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IFPRI

REPORT 1984

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**IFPRI** REPORT  
1984

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE



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# INTRODUCTION

In 1984 the International Food Policy Research Institute (IFPRI) continued to conduct research on the complex issues associated with food production, distribution, consumption, and trade in the developing world. During this year events around the world underlined the importance of the greater understanding of food problems and the critical need for appropriate policies to alleviate them. One of the most pressing long-term problems—declining per capita food production in Africa—was reflected in the immediate drought-related crises in the region. IFPRI continued to direct its research efforts toward long-term problems throughout the Third World. During the last several years, these efforts have included an increasing emphasis on Africa.

1984 marked IFPRI's fifth year as a member of the Consultative Group on International Agricultural Research (CGIAR). As is customary with all 13 centers supported by the CGIAR, the Technical Advisory Committee (TAC) to the CGIAR requested that IFPRI be reviewed in its fifth year to assess its achievements and the appropriateness and effectiveness of its research efforts. Two reviews were conducted: an External Program Review and a Management Review. Both strongly supported the substance and administration of IFPRI's research efforts.

In his submission of the report of IFPRI's External Program Review to the chairman of the CGIAR in August, the chairman of the TAC stated:

IFPRI is a research institute of high repute which has gained the confidence and support from policy analysts and decision makers in developing countries. It is a dynamic institution which is building an effective network of cooperative ventures both inside and outside the CGIAR system.

IFPRI was gratified by the quality of both review teams, their dedication to the complex task they undertook, and the thoroughness of their reviews. And, of course, IFPRI was proud of the outcome.

The final report of the External Program Review contains a number of recommendations, many of which have already been carried out. These are mentioned, where applicable, in the text that follows.

This year the director's annual food policy statement discusses the changes that have occurred in the world food situation since the inception of the CGIAR. It was presented first as a speech during International Centers Week—the formal meeting of the donors to the CGIAR and the CGIAR center directors and board chairmen—in response to a recommendation of the External Program Review. This statement highlights three major trends that have occurred in recent years:



the move from Asia to Africa as the region where food production is of greatest concern, the growth in food exports from the developed countries, and the persistence of poverty, especially in Asia, despite major increases in food production.

As in previous years the annual report describes the activities undertaken in IFPRI's research programs: Food Data Evaluation (formerly Food Trends Analysis), Food Production Policy (formerly Food Production Policy and Development Strategy), Food Consumption and Nutrition Policy, International Food Trade and Food Security, and IFPRI's newest program, Agricultural Growth Linkages and Development Policy.

The results of the work undertaken during 1984 are reported in five research reports, five issues of *IFPRI Abstract*, and three issues of the newsletter *IFPRI Report*. Other publications included *Agricultural Research and Human Nutrition*, edited by Per Pinstrup-Andersen, Alan Berg, and Martin Forman, which presents a comprehensive review of the nutrition-related activities undertaken by the international agricultural research centers,

and reprints of 13 articles by IFPRI staff.

The Outreach section of the annual report contains a discussion of IFPRI's collaboration with other centers in the CGIAR and an expanded discussion of collaboration with national institutions in developing countries. In 1984 these collaborating institutions were located in Argentina, Bangladesh, Chile, Colombia, Egypt, Guatemala, India, Indonesia, Kenya, Malaysia, Nepal, Nigeria, Peru, the Philippines, Sri Lanka, Thailand, Zaire, and Zimbabwe. In addition, IFPRI held the first two of its food policy seminars, one in Washington, D.C., the other in Chiang Mai, Thailand. These meetings brought together policymakers, advisers, and researchers from developing countries to discuss issues of pricing policy and consumer-oriented food policies.

In February IFPRI held its Board of Trustees meeting for program review in Bangkok, Thailand. IFPRI researchers and Board members took the opportunity to meet with Thai economists and policymakers to discuss food issues facing the country.

