluating technology, because up to now despite the rhetoric, relatively few projects have been able to fully overcome the "top down" orientation of most researchers.

Although the lessons have been well learned with respect to the need for user participation in the technology-development process, we have yet to learn how to stimulate and nurture this participation by farmers. It is probably in this task where NGOs can share with us their insights and experiences.

3.4 Crops for Rural Poor

AFNS' deliberate focus on neglected crops in difficult environments for poor people is indeed a first-class demonstration of "putting our money where our mouth is" as far as rural, poor beneficiaries are concerned. However, another round of neglect may ensue unless some follow-up is done to find out what has happened to the tender loving care lavished on these crops. We are referring to the "handing over to" or "taking over by" national governments in terms of support for continuing work.

The following are cited to make our point:

Sorghum was the basis of six projects during the past five-year period, but of these, the projects in Ethiopia and Senegal have now completed three or four phases, and have been taken over by the national governments. A cold-tolerant sorghum project in Mexico was taken over by another donor, and sorghum work in Papua New Guinea was discontinued.... The millet project in India, which has developed excellent *Setaria* and Proso millet material will soon be taken over by Indian Council of Agricultural Research (ICAR).

IDRC also supported national cassava research programs in Peru, Ecuador, Brazil and the Caribbean, but once these programs have grown sufficiently in strength, the funding has largely been taken over by the national program....

In the Philippines, work on cassava has now been taken over, but CAPS continues to support sweet potato research there....

Triticale support has now ended except for a minor component in the cereals project in Rwanda, where triticale outperforms other crops on acid soils; and is consumed as porridge.

Considering the economic situation in many developing countries where these projects are located, agricultural research is not likely to be top priority when funds are low. Do these crops receive the care that they deserve or are they again in a state of neglect? If we do not know the answer, can IDRC's Regional Offices find out?

In the case of triticale, we have a crop that generated a great deal of excitement and that might be aptly described as something that started with a bang and ended with a whimper. It is not what is said but what is unsaid about the fate of the crop that puzzles us. With the current famine in parts of Africa, does triticale have a role? A larger question arises, however: are some of these crops better left neglected? We hope not, but we need to assess the pay-off from past investments.

If national programs have actually taken over the research support for these crops and have made further strides in the direction of farmers' fields, then it is a truly major achievement for AFNS.

One of the aftermaths of the Save Africa Movement is the likelihood that recipients of food aid will acquire a taste and preference for items in the food aid package that all came from developed countries. This could set back the neglected crops even more as they take on a lowly status as food for the poor.

We recommend that AFNS continue to give priority for significant improvements in the food crops used by the rural poor.

3.5 Farming Systems

A significant development in the CAPS program is the introduction of a farming systems perspective into crop improvement projects and the shift of many crop improvement projects toward a systems approach with more of the research being conducted on farmers' fields. This approach could be expected to short-circuit the technology-transfer process because the farming systems perspective is supposed to facilitate the problem identification and definition and, therefore, technology generation can be more specifically geared toward what is needed by farm households under their particular circumstances. This, in effect, is a built-in technology-transfer mechanism instead of technology generation being an entirely separate process from technology transfer as has been the case under the conventional research system. The CAPS program is quick to point out, however, that "national programs answering the needs of small farmers are only starting to emerge now in Africa."

If farming systems research (FSR) is to have a built-in mechanism for technology transfer, the farm household and even the village must have an opportunity to participate in the process. Otherwise, research on farmers' fields could not be much more than central experiment station research transferred to farmers' fields - at any rate, the FSR process and even the concept itself deserves continuing documentation and analysis of actual practice so that greater clarity will be achieved both in procedure and in substance.

In the CAPS presentation on FSR, we wish to emphasize the following.

An awareness of the importance of research being determined by the farmers' explicit needs has developed over the past 10 years, rather than the traditional approach of basing research on pre-concern ideas of scientists, who themselves are often from urban background.... Although there are diverse definitions of FSR, the approach supported by CAPS is holistic and "bottom-up." It aims, through close interaction with the farming community, to identify constraints and to test and introduce appropriate new technologies. Even though it may concentrate only on one or two subsystems, it involves a multidisciplinary team approach and fully involves the farmer in the research, a process that is more an evolution than a revolution....

But FSR projects are considerably more complex from a conceptual, technical, administrative, and organizational standpoint than either cropping systems research (CSR) or animal production systems research (APSR) projects, this trend will need to be closely monitored.... There is a need to take stock of the effectiveness of FSR compared to CSR and APSR. Within the next few years sufficient experience should have accumulated within the CAPS-supported FSR projects to undertake a comparative evaluation....

Although the systems approach has been shown to be a promising avenue for agricultural research and development, it is still dependent on the availability of appropriate new component technologies. When these do not exist they must be developed and more conventional commodity-oriented research albeit with an on-farm bias probably remains the best means of achieving this. It is thus intended for the overall CAPS program to allocate funds to both commodity and systems research.

Although these statements say all the right things, the staff are not naive about the complexities of their chosen path. It is rather ironic, for example, that FSR seems to be more appropriate for disadvantaged areas and yet it is in these more

difficult places where the expertise may not be easy to find. It is probably not an exaggeration to say that, to implement FSR effectively, we need a new breed of researchers or a reorientation of current ones.

As a matter of fact, perhaps the most significant achievement of FSR to date is the number of researchers who have been brought to observe and analyze farm-level conditions when, otherwise, many of them would be quite comfortable in their experimental station plots and air-conditioned labs.

3.6 More of the Same or New Directions

The CAPS program states that "where work has been successful, the future will be more of the same, while in others a careful evaluation is essential to give direction." Perhaps it is precisely where AFNS has been more successful that it should not be more of the same. Being the oldest and most heavily funded of the AFNS programs, perhaps an analysis and synthesis of the experiences with respect to the following items is needed:

- Methodological tools, techniques, experimental designs, and data-gathering instruments for the socioeconomic, agronomic, livestock, etc aspects of research projects;
- Substantive findings on the technical side of the farming system itself and the various components;
- Project management procedures and structures that have worked, or not worked, including the realities of networking;

- Regional, international, and national working relationships and inter-institutional linkages among ministries of agriculture, universities, specialized research institutions, extension organizations, and the farm community. How we reach the latter, obtain feedback, and take the feedback into account in agricultural research is not an easy task; and
- Schemes used in building indigenous institutions and local research capacity.

AFNS has done work around the world. In the analysis of all these previous experiences, we must look for lessons as well as emerging problem areas that will take us into new possibilities.

Because of its style of operation, IDRC is very rich in these experiences. As a matter of fact, project documents, progress reports, monitoring visits, technical publications, project completion reports, POs' trip reports, etc. constitute a gold mine of information for research management in developing countries. How can we maximize the utilization of all this information, not only for the benefit of IDRC in terms of a useful institutional memory but also for what can be learned in the task of building and strengthening of research capacity under less than ideal conditions?

The International Service for National Agricultural Research (ISNAR), for example, is in the business of strengthening national agricultural research systems (NARS). Usually it reviews the NARS itself. Another way of approaching this is to analyze how donor agencies such as IDRC go about doing their job, because they are in much the same business. A joint effort involving ISNAR and IDRC could increase the information made available to others through an analysis of AFNS' archives.

3.7 International and Regional Research Centers

The use of international and regional research centres as a strategic mechanism for developing, implementing, and backstopping research projects in national programs is very much part of the CAPS style of operation. Perhaps it is fair to say that it has been mutually productive, so far. International centres find a way of working with national programs and CAPS can rely on technical backstopping.

For these reasons, the dreams of the Fisheries program is for a fisheries centre in the style of the Consultative Group on International Agricultural Research (CGIAR) to be endorsed or funded or both, by IDRC. In the meantime, the program continues to identify strong national and regional centres and envisions beginning "a program rather than project support on a trial basis with some of these institutions".

The Forestry program, by contrast, found a considerable number of research institutions in both developed and developing countries with underutilized capacity and lack of communication among them. They, therefore, welcome very much the establishment of a semipermanent secretariat by the International Union of Forest Research Organization (IUFRO) which has the mandate to identify forest research needs in the developing world, and to stimulate the input by researchers from institutes in developing countries.

PPS, for its part, said that "because of a lack of post-production training programs in all regions, the program

focused on encouraging researchers to learn by doing, coached by program officers specialized in key areas." They also provided support in the creation of the Philippine National Post Harvest Institute for Research and Extension (NAPHIRE).

It is surprising that PPS has not found any post-production training programs in any region because the Central Food Technology Research Institute (CRFTRI) in Mysore, India, is an internationally known centre that has been providing degree and nondegree training programs for international participants for many years now. Furthermore the United Nations University's (UNU) subprogram on "Food, Nutrition and Poverty" has a number of other associated institutions specializing in fields related to PPS. They also have training programs in addition to research activities.

A major reason for dwelling on AFNS' use of international and regional research centre is that about 25% of the expenditure on current projects went to these centres.

Because of IDRC's very strong commitment to the development of national research capacity, we think that this proportion of AFNS' resources directed toward international centres should be reexamined in terms of those centres' contribution to this commitment.

3.8 Agricultural Economics Program

The statement of objectives of the AEP is too general and could be perceived as the objectives of any rural social science

program. It does not give the reader much of a hint as to what the subprograms would contain. Because AEP is a program within AFNS, its role vis-à-vis the four major programs must be reflected in the statement of objectives. Otherwise, there is little justification for having a separate AEP under AFNS.

Was AEP not intended to perform a supportive function in the AFNS projects so that the economics component would be meaningfully addressed? The description of the three main areas of support tell the story in a way that the statement of objectives does not. However, the project selection criteria that AEP has specified contain the elements that could be appropriately incorporated in the statement of objectives.

For example, the following project selection criteria communicate the essence of AEP:

- is or will become directly involved in the generation of technology;
- accept and integrate social and natural resource systems concepts into their research program;
- employ a methodology likely to be utilized by national research groups in the future; and
- consider both distributive justice and allocative efficiency in the design of the research proposed.

It is evident that many AFNS projects suffer from a lack of, or weakness in, socioeconomic considerations. For this reason, inputs from the Economics and Rural Development Program (ERDP) of SS are quite crucial. It is worth noting for example, that the Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) has recognized this need and developed training programs for the

purpose. The Centro Internacional de la Papa (CIP) has a proposal for a master's degree level program on socioeconomic training for agricultural research. This is not intended for the usual social scientist but for the socioeconomist who will be working specifically with agricultural researchers. Perhaps we can now find enough professionals from around the world who have had the field experience, know the methodology, and show the inclination to enable us to assist developing-country institutions in this task.

A very positive development in the area of enhancing socioeconomic research capability in a particular AFNS research area is the training program on farming systems socioeconomic research, which is supported by the Division. Although this represents a big step in the desirable direction, much more needs to be learned not only on how to do it but also on what questions need to be asked and why. In other words, AEP has its work cut out for itself.

Anticipating the great demand that will be made on the resources of AEP by the four other programs of AFNS, which all indicated their need for more socioeconomics in their projects and in view of AEP's own realization that "what is missing is a research system that will encourage agricultural economists to become directly involved in the development of new agricultural technology," AEP should probably concentrate on the first two major areas of support: economics of production and utilization systems based on natural resources and economics of technology introduction. The third area, economics of agricultural research

resource allocation, might, for the moment, be better left to ERDP of SS, the International Food Policy Research Institute (IFPRI), ISNAR, University of Minnesota, etc. because AEP has an extremely small staff. They should have their hands full with joint activities with other AFNS programs. As it rightly defines its role:

Since AEP is part of the AFNS Division, it is in a position to integrate both social science and technology development from planning to adoption and so will become responsible for all agricultural economics research.

3.9 Fisheries

The Fisheries program seems to have been very multi-disciplinary right from the start with important inputs made by the SS, IS, HS, FAD and COOP Divisions as well as COM. It is also quite integrated with PPS, which handles almost all fish-processing activities, and AEP, which covers the economic aspects.

It is also worth noting that Fisheries acknowledge that

full descriptions of the widely varied fisheries systems operating in Africa are lacking in many areas. Descriptive research of this kind, although not particularly glorious, may be essential in focusing development efforts on aspects of the fish production and marketing system which are most amenable to improvement.

Descriptive studies are often dismissed as being nothing but descriptive but, in many instances, one reason why we are working on the wrong problem is because we do not have a good description of existing farming, forestry, and post-production systems.

The four major programs differ in their choice of institutions to work with and support. Fisheries plans to continue support to both university and government departments, building linkages wherever possible. CAPS support goes mostly to government research institutions in Asia whereas in Africa, where government research institutes are generally weaker, universities are predominant. It intends to make a gradual move of funding from universities to government research institutions. PPS, on the other hand, found that most research by the established food technology research institutions is aimed at the larger scale processed-food industry whereas academic institutions tend to be less interested in applied research. In the case of Forestry, the vast majority of projects supported have been with government research institutes or forest services; university research departments have received little support because of their tendency to work on basic, rather than applied, research.

