AGR/TAC:IAR/85/3

THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

Thirty-Sixth Meeting, Rome (Italy), 11-18 March 1985

NUTRITIONAL CONCERNS IN INTERNATIONAL AGRICULTURAL RESEARCH

(Agenda Item 8-c)

Proposed Objectives of the Discussion

Attached for TAC consideration is the final version of the Center Directors' Position Paper on Nutrition, which has been forwarded by the Chairman of Center Directors for distribution to TAC. This paper is based on a draft prepared by Per Pinstrup-Anderson of IFPRI, and incorporates a number of comments, as agreed at the November meeting of Center Directors.

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

February 1985

Revised December 1984

The International Agricultural Research Centers and Human Nutrition - A Position Paper

The International Agricultural Research Centers

FOREWORD

This paper is the first of a proposed series of position papers to be developed by the directors of the international agricultural research centers. This position paper is based on a set of papers prepared for and discussed at an inter-center workshop organized by IFPRI and held at ILCA in 1984. Workshop recommendations are reflected in the position paper to the extent they are agreed upon by the center directors.

The paper presents the current views of the center directors with respect to the interaction between international agricultural research and human nutrition and illustrates the efforts made by the IARCs to explicitly consider nutrition concerns in their planning and work. Since these efforts are discussed in great detail in the proceedings issue from the abovementioned workshop, only illustrations are provided in this paper. These illustrations are drawn from centers supported by the CGIAR and the AVRDC.

Statements made in this paper refer to the system of IARCs and certain statements may not reflect activities of each and every center.

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Chairman, Center Directors

INTRODUCTION

The International Agricultural Research Centers (IARCs) were established to assist developing countries in reaching higher standards of living, particularly low-income people, whether consumers, farmers or landless labor. The immediate objectives pursued by the IARCs to reach this final goal are expanded food production, reduced unit costs of production and more efficient resource utilization, increased production stability, improved production systems, and improved food policies. The IARCs recognize the importance of adequate food consumption and nutrition in the well-being of the poor, and the goal of improving the nutritional status of people in developing countries is either implicit or explicit in all IARC mandates. All IARCs consider nutrition goals in the interpretation of their mandates and, as further discussed below, a number of activities are undertaken to enhance the nutrition effects of IARC research and training.

The IARCs are fully aware that existing malnutrition is caused by a multitude of factors, not all of which are food-related. The nature of appropriate solutions vary among population groups and may include clinical treatment of severely malnourished individuals, primary health care, direct feeding, expanded food supply and lower food prices, income generation among the poor, and public policies on a variety of factors such as food prices, foreign trade, and resource ownership. Provision of clean drinking water, improved sanitary conditions, and various primary health interventions may also be required.

Research and training undertaken by the IARCs and collaborating national institutions may influence human nutrition indirectly through its impact on food production, incomes, national food policies and other factors. In particular, the nutrition effects may come about through the impact of technological or policy change on one or more of the following factors:

1. Incomes acquired by households with malnourished members.
2. Prices of food commodities.
3. Nutrient composition of available foods.
4. The nature of production systems among semi-subsistence farmers.
5. Risk and fluctuations in food production, prices and incomes.
6. Household income composition, intra-household income and budget control, and women's time allocation.
7. Labor demand and energy expenditures.
8. Infectious diseases.

Changes in food supplies affect the nutritional status of individuals only to the extent that the food consumption of people currently malnourished or at risk of becoming malnourished is affected. The degree to which expanded food production is translated into expanded food consumption by the malnourished varies depending on the commodity for which production is expanded and the nature of the technology or policy that brought about the expansion. Thus, the IARCs recognize that the nutrition impact cannot be measured simply on the basis of total production expansions. What is important from a nutritional

perspective is not how much more is produced but how food consumption by the malnourished will be affected.