# THE CHANGING WORLD FOOD SITUATION— A CGIAR PERSPECTIVE

by John W. Mellor\*

*This past year the Technical Advisory Committee to the CGIAR had IFPRI undergo its first five-year External Program Review. The review team, noting the dynamic nature of the global food scene, urged that once every two years the director of IFPRI draw upon the accumulated knowledge of the Food and Agriculture Organization of the United Nations (FAO), the World Bank, IFPRI and other centers of the CGIAR, and other organizations and individuals to present information and to suggest conclusions that would be helpful in stimulating thought and action consistent with the objectives and means of the CGIAR system. The review team, while noting the need for cautious qualification of economic research, encouraged the director of the Institute to extrapolate research findings to the specific questions raised by policymaking bodies. This paper was originally presented at International Centers Week, Washington, D.C., November 7, 1984.*

This is a particularly appropriate time to take stock of the world food situation from a CGIAR perspective. Major changes have occurred since the initiation of the CGIAR system and its early years of explosive growth. I will emphasize three changes that have been with us long enough for their presence to be clearly defined but that are new enough for there to be some uncertainty about how to deal with them.

First is the swing from Asia to Africa as the area in which the growth of food production causes the greatest concern. Second is the extraordinary growth in the food exports of the developed countries, including the emergence of the European Community as a major food exporter. Third is the continued existence of massive malnutrition and poverty, particularly in Asia, in the face of major improvements in food production growth rates. All three drive home the extraordinary increase in the complexity of the global food problem over the past few decades and offer major challenges to the performance of the CGIAR system. I will dwell particularly on Africa, where the problems are most immediate.

## THE RISE OF AFRICA AS THE MAJOR FOOD PROBLEM AREA

Asia dominated Third World food imports during the period of the CGIAR's conception and early growth. The potential size of imports into the region and the implications of a chaotic political situation consequent to large-scale food shortages in an area with such vast numbers of people suggested a clear danger on the food front. We can also see now that a major increase in food

\*I am particularly grateful to Curtis Farrar, Leonardo Paulino, and Christopher Delgado for several discussions of the content of this paper.

prices and probably in production instability as well were then in process. The forces of instability not only led to greater concern for food security but also focused more attention on raising food production growth rates in Asia. Fortunately, by that time it was clear that the soils, climate, and nature of the dominant crops were propitious for major scientific breakthroughs.

The change in production trends for basic food staples in Asia from the decade of the 1960s to the decade of the 1970s is striking. The food production and yield growth rates increased by more than one-fifth. The area growth rates increased by one-quarter. It is likely that the large boosts in yields favored further investment in irrigation and increased double cropping: thus yield growth fostered, and did not substitute for, area growth. This substantial acceleration reflects the success of modern high-yield varieties and the systems that created them. The preponderance of evidence is that the processes that produced these accelerated trends are being institutionalized and thus can be expected to continue. It is of course important that we all continue to work to see that this is the case.

The simply drawn challenge for the 1960s was successfully met. The analogous challenge for the 1980s lies in Africa. A comparison of Africa and Asia in the 1960s and 1970s describes this challenge. In Africa, in the 1970s compared to the 1960s, the growth rate for area expansion dropped by more than half, the yields did not change significantly in either decade, and the production growth rate declined by more than three-quarters. In the 1970s the food production growth rate was less than half the population growth rate. It is particularly notable that in land-rich Africa in the 1960s, area devoted to food crops grew three times faster than in Asia, while in the 1970s the growth rates for the two regions were about the same. There was a sharp rise in the rate for Asia and a dramatic decline in Africa.

Tremendous increases in food imports into Sub-Saharan Africa are readily understandable considering the continent's poor food production record. With food exports declining at an annual rate of nearly 5 percent and imports increasing at more than 7 percent, Sub-Saharan Africa moved in a little more than a decade from a net exporter of food to a significant net importer and, extrapolating present trends, by the year 2000 imports will be massive. Trade data, which are generally believed to be more accurate than production data, are generally consistent with the production trends described.

## COMPARING ASIAN AND AFRICAN PROBLEMS

In focusing on food production in Africa, major uncertainties and differences must be faced compared to Asia in the 1960s. First, in the late 1960s there was little controversy as to the efficacy of a major push on food production in Asia. For Africa now, there is considerable controversy about the relative advantages of producing food and export crops (see, for example, the World Bank's *Agenda for Action*). Second, for Asia the need for technological breakthroughs was clear. There was a full expectation that new technology could meet production and equity objectives concurrently, and the broad outlines of the technological answers were generally agreed upon. For Africa, agreement on the nature of the technological breakthroughs needed is less clear, and so the focus on a technological answer is less sharp. Third, in Africa there is commonly less agreement on what regions a food production breakthrough is most likely to occur in and less inclination to face the political problems that must be solved in order to emphasize those regions. And fourth, Africa is more subject to labor constraints than Asia, thereby posing a much more complex research problem. Each of these four problems diffuses the

focus on food production research and must be put into appropriate perspective if success is to occur.