The ideal state, if it were possible, is to build bridges between government research institutes and the universities because the latter will continue to be the producers of research personnel. These researchers need to be exposed to the facts of life through research projects, preferably those that take them to the farm, to the forest, or to the fish ponds.

3.10 Nongovernmental Organizations

The Forestry program plans to include NGOs to improve the dissemination of results. The role of grassroots-oriented NGOs

in stimulating farm household participation in technology development and adoption might also be explored by CAPS.

NGOs can also be very useful in identifying the real problems to be solved. Even though, as a rule, they do not have the capacity to lead research projects, their names should appear more often in project summaries as meaningful collaborators.

3.11 Increased Allocations for DAPs

The CAPS expressed a need for larger budget allocations for DAPs and, in general, AFNS sees the value of small grant-projects in building research capacity. This is indeed a desirable direction to take that will be much appreciated by research proponents.

Another suggestion, made by one AFNS PO, should be further examined for possible implementation: each PO would control, in a personal account, a small sum of money (\$3-5 thousand/year) to help deal with emergency cases of all types. This could be drawn on the PO's sole authority from the personal account when it is needed under circumstances that cannot wait for the regular process. The fund would be replenished afterward in a regular way by sums taken from the appropriate project budget. This is a practical application of the universal concept of "petty cash." Of course, the officer would have to justify afterward the proper use of this money.

3.12 The Silent N in AFNS

For a long time, the "N" in AFNS has been a puzzle to researchers for it is almost silent or imbedded in agriculture and food except in the PPS program which

.... over the past few years has supported several nutrition-related projects in the Asian region involving the encouragement of legume production and consumption. It was envisaged that this would upgrade the quality of rural diets by providing greater amounts of protein. The strategies in these projects were the development of supplementary infant foods using legume/cereal mixtures as a base and the promotion of legume/cereal processing at the village level to increase self-reliance and community involvement.

These types of projects reflect a "response to many requests for support by food technologists to develop high-nutrition foods or food supplements."

The consultants who reviewed these projects have found many weaknesses and recommended not only a systems approach to weaning food development but also suggested studies on methods for overcoming specific deficiencies in vitamin A, iron, and iodine. On the latter suggestion, the U.N. Administrative Coordinating Committee on Nutrition, through the Advisory Group on Nutrition (AGN), has already produced well documented materials on these methods based on studies and experience around the world. Such deficiencies evidently lend themselves to technological solutions that have already been developed and tried. What is rather frustrating is why more investments have not been made on

implementing those known solutions to problems that are so visible and prevalent. In Indonesia, monosodium glutamate (MSG) is used as a medium for vitamin A because the well-known brand Ajinomoto is very much part of Indonesian cooking.

The systems approach to weaning food development can be a very complex undertaking. Just a cursory and nonexpert examination of the problem tells us that we would need the following:

- Analysis of food consumption patterns, food availability, weaning food practices (what is eaten, by whom, at what age);
- Production of weaning-food ingredients in sufficient amounts for processing;
- Processing equipment and attention to scale and organization of processing;
- Marketing of product;
- Identification of nutritionally at-risk groups; and
- Development of nutrition intervention to reach them through weaning-food product.

A recent publication, Improving the Nutritional Status of Children During the Weaning Period: Manual for Policymakers¹ is based on actual R & D experience and discusses the weaning-foods development system comprehensively. A working group of experts wrote papers which became the basis for this manual prepared by the Home and Village Prepared

¹ Mitzner, K., Scrimshaw, N., and Morgan, R., ed. n.d. Improving the nutritional status of children during the weaning period: Manual for policymakers, program planners, and fieldworkers. Available from International Food and Nutrition Program, MIT, 18 Vassar Street, Room 204 - 201, Cambridge, MA 02139, USA (Tel. 617-253-5101).

Weaning Foods Project of the Massachusetts Institute of Technology (MIT)- Harvard International Food and Nutrition Program and the United States Department of Agriculture (USDA).

This manual describes the international experience in processed weaning food projects as follows:

In the 1960's a number of processed weaning food projects were begun in Latin America, Africa, the Middle East and Asia. Some were sponsored by governments and the United Nations; others were organized by food industries. Only a few of these projects achieved a significant sales volume measured against their market potential. These experiences indicate that careful project planning and implementation are required for success.

Among the surviving projects are: Incaparina in Guatemala, Colombiagarina and Duryea in Colombia, Superamine in Algeria and Egypt, Faffa in Ethiopia, and Pronutro in South Africa. Recently, projects such as Thriposha in Sri Lanka and Cerex in Guyana, using low-cost extrusion for the local production of nutritious foods.

Table 1 shows that all of the surviving products are distributed free by government. Commercial sales are a small part of the marketing system.

It is tough enough to develop suitable PPS projects that will result in operationally workable systems. Adding a specific nutrition task to it makes it infinitely more demanding. Without underestimating their staff capability, PPS by itself cannot promote weaning-foods development without acquiring additional expertise.

Table 1. Selected processed weaning foods.

| Product (country) | Ingredient | Processing method | Product form | Marketing method | Packaging | Size of package | Years on market |
|--------------------------|--|-----------------------|-----------------|---------------------------|---------------|-----------------|-----------------|
| Incaparina (Guatemala) | Processed corn and cottonseed flour, vitamins and minerals | Mixing of ingredients | Mixed processed | Free and Government | Paper Plastic | 460 g 75 g | 22 |
| Maisoy (Bolivia) | Corn and whole soy | Extrusion | Flour flakes | Free and Government | Plastic Box | | 7 |
| Bienestarina* (Colombia) | Rice, soy and milk | Extrusion | Flour | Government | Plastic | kg | 10 |
| Chicolac (Bolivia) | Rice, milk | Spray drying | Flour | Free | Plastic | 500 g | 1 |
| Torti-Rice (Costa Rica) | Lime-treated corn and soy | Mixing | Flour | Free | Plastic | | 7 |
| Thriposha (Sri Lanka) | Corn and whole soy | Low-cost extrusion | Flour | Free and commercial sales | Plastic | 454 g | 6 |
| Cerex (Guyana) | Corn grits, rice, soyflour, oil and nonfat dry milk | Low-cost extrusion | Flour | Free and commercial sales | Plastic | 454 g | 3 |

Source: Improving the Nutritional Status of Children During the Weaning Period.

* Bienestarina is no longer on the market.

Contrary to what the In-Depth Review document said about "the absence of institutions and scientists involved in the field of human nutrition," many institutions and scientists in the developing world are doing nutrition-related research, including many interdisciplinary projects - nutritionists are probably more interdisciplinary than agriculturists and most countries have a nutrition program of some sort. The Division would be well advised to consult with the U.N. Administrative Committee's Sub-Committee on Nutrition (SCN), which includes multilateral as well as bilateral donor-agency representatives supporting work in nutrition at UNU. A series of state-of-the-art reviews, being prepared under the sponsorship of the SCN, deals with different aspects of the nutrition problem including one on nutrition considerations in agricultural research. IFPRI and the World Bank have done quite a bit of analytical work on nutrition. Discussions with these different agencies would give AFNS a better basis for deciding whether it should take on a specific nutrition thrust or not and what this thrust might be in the light of what others are doing. Being better informed can certainly help "define the objectives and purpose of AFNS human nutrition activities and establish what roles Health Sciences, Social Sciences and PPS can play within a cooperative framework."

It may be that the AFNS' overriding concern for human nutrition, defined as "making enough food available" is the best role it could play.

This definition of its nutrition role can probably be fittingly implemented through the cropping/farming systems program. AFNS could have a subprogram that focuses on the food consumption perspective in FSR. Frankenberger² argues that the focus is more on food consumption than on nutrition because

FSR production activities are more directly linked to food consumption than to nutrition. A number of factors other than food may have an impact on the nutritional well-being of the farm family, such as poor sanitation or exposure to disease. Thus, FSR projects should not be held accountable for nutritional consequences outside of their control. In addition, data collection procedures focusing on food consumption can be more readily incorporated into production-oriented FSR procedures than nutritional studies.

He points out some of the linkages between certain aspects of production and consumption such as:

- Seasonality of production. In most areas of the world, there is a seasonal dimension to agricultural production, food availability, malnutrition, human energy expenditure, incidence of disease, and the terms of trade for the poor.
- Crop mix and minor crops.
- Income. Income can have an impact on consumption levels depending upon how regularly it is received, what form it is in (i.e., food versus cash), and who is the recipient in the household.

² Frankenberger, T.R. n.d. Major issues to address in the incorporation of a food consumption perspective to FSR, (A report prepared under RSSA-BST-1171-R-AG 3125-01 with the Office of Nutrition, Bureau for Science and Technology, USAID under Project 931-1171). USA. Nutrition Economics Group, Technical Assistance Division, Office of International Cooperation and Development, USDA, Washington, D.C.

- The role of women in production. Women are often responsible for food crops and their income is usually used for food purchases. Increasing the agricultural labour demands of women through cash crop intervention may lead to a change in cooking habits, women planting less labour-intensive and less nutritious food crops, and less time being devoted to child care and breastfeeding.
- Crop labour requirement.
- Market prices and seasonality. For example, high consumer food prices coincide with small-farmer food shortages. In addition, government import and export policies may adversely affect the prices of crops grown locally, keeping the purchasing power of small farmers low.

Consumption-related criteria should be incorporated in target-area and household selection to ensure that nutritionally vulnerable areas and households participate in project activities.

Something along this line could be explored as another way to break the silence of N in AFNS. Otherwise, it might be more practical to contemplate changing the name of the Division so that it does not mislead the public in thinking that it has an important nutrition thrust. It could be called Agriculture, Forestry, Fisheries and Food Sciences Division (AFFFS).

3.13 Networks and Networking

There are 27 existing and 5 potential networks through which AFNS provides either partial or full support for research activities and coordination, as well as for training, workshops, conferences, meetings, and monitoring tours (Table 2).

Because networking is a major mechanism used by the Division, an analysis of how these networks actually function and what they are able to achieve must be done at some point. Are

Table 2. Networks Affecting AFNS Activities

| |
|---|
| Cassava Cooperative Research, Asia |
| Asian Cropping Systems Network |
| African Research Network on Agricultural By-products |
| Asian Cropping/Farming Systems Network |
| International Crops Research Institute for the Semi-Arid Tropics/ Semi-Arid Food Grain Research and Development (ICRISAT/SAFGRAD) network (sorghum, millet, and striga) |
| Possible network on legumes for which no International Agricultural Research Centre (IARC) has a mandate (e.g., peas and <u>Lathyrus</u>) |
| Oilseeds Project Network (centred in Ethiopia) |
| Rootcrops Research Network in Eastern and Southern Africa |
| Cassava Network in West Africa, International Institute of Tropical Agriculture (IITA) |
| Network on Potatoes in Latin America, PRACIPA |
| International Network for Improvement for Banana and Plantain (INIBAP) |
| Andean Crops Network |
| Network on phosphate fertilizers, eight West African countries with the International Fertilizer Development Centre (IFDC) (proposed) |
| International Board for Soil Research and Management (IBSRAM) |
| Animal Production Systems Network, Latin America (Similar network possible in Eastern Africa) |
| International network on small ruminants (proposed) |
| Tropical Pastures Network in Latin America and Caribbean, coordinated by the Centro Internacional de Agricultura Tropical (CIAT) |
| Pastures Network for Eastern and Southern Africa (PANESA) |
| African Research Network for Agricultural By-Products (ARNAB) |
| International Livestock Centre for Africa (ILCA) |

African animal production systems network (proposed)
 West African Animal Production Systems Network
 West African Agroforestry Projects Network
 Forest Products Utilization, Andean Pact countries
 Asian Network on Bamboo and Rattan (10 projects)
 Shelterbelt Projects in Africa Network (4 projects)
 Leucaena Network (Asia)
 High-Altitude Afforestation, Latin America
 Crops Post-Harvest Program, Association of South East Asian Nations (ASEAN)
 Southern Africa Development Coordination Conference (SADCC) program concerned with identifying post-harvest problems
 Asian Fisheries Social Science Research Network
 Network on seaweeds (proposed)
 Oyster production network (proposed)

they as effective in stimulating good research and in generating research results as they are in creating a community of researchers interested in a particular research problem? Who belongs to the network? Who implements projects? And who attends meetings?

Networks are expensive to operate and maintain and, therefore, ways of improving effectiveness are essential. Are junior staff members who "create and do things" given enough opportunity to be recognized in reports and publications and to share in the benefits of travel and meetings inherent in the network approach. In our project visits, we met such individuals who might not have "surfaced" if the institutional project leaders had been around.

How do we minimize the participation of professional jet-setters who do not do much research but, when it is time to travel are first in line? We must endeavour to meet the "doers" at the lower end of the totem pole where project productivity is really determined: there are institutional project leaders, project project leaders, and operational project leaders: they are rarely the same person.

Perhaps some of the projects suffer from "premature" networking, which seduces the researchers into working on a certain problem area before they have really identified and defined the problem. Because networking is so much a part of our modus operandi, we probably, and unwittingly, thrust a problem area on potential researchers before they have had a chance to really assess the local situation for themselves. Do we also unconsciously use "networkability" as a criterion for "fundability"? Networks are attractive to researchers for several reasons, one of which is the opportunity to travel. Because, in theory, AFNS does not provide honoraria for researchers, local and international travel is one of the incentives built into the network.