However, expansions in food supplies may have important implications for food prices and incomes. Changes in incomes of households with malnourished members and changes in food prices facing these households influence the ability of the households to obtain food and may also change the cost of food relative to other goods competing for the household budget. Although quantitative estimates of the nutrition effects are scarce, there is no doubt that the large expansions of food production facilitated by the IARCs have greatly increased consumers' access to sufficient food.[1]

Food consumption by the poor is very sensitive to changes in food prices. Thus, changes in food prices and their fluctuation over time are of particular interest from a nutritional point of view. High price levels and severe price fluctuations are much more harmful to the poor than to the better-off consumers. On the other hand, low price levels and large income fluctuations may have severe negative nutrition effects among the rural poor who depend on food production for their incomes.

Thus, although all eight factors mentioned above may be important, the IARCs believe that the most significant nutrition impact of agricultural research is likely to occur through changes in food prices,

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[1] The contributions of the IARCs to improved nutrition are discussed in Jim Ryan, "The Effects of the International Agricultural Research Centers on Human Nutrition: Catalogue and Commentary" in Per Pinstrup-Andersen, Alan Berg and Martin Forman (eds.), International Agricultural Research and Human Nutrition, Washington, D.C. and Rome: IFPRI and ACC/SCN, 1984.

unit costs of production, incomes, fluctuations in prices, and food availability. More narrowly focused efforts to change the nutrient composition of individual commodities also play a role here.

The IARCs further recognize that since the degree to which expanded food production, increased incomes, reduced fluctuations, and other factors mentioned above benefit the poor and malnourished depends on the nature of the research output, the IARCs and collaborating national agricultural research institutions may influence the nutrition effects of their work through their decisions on: 1) the choice of commodities for which research is to be done and the relative budget and staff allocation to each, i.e., commodity priorities; 2) specification of desired changes in commodity characteristics; 3) specification of desired technology characteristics; 4) choice of production systems to be researched; and 5) identification of food policy issues to be researched.

In view of the opportunities for influencing the nutrition impact of agricultural research, the IARCs undertake a number of activities aimed at the explicit consideration of nutritional implications within each of the five decision areas mentioned above. Illustrations of past, ongoing, and proposed activities are presented below.[2]

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[2] A more detailed description of the activities by each center is provided in Per Pinstrup-Andersen, Alan Berg, and Martin Forman (eds.), International Agricultural Research and Human Nutrition, Washington, D.C. and Rome: IFPRI and ACC/SCN, 1984, which contains a chapter prepared by each of the centers as well as chapters that provide syntheses of activities across centers and an extensive list of references (see Appendix 1 of this paper).

ILLUSTRATIONS OF PAST, CURRENT, AND PROPOSED ACTIVITIES

Commodity Priorities

The key issue here is how total calorie and nutrient intakes by the malnourished would change as a consequence of the introduction of yield-expanding or yield-stabilizing technology or changing government policy for a particular crop or livestock species. This would be determined primarily by (1) the relative importance of the crop or livestock species in the current and expected future diet of the malnourished and their reaction to changes in the price of the commodity; (2) the extent to which farm households with malnourished members produce the crop or livestock species; (3) the extent to which additional employment is created both directly and indirectly; and (4) existing price and trade policies.

If existing malnutrition is primarily found among those who do not participate in food production, i.e., urban and some rural consumers, then nutritional considerations would suggest that research emphasis be placed on commodities that take up a large share of these consumers' food budgets and for which supply expansions would be expected to result in price reductions which, in turn, would lead to relatively large expansions in total intakes of calories and/or deficient nutrients.

If, on the other hand, nutritional deficiencies are primarily found among low-income agricultural producers, nutritional considerations would suggest research emphasis on commodities that would generate more incomes for these households, reduce risks and seasonal

fluctuations, and/or make more food available to them from their own production.

Because international agricultural research by nature serves a number of countries and the relative importance of consumer versus producer malnutrition differs among countries, commodity priorities in international agricultural research cannot usually be limited to one or the other. Ideally, from a nutritional point of view, emphasis would be on commodities that: 1) occupy a large share of the budget of households with malnourished members and for whom a price reduction would result in a large increase in total calorie and nutrient intakes, 2) occupy a large share of the resources (land and labor) owned or controlled by producing households with malnourished members, and 3) generate and have large potential for expanding employment and incomes for the landless poor. These considerations were in fact included in decisions on commodity mandates of centers when they were created.