As I expand on the severe problems of African food production it must be kept in mind that our base of knowledge, not only of science but also of institutional needs, is much greater than in the late 1960s. Hence today's more serious problems may prove more manageable than yesterday's somewhat easier ones, if we diagnose the problem correctly and apply ourselves.

The average productivity of smallholder labor in food production in Africa seems markedly lower than in Asia. This conclusion is supported by some evidence that the cultivated area of foodgrains per labor force hour is smaller than in other developing areas. The labor inputs for many areas of Africa are close to those for India, but there is much less irrigated area in Africa, the soil is less fertile, and less fertilizer is used. Low labor productivity in agriculture helps account for the unusually high rural-urban wage differential in Africa. Because the value-product of African labor is generally higher in export crops, it can be argued that it might be better for Africa to specialize in these commodities. It is not an argument to be dismissed lightly given the generally low productivity of resources in food production.

Four points need to be kept in mind in dealing with this argument. First, given the risk aversion common to farmers, the extent to which they are willing to put their resources in export crop production is determined by their ability to produce adequate home food supplies. Thus food production and export production may be complementary, not competitive; increased productivity of the former allows increased production of the latter. Second, a substantial proportion of African labor resources are already in food production. Failure to substantially raise the productivity of these resources in food production means leaving large numbers of people in poverty and malnourishment

for the decades required to facilitate a shift to alternative production and distribution systems. Third, there is great variability from place to place in the food production resource base in Africa. Although the comparative advantage argument against food production may apply in some areas, it seems unlikely in others. Fourth, no government, given reasonable prospects of success in domestic food production, will import the bulk of its basic food sustenance.

The possibility of major technological breakthroughs in Africa now seems far less likely than in Asia in the 1960s, if for no other reason than because Asian agriculture was dominated by young soils and the prospect of good water control, whereas African agriculture is dominated by old soils with little prospect of good water control for decades. In Asia, in the late 1950s, when it began to be recognized that a solution to the food problem required concentration on the better areas, there was little disagreement about the principle or practice of delineating those areas (see, for example, the 1959 Ford Team report on India). In Africa, the principle is yet to be widely accepted and the difficult task of developing the knowledge base for delineating the regions where success is most probable has hardly begun—to say nothing of addressing the complex political problems implicit in such policy.

In Asia, one key resource has generally been abundant—labor. If more labor is needed to raise yields, it will be available with only modest reorganization or introduction of mechanical aids. In Africa, labor productivity is much lower than in Asia and seasonal labor bottlenecks act as an unusually severe constraint to production growth. It seems that in Africa not only is the productivity of labor in food production lower than in Asia, but the number of hours worked each year may be smaller due to the extreme seasonality of labor requirements. Indeed, the simple comparative advantage model to the contrary, tight seasonal bottlenecks in pro-

ducing the basic food supply severely constrain growth in export crop production as well. To oversimplify, with the exception of countries such as Ethiopia and Kenya, Africa might best be described as land surplus in the same manner that Asia is described as labor surplus. That is certainly not to say that biological scientific research is not the answer, but that it may be more difficult to focus that research than in Asia. One should note that Africa's poor record on food production is largely due to the labor constraint combined with rapid urbanization, rising urban incomes, and rising remittances to rural areas. These all serve to reduce labor input into agriculture, slowing the expansion of area cultivated as well as of yields per acre. These same forces have a much less negative impact on agriculture under the labor surplus regimes of Asia.

## APPROACHING AFRICA'S PROBLEMS

What might we conclude from this analysis about Africa? First, the difficulty of the problem is not cause for despair, but only indicates the urgency of making difficult choices and acting upon them. There is no question that food production growth rates can be greatly accelerated in Sub-Saharan Africa. It is worth adding that if we had faced the problems of Africa before those of Asia, we would also be enumerating differences between the two, but we would be pointing out the difficulties of moving in Asia because we would have less experience with those circumstances.