It is also interesting that one project leader said he wanted to change the objective of the project because he thought that something else needed to be pursued but the PO would not allow him to do so because a change in objective would mean going back to the Board. (To avoid putting the PO in an awkward position, we did not go into the details.) However, we should reexamine our procedures to prevent the continuation of a project

that is already perceived "not to be right." The more relevant question is how was the problem identified and defined in the first place.

We concur with the gist of the Nutrition/Supplementary Foods Review by Tara Gopaldas and Max Rutnam and summarized by R.H. Young.

The projects were founded on insufficient base material. A systems approach is vital to success but was invariably lacking in the projects, with researchers concentrating on their own fields of expertise....

No attempts were made to carry out ex ante market surveys and this omission has seriously hindered progress. No methodology or expertise was available for undertaking market research in rural environments. Many of the researchers exhibited a lack of appreciation of the existing rural situation....

A major deficiency was a general lack of knowledge concerning traditional weaning practices....

The consultants concurred that village technology for the production of supplementary foods may not be relevant....

Perhaps it was inappropriate to define the project right away in terms of legume utilization when legumes may not be the right ingredient for a particular place. Field exposure for the researchers is a "must", not only for problem identification but also for greater clarity with respect to target beneficiaries and for forging linkages with other institutions, individuals, and disciplines. In other words, researchers must be given a chance to learn about different aspects of the research problem area before the project objective rigidifies.

The observations made by the consultants for the Nutrition/Supplementary Foods Review are relevant to the crops-livestock systems, mechanical grain dryers, rattan, small-scale energy systems, and perhaps other projects of the Division as well.

Perhaps an investment of \$5,000 or \$8,000 on pre-project research and development "homework," including an analysis of the relevant system and its components, review of literature, and field exposure for the researchers, would be a very cost-effective use of small grants or DAPs. This could make the \$350,000 project much more effective. The seriousness and capability of the proponent is also put to a test. If a larger project fails to materialize from this initial grant, the loss is small and the exercise would be a learning experience for both IDRC and the proponents.

3.14 Some Observations on Training

One of the objects of IDRC is "to assist the developing regions to build up the research capabilities, the innovative skills and the institutions required to solve their problems." In line with this Centre-wide objective, the AFNS program's statement of purpose in A Decade of Learning³ (p. 138) is

³ International Development Research Centre 1981. A decade of learning: International Development Research Centre - Agriculture, Food and Nutrition Sciences: The first ten years. IDRC, Ottawa, Canada. IDRC-170e, 180pp.

To strengthen the scientific capability of developing countries in the belief that every nation needs its own food and agricultural research service, staffed with scientists and technologists able to choose from among the many alternative systems and technologies, those most relevant, appropriate, and readily adaptable to their country's needs and resources.

Because of this, training has a very crucial role in research-capacity building whether it be degree or nondegree, short-term or longer term, individual or group, or directly or indirectly related to programs or projects, or whether it comes in the form of institutional support to a trainor/recipient institution.

The evaluation study by Pedro V. Flores on FAD training in Asia-Pacific Region, 1982-84, has some observations that are relevant here.

Sixty-one percent of 82 AFNS projects in 1980-84 have a training component compared to 45 percent of 64 HS and 56 percent of 54 SS projects. Eighteen percent of total budget was allocated for in-project training. The comparable figures for two other divisions are: 10.2 percent for HS and 15.35 percent for SS. For the 5-year period, there were 33 Master's and 7 PhD level trainees. SS had one and HS, none.

The Fisheries program received the largest share (34 percent) of total FAD funds.

Fifty-nine percent of FAD awards for AFNS went to institutions where the Division has project support. However, the FAD report underscores the usefulness of awards to non-IDRC institutions to facilitate future relationships - as a "research stimulation" objective.

About 44 percent of 38 in-project trainees finished their degrees after the completion of the research projects with which they were associated.

The cost of degree training is much higher in international than national institutions and the cost of routing FAD funds to regional and international can be from 3 to 9 times more per trainee per year than giving the grant directly to national institutions.

Because the research projects belong to AFNS but training is administered by FAD, some arrangement between these divisions must be made with respect to monitoring, follow-up, and strategic research support to returnees from training programs. Trainees of whatever type are potential recipients of project-generated research results and more general IDRC publications. They are also potential IDRC "friends" and constituents around the world. They are part of IDRC's research public.

A more pragmatic reason for follow-up, however, is the fact that many trainees complete their degrees after the termination of research projects. Upon return, the most common experience is one of frustration because research support is seldom immediately available to get them started.

Can we do something to shorten this exasperating period so that reentry into the research scene can be productive right away? Experience has shown that if a new degree holder fails to find a research role within a year of return, research productivity lags considerably and might even be prematurely aborted. Can we set aside small research funds in anticipation of their return?

3.15 The Canadian Connection

Prospects for collaboration with Canadian institutions look promising. AFNS seems very able to absorb COOP funding without distorting the Division's priorities. Perhaps this is due to the wide range of subjects in AFNS that lend themselves to

cooperative research. All topics that have been identified for cooperative projects are regarded as "priority by program staff; have arisen from existing projects and most link with existing networks". In other words, Canadian and national institutions do not need to go on "fishing expeditions" to find problem areas for collaboration.

CAPS, for example, had seven active cooperative projects with a further four in the pipeline. For 1985/86, about \$2 million will be allocated for CAPS cooperative projects, representing 16.5% of the total resources available to the program.

3.16 The Beneficiaries

Every project summary presented to the Board includes some section on recipient, beneficiaries, institutional linkages, etc. Although we are seriously thinking about the rural poor, quite often they are a long way from being actual beneficiaries - not by intent but by the very nature of the research process. In assessing the impact of IDRC's support, we must look at several groups of publics and direct, indirect, and interim beneficiaries.

- The recipient institution and the researchers involved are the most direct beneficiaries.
- There are a number of relevant publics who ought to be "touched" somehow by project activities and outputs:
 - a) The research community in the developing country (and those in Canada and other developed countries interested in international development) through the technical and methodological results of projects;

- b) Relevant decision-makers in the research, teaching, and extension agencies, in Parliament, and in agriculture and even budget ministries;
 - c) Multiplier trainers and trainees;
 - d) International development agencies who could introduce the technology developed from research results in the design of agricultural and rural development projects. Rightly or wrongly, these agencies become powerful conduits for ideas because of their command over resources. For example, the Training and Visit (T&V) system for extension and technology transfer is a feature of every extension project supported by the World Bank around the developing world from Nepal to Kenya. The T&V system, therefore, could be an effective carrier of new seeds or new ways of feeding animals.
- Rural household producers benefit from research project results only if these results are eventually translated into something useful for them.
 - Low-income rural and urban consumers are the ultimate destinations of whatever is produced.

In many developing countries, the poorest among the poor are households of agricultural landless, the marginal lowland cultivators, the upland farm households, desert inhabitants, artisanal fishermen, and the millions of urban slum dwellers. Are the latter part of the poor we have in mind?

Perhaps it is also about time to take a second look at what we mean by subsistence farmer. Purely subsistence farmers, who produce and consume whatever they produce, may not be as prevalent now as they once were. Most of them have become part of the monetary economy and therefore sell at least some part of their produce to purchase other commodities. The use of modern inputs in farming automatically puts them at least partially in the monetary economy. Some studies in Asia, for example, have shown that many rice farmers are net purchasers of rice not

necessarily because they do not produce enough but because the bulk of their produce is sold to pay for other needs.

Where there is a large agricultural landless population who are dependent on hired farm work as a major source of income, it would be hurting the poorest of the poor if the technology developed resulted in their displacement, particularly if alternative farm or nonfarm job opportunities are limited.

The identification and definition of target beneficiaries for the research undertaken is useful because this is one criterion applied for determining the fundability of a project. For example, the level at which the use of a post-harvest processing equipment would be viable may be not the household but the larger community - even outside the village. Increases in food production benefit the urban consumers, especially the poor ones. Therefore, the reality of nonrural and even nonpoor beneficiaries may be relevant to some of the AFNS projects.

In the final analysis, however, people from outside the research establishment benefit only if the research results "produce development" or contribute to decisions that lead to "development." The challenge is how to shorten the temporal and spatial lag between the development of a research project and the utilization of its results. One obvious way is to identify and define the "right problem" so that the "right solutions" could be found. Perhaps we should invest a bit more resources on the problem-identification and project-development process, especially where researchers are not only inexperienced but also relatively "out-of-touch" with the real world. A system of small

preproject grants that would provide the proponent with first-hand exposure to different farming systems, for example, or to existing aquaculture management, or to kinds of processed foods sold in the local market could stimulate a different type of creativity from a review of literature on the subject. Furthermore, it might help them clarify for themselves the target beneficiaries for their research.

3.17 On Responsiveness

Is AFNS responsive? Responsiveness can mean several things:

Passively responsive means simply responding to research initiatives of the developing-country researchers, sometimes in collaboration with Canadian scientists.

Actively responsive means making a steering approach toward certain chosen paths.

Interactively responsive means being able to arrive at research priorities for support through an interactive process by continuing dialogues with knowledgeable individuals and institutions, through second-hand contacts (the relevant literature), and through first-hand exposure to problems of the developing world.

Pragmatic responsiveness means providing research support even in small amounts but characterized by timeliness and flexibility to explore new research leads or to identify the interlocking components of a problem that require a systems perspective. Most of all, however, pragmatic responsiveness means supporting promising new entrants to the research system who are fresh from their master's degree or other training programs and are actively searching for something to apply their training to. To be pragmatically responsive, AFNS must have access to flexible funds because timeliness is the essence, not necessarily the size of the cheque. Pragmatic responsiveness means responding to opportunities as they appear and not as programmed.

Person responsiveness means the ability to identify promising as well as proven individuals and to find ways of making or keeping them productive. In other words, this means supporting researchers and trusting them to do the right thing.

Idea responsiveness means responding to an exciting idea even if it does not fit neatly into the established program and format.

In general, responsiveness implies learning and listening - neither of which do not come naturally when one has money but no time.

AFNS can roughly be characterized as interactively responsive but more steering than passive. For example, farming system/on-farm research is not the usual type of request that would come spontaneously from institutions with typical experiment station orientation. Furthermore, in its relationship to nonnational research institutions like the IARCs, the strategy is even much more "steering" as expressed in the In-Depth Review document.

One of the main concerns of AFNS has been the limited cooperation between non-national and national research institutions, with the result that national programs have become marginal to some research in their own country. AFNS sees itself therefore in a role of helping to redirect and improve the international research system, and a main objective is to change the focus of non-national institutions towards more of a service role for national centres, and towards the establishment of an effective working relationship. Funding for non-national centres is thus limited to inputs that further the changes AFNS considers desirable.

There is nothing wrong in this type of steering, which is really desirable provided the specific methods to accomplish the general objective are not also laid down. There must be room for exploring other means to reach the same goal because after Phase III, the institutions usually have to be on their own in terms of funding.

Another factor which affects responsiveness is competition.

As the Review document says:

AFNS with its modest project finance of an average 300,000 CAD is finding itself more and more among the lesser donors. When integrated development projects by large donors and regional development banks reach several hundred million dollars, then an AFNS project becomes a rather modest affair. While a few countries have expressed quite outright that they are not interested in small research projects, most others might accept them, but find it not worthwhile giving it priority or support. In this environment of donor competition, it will be increasingly necessary to show that "small can be beautiful," or more likely, that a relatively small input in a key research topic can pay considerable long-term dividends.

Our reaction to this is that small can be beautiful if it is flexible and timely. Incidentally, \$300,000 - even in Canadian dollars - is not small if we compare it to grants made by research-donor agencies and foundations. Needless to say, we cannot compete with the World Bank and the regional development banks but they are not research donors. Strictly speaking, they are not donors, at all: they are money lenders.

3.18 Learning Lessons and Maintaining Credibility

If POs are to maintain their professional credibility, they must be kept professionally alive. The 13 project groups organized by CAPS is a very functional way of focusing their substantive interest on more than one area of specialization. The other suggestions are

- Analysis and synthesis of technical results in a particular problem area in their respective disciplines and extracting lessons in research management from AFNS experience (to do these they will need program assistants or research assistants, who are relatively inexpensive);

- Acting as visiting scientists at international, regional, or national research institutes or universities;
- Establishing affiliate-faculty status in some universities to supervise graduate-student research (which can be done even if one is working as a PO);
- Setting up exchange programs with university professors with the latter serving as POs and POs serving as professors - in this way, the program does not suffer from lack of personnel and could gain new insights from the exchange; and
- Making a deliberate effort to develop an informal network of friends and colleagues outside the donor-recipient relationship. This is not easy, but it can be done. Sometimes it is the best way to find out what people really think about IDRC. Developing this relationship is time-intensive but it is an investment worth making.

Another, perhaps more feasible, way of providing learning opportunities is to change regional assignments of POs every few years. This would mean new challenges in terms of ecology, culture, institutional arrangements, etc. even if the PO continued to be concerned with the same subject-matter area.