While emphasis on the "nutritionally ideal" commodity combination may be unattainable because of variability of circumstances among countries and regions within countries and also because of conflicts with desires to achieve other goals, attempts to move toward such an emphasis may nevertheless be feasible. The success of such attempts will depend on availability of information on: 1) which foods households with malnourished members consume and produce, 2) how they adjust their food intakes in reaction to changes in prices of individual food commodities and incomes, 3) commodity-related employment of rural poor (direct and caused by linkages), 4) the likely impact of

various research strategies on food prices and incomes of the poor and malnourished, and 5) existing and prospective food policies.

A number of centers have undertaken research to improve existing knowledge of what the poor eat and how they react to changes in incomes and prices of individual foods. Based on a survey of 1,000 households in five Taiwan cities, the Asian Vegetable Research and Development Center (AVRDC) analyzed the consumption patterns of vegetables (1).[3]

In a study of seven countries, the International Potato Center (CIP) examines the role of potatoes in the diet of various population groups under a variety of agroecological, cultural, and socioeconomic conditions (2,3). As an outcome of the second social science planning conference of CIP held in September 1981, the evaluation committee endorsed "...an increasing emphasis on demand and consumption studies so as to: (i) develop basic information on actual and potential use of potatoes as food for poor people; and (ii) assist CIP policymakers in identifying potential target countries and beneficiary groups within countries" (4).

On the basis of existing data, the International Maize and Wheat Improvement Center (CIMMYT) undertook an analysis of the role of maize and wheat in the diet of the poor and how this role is affected by various policy measures (5).

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3 Numbers in parenthesis indicate the references as shown in the back of the paper. See Per Pinstrup-Andersen, Alan Berg, and Martin Forman (eds.), International Agricultural Research and Human Nutrition, for references and further details regarding this and subsequent illustrations of center activities.

Using household consumption data, the International Center of Tropical Agriculture (CIAT) estimated the relative importance of various foods and food groups in the diets of the poor in a number of Latin American cities as well as the related income elasticities (6). Similar work that also included estimates of price elasticities for the malnourished was completed for the city of Cali, Colombia, on the basis of primary data (7). These estimates were then used to illustrate how commodity priorities in agricultural research might be affected if improved nutrition were an explicit goal. Emphasis was on the development and testing of an analytical approach that might be useful for national institutions. More in-depth consumption analyses of individual CIAT commodities, such as cassava, have also been undertaken (8), and food consumption data are used to assist in the development of CIAT's long-term plans (9).

Estimation of income and price elasticities specific to the poor and/or malnourished has also been undertaken by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) for India (10) and by the International Food Policy Research Institute (IFPRI) for Brazil, Egypt, and Thailand (11, 12, 13). These studies illustrate the utility of such elasticities for estimating the nutrition effects of alternative commodity priorities in agricultural research and policies.

The IARCs recognize the need to expand work in this area to cover a larger proportion of the poor and malnourished. Consideration is currently being given to an integrated study with participation from all interested centers which would draw on existing data, whether

available from the centers' own work or data collected by others, e.g., consumption surveys. Such a study would provide estimates of the global, regional, and national importance of each of the major foods in the current and future diets, budgets, and incomes of low-income households with malnourished members, as well as data on how food intakes by these households would be affected by technological change and price policies for each of the principal commodities. Such information is expected to be useful in future decisions by each of the centers and by the CGIAR on commodity priorities, technology design, and production systems emphasis.

The utility of this information is likely to be even higher for national agricultural research and policy-related institutions. The relative importance of the various commodities in diets and incomes of the poor often varies across and within countries covered by the IARCs, and these location-specific situations are best dealt with by national institutions. Thus, while the IARCs are taking the initiative to collect and analyze the above information, it is important that it be shared with national institutions. This will be done directly and through collaboration with other international institutions. As the usefulness of this work is illustrated, the IARCs expect that national institutions will become more actively involved.