Second, the elements of truth in the argument for the comparative advantage of export crops and the low labor productivity in Africa both point to technological change as the basis for improvement in the food record. The generally small response to rapidly rising real food prices

in much of Africa confirms this. Policy changes probably can bring significant increases in output, particularly in the export sectors and for commodities for which output has actually declined. But in a few years that potential, insofar as it proves to exist, will be reached and new technology will be the only remaining answer.

Third, technological research, at least for a major portion of Africa, must focus on labor productivity. The urgency of the situation calls for attention to all possible means of raising labor productivity, particularly during seasonal peaks. These means might include changes in crop labor profiles, changes in the combination of crops, chemical and mechanical innovations, and basic increases in yields. A close integration of mechanical with biological research seems called for, as does an effort to facilitate cultivation of larger areas per unit of labor. This emphasis on raising labor productivity is of course in no way a call for large-scale farming. In fact, since the result needed is an overall increase in labor productivity, not a dualistic pattern of raising productivity for just a few, the call is for small-scale farming. Given the very low productivity of labor in food production in Africa relative to urban incomes and to labor productivity in agriculture elsewhere in the developing world, the improvements must be major to have a significant effect on production: marginal changes will not meet the challenge. This assertion has significant implications for research allocations.

Fourth, precisely because marginal changes will not be enough and because of the difficulty of the environment, hard decisions must be made about research resource allocations to put them where payoffs are most likely to occur. These decisions must be by commodity as well as by region and subregion. The regional choices will also relate to the physical condition of the soil and the amount of rainfall. Needless to say, as breakthroughs occur in the easier situations, research will be needed to push out into the more

difficult areas. The faster research resources expand, the faster that broadening effort can occur. In the meantime complex political adjustments will have to accompany these hard decisions. It is perhaps particularly necessary to be explicit here: all these priorities have powerful political implications and can only be effective if implemented through the political processes of each country. The problem of regional choices is inevitable, and it is already being made in a number of situations, but often with inadequate information. The foreign assistance community can help to extend the capacity to generate and use the necessary information within national institutions.

Finally, as new technologies profitable to African smallholders are developed, many ancillary policies must be implemented. The extraordinary cost of food transport in Africa, typically double that of Asia, means large investments in infrastructure are needed. The need is reinforced by the substantial deficiency in food supplies in rural areas in bad years, which interacts with the labor constraint to reduce the next year's output. Although migration of labor in poor crop years is no doubt a factor, undernutrition may prove important as well. In Africa even more than in Asia the capacity to provide food security in rural areas is needed and that requires good infrastructure. Similarly, the inefficiency of marketing institutions in much of Africa reduces farm prices by major proportions: reform is essential. African soils are extremely low in nutrient content; hence fertilizer must play a larger role than in Asia. Hard decisions about regional allocation of fertilizer distribution facilities must be made. And priority must also be given to complementary policies necessary for rapid adoption of new technologies.

These are tremendous challenges. They are surely more difficult than the ones faced two decades ago in Asia. But surely our much greater scientific and practical knowledge gives us the capacity to surmount these problems over the next two decades.

## THE FOOD EXPORT CAPACITY OF DEVELOPED NATIONS

There has been extraordinary growth in cereal shipments from developed to developing countries. They increased nearly fivefold from the early 1960s to the late 1970s and can be expected to increase another four or fivefold by the end of the century. Three forces are at work: first, extraordinary growth in commercial demand in the rapidly prospering countries of North Africa/Middle East, Latin America, and Asia; second, a rapid increase in demand in the face of urbanization fueled by oil and foreign aid in Africa; and third, virtual cessation of growth in per capita food consumption in the developed countries.