Some substantive issues underlying AFNS projects that could be taken on by POs as their own research, with potential publications, through an analysis of IDRC's own experience and the data they have access to include

- Low-input versus high-input technologies;
- Improving upon farmers' practices versus introducing entirely new technology packages;
- Component research versus FSR, i.e., the implies single disciplinary versus multidisciplinary approach;
- Experiment station research versus on-farm research;
- Farmers' participatory research versus scientist-defined research - or more popularly known as bottom-up versus top-down research process;

- Farmer versus agricultural household versus village as the unit of analysis and focus of operation; and
- Chemical fertilizers and insecticides versus nitrogen-fixing plant species, biological control of insects, etc.

We recognize that these are not either or issues - nor are they easy issues to deal with. They are important, however, because we need to know how viable these concepts are when translated into practice. Are we just romanticizing low-input technology or glamorizing farmer participation in the research process?

For AFNS, these issues are directly relevant because, implicitly or explicitly, research projects take a particular direction on the basis of assumptions made with respect to the above issues.

3.19 Centre-Wide Research Project Incentives

Where salaries are low, cost of living is high, and there are competing demands on the researcher's time, incentives quite often make the difference in whether a research project gets done well or gets done at all. In many institutions, "honorarium" is a way of life, a necessity for professional survival. Researchers find it difficult to understand, and we find it impossible to explain, why for some IDRC projects honoraria are paid whereas the policy is "no honoraria" for others. There is a difference in practice across divisions and within a division. These inconsistencies are aggravated when the recipients from the same institution compare notes and are told different stories.

It is further aggravated when IDRC pays full salaries in dollars (or its equivalent) to researchers in some local institutions. Strictly speaking, are these research projects intended to build research capacity or are they research contracts paid for at prevailing market rates?

Once in a while, we should find out how many half-or quarter-time projects a researcher has.

We must reexamine both policy and practice with respect to these project incentives to arrive at something more reasonable and defensible. However, we do not subscribe to the philosophy that research is best accomplished in poverty.

3.20 The AFNS Mandate and the SS Division

The Division thinks that their mandate, which dates from December 1971, is as relevant and important now as it was then.

The program seeks to encourage and support research, development, and training designed to increase and improve the production, protection, preservation, processing, distribution, marketing, and utilization of agricultural commodities of plant, animal, marine, and forest origin. The scope extends to cover the transformation of these commodities and the development of related industrial technologies. It also embraces the production of food by synthesis or chemical modification or organic or inorganic substances.

The specific objectives of AFNS were set out to be:

- a) To identify and support programs in agriculture, food, nutrition and consumer sciences destined to increase the income and improve the health and welfare of rural communities in the less developed world, and to promote research to this end by food and agricultural scientists and technologists in the less developed countries;

- b) To provide food and agricultural scientists throughout the less developed world with improved opportunities and means to meet, to intercommunicate, and to cooperate in subjects of closely related research interest and activity.
- c) To accelerate the rate at which the research findings of the international centres for food and agricultural research are translated into systems of technology relevant to the needs of, and acceptable to rural communities, and to encourage and support studies on the impact of these technologies upon the material and physical well-being of the rural communities which endeavour to adopt them; and
- d) To stimulate among Canadian food and agricultural scientists a greater awareness of and interest in international development and to mobilize relevant Canadian specialized knowledge and experience in support of programs and projects sustained by IDRC.

From our review, objectives a and b have been actively pursued, except for nutrition and consumer sciences. Objective d was part of the AFNS strategy even before the creation of the cooperative program within IDRC. The first part of objective c has received quite a bit of attention especially through networks associated with the IARCs. The second part, which was meant to "encourage studies on the impact of technologies upon the material and physical well-being of the rural communities that endeavour to adopt them", has not yet materialized.

Theoretically, the SS Division could lead or assist in identifying and defining the nature of the problems that AFNS research should address for the benefit of different sectors of society. So far, however, SS has not explicitly defined its major thrust and its specific objectives and, therefore, its role vis-à-vis the AFNS program remains unstated. This is clear from the Report of the Board's Ad Hoc Committee to Review the Social Sciences Division.

The Committee is convinced that most of the projects supported by the Division or put forward for support by the Centre and the Board are responses to needs identified by researchers in the developing countries. Such responsiveness is, indeed, encouraged by the Board but longer term and strategic planning cannot be formulated solely on the basis of requests from researchers in developing countries, the experiences of field officers and the recommendations from Divisional programmes. It is also important that the Division set general directions and goals while preserving the means to assess and respond to needs as they are identified whether by researchers in developing countries or by programme officers in the course of their work.

The underlying organizing theme for SS is implied, but not explicitly stated in their five major programs. Some of the subtopics within these programs have a direct or indirect bearing on AFNS undertakings:

- Resource allocation policies for science and technology;
- Agricultural research and technical change;
- Energy surveys with emphasis on rural areas;
- Population and agriculture;
- Urban services (a special concern could be urban functions in agriculture and rural development because many of the services for the latter are urban-based and policies are made largely by urban-based and urban-oriented decision-makers);
- Women in development (this area is particularly appropriate to agriculture because women are very much involved in agriculture-related tasks and developments in agricultural technology have important implications for women's work);
- Nonformal and adult education; and
- Social learning (problems in agricultural extension, community development, technology transfer, agricultural education, irrigation and water management, agricultural credit, etc. are aspects of nonformal and adult education and social learning).

Is it possible for more than one division to develop projects that deal with the same problem area in the same country so that we can begin to help solve problems in a more substantial way? We now have a mechanism for dealing with interdivisional issues through the Offices of the Vice-Presidents.

This is not a dogmatic call for interdisciplinarity or integratedness but a small suggestion for interdivisional consultation or discussion. Can we have a common focus on certain problems so that related research projects across divisions may be developed toward a cumulative impact on the problem at hand? Hopefully the systems approach, which is AFNS' current approach, will rub off on the researchers from the developing countries. To illustrate, the three projects discussed below seem to be likely candidates for the systems approach across divisions.

- 1) Maize Marketing and Extension - Sierra Leone. The broad objectives of this study [Project 83-0223] are to analyze the current and future prospects for maize in Sierra Leone to assist the government in the formulation of a strategy for maize production in Sierra Leone. [This strategy includes formulation of] research priorities particularly with respect to varietal type, colour and maturity; identification of areas with comparative advantage in maize production; production recommendations for maize in each identified area....

The study will examine the maize industry of Sierra Leone, focusing particularly on marketing, pricing and agricultural extension as factors influencing the level of domestic production.

Unless the project leaders are extremely knowledgeable and very influential, it seems that a "companion" project on the state of the technology in maize production and the technological possibilities would be desirable. Most of all, however, if research priorities are to be established, implementation of identified priorities might come easier if the scientists (plant breeders, agronomists, etc.) who are to implement the priorities were involved. Quite often what is socioeconomically desirable is not immediately technically feasible. It takes time, for example, to produce the "right" varieties for the "right" reasons in the "right" places. Many extension projects fail because there is not much to extend or what they are extending is not what is needed.

- 2) Upland Resource Development Studies III - Philippines. The overall objective [of this project 83-0235] is to study the attitudes and farming practices of small upland farmers in Region X that influence soil erosion, and to identify and implement a trial program of alternative practices to reduce soil erosion.

It would, indeed, be strategic if another project on agroforestry were to be supported in this same location, but agroforestry belongs to another division. There are at least two agricultural universities in the vicinity that might have an interest along this line because the task of developing "alternative practices to reduce soil erosion" requires something beyond social science research.

Capistrano and Fujisaka,⁴ for example, conclude that "studies and evaluations of upland development projects have been focused more on the project management and implementation aspects and lessons learned from these, rather than on actual productivity and profitability." They question the usual assumption that "technical input strategies are available for upland development projects" and suggest that upland development workers must continue to pay close attention to technology development and continue to search for strategies that are locally or project appropriate. They mention the need for developing workable complex input strategies, applied on-farm experimentation and research in upland communities, and development of technical input strategies vis-à-vis the actual circumstances faced by the farmer in the context of extremely fragile environment. Halos⁵ likewise, points out that "agroforestry suffers from the lack of appropriate technologies and/or from the inadequacy of available technologies."

- 3) Handicraft Studies - Philippines and Sri Lanka. The purpose of this project [83-0266 and 83-0260] is to determine the contributions which handicrafts make to the national economy of the country and to analyze the constraints to growth within the handicraft industries.

⁴ Capistrano, A. Dog and Fujisaka, S. 1984 Tenure, technology and productivity of agroforestry schemes, Philippine Institute for Development Studies, Working Paper 84-06.

⁵ Halos, S. 1983. Agroforestry: A new name for an old practice *Scientia Filipina*, 3, (1), 39.

Here again, a companion project on the state of raw materials - bamboo, rattan, abaca, seashells, corals, etc. - would add quite a bit of realism to the assessment of the handicraft industry. For example, rattan in the Philippines is practically depleted and the country is now importing its rattan. Seashells and corals have been excessively "mined" and, therefore, the life of the industries dependent on these materials is bound to be short even if "bountiful." What technological breakthroughs can we expect in bamboo, rattan, seashells, etc.? The projects that IDRC is supporting on these can give the handicraft industry some ideas as to what can be expected technically. Abaca production, for example, might need some research support because it is one of the poor sources of cash income in some rural communities where the crop is grown. Can we "cultivate" more seashells and corals faster? On the other hand, the social scientists can, we hope, tell us who benefits from these industries? Tissue culture offers new potentials for rattan. An expert on the subject thinks that it might be feasible to grow rattan in commercial plantations in logged-over areas. The social, economic, and technical aspects of this potential must be looked into while the tiny plants in the test tubes are being raised for their new life in a rehabilitated habitat.

A very positive development in the direction discussed here is the Economic Research and Training - Ivory Coast project (85-0038), which is supported by SS (ERDP), AFNS (AEP), FAD, and COM divisions. The Centre will finance the establishment of two

research bases, the implementation of an integrated research program on agricultural production systems involving social scientists from CIRES (Centre ivoirien des recherches économiques et sociales) and biological scientists from national programs, and the start of a regional training program at the graduate level in rural economics.

Admittedly these types of projects require more time and discussions to develop because of the necessary interactions across divisions at IDRC and the forging of linkages between and among institutions in the developing countries. Is there a way of sharing the project load credit among POs involved across divisions so that the extra inputs required do not become an additional burden but rather an incentive to work interactively? Researchers from developing countries have commented quite often on the sense of "separateness" and relative "impermeability" of IDRC's divisions to one another. In less elegant language, they say that "It seems that IDRC has a tough time getting its own act together to respond to initiatives which involve more than one division." How can we, therefore, expect developing-country institutions to do better?

3.21 Socioeconomic Inputs in AFNS Projects

Projects that have resulted in publications, such as Livestock in Asia: Issues and Policies (edited by Jeffrey C. Fine and Ralph G. Lattimore)⁶ and Small-Scale Fisheries in

⁶ Fine, J.C. and Lattimore, R.G., ed. 1982. Livestock in Asia: Issues and Policies. IDRC, Ottawa, Canada. IDRC-202e, 192 pp.

Asia: Socioeconomic Analysis and Policy (edited by Theodore Panayotou)⁷, could be useful to AFNS in identifying and defining issues and problems for research. For example, the livestock publication concluded (p. 25-26)

The Asian experience to date has shown that there are no easy answers to rapidly increasing the production of animal products. Widely touted technology packages neglected the enormous variability of farm resources and animal practices in Asia. They did not exhibit adequate understanding of the day-to-day animal management techniques practiced by the farmers and the basic rationale behind these practices. Unfortunately, the need for marginal changes within the complex traditional crop-livestock farming system does not suit the large-scale project approach of governments and donors. The need is therefore, for more preproject research, small-scale projects, and a village-oriented systems approach.

The volume on small-scale fisheries in Asia suggests (p. 277) that there are areas in which the efficiency and profitability of fishing, and hence the well-being of the fishermen, could be improved through deliberate policies to upgrade management and skills, to convert less profitable types of gears into more profitable ones, to encourage the substitution of more productive or less-costly inputs for the less-productive or more-costly ones, and to increase the competitiveness and efficiency of the marketing system.

3.22 The Consolidation Issue

A discussion paper prepared by OPE in July 1982, Using Knowledge for Development raised the issue of consolidation.

After more than a decade of operation with about 800 research activities, the Centre could deliberately enter a phase of consolidation, as more of the research begins to mature. Following a careful review

⁷ Panayotou, T., ed. 1985. Small-scale fisheries in Asia: Socioeconomic analysis and policy. IDRC, Ottawa, Canada. IDRC-229e, 283 pp.

of existing projects, there could be selective pursuit into further phases of existing activities. This would reduce the pressure on program staff to develop more new projects each year, allowing more attention to be paid to monitoring and development of existing endeavours. It would allow greater continuity of support, the lack of which is seen as a constraint to capacity-building as well as to utilization. If utilization means seeing concrete results in terms of economic and social advance, and if for this to happen, many elements of knowledge have to be integrated at the site of the problem, the Centre would have to move more toward integration at specific locations....