It should be noted that the above-mentioned data provide only one of a number of criteria to be considered in deciding on the allocation of research resources to individual commodities. How to deal with trade-offs between the achievement of nutritional and other goals, that is, what should be the relative weight given to each, is a

question to be faced at both national and international levels. While not sufficient for addressing such questions, the data discussed here would at least provide an indicator for determining how changes in commodity priorities in agricultural research might affect real income and the nutritional status of the poor and malnourished. Thus, it would add a nutrition/poverty dimension to other indicators currently used to decide on the relative emphasis to be placed on each commodity.

The interaction between the impact of agricultural research and that of public policies, such as food price policies, should also be considered. Clearly, the impact of one depends on the state of the other. Assuming at the time of deciding on research priorities that existing policies will not change in the future may be as incorrect as assuming that policies will change to maximize the nutritional effects of research results. The most promising avenue is clearly in between the two extremes. At the same time, governments may need assistance on selecting the most appropriate combination of technological change and public policy.

Commodity Characteristics

The nutritionally important question is whether total intake of calories and digestible nutrients by an individual is sufficient and not whether the particular calories and nutrients originate from one food or another. In most cases, foods currently available to the malnourished are capable of providing an adequate diet if consumed in appropriate quantities and dietary combinations. Thus, improving

nutritional characteristics of foods currently available is not essential to eliminate malnutrition. This does not mean, however, that the IARCs ignore potential nutritional gains from improving traditional foods. Testing of promising breeding and selection material for such factors as protein content, quality and digestibility, content of vitamin A, and oil content may facilitate a nutritionally more appropriate choice of material without unacceptable reductions in the achievement of other goals, such as improved yields and yield stability. Such testing is especially important for commodities that show large genetic variation in a particular nutrition-related characteristic critical for those who traditionally consume the commodity.

Increasing the energy density of foods that have a large genetic variation in oil content and that traditionally are principal calorie sources for small children is a case in point. Improving the protein quality, quantity, or digestibility of foods that present large genetic variation in these characteristics and that are an important component of protein-deficient diets is another example, provided that the additional protein is expected to be available at a lower price than the cheapest alternative source acceptable to the consumers.

In addition to nutrient composition, attention is given by many of the IARCs, for example, ICRISAT, AVRDC, and CIAT, to characteristics that influence the acceptability of particular commodities among low-income consumers, such as cooking quality, texture, and color.

Consumer acceptance may be closely linked with nutrition effects, particularly in cases where acceptance is associated with income level

but not nutritional quality. Less preferred but nutritious commodities tend to provide cheaper calories and nutrients to the poor because they are less in demand by the higher income population groups. This point is illustrated by CIAT findings that small-grained beans are considered inferior to normal-size beans (on appearance, not nutrition grounds) and therefore command a lower price and are consumed primarily by the poor.

Storage characteristics are considered from the point of view of reducing physical losses as well as deterioration of the nutritional quality. Interaction between plant breeding and selection and research on post-harvest technology is important to assure high efficiency and to limit losses in storage and processing.

The IARCs are currently exploring ways in which expanded work by the centers or others on post-harvest technology, including storage losses and deterioration of the nutritional quality, various marketing losses, and losses in home and village processing, could improve nutrition.

Five types of information are required for decisionmaking on commodity characteristics. First, it is important to know whether a particular food commodity plays an important role in diets of people suffering from nutritional problems. Such knowledge should result from information regarding consumption patterns by the malnourished, as discussed under commodity priorities. Second, information is needed on the relationship between consumer preferences and the characteristics of a particular commodity, e.g., cooking quality, color, and texture, and how these preferences vary among income

groups. Third, information regarding the genetic variation in the particular nutrition-related characteristics is important. Fourth, actual testing will provide breeding and selection guidelines; and fifth, implications of changing commodity characteristics for other parts of the food system should be anticipated and included in the estimation of nutritional effects, e.g., spoilage problems associated with higher oil content.