Both the demand for imports and the supply of exports are large. The balance between these powerful forces is necessarily highly unpredictable. At the time of the formation of the CGIAR there was widespread doubt whether the burgeoning demand for imports could be met, particularly in Asia. The world experienced a crisis of extraordinarily low cereal stocks in the mid-1960s and another in the mid-1970s. Real cereal prices had been trending up in the 1960s and then rose very sharply in the mid-1970s. Now, a decade later the concern is quite the opposite. Can adequate markets be found for rapidly growing developed-country surpluses? For almost a decade cereal stocks have been large and real prices low. The European Community has emerged as a major and rapidly growing exporter of cereals, with net exports perhaps rising to 25 million tons by 1990. In Europe as in North America growth of cereal demand has virtually ceased, while continued productivity growth has been institutionalized. Rapidly growing exports, sharply lower prices, or both seem inevitable. In fact, the dynamics of demand for food during the period 1961-77 is usefully

illustrated by the fact that the European Community had a production growth rate two-thirds that of East Europe and the USSR, but the former was accelerating exports while the latter were increasing imports. In this period, food consumption was growing by 3.5 percent a year in East Europe and the USSR, compared to 1.1 percent in the European Community. In the Eastern Bloc, growth in the demand for food has not yet leveled off.

It is not surprising that questions should be raised in developed countries about the efficacy of accelerating food production growth rates in the potential food markets of the developing countries. These questions have profound implications for the financing of the CGIAR. It is vital, however, to the interests of food exporters to recognize (1) that their major market is in developing countries; (2) that the growth of these markets is a function not just of the overall growth rate in these countries but of the extent to which lower-income people share in that growth, because they are the ones who spend their additional income on food; and (3) that it is growth in the domestic food production sector that spurs broad participation in growth. Thus, although it may seem odd, it is in the interest of food exporters that agricultural production in the low-income countries grow rapidly and hence, and I emphasize this, in the interest of developed-country exporters to foster accelerated agricultural growth in low-income developing countries. A few statistics will help demonstrate this.

## PRODUCTION GROWTH FEEDS DEMAND

**GROWTH** For the period 1961-77 Latin America had the fastest growth rate of staple food production of the major continental areas (3.2 percent), but consumption grew more rapidly (3.6 percent). Latin American net staple food exports

declined substantially and are projected to become negative during the next few decades. Fueled by oil revenues, staple food consumption grew at a 3.5 percent pace in North Africa/Middle East (compared to 2.6 percent for production). The situation for this period in Asia is clouded by the fact that India (which accounts for nearly half of both food consumption and production for Asia, excluding the People's Republic of China) experienced no increase in per capita staple food consumption, although the production growth rate increased. But in the rest of Asia consumption grew by 3.3 percent compared to a 2.9 percent production growth rate.

Thus countries with high rates of growth of staple food production tend to have even faster rates of growth of consumption and hence increasing food imports. The relationship is dramatically underlined by the 16 developing countries with the fastest growth rates in food staple production for 1961-76. They more than doubled their net imports of food staples in that same period.

The reason for these surprising relationships is that accelerated growth in smallholder agriculture generates income increases that stimulate demand for employment-intensive goods and services. The added incomes from such employment are largely spent on food, which, combined with additional demand from growth in other sectors, easily surges ahead of the supply growth in the domestic food sector. These relationships hold as long as people have sufficiently low incomes to spend the bulk of that income on food. Generally, broad-based, employment-oriented growth does not occur without vigorous growth in agriculture. I will comment further in the next section on the policy measures to make good use of these relationships.

In this context it is important to note the vital role of accelerated growth in livestock consumption and the even more rapid growth in the use of concentrated livestock feeds. This is dramatically illustrated by Taiwan. Taiwan was a net cereal exporter in the early 1950s. It had an

excellent growth record in agricultural production in the succeeding three decades, but it now imports 60 percent of all cereals consumed, and practically all of those imports are feedgrains. As incomes rise, consumption of livestock products rises proportionately more. And the relatively fixed supply of traditional livestock feed is quickly used up and cereals are substituted. Thus cereal consumption by livestock rises much faster than livestock production. The critical determinant of the direction of real food prices over the next few decades is the set of forces determining demand for livestock feed in the developing countries and the Soviet Bloc.

## FOOD PRODUCTION AND ALLEVIATING POVERTY

Although the most difficult food production problems are now in Africa, the most massive poverty is still in Asia. In Asia, cereal production growth rates have accelerated and commercial imports of cereals have grown, but poverty has persisted. Although the role of cost-decreasing food production technology is central to the processes of poverty abatement, there is much that can be done to increase the effectiveness of such technology in reducing poverty. The role of the CGIAR is important and pervasive in these processes.