One barrier to this is the sectoral composition of the research community in developing countries.

There is frequent mention of the scientific process as a long term affair and about the need for perseverance. Yet personnel changes and the consequent shifts of interest within Divisions tend to mitigate against continuity....

For some reason, the Board did not spend much time discussing the consolidation issue then. This report brings the matter to the Board once again for its consideration. AFNS has 346 current projects in 216 institutions in 60 developing countries - 24 of which had only one project each (Table 3), 13 international research organizations (Table 4), and 14 Canadian institutions (Table 5) at a total cost of more than \$81 million (Table 6).

Table 3. Location of current AFNS projects.

| Country | Institutions | Amount (\$) |
|--------------------|--------------|-------------|
| Bangladesh | 5 | 1,523,915 |
| Belize | 2 | 655,850 |
| Botswana | 3 | 583,200 |
| Brazil | 1 | 418,900 |
| Burundi | 1 | 648,300 |
| Cameroon | 2 | 609,600 |
| Chile | 5 | 2,613,500 |
| China | 4 | 1,949,800 |
| Colombia | 6 | 1,703,800 |
| Congo | 1 | 139,000 |
| Costa Rica | 1 | 565,800 |
| Cuba | 1 | 73,700 |
| Dominican Republic | 3 | 1,120,200 |
| Ecuador | 2 | 377,190 |
| Egypt | 5 | 2,659,200 |
| El Salvador | 1 | 128,900 |
| Ethiopia | 4 | 1,942,880 |
| Ghana | 1 | 51,800 |
| Guatemala | 3a | - |
| Guyana | 1 | 270,000 |
| Haiti | 2 | 332,400 |
| Honduras | 1 | 226,600 |
| India | 10b | 2,141,199 |
| Indonesia | 8 | 2,794,670 |
| Jamaica | 3 | 668,200 |
| Jordan | 1 | 308,100 |
| Kenya | 3 | 1,041,200 |
| Liberia | 1 | 192,200 |
| Malawi | 2 | 446,600 |
| Malaysia | 6 | 1,259,590 |
| Mali | 4 | 1,594,070 |
| Mauritania | 1 | 151,100 |
| Mexico | 1 | 146,000 |
| Mozambique | 1 | 584,000 |
| Nepal | 2 | 521,000 |
| Niger | 1 | 165,000 |
| Nigeria | 2 | 357,300 |
| Pakistan | 2 | 557,700 |
| Panama | 3 | 977,900 |
| Paraguay | 1 | 161,600 |
| Peru | 7 | 6,566,390 |
| Philippines | 11 | 3,642,880 |
| Rwanda | 1 | 376,000 |
| Senegal | 4 | 729,100 |
| Sierra Leone | 2 | 1,288,050 |
| Singapore | 1 | 239,200 |

Table 3. Location of current AFNS projects.

(cont'd)

| Country | Institutions | Amount (\$) |
|-------------------------|--------------|-------------|
| Somalia | 1 | 479,500 |
| Sri Lanka | 6 | 1,812,320 |
| St Kitts-Nevis-Anguilla | 1 | 210,200 |
| Sudan | 4 | 2,059,040 |
| Swaziland | 1 | 15,500 |
| Syria | 1 | 311,300 |
| Tanzania | 5 | 1,844,755 |
| Thailand | 8 | 3,445,840 |
| Togo | 2 | 363,200 |
| Trinidad and Tobago | -c | - |
| Tunisia | 1 | 326,700 |
| Turkey | 2 | 460,900 |
| Uganda | 2 | 1,020,200 |
| Upper Volta | 3 | 442,300 |
| TOTAL | | 58,396,339 |

a All three institutions are regional.

b Nine projects through ICARC. Is this IARC or ICAR.

c Regional institutions.

Table 4. AFNS support in international and regional research organizations.

| INTERNATIONAL | Amount (\$) |
|---|--------------------|
| CGIAR centres | |
| CIAT (Centro Internacional de Agricultura Tropical) | 803,000 |
| IRRI (International Rice Research Institute) | 2,533,400 |
| CIP (Centro Internacional de la Papa) | 763,000 |
| ICARDA (International Center for Agricultural Research in the Dry Areas) | 1,382,000 |
| ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) | 1,842,400 |
| ILCA (International Livestock Centre for Africa) | 1,116,500 |
| WARDA (West Africa Rice Development Association) | 372,300 |
| IITA (International Institute of Tropical Agriculture) | 1,860,800 |
| TOTAL | 10,673,400 |
| Non-CGIAR organizations | |
| IBSRAM (International Board for Soil Research and Management) | 100,000 |
| INIBAP (International Network for Improvement of Banana and Plantain) | 75,000 |
| ICRAF (International Council for Research in Agroforestry) | 521,080 |
| IFDC (International Fertilizer Development Center) | 1,077,500 |
| ICLARM (International Center for Living Aquatic Resources Management) | 668,600 |
| TOTAL | 2,422,180 |
| REGIONAL | |
| CATIE (Centro Agronomico Tropical de Investigacion y Ensenanza) | 1,622,900 |
| IICA (Institute Interamericano de Cooperacion para la Agricultura) | 1,463,810 |
| INCAP (Instituto de Nutricion de Centroamérica y Panama) | 395,200 |
| CARDI (Caribbean Agricultural Research and Development Institute) | 903,700 |
| ICAITI (Instituto Centroamericano de Investigacion y Tecnologia Industrial) | 271,440 |
| PAHO (Pan-American Health Organization) | 335,100 |
| AVRDC (Asian Vegetable Research and Development Center) | 568,010 |
| AIT (Asian Institute of Technology) | 200,300 |
| SEAFDEC (Southeast Asian Fisheries Development Center) | 458,600 |
| CIBC (Commonwealth Institute of Biological Control) | 469,600 |
| TOTAL | 6,688,660 |

Table 5. AFNS projects with Canadian organizations.

| ORGANIZATION | Amount (\$) |
|---|------------------|
| University of Guelph | 133,850 |
| National Research Council (Prairie Regional Laboratory) | 158,000 |
| Technical University of Nova Scotia | 150,000 |
| Atlantic Bridge Co. Ltd, Nova Scotia | 125,600 |
| Laval University | 160,000 |
| University of Manitoba | 1,036,086 |
| Dalhousie University | 69,000 |
| Canadian University Service Overseas | 14,100 |
| University of Victoria, British Columbia | 310,200 |
| Memorial University of Newfoundland | 75,200 |
| University of Alberta | 330,100 |
| University of Calgary | 13,900 |
| Hatfield Consultants | 96,800 |
| Agriculture Canada, Lethbridge, | 296,200 |
| TOTAL 14 | 2,969,036 |

Table 6. Distribution of AFNS financial support.

| | Amount (\$) | % of total |
|--------------------------------------|---------------------|---------------|
| Developing country institutions | 58,396,339 | 71.94 |
| International research organizations | | |
| IARCs | 10,673,400 | 13.15 |
| Other international organizations | 2,422,180 | 3.01 |
| Regional research organizations | 6,688,660 | 8.24 |
| Canadian institutions | 2,969,036 | 3.66 |
| TOTAL | \$81,169,615 | 100.00 |

Do we really want to continue along this route of distributing our "blessings" around the world? The poor are probably less likely to be reached in this manner.

Although the network approach is one way of consolidating projects, within a country, the subject of the network could just be a tiny speck in the scheme of things unless there is sufficient activity within country to create a critical mass. To consolidate, we can limit countries, group countries into clusters, or link institutions within countries. In the case of Africa, we can probably identify by now the countries, institutions, and individual researchers where we see research opportunities and which are not currently overrun by donors chasing projects and researchers. Can we concentrate POs' time and resources on these promising lands and not look for new and newer places to conquer?

Where it is possible and the research on infrastructure warrants, we could take a program rather than a project orientation with a problem focus within a country. For example, we can have a root and tuber crop program, not just project, in Country X using a lead institution. Different components of the program could cut across IDRC divisions and link together relevant institutions in the country. Analysis of the existing production, processing, marketing, and consumption systems: the magnitude and relevant sites of actual and potential application would be studied as would diffusion, adoption, and impact of technologies. In each collaborating institution, training needs and opportunities would be identified and supported. Regional

and even international networks will be organized around specific research areas such as breeding of new varieties, processing, and storage. The assignment within the network would be on the basis of country strength so that a complementarity could be achieved.

The project mode, which often fragments the problem, aggravates the fragmentation when different agencies with their own idiosyncracies fund different components of the program. Each one specifies its own interests instead of making a contribution toward the development of the entire program.

Not every institution and every country is ripe for program support as the OPE report suggested - after more than a decade, only some research areas must have reached a level of maturity that make them more amenable to program support. If we are ready to trust the capability of some lead institutions to develop programs which network with other institutions in other countries, this is another approach to consolidation.

If we are going follow the systems approach, however, a great deal of time must be spent in specifying the parameters of the system in a synergistic fashion. This means an investment of time on the part of the POs. If we consolidate in terms of countries and more program instead of project support, they might find more time to work with researchers in a more concentrated manner than is possible with hundreds of projects scattered around the world.

We would recommend that AFNS work in the future toward a certain concentration of support. This could be achieved primarily by the adjusted deployment of POs. After the next 5 years, all countries with less than three projects and those where project implementation has been very difficult would be put aside. However, benefits of networks and access to information and training should still be open to most countries even though they do not have active projects.

A final note on funding: AFNS cannot be accused of lavishing its resources on Canadian institutions but, no doubt, the Division will find ways of tapping COOP funds.

3.23 Staff Preoccupations

All of the professional staff of AFNS were interviewed on a one-to-one basis by the Ad Hoc Committee and from these conversations, we suggest that the following five points should be examined in order to find out if management can be further improved.

First, IDRC should again try to improve its present policy regarding the safety measures for its staff and representatives working in the field. It is difficult enough to work in a foreign country where the environment is so different. The personnel must feel at all times that they are protected, to the limit possible, against all dangers such as health hazards, civil strife, thefts, customs drudgeries, unnecessary police interventions, and political graft.

Second, there has been an important and excellent trend in IDRC, in recent years, toward decentralizing the administration to give more importance to the regional offices. It seems, however, that the function of consultation has followed this trend more slowly: field staff are often surprised to hear of a sudden decision that seriously affects their work but of which they have never read or heard previously.

Third, IDRC should examine if the present administrative powers of the Office of the Comptroller General and Treasurer (CGT) could leave a higher level of decision-making at the level of the Regional Office. Hurtful delays would be avoided and personnel might be in a better position to argue its own cases.

Fourth, the present method of promoting POs seems to have too low an incentive effect, especially for those who seriously wish to make a permanent career of this type of work.

At present, POs can be classified at three levels - 12, 13, or 14. In AFNS, there are specific rules to move from 12 to 13 (senior program officers). Of the present 25 POs in AFNS, only only 3 are at level 13. To move from 13 to 14, additional requirements are imposed: AFNS has only one PO at level 14.

IDRC might examine the possibility of having a three-tier system that would work a little differently. Three position titles would be used - junior program officer, program officer, and senior program officer. The passage from one stage to the next would be on the basis of a points system where two-thirds of the points would be earned by performance and one-third would be given for degrees earned and years of experience. Of course, IDRC could hire at any of the three levels, depending on past experience, but it would be done mostly at the two first levels. Finally, if a change is made, it might be useful to make a major difference between the salaries of one level and those of the next so that program officers would have, at all times, the incentive of possible improvement.

Fifth, many employees mentioned that the number of administrative support staff in regional offices is not adequate. They claim that an increase in this type of personnel would not be very costly and it would enable professionals to do more and better work at the level of their own competence. Some have compared this situation with their own perception of recent increases of support staff in Ottawa.

We are glad to point out that we found very few complaints of a personal nature. We have concluded that the human environment is, at present, very good in AFNS and there does not seem to exist serious conflicts of personalities.

4.0

PROJECT ASSESSMENT

Almost all of the projects that the Ad Hoc Committee examined have achieved a certain degree of success because they have fulfilled some of their objectives. As a rule, most of the more specific objectives of a technical or scientific nature are completely or partially achieved. Furthermore, almost all projects contribute in one way or another to an increase in the scientific knowledge and capacity of individuals, institutions, and countries involved. Many of the projects have at least established procedures that were afterward useful to other researchers or even production improvements used by a limited number of small farmers.

The committee was eager to discover the projects that have produced more results than this. We were also interested in the projects situated at the other end of the scale - that is, those that have had a very disappointing history.

4.1 High-Impact Projects

The main criterion that we used to qualify projects the first, high-impact, category was the real impact of the research

on a large number of individuals for a good period of time. We treat these in two different categories: first, those the division felt were successful. These are described and the reasons for their success in the division's view are given in the In-depth review paper of the AFNS Division.