Most IARC activities in this area relate to the protein content (quantity and/or quality) and digestibility, including toxic factors, of individual crops. CIMMYT's research on quality protein maize is well known and needs no further elaboration. Many of the centers undertake analyses of protein quantity and quality in breeding and selection materials, e.g., AVRDC in sweet potato and mung bean, ICRISAT in sorghum, pearl millet, chick peas, and pigeon peas (14), and the International Center for Agricultural Research in Dry Areas (ICARDA) on wheat, barley, and various grain legumes (15, 16). Most of these analyses are based on chemical testing.

The International Rice Research Institute (IRRI) has tested for protein quality and digestibility of rice in children and rats (17). Furthermore, CIP, in collaboration with the Instituto de Investigacion Nutricional (IIN), has carried out studies of potato protein quality and digestibility in children (18). IIN has also undertaken evaluation of protein quality and digestibility of sorghum varieties in infants (19).

The emphasis on improved protein content (quantity and quality) as a crop breeding and selection goal in agricultural research has

had an interesting evolution. Up until the early 1970s, it was generally believed that the principal nutrition problem was one of protein deficiency or deficiency of certain essential amino acids in the diet. This, together with promises of dramatic improvements in the protein quality in grains, as exemplified by the Opaque-2 gene in maize and high-lysine lines of sorghum, led to pressures on the IARCs to place emphasis on improved protein content as a breeding and selection goal even, if necessary, at the expense of yield advances. It was during this period that the high-lysine maize program was initiated at CIMMYT. It was also during this period that a Protein Quality Planning Conference at CIP recommended that "...data derived from chemical and biological evaluations of nutrition quality are to provide the basis of selecting parental materials," although not at the expense of yield increase (18).

The pressure lessened as the scientific nutrition community provided more evidence in support of the argument that the principal nutrition problem was one of a combined calorie-protein deficiency, and that in most cases both would be alleviated by greater food consumption under existing dietary compositions while increased protein intakes or improved protein quality in the absence of expanded energy intakes would do little to alleviate the problem. ICRISAT contributed greatly to a clarification of this issue through its work on protein and amino acid consumption and the implications of a yield versus protein focus for plant breeding (20). Work sponsored by CIMMYT (21) also made an important contribution in this regard.

Partly as a consequence of the changing view of the role of protein in alleviating malnutrition and partly because of other difficulties associated with high-quality protein material, e.g., poor consumer acceptance and storage problems, as illustrated by CIAT research (22), the IARCs have de-emphasized protein, particularly in cases of an apparent conflict between more or better protein and higher yields.

Recent testing for nutrient content includes studies by IRRI on the effect of sulphur deficiencies in soils on the content of sulphur-containing amino acids in rice (17), evaluation by the International Institute of Tropical Agriculture (IITA) of nitrogen content in sweet potato leaves and roots (23), testing for and improvement in the content of vitamin A in sweet potato at AVRDC, and exploratory research by CIMMYT to improve nutritional quality aspects other than protein in maize, e.g., oil content (24).

Findings from ICRISAT village-level studies show that certain vitamins and minerals are limiting factors in the diets of the semi-arid tropics of India, and Ryan (25) concluded that there may be some scope for selection of breeding lines for improved vitamin and mineral content. This raises an interesting perspective that deserves further examination: while care should be taken not to introduce an excessive number of breeding and selection criteria, some additional exploratory work might be worthwhile to assess whether widespread vitamin and mineral deficiencies could be effectively dealt with through breeding and selection without serious adverse effects on the achievement of other goals such as yield expansions. Such work is currently being done by AVRDC.

In cases where the achievement of certain nutrition-related changes in the breeding and selection materials conflicts with the achievement of other goals, such as resistance to certain pests and yield capacity, trade-offs need to be considered. The current approach for establishing criteria for choice in such cases and issues to be taken into account varies among centers and commodities, and a common set of criteria among IARCs does not exist. As materials approach release, however, the centers assist in signalling any results from testing of nutrient and anti-nutrient content that indicate contents below normally acceptable standards.