The two most powerful forces for reducing poverty in developing countries are increasing food production and declining food prices. Each plays a role in increasing the real income of low-income people. The only way both can occur simultaneously is through cost-decreasing technological change in agriculture. Radical redistribution of income without such technological change in agriculture will tend to force food prices up or sharply increase the import bill: the former taking away with the right hand what the left has given, while the latter may be difficult to

finance. Thus a redistribution of income without sharply increased food production is unlikely to be sustainable. The rapid growth of rural populations adds greatly to the urgency of achieving accelerated growth in food production if poverty is to be reduced.

Increased food production without increased employment of the poor will tend to distribute benefits to the poor through lower prices, but those lower prices may stifle the very technological change that provides the increased food supplies. Thus it is important that the employment multipliers nascent in food production growth be fully realized. Unfortunately, how public policy can assist in these processes is one of the least understood aspects of development policy.

However, we have a reasonable basis for the following hypotheses. First, infrastructure development (such as roads, electrification, and communication) seems to be important in encouraging local employment linkages from income-raising technological change in agriculture. These of course also facilitate growth in agriculture itself. Second, although institutional credit has probably not generally played an important role in the growth of these employment-intensive rural activities, it might be able to accelerate that growth, and if so, it will have to be largely for operating capital rather than for fixed capital. Third, services are probably also an important component of rapid growth of rural employment and should be encouraged. Fourth, livestock, fruit, and vegetable products are likely to be especially important sources of increased rural employment as incomes rise, but they require special measures to provide technology, marketing, and financing. Without such attention they are apt to be choked off at great loss of employment.

Two further points should be made about livestock. The underlying production economics suggest that livestock has a large potential for employment, but we observe an all too common tendency to use highly capital-intensive methods of production. Rapid growth in livestock



production offers an opportunity for rapid growth in the market for "inferior" goods (such as barley, sorghum, and cassava), which are often produced by the very poorest farmers and which face inelastic demand and declining prices in the face of productivity-increasing technology. Thus we need to give substantial attention to the development and application of appropriate livestock technology so that rapidly growing demand can be met with labor-intensive production.

Thus if an impact is to be made on the immense problem of poverty in Asia, two points must be emphasized.

First and most important, the pace of technological change must be maintained or even accelerated. Continued rapid growth in irrigated area is essential as is research to protect past gains and to provide further gains.

Second, if downward pressure on prices occurs, efforts must be redoubled to increase the effective demand for food

by raising the real income of the poor through accelerated growth in employment. It is urgent that we expand our knowledge of these processes so that technological change in food production can be accompanied by the appropriate policies for translating that change into increased benefits to the poor.

**CONCLUSION** Improved technology is essential to meeting Africa's immense problems, to enlarging markets for agricultural exports of developed countries by accelerating growth in employment and demand that grows out of agricultural success, and to solving the problems of poverty by providing low-cost food and remunerative employment through direct and indirect influences. It is the challenge of the CGIAR to diagram and practice an effective strategy for developing such technology in consort with our colleagues in the national systems.

# FOOD DATA EVALUATION PROGRAM

The Food Data Evaluation Program (formerly the Food Trends Analysis Program) analyzes the trends of food production, consumption, and trade in the Third World; factors underlying these trends; and projections of food output and demand. Its research builds on agricultural and economic data furnished by other international organizations—especially the Food and Agriculture Organization of the United Nations (FAO). Studies attempt to identify critical food problem areas, indicate likely production shortfalls, and analyze the implications of these food gaps for policy. Program activities provide the backdrop for defining the food problems in developing countries and thereby assist in identifying issues for IFPRI research on food policies in these countries.

In response to a recommendation of the External Program Review in early 1984, a shift in research efforts was started toward the end of the year to address the problems posed by inadequate food data systems in developing countries. This new objective, which requires close collaboration with FAO and national authorities, calls for studies dealing with the gathering, evaluation, and use of data in food policy analysis, especially for the Third World countries with relatively weak food data systems.

Study results obtained in 1984 include cassava trends in Tropical Asia, additional