Cropping system research in Asia (see Appendix A)
 Improving pastures in Latin America
 Oil crops network in East Africa and Asia
 Root crops research in Cameroon
 Aquaculture research in Turkey
 Dehullers and grain milling in Africa
 Farming systems in Mali
 Tree plantations in China

Our own assessment of a few projects and our conversations with POs enabled us to identify a certain number of AFNS activities that **may** also qualify in the category of "real impact on a large number of individuals for a good period of time." Some of the projects Program Officers regarded as promising or having had an impact probably need further documentation to substantiate this perceived impact in a more systematic manner. For sake of brevity, we give here only a very short description. Some of these projects and of those in the AFNS list are further described and analyzed in Appendix B

4.1.1 Projects in Asia

Sweet Potatoes in Philippines. This project (83-0035) has identified, selected, and distributed to farmers improved cultivars that are now starting to be used. Equally important is the role of this project in bringing together academics and farmers in the field (see Appendix B).

Post-Harvest Technology in Philippines. This project (82-0081) was able to mobilize many farmers, directly or

through their organizations, to pool their resources to buy and operate appropriate equipment so as to process all of their crops, and particularly rice better. This has reduced post-harvest losses and has given them a better end-product that has brought a higher revenue.

Improvement of Food-Processing in Thailand. This project (81-0061) has brought research into many small food-processing plants. It has enabled many of them to improve their operations enough so that they can now meet the competition and stay in business. This is bound to help the employment situation in many local villages and it will also maintain better services for farmers.

Improvement of Fermented Fish in Philippines. This project (84-0112) aims to improve the processing system of 800 small factories producing the traditional and well-accepted food products called patis and bagoong. This will help local employment and will supply the general population with a larger supply of excellent high protein-food.

Colza, Saffran, and Sesame Improvement in India. This series of projects (82-0060, 82-0061, and 82-0062) dealing with improved genetic stocks for oilcrops has permitted a large number of people in different parts of India to have access to increased amounts of cooking oils. Thus, it has contributed to an improvement of their diet. The large number of producers who have accepted these improved varieties have increased their income.

4.1.2 Projects in Africa

Livestock Systems in Zimbabwe. This project (82-0134) has permitted the establishment of a new methodology to effectively study livestock problems as they really present themselves in the field. It was able to propose production systems that will affect and improve both livestock and crops of a large number of small farmers who derive their livelihood from plants and animals.

Shelter Trees in Tunisia. This project (83-0295) has proposed a sound methodology to study the efficient action of trees as a protection against the drying and eroding effects of high winds in Tunisia. It will recommend a system of protection that will help not only the farmers of this country but also of other North African countries. Finally, it will try to lower the cost of this procedure to a level where it will be economically attractive to most farmers.

Grain Milling in Botswana. This project (78-0023) has permitted the development and distribution of dehullers to small mills, thus increasing their productivity. It has also reduced, in many instances, the need for the women of the family to continue the hard chore of grinding for every meal.

Village Firewood Production in Niger. This project (80-0076) was successful in mobilizing the peasants in the task of finding and implementing a solution to their severe energy

problem. They have started to plant and then protect appropriate species of trees in convenient locations in their areas.

Regional Seed Center in Zimbabwe. This project (83-0300) has created a network involving many countries: including Kenya, Malawi, Rwanda, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe. It has permitted the development of a common pool of certified seeds and it has trained scientific and technical personnel to look after these operations. Finally, it has increased considerably the sources and diversity of genetic material.

Millet Threshers in Mali. The project (79-0082) has established a thresher that can be powered by hand and can be manufactured in Mali. This project has also established a close link between the research group and the problems of village people.

4.1.3. Projects in Latin America

Timber grading in Mexico. This project (83-0126) has established a building code with pertinent and practical regulations covering future use of the right types of wood for house building. This will enable many sawmills to improve their own efficiency so that, in the future, a larger proportion of houses will use this material, which will better resist the elements.

Phosphate Rock in Colombia. A new technology was established to use national sources of phosphate for manufacturing fertilizers. Two important companies are now using this process and this has reduced the price of certain fertilizers at the farmers' level. It has also improved the country's balance of payments by reducing importation of this costly product. (project 84-0114)

Rural Development in Colombia. These activities (71-0050, 72-0124), now known as the Caqueza Project, led to a very informative IDRC publication of 1979.⁸ In retrospect, we can now trace back to this project most of the real improvements that have occurred in agricultural research for Colombia, and even for other parts of Latin America. It has permitted better problem identification by associating small farmers with the research process from the beginning of a project to the ultimate application of results. It has permitted the acceptance of systems research. Finally, it has fostered the changes in the structures of research institutions that now promote the creation of a larger number of multidisciplinary projects.

⁸ Zandstra, H., Swanberg, K., Zulberti, C., and Nestel, B. 1979. Caqueza: Living Rural Development. IDRC Ottawa, Canada. IDRC-107e, 321 pp.

Multiple Cropping in Colombia. The objective of these projects (79-0021, 82-0095) was to develop and adapt methodologies of multiple-cropping research under farm conditions as they exist in Colombia. It has permitted the improvement of past procedures and, because it has involved the farmers in the research process, it has permitted fast dissemination of results to a large number of individuals.

Rural University in Colombia. This project (80-0072) has led recently to the publication of a new IDRC monograph⁹. It introduced the element of multicropping research within a new scheme of agricultural education. The Rural University trains individuals at three interconnecting levels. First, a very flexible university curriculum leads to a degree somewhat similar to our Bachelor of Agricultural Sciences. These professionals, called "engineers," are then linked to the training, on a shorter-term basis (about 2 years), of technicians who are in turn responsible for some impulsores whose role is to lead a community in improving not only their agricultural production methods but also other parts of their life such as health, primary education, and family conditions. Results obtained so far indicate that this new system, with its important multiplying effect, may lead to a massive impact on the poorer elements of Latin America.

⁹ Arbab, F. 1984. Rural university: Learning about education and development. IDRC, Ottawa, Canada. IDRC-231e, 71 pp.

Tropical Pastures in Latin America. These projects (81-0133 and 83-0217) executed in collaboration with CIAT in Colombia, aim at transforming the plant covering of very large areas of poor pastures that are now idle or only used in a very extensive manner. Successes obtained so far with appropriate legumes and grasses have increased the feeding capacity of this land 10-fold. It may, with time, be possible to transfer to these large open areas a good part of the milk and beef production of countries such as Colombia, Venezuela, and Peru, leaving more productive lands available for increased cereal production.

Aquaculture in Panama. Panama has now a very complete infrastructure for the scientific production of seed stocks of fishes and other aquatic species such as shrimps and crabs. The IDRC projects (81-0026 and 84-0215) touch upon the biological aspects of a total system that goes from hatching laboratories to the controlled production of aquatic food in ponds owned and operated by the local populations of rural communities. The results will influence the eating habits and the food-producing capacity of a large number of persons in Panama and could lead to similar organizations elsewhere in Latin America.

4.2 Unsuccessful Projects

As stated previously, we encountered directly or through the eyes of POs a certain number of projects whose performance was much below expectation. We mention a few of them here with the probable reasons for such poor results.

Root Crops in Indonesia. This project (76-0060) achieved few of its objectives in relation to the improvement of root crops. First of all, it lacked the necessary leadership, it was conceived and implemented mostly to satisfy academic goals of the researchers, and it also met with serious administrative difficulties.

Banana Improvement in Philippines. This project (80-0189) aimed at improving the production of bananas used mainly as food by the farming families. The administration of the project was weak. It was not possible to hire an agricultural economist who was needed for important aspects of the work. Many of the persons involved in the project could spend only a very small proportion of their working time to it. Finally, results as a whole were very fragmentary.

Reforestation in Jordan. This project (75-0120) was not able to put together a team with the necessary scientific competence and, therefore, it had no impact.

Alfa Project in Tunisia. This project (74-0049) was used mainly to serve as a base for academic degrees. It suffered also from the fact that Tunisia was very weak in the field of forestry research.

Sorghum Milling in Sudan. The level of commitment from the government for this project (78-0054) was very low and even the research team did not believe too much in its objectives. Very

little was achieved and the project did not lead to practical applications.

Land Reclamation in Sudan. This project (82-0194) was pushed by the Sudanese government to be implemented at the wrong location - this was done for internal political reasons. The project did not reach its main objectives.

Fire Wood and Improved Stoves in Haiti. Even though this sector of activity was encouraged by the World Bank, the project (82-0024) soon met with administrative difficulties and other shortcomings and in consequence it filled very few of its objectives.

Bamboo in Bangladesh. The scientist in charge of this project (83-0296) has failed to do his job correctly and therefore the objectives were not met.

Post-Harvest Technology in Indonesia. This project (78-0115) was given to an institution that proved afterward to have no capacity for research work. It did not meet its objectives.

Legume Processing in Thailand. The project (82-0082) was not well organized. The introduction of cowpeas as a crop in the region was not accepted by the population because it had not been part of their traditional diet.

Gum Arabic in Senegal. First, IDRC's money had to go to the researchers through the Forestry Department and this created many logistic and administration problems. Later in the project, (78-0104) a method was found to get the money directly to the researchers but valuable time had been lost and many of the objectives were not met.

Food Legume Insect Control in Upper-Volta. During the development of this project (79-0172), there was a change of government and the project leader disappeared from the scene. The project was never terminated.

Food Legumes in Philippines. This project (80-0161) had a good link with a nutrition program but it was poorly coordinated with legumes production. After its completion, nothing seems to have been done about the application of its results.

4.3 Discussion

After these two enumerations, which have investigated the two opposite ends of the success scale, we feel that we can suggest a series of practical questions that should be asked before a project is finally accepted. First, we suggest questions on the negative side.

- Does the proposal address real problems in the field or is this research being put forward as an academic exercise?
- Does the leader of the project have the necessary scientific competence and will he/she be able to cope with the administrative tasks?

- Does the institution have the capacity and the will to carry the exercise to a successful completion?
- Does the problem to be solved require a multidisciplinary group? If so, does the project team include experts of all the necessary disciplines and will the leader be able to manage the group?
- Has the project mobilized enough collaboration and commitment from the national government?
- Will the project take place in areas where its scientific activities can be performed without too great a risk of serious disturbances?
- Can IDRC's money reach the researchers in a convenient way so that administrative impossibilities will not develop?
- Will the leader or other important members of the team be able to stay with the project long enough to assure its success?
- Is there a danger of any kind (health, social unrest, total isolation, etc.) that is likely to disrupt the continuation of the project after it has been started?

On the positive side, the essential factors can be summarized more succinctly: competence, dedication, strong institution, teamwork, previous good performance, scientific reputation, commitment from institution and government, good knowledge of IDRC, and sound administrative structures.

However, to reach the level of a project that will have an important impact, a practical link must be foreseen from the beginning between the research team and the future users of the results. To help to achieve this in a larger number of future projects, the Committee wishes to recommend that the following new procedure be established for AFNS projects.

In the budget of future AFNS projects, a limited amount of money (expressed in percentage terms or as an absolute value) should be set aside automatically to be used only by the leader of the project, if he/she so elects, after the completion of the research activities. This would cover any type of work that would start the process of dissemination of results. It could be a scientific paper, a seminar, a workshop, an article or a speech to the media used for extension purposes, or a meeting with a group of producers or with other users of the project results.

This new procedure would have the added effect of allowing the project leader a short period of adaptation after the completion of a project to better organize his/her future research activities. We would thus avoid the present system where the economic pressures steer many good researchers into other lines of work after having completed an IDRC project.

APPENDIX A: A NEW SET OF ISSUES FOR A SUCCESS STORY

The Asian Cropping Systems Network started in 1974 with the Philippines and Indonesia. The network now has 13 additional members: Bangladesh, Bhutan, Burma, China, India, Korea, Malaysia, Nepal, Nigeria, Pakistan, Sri Lanka, Thailand, and Viet Nam. The network activities started in 1975 with six cropping systems sites in Indonesia, the Philippines, and Thailand. As of 1984, there were 188 sites in 10 countries. Of this total, 42 are considered network sites where environment and cropping pattern performance are monitored. The sites represent irrigated, rain-fed, partially irrigated, upland, and deep-water rice areas.

The methodology for cropping systems research, developed by IRRI, used Zandstra et al. (1981) A Methodology for On-Farm Cropping Systems Research as a "Bible." The methodology is followed on all sites with minor modifications and is also applied to upland and plantation crop-based systems. The value of this work is well acknowledged in The Report of the IFAD [International Fund for Agricultural Development] Mission to Review the Rice-Based Cropping Systems Program of IRRI (I.W. Buddenhagen, I.C. Mahapatra, and B.H. Siwi, 1984) and in The Review of Farming Systems Research (D.M. Sands, 1985), which was done for the Technical Advisory Committee (TAC) of CGIAR. Sands regards IRRI's collaboration with NARSs in the Asian Cropping Systems Network as an "excellent model for establishing linkages

between international agricultural research centers (IARCs) and NARS which promote a symbiotic relationship in farming systems adaptive research."

In terms of development impact, IRRI cites Iloilo Province in the Philippines where a new cropping pattern has changed the lives of many over a period of six years. This came about with the introduction of an earlier maturing, pest-resistant rice variety IR 36, and the management practice of direct seeding the first rice crop. Before, only 12 percent of the crop was direct seeded. By 1984, 100 percent [was direct seeded] and IR 36 is grown on 98 percent of the land used. Farmers' net income has increased by about 30 percent.