Technology Characteristics and Production Systems

Research decisions determine or influence the nature of the resulting technology that, in turn, influences human nutrition in at least four ways. First, the nature of the technology is an important determinant of how much more is produced of a particular commodity and at what cost. The nutrition implications of these matters were discussed under commodity priorities. Second, the extent to which rural households with malnourished members gain from new technology depends on whether the technology is suited for the production environments controlled by these households and the effects of the technology on employment. Thus, identification of the production environments most commonly controlled by these households, along with explicit specification of the production environments best suited for particular technology designs, is useful in efforts to incorporate nutrition concerns in decisionmaking that influences the nature of

the technology to be developed (26). Research to refine existing knowledge of the characteristics of the various agroecological zones currently being done by many of the IARCs is also expected to be useful for nutritional considerations.

Third, because seasonal and irregular fluctuations in food availability, prices, and incomes are important contributors to malnutrition in many rural areas, new technology that facilitates a reduction in such fluctuations would be preferable from a nutritional point of view. Past and current international agricultural research places high priority on reduced lodging losses, improved disease and pest resistance tolerance, drought tolerance, better adaptation to improved cropping patterns, and other factors that increase yields while reducing the risk of partial or total crop failure and diminishing seasonal fluctuations -- thus serving nutritional as well as other goals.

Finally, the interaction between technology characteristics and household decisionmaking and labor allocation may be an important consideration from a nutritional point of view. A particularly important issue is the role played by women in low-income farm households in decisions regarding technology adoption and labor allocation and how technological change affects time allocation by women to other nutrition-related activities, such as child care -- including breastfeeding -- and food preparation. A recent workshop by IRRI further explored the role of women in rice farming. More research is needed on these issues to assess their importance in decisionmaking on technology design and public policies.

The impact of technological change on the distribution of household budget control between men and women and the resulting effects on food consumption and nutrition is another important issue deserving additional attention by the research community. Such research is being initiated by IFPRI.

Although some centers, e.g., CIMMYT (27) and ICRISAT (25), have undertaken nutrition-related studies among farmers participating in farming systems research, attempts to integrate nutritional considerations into farming systems research are very limited, and an effective methodology has not yet been developed and tested. Yet, in areas where low-income farm households suffer from nutritional deficiencies, the explicit consideration of how farming systems may better meet nutritional goals could have a high pay-off. Therefore, the IARCs are currently exploring whether and how nutritional considerations may be more effectively incorporated into farming systems research.

Since the appropriateness of specific farming systems depends on a series of factors, some of which are likely to be location-specific, the IARCs focus on developing and testing methodologies which may be useful for national institutions, although in some cases the empirical results are likely to be useful for IARCs in their own design of technology. One critical set of issues that must be considered in the design of methodologies is the extent to which the etiology of existing nutritional problems is to be researched (i.e., the nature and causes of the problems) and whether options for solving the problems which are outside the scope of farming systems (e.g., food supplementation,

primary health care, and price and land tenure policies) should be included. A closely related issue is whether farming systems research by a particular center should be limited to the commodities included in its mandate. From a nutritional point of view, it is important that all farm activities influencing nutritional status be considered. A constraints methodology similar to that developed by IRRI and other IARCs to analyze yield constraints may be considered to assist in identifying the most appropriate solution to existing nutrition problems in rural areas. Such a methodology should include both food and health factors.

Food Policy

The nutrition effect of agricultural research depends on the nature of existing institutions and government policies in many areas, including food prices, foreign trade, and resource ownership. These institutions and policies may themselves contribute to or alleviate nutrition problems; they may also enhance or hinder attempts by the agricultural research community to improve nutrition. The IARCs recognize that the interaction between agricultural research and government policy must be explicitly considered and attempts must be made to identify the appropriate role of each, along with the role of direct nutrition intervention, in alleviating malnutrition. This is most appropriately done at the national or local level. The IARCs emphasize activities that may assist national institutions in improving their capacity to effectively incorporate nutrition considerations into the design of agricultural research and technology as

well as food policy, such as development and testing of approaches, although a great deal of these activities is also of direct utility to IARCs in their own research planning.

Research within the IARCs on the nutrition implications of government policies is done mostly by IFPRI. Past and ongoing work includes studies of food subsidy policies and their nutrition implications in a number of countries, e.g., Sri Lanka (28), Bangladesh (29), India (30, 31), Brazil (32), and Egypt (12, 33, 34, 35). Results of these and other case studies are currently being synthesized for the purpose of deriving general guidelines to assist in the design and implementation of food price policies that take into account nutritional implications, as well as the need for production incentives, and a favorable economic environment for adoption of improved agricultural technology. The interaction between food price policy and technological change is an important aspect of this research, and lessons are highlighted for future price policy as well as agricultural research, such as the relative prices of wheat grain and straw and adoption of improved wheat varieties in Egypt.

Other IFPRI policy research focuses on the nutritional implications of technological change and shifts from semi-subsistence to cash cropping in a number of countries, including Kenya, Zambia, Rwanda, Gambia, the Philippines, Guatemala, Malaysia, and India. The aims of these studies are: 1) to improve current understanding of the interaction between changes in agricultural production at the farm and community levels and the nutritional status of the rural poor, 2) to identify ways in which government policies may avoid negative and

enhance positive nutritional effects of such changes, and 3) to assist in the design of appropriate agricultural technology. Thus, the studies are aimed at assisting governments and technological change institutions (research and extension) in identifying ways of assuring that the rural poor benefit from rural transformation in the short as well as the long run, while facilitating rapid adoption of improved technology.

A number of other activities in the area of nutrition-related policy research are undertaken by the IARCs, e.g., studies of how policies influence structural demand changes for food, household food acquisition behavior, and the role of women in technology adoption. Other policy research not directly related to nutrition, such as analyses of production and trade policies, assist in improving the understanding of how technological change may be best used to meet nutrition and other goals.

Strengthening Nutrition Expertise at IARCs

The IARCs have undertaken and participated in a number of activities to strengthen their nutrition expertise. Some centers, e.g., AVRDC, IFPRI, and CIP, have nutritionists on the staff. At most centers, economists and other social scientists and/or biological scientists from various disciplines, e.g., microbiology, are involved in research directly aimed at the enhancement of the nutrition impact of center research. Workshops on the interaction between agricultural research and human nutrition have been organized and/or hosted by various centers, e.g., ICARDA, ICRISAT, ILCA, and IFPRI, usually in

collaboration with other international institutions, such as the United Nations ACC/Sub-Committee on Nutrition and the United Nations University. CIMMYT has established an external nutrition advisory panel and some centers, e.g., CIP and ICRISAT, are collaborating with host-country nutrition institutes on various aspects of human nutrition.

The IARCs, however, recognize that more could be done to assure that nutritional goals are taken into account to the fullest extent feasible. The principal constraint to expanded activities in this area is the limited expertise on human nutrition at the IARCs and lack of resources for its expansion, particularly in light of important trade-offs with other activities within their respective mandates with large expected pay-offs.

In view of the great variation among centers with respect to mandate, work program, staffing patterns, current nutrition expertise, and related matters, no single approach to the strengthening of center expertise in nutrition is likely to be most appropriate for all centers. Instead, following a recommendation by the recent workshop, the IARCs are currently reviewing their individual needs and opportunities for strengthening the availability of nutrition expertise, including additional short- or long-term staff, consultants, advisory committees, etc. Identified needs will then be communicated to institutions and individuals that may be in a position to assist in meeting the needs through human and/or financial resources, e.g., the ACC/SCN, FAO, and bilateral donor agencies. As an example of such efforts, IRRI has requested financial support from the Danish Aid Agency (DANIDA) for a staff position in nutrition.

Accepting another workshop recommendation, the IARCs have established an internal network for exchange of nutrition information. The network consists of one staff member from each center. Its purposes are to: 1) assure that information on nutrition-related center activities is distributed to all centers, collaborating national agricultural research institutions, and other interested parties, 2) maintain contact with and receive nutrition-related information relevant to the IARCs from institutions outside the centers, e.g. ACC/SCN, FAO, WHO, and regional and national nutrition institutes, 3) facilitate communication between centers and potential sources of outside support for nutrition-related activities, and 4) follow up on recommendations made by the recent workshop. Each network person disseminates received information within his/her center, facilitates contact between center staff/management and experts outside the center, and takes initiative to assist the center on nutrition-related activities that the center deems appropriate.