The major accomplishments by the participants of the Asian Farming Systems Program over the past 5 years include

- development of methods for evaluating improved technology, including cropping intensification methods on small Asian rice farms;
- Establishment of national farming systems programs;
- Increased quantity and quality of training for cropping environments;
- Introduction to small Asian rice farmers of improved crop varieties from all parts of the world; and
- Identification of important research areas.

The Cropping/Farming Systems program is an excellent example of how long it takes for an old practice to emerge into a scientifically respectable research arena; for a methodology to evolve; for interdisciplinary, international, interinstitutional,

and IARC-NARS collaboration to "mature" into a productive working relationship; for suitable technology components to fit synergistically into the Changing system; and for the results to actually reach ultimate intended beneficiaries. As the monograph A Decade of Learning¹⁰ mentioned (p. 80):

Multiple cropping systems research began at IRRI in the late 1960s and was of modest proportions until 1971 at which time IDRC gave support to an agronomist and an agricultural economist. IDRC support for the IRRI program has continued through the decade though the research team and its activities are now much larger than IDRC can finance alone"

It has taken more than 20 years for the cropping systems research program to begin to bear fruit for the benefit of some rural communities. What is notable is that, at present, research activities in many participating countries are funded by their own national programs, the World Bank, U.S. Agency for International Development (USAID), CIDA, IFAD, the Food and Agriculture Organization of the United Nations (FAO), and other organizations. IDRC's support started about 14 years ago soon after the Centre came into being. Because of our long history of support for this program, a review report to one funding agency noted that: "At IRRI and among the network people, the perception exists that only IDRC is backing the network activities."

¹⁰ See footnote 3.

It is important to remember this when, at certain times, we also feel that IDRC's contribution is not being sufficiently credited. The most significant development in the FSR program is the willingness of national programs to put in their own resources - even World Bank funds should be considered national funds because that they are loans not grants to the countries. This program shows that it takes a long time even for a promising research area for research results to "produce development."

In the light of these very positive achievements, the CAPS program may want to look into potential "growth" features in terms of its basic methodology, studies on adoption of systems as well as component technologies, and monitoring of impact not only in terms of increases in production and income and what changes in institutional arrangements have taken place, but also with respect to who actually benefits and how land-use intensification affects the environment.

Additional Issues

Internalization

To what extent has the farming system perspective been internalized by participating agricultural researchers so that it guides the identification and definition of the next research problems even in component technology research? It has been said that "the best type of interdisciplinary thinking is one that takes place within the same skull." As the participants from Thailand put it:

Our work in integrated farming systems based on rice is far from satisfactory. Our economics is not good either. However, our researchers who are essentially rice researchers are now exposed to the variety of factors that should be looked into when dealing with small farmers. On the part of our farmer-cooperators they seem to be more receptive now to our researches than when we were working on rice alone. At least they can now ask varied questions other than talk about the varieties of rice only. Finally when we must have gained enough experience and have interacted with people from different disciplines, we expect to be in a better position to help our ultimate target...the small farmers.

Are we able to arrive at more relevant research priorities as a consequence of the farming systems approach?

Bottom-Up Versus Top-Down Philosophy

Although the cropping/farming systems methodology is based on a "bottom-up" rather than a "top-down" philosophy and it is supposed to "marry the knowledge of the researcher to the skills and experience of the farmer," it is not clear as to how this "marriage" takes place. Although it is a fact that much of the research takes place in farmer's fields, the role of the farmer in the entire process remains undefined. As Dennis J. Greenland of IRRI admits

The understanding of how to work with farmers...has increased greatly in the past nine years...although we recognize that it is a continuing learning process, and we are only at the start.

Perhaps the methodology developed elsewhere in connection with farmer participation in irrigation development can be examined for possible transferable lessons to FSR. Even the Socio-Economic Research Training Program does not contain much on how the research team learns about farmers' practices. As the Nepalese participant observed: "The value of monitoring local farmer practices to compare the improved technology is sometimes difficult for local staff to understand." Furthermore, they complained that "the inclusion even of a brief site description

as part of the methodology with its corresponding socio-economic implications has been a consistent stumbling block. Field based socio-economists are basically non-existent in Nepal."

Another illustration of the problem in the socioeconomic component of FSR is provided by a trip report filed by someone who visited a participating country in May 1984:

Over 3 years ago, site descriptions were carried out on the 7 cropping systems sites, by using a rather lengthy interview schedule to interview a large number of farmers. Up to now the data collected from the survey has not been processed, analyzed, written up or, in large part, used. Upon review it appeared that a large part of the data collected in the site descriptions were not useful and that a large part of the data useful for cropping systems research were not collected. Given the very limited number of cropping systems staff, the timely processing and analysis of the large amount of data collected in the site descriptions was next to impossible....

Another member of the research team articulates their dilemma:

Our problem with farm record keeping is that more data tend to be collected than needed but there is a reluctance to make decisions on which data can be deleted. Part of this reluctance is due to lack of experience and the difficulty to know, ex-ante, which data are particularly important for your purpose, in practice and which are not.

From all of these observations the message seems to be that more work is needed on the socioeconomic component in the overall FSR.

The Farming FSR Training Modules on socioeconomics being prepared by IRRI, which were subjected to comments from participants in the FSR program as well as experts from other

programs, is a major step in improving the situation. However, the "how-to-do it" part and the location-specific modifications both in terms of content and method remains a sizeable challenge which deserves research support.

Modification to the Methodology

Because the methodology for cropping systems research developed by IRRI and further refined in the network is used in all the sites with minor (and sometimes major) modifications and the same methodology is used by the collaborators on upland - and plantation-crop-based systems, it is probably time to examine the modifications on the basis of actual experiences in applying the methodology in different sites. Perhaps the methodology is sufficiently well established now that it can afford to be "contaminated" by potentially applicable features from other FSR-type approaches.

It might be noted, for example, that CIMMYT in its 1984 Research Highlights shows through documented case studies how on-farm research activities in national programs contribute to the definition of recommendation domains and research opportunities, design of initial experiments in farmers' fields; modification of initial hypotheses; generation of research results, formulation of farmers' recommendations, and impact of the program at the farmer level.

Modification and Adaption by the Farmer

In monitoring and evaluating adoption of recommended farming systems and component technologies, it is important not only to note the adoptions but also to identify farmer-modifications of the systems and the technologies they have adopted. The modification and adaptation process is seldom studied because the focus is always on adoption or nonadoption. This is unfortunate because it is probably in the adaptation process that "marriage" between farmers' practice and recommended practice takes place. It is also

possible that in this "marriage" lies the most effective feedback to the researchers as to "goodness of fit" of their recommendations. It is, therefore, a rich source of the next research priorities for the research system.

How many of the component technology researchers use FSR for this purpose? It must be recalled that this research approach evolved after the "green revolution" era that purportedly left most small farmers untouched by new agricultural technology. Has FSR brought the researcher closer to the farm and the farmer?

Unit of Collaboration

Can FSR enlarge its unit of collaboration at the farm level to be the farm household and not just the farmer? This will be a more accurate representation of farming reality.

Incentives for FSR

It is curious that the well-known advocates and experts on FSR are researchers from the developed countries. Does this mean that the concept and practice of FSR, particularly on-farm research, has not been attractive to scientists of developing countries? Can FSR projects be deliberately designed to bring the research and farm communities into more productive field encounters by providing the right incentives? Hopefully, in time, the reward system of the national programs would be supportive of greater researcher interaction with farm households under their circumstances.

APPENDIX B: NOTES ON PROJECT VISITS

Of the projects that were visited in the Philippines, two stand out: Sweet Potato Improvement and Rootcrops Storage (81-0131) of the Philippines Root Crop Research and Training Center (PRCRTC) - Visayas State College of Agriculture (VISCA) and Cropping Systems Outreach at IIRI (78-0095 and 82-0089). The second has about a 20-year history of support and continuing work. Because comments about this project have been made in another section and the AFNS In-Depth review document has described it, the Asian Cropping Systems project will not be further considered here.

Rootcrops Project

The rootcrop Project is made up of several smaller projects. These are relatively new and look very promising for eight reasons.

First, the projects are an integral part of PRCRTC's Research and Development Program, which is supported by VISCA and the Philippine Council for Agriculture and Resources Research Development (PCARRD).

Second, the director, project leaders, study leaders, and research assistants devote the major part or all of their working hours on rootcrop activities.

Third, the projects are linked to work on processing, utilization, marketing, and substitution of corn by dried rootcrop chips in animal-feed formulations and commercial substitution of wheat flour by cassava or sweet-potato flour in various food products. The projects are also linked to the Philippine Rootcrop Information Service. In other words, there is an operational systems approach that has literally begun to

produce results. The weakest component at the moment is socioeconomics. Researchers should now be actively and farmer practices, to identify new problems for research, and to get a sense of impact on producers, landowners, hired labour, traders, processors, and consumers. Actual yield figures and income from production are not yet available. An analysis of the production, marketing, and utilization potentials is badly needed.

Fourth, the project leaders are very development-oriented and eager to see their technology used in farmers' fields. It is interesting that the project leader on rootcrop storage was one of those instrumental in introducing the new varieties to potential growing areas because of her desire to test storage practices under farmers' conditions. The seminars conducted and planting materials distributed have helped spread the varieties even to other islands. Right now, however, the demand for fresh rootcrops is still high and, therefore, storage practices must remain in the wings ready to be activated later. Seminars on storage stress the role of structures and soil storage because of perishability, especially of cassava.

Fifth, the sweet potato and cassava varieties are planted without fertilizer and yet farmers say that they are getting better yields than from their traditional varieties. Even the storage practices, particularly the soil storage, is practically input free because the "soil" used is sea sand, river sand, or sawdust, whichever is available locally. The varieties and technologies developed generally meet what is now fashionably referred to as low-input technology. Furthermore, cassava and sweet potato grow in the upland where the rural poor are in great abundance. These rootcrops meet both consumption and cash needs of the farm household. Efforts are being made, however, to stimulate further consumption of rootcrops by middle and upper-level income groups by packaging and marketing them in the supermarket. Low-income vendors sell rootcrop delicacies and more products are being experimented on.

Sixth, rootcrops, particularly sweet potatoes fit very well into farming systems. The young leaves are also nutritious vegetable items.

Seventh, farmers - particularly in Southern Leyte where the typhoon caused quite a bit of destruction - acknowledge that the sweet potato has saved them from hunger because planting materials were made available right away. Coconuts were not only destroyed but also the price plummeted, hence rootcrops came in handy. Rootcrops seem to be the commodity whose time has come. The price of rice has increased considerably and, therefore, rootcrops become even more important. There are nearby islands where sweet potato and cassava are staple foods. In some Moslem communities in Mindanao, cassava is a staple food also. In other

rainfed and upland areas, rootcrops have not yet been systematically looked at as ingredients in the farming system. The crisis that has hit the sugar-producing areas offer a new potential home for rootcrops in the diversification strategy. More urgent, however, is the need for food for the sugar workers and their families who have lost their jobs because many sugar mills have been "mothballed" and sugar planters have stopped planting.

Eight, the advantages of storage practices even for a fresh market are many because of the brief shelf life. For example, farmers can harvest a few days before buyers come and keep the crop in the storage structure. In case of typhoons, soil storage of cassava assures the household of food. We saw cassava that had been stored for 9 months and it was still very fresh. Where pilferage of crops takes place in the field, the crop can be harvested and stored near the house for better security. Furthermore, instead of staggered harvesting, which is currently practiced, crops can be harvested all at once to prevent deterioration in quality, and stored to wait for better price.

In general, the rootcrops projects are excellent illustrations of systems approach: synergism among the components, R&D orientation of the director and research leaders as well as the junior staff, on-the-ground utilization of the technology by farmers who are clearly in the AFNS target group called rural poor, and technical input by two research leaders who were IDRC-supported doctoral scholars. The training component of the project fitted in very well and their expertise is being put to productive use, including the short-term training and travel given to the project leader in storage. Her exposure to CIP's diffused light storage gave her some ideas for sweet potato storage. Most of all, however, she was attracted to the farmer-back-to-farmer approach in developing technology, which brought her to farmers' fields in the uplands.

Perhaps an added advantage of VISCA is its distance from Metro Manila. This means fewer distractions, fewer competing consultancies and greater concentration, on the research projects.

Other Projects

The Banana (80-0189) and Rattan (81-0182) projects are in the germplasm collection, tissue culture, and variety selection stages. Because rattan takes about 10 years to become productive, it might be strategic to explore production areas and who might be interested in planting materials. The Legume Utilization project was linked with the nutrition program but less so with legume production. It is interesting that at the time of visit to the institution only the project leader and the typist knew anything about the project! The reaction from other staff members was: "Ah...That project is already completed." One got the feeling, therefore, that it has become a "closed book."

The Banana project might benefit from an analysis of banana production, marketing, and utilization practices and potentials to identify technical problems for research and development better. An approach similar to the rootcrops project might be more fruitful.