To further strengthen the interaction with nutrition expertise outside the IARCs, the IARCs are also exploring the feasibility and potential utility of establishing or strengthening links with nutrition institutions and related agencies that might offer prospects for collaboration or information exchange of benefit to the centers.

The utility of incorporating nutritional considerations into research planning at the international level is somewhat limited. The nature and causes of nutrition problems, as well as the most appropriate solutions, differ among countries and among population groups within countries served by a particular IARC, and it is

important that national agricultural research institutions be heavily involved in efforts to strengthen the interaction between human nutrition and agricultural research. They are often in a better position than IARCs to effectively focus agricultural research on specific nutrition problems while transmitting the implications for international research to the IARCs. Although the IARCs are taking the lead, the majority of the needed future activities may well be undertaken by national institutions. Thus, the IARCs are currently strengthening the dialogue with national agricultural research institutions concerning nutritional issues for the purpose of incorporating more effectively the nutritional considerations in research planning at the national as well as the international level.

One potentially effective way of incorporating nutritional concerns into national agricultural research is through training of staff of national institutions. This is currently being done by AVRDC, and, following a workshop recommendation, other IARCs are currently exploring how issues related to the interaction between human nutrition and agriculture may best be incorporated into their training programs on production, farming systems, research management, and other appropriate subjects.

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APPENDIX 1

Suggested Additional Readings

In order to facilitate access to a more complete description of nutrition-related activities undertaken by each of the IARCs, a list of the papers prepared for the workshop on "Incorporating Nutritional Goals into International Agricultural Research," February 29-March 2, 1984, and published in Per Pinstrup-Andersen, Alan Berg, and Martin Forman (eds.), International Agricultural Research and Human Nutrition, Washington, D.C. and Rome: IFPRI and ACC/SCN, 1984, is shown below:

Bressani, Ricardo. Incorporating Nutritional Concerns into the Specification of Desired Changes in Commodity Characteristics in International Agricultural Research.

Doyle, J. J. ILRAD's Research Program--Its Relevance to Improved Human Nutrition.

Flinn, J. C. and Unnevehr, J. L. Contributions of Modern Rice Varieties to Nutrition in Asia--An IRRI Perspective.

Gryseels, Guido and Whalen, Irene T. Incorporating Nutritional Goals Into International Agricultural Research--An ILCA Perspective.

International Service for National Agricultural Research. Incorporating Nutritional Goals into the Design of International Agricultural Research: The Role of ISNAR.

Jodha, N. S. ICRISAT Research and Human Nutrition.

Muchnik de Rubinstein, Eugenia. Incorporating Nutritional Concerns into the Establishment of Commodity Priorities in International Agricultural Research.

Okigbo, Bede N. and Ay, Peter. Nutrition in the Research and Training Activities of IITA.

Omawale. Incorporating Nutritional Concerns into the Specification of Desired Technology Characteristics in International Agricultural Research.

Pachico, Douglas H. Nutritional Objectives in Agricultural Research--The Case of CIAT.

Pinstrup-Andersen, Per. Incorporating Nutritional Goals into the Design of International Agricultural Research--An Overview.

_____. Nutrition-Related Food Policy Research at IFPRI.

Ryan, James G. The Effects of the International Agricultural Research Centers on Human Nutrition--Catalog and Commentary.

Shivashankar, Gurubasavappa. The Function of Plant Genetic Resources in the Improvement of Nutritional Quality, With Emphasis on Activities Undertaken by IBPGR.

Somel, Kutlu. Nutritional Dimensions of Agricultural Research at ICARDA.

Tripp, Robert. Nutrition in Agricultural Research at CIMMYT.

_____. Production Research at the International Agricultural Research Centers and Nutritional Goals.

Tsou, Samson C. S. and Gershon, Jack. Nutritional Goals and Activities of the AVRDC Research Program.

Valle-Riestra, José. The Incorporation of Nutritional Goals into the Research Design of the International Potato Center.

In addition to these papers, the volume contains an extensive list of references to center publications relevant to the topic of human nutrition and agricultural research.