The Small-Scale Energy Systems project (83-0114) in Olmo, Hacienda San Jose, San Carlos City, Negros Occidental, is interesting and challenging technically speaking but the community aspects look problematic. Sugar workers have

traditionally looked up to the hacendero for all their needs, including electricity. Their participation in the project, including the planting of ipil-ipil (lencaena) in an area quite far from their residence, has not yet materialized. Meantime, because of the depressed sugar industry, the household heads work only 2 days/week. What they urgently need now are alternative sources of income and employment.

If this project can steer the workers in the direction of doing something for themselves, it might, in a small way, start them off toward a nonpaternalistic road. This will take quite a bit of doing, however, while waiting for the benefits from electrification.

Crop-Livestock Systems - Philippines/IRRI

The site visit to Sta Barbara, Pangasinan, was intended to look also at the Food Legumes (IRRI-UPLB) project because this is where the legume element (mungbean, cowpea, etc.) of the Institute of Plant Breeding of the University of the Philippines at Los Banos (UPLB) is supposed to be tried as an ingredient in the crop-livestock system (Project 83-0218).

Four main impressions arose from this visit.

First, the crops-livestock system came out "less of a system" than one would expect: the livestock coordinator knew very little about the legume component, other members of the household who have responsibility for livestock production (even cattle) were not regarded part of the system, and women raising swine are not included in the research scenario because they are using commercial feeds!

Second, the project (in effect, IDRC) was the financier for the cattle fattening project. The farmer-cooperators who have sold their cattle cannot buy new sets of animals because they are waiting for the money that will come from Singapore (IDRC). Is this a role that we want to play or is it analogous to the practice of subsidizing the farmer's risk in rice production? Incidentally, in Ilo Ilo, it is a local bank that provides credit for cattle fattening but the extension worker supervises the farm households very closely in terms of technical assistance and credit utilization. The household (not just the farmer) is the operational unit for the crop and livestock system.

Third, the the area has a high incidence of agricultural landlessness. Evidence that some real population pressure and competition for jobs exists is the fact that 2 years ago a system of transplanting for free (except for two meals) was introduced with the planters earning the right to harvest: transplanting had previously been a fully paid task in this place.

In the light of these conditions in the village, perhaps the landless households could be included as cooperators in the cattle fattening project.

Incidentally, the livestock experts are confronted with a real challenge in that farmer-cooperators seem to feed ipil-ipil to their animals only when they know project staff will visit. Because ipil-ipil is a major component of the technology that the project staff proposes for the area, the "coolness" of the farmers to this feed ingredient is regarded as a real bottleneck. It is curious that, although the project suffers from "data overkill" (as commented on by the livestock coordinator), the extremely important question as to why farmers have not used ipil-ipil has not been asked although the project staff knew from the start that farmers were not using it.

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Fourth, the participants in the system, both researchers and cooperators, seem to be a little confused. What does the system consist of, operationally speaking? Perhaps there is a need for participants within the project to reexamine the concept of farming systems and how to translate it into meaningful activities that add up to a system. Included in this re-examination would be an analysis of the existing farming system in the village and in the farm household.

In fairness, the Sta Barbara project on the crop-livestock system is still young and is complicated. A long learning process lies ahead particularly because the project is also a multi-institutional undertaking that involves the Institutes of Animal Science and of Plant Breeding of UPLB, the Ministry of Agriculture and Food, and IRRI.

One aspect of this project that needs to be looked into is its top-heavy nature. The frontline Ministry of Agriculture staff members who work directly with farmers are very poorly paid: 20 PHP/day¹¹ plus a 300 PHP/month incentive from the Ministry and 300 PHP/month transportation allowance (a total of about 62 USD/month). The project staff argue that this compensation for the frontline workers is already better than what their colleagues ordinarily receive. Although this is true, it is very difficult to demonstrate that it pays to work at the field level especially when University and IRRI staff associated with the project are paid much more. The former receive honoraria from project funds through IRRI but make only occasional visits to the project site.

¹¹ 1 U.S. dollar (USD) = 20 Philippine pesos (PHP).

If we want to encourage researchers to do on-farm research in interaction with farmers, the reward system must be tilted in the direction of the farm and away from the office. One practice that mitigates the situation is the training opportunities offered to these workers.

Rural Development - Colombia

The 1979 IDRC publication Caqueza¹² analyses in detail the full experiment (phases I and II, projects 71-0005 and 72-0124, 1971 to 1978) after linking it with previous ventures of the same nature that were successful in Mexico and in India. Among other points, it concludes by stating that a large number of producers in the area were encouraged to make changes in their traditional farm operations that have led to improved income and living conditions. The project had, as a direct consequence, the implementation of a large 5 years (1976-81), multimillion dollar development program for Colombia with large investments subscribed by the Inter-American Development Bank (IDB), the International Bank for Reconstruction and Development (IBRD), CIDA, and USAID. It covered not only agriculture but also other development aspects such as education, health, and social services.

We were curious to ask a few Colombian what is their present impression was of the lasting impact of the Caqueza project, as

¹² See footnote 8.

seen 6 years after the 1979 IDRC publication. First, we were told that a good number of the small farmers of the Cundinamarca district are still benefiting from what they learned through this project. However, another phenomenon has taken place during these last 6 years: this district is situated only 1 hour drive from the capital and Bogota has had a tremendous growth in the last 10 years that has brought its present population to over 5 million. Many of the farmers of the Cundinamarca area were caught in the strong magnetic attraction of city life and they are now city dwellers.

We were happy to meet the present Director-General of the Instituto Colombiano Agropecuario (ICA), Mr Fernando Gomez Moncayo, and Dr Jorge Ardila Vasquez, who is in charge of research and extension. Both have admitted that much of their present thinking traces back to Caqueza. Today, the structures and programs of ICA permit a continuous and close link between research and extension. Furthermore, a large part of the scientific data is taken directly in the fields of small farmers who are thus involved from start to finish of a project. Finally, researchers of ICA now include some economical and sociological parameters in many of their current programs. We can also mention another group in Cali, the Fundacion para la Aplicacion y la Ensenanza de las ciencias (FUNDAEC), which has established a new pattern of development that has borrowed from the Caqueza philosophy. We found another team in Panama, active in aquaculture, using the same methodologies. It is clear that, in the field of applied research, once you have had a proven

success then it is just a matter of time for the lesson to be applied by an increasing number of individuals very often far removed from the site of the first breakthrough.

Multiple Cropping - Colombia

The objective Phase I of this project (79-0021), which ran from 1979 to 1983, was to adapt and develop methodologies for multiple-cropping research under Colombian conditions and to carry-out agronomic research involving small farmers so as to find means of improving the income of this class of producers. A report on phase I was written by Mr N. Mateo in 1984. Many systems of multicropping and also of relay crops were tested in one zone and then recommendations were made to improve productivity not only in that area but also in other similar zones of Colombia. In addition to the recommendations, new research technologies were established and seven researchers received additional training. Administrative changes in ICA resulted in some delays in the implementation and there was often resistance from the producers to adopt new methods; however, enough progress was made to permit a second phase to be recommended.

Objectives of phase II (project 82-0095), which started in 1983 and will end in 1987, were to complete the evaluation and formulate technical recommendations for six intercropping patterns coming out of phase I, to evaluate two new systems based on sugarcane and yam, to conduct preproduction trials on farmers' fields, and to transmit successful results through the full Colombian extension network.

The person responsible for phase II was interviewed and he is thinking already about a follow-up in 1987. This will take the form of a new project with a wider base where animal production and post-production elements would be added to the cropping systems. We left under the impression that the dissemination of results has already started but it seems to be progressing too slowly.

Rural University - Colombia

Phase I of this project (80-0072), which ran from 1980 to 1984, was to focus on the approach to training of a new kind of rural personnel and on the experimentation with new agricultural practices and technologies appropriate to the peasant economy.

An interim report was written in 1984 by Mr N. Mateo. It pointed out that 25 production subsystems had been tested and 13 had been validated and adopted by farmers. A nonformal educational process was established in seven villages involving 240 farmers. The FUNDAEC approach was replicated by the Fundacion para la Educacion Superior y el desarrollo (FEDESARROLLO) in the Cauca Valley and on the Pacific Coast by the United Nations Children's Fund (UNICEF). A second phase for the project was strongly recommended.

The second phase of the project (83-0093), from 1980 to 1984, continued the testing of the crop systems and added animal production. It also continued the development of the Rural University.

The role of this new kind of university is to teach, according to a very flexible schedule, at three levels. The students train during a period of 5 to 6 years for a university degree of "Engineer," which corresponds approximately to the Canadian degree of Bachelor in Agricultural Sciences. The next level of training lasts 2 to 3 years and is for a larger group of persons called Technicos. Each of these technicians, with the help of the engineers trains a number of Impulsores whose task is to work at the level of a small community. Thus, the system has an important multiplying effect that enables it to reach, progressively, a very large number of persons in the field. Furthermore, there is a total development aspect to the activities that involves not only research on and production of food but also education, health, economic and social services, etc. We met with a group of engineers during one of their regular seminars and noticed both the presence of many women and a mixture of skin colours going from white to very dark black. They appeared to be well-coordinated team full of energy and confidence, and they answered questions very well. We saw their research work on small farms dealing with multiple cropping and this too made good sense as a scientific activity.

They also have with IDRC a small project (83-0210, 1984 to 1987) for transforming fruits that are often hard to market into a new juice product. Their chance of success here may be below 50% but even this may teach them something useful and, because of their customary enthusiasm and hard work, they may actually make money out of this venture.

Tropical Pastures - CIAT

The objective of phase I of this project (81-0133, 1982 to 1984) was to improve livestock production by increasing the availability of germ plasm to national research programs dealing with grazing trials and by developing methodologies for pasture evaluation. An interim report was written in 1984 by Mr H. Li Pun.

Results from the project were: a large number of grasses and legumes had been tested; four scientists from Panama, one from Peru, and one from Ecuador had received training; a workshop on the methodology for germ plasm evaluation, attended by 53 animal scientists from 20 countries, was held; and a network on research for pastures was created at CIAT in 1979. A second phase was recommended.

The objectives of the second phase, (83-0217, 1984 to 1989) are to continue the tests started in phase I: to conduct on-farm evaluations of animal production systems based on new improved species. Selected researchers from national institutions will be trained in production techniques for pasture seeds.

We met with the leader of the project and were impressed by his vision of the future and the scope of his work. In parts of Colombia, there are vast areas of very poor pastures called llanos where at present, a limited number of slow-growing, low-producing cattle are sparsely distributed. The main objective of the project is to find the right types of grasses and legumes that will grow well in this type of environment. Some of the

results so far have indicated that production of such areas can be increased at least 10-fold. The ultimate goal for the Government of Colombia is to transfer, progressively, the country's large of population cattle to these vast, open lands. This would free the fertile farms where beef and dairy cattle are now located for more intensive production of food in the form of cereals, fruits, and vegetables. This may be the most practical way of reducing the present large deficit of cereals in Colombia.

We hope that this project will ultimately have a major impact in the home country of CIAT and also in the other countries participating in the research network.

Mariculture: Phases I and II - Panama

Panama receives from nature a large amount of rain on a hilly terrain and, therefore, this water can be managed to produce a lot of food. This is backed up by an efficient complete aquaculture system involving research, artificial reproduction of fish and other aquatic species, and a supply of fingerlings for culture in the many ponds distributed through the countryside. We visited one example of what happens at the end of the line within the project (81-0026 and 84-0215, 1981 to 1989).

It was a practical, efficient organization located in a small Indian village that it works in the following way. The ample rain water is conducted by gravity through small channels down a sloping field where part is used to irrigate multicropped fields of cassava, maize, plantain, fruits, and vegetables. The

remaining water is diverted under cages that contain rabbits and chickens. Droppings from these animals fall into pens where hogs or goats are fed. The water and manure from these are empty into a series of ponds where fish and prawns are produced commercially. Finally, all the waste plant material from the fields is used as supplementary food for the fish. Such complete systems have been described in science fiction but to see a working example in a remote Indian village was a very pleasant surprise.

This complicated activity is directed and controlled at all levels by the Departemento de Capacitacion Agroacuicola of the Ministry of Agricultural Development. The Departemento is the creation of one strong individual, Dr Richard Pretto, who combined a sound scientific base with a capacity and a will for having things done by others to translate his knowledge into increased production of food. All this was started under the former strong President Trujillo who protected Pretto and said publicly that he would not be contented until every village had its own pond for aquaculture.

Finally, another aspect of this program that is worth noting is the fact that a good number of students from Latin America and even from the USA are doing graduate work within the program and some of the regular Panamanian staff are often sent to other Central American countries for demonstration and development purposes.

Beef-Feeding Systems - Panama

The general objective of the first phase of this project (77-0046, 1978 to 1981) was to increase milk production through systematic pasture management supplemented with conserved forage and by-products. On the results of the first phase, a second was recommended with approximately the same objective.

Beef-Dairy Feeding Systems - Panama

We visited some of the farms where the tests under this project (80-0210, 1981 to 1986) take place. Results are beginning to show but progress is rather slow when we consider the number of researchers active on this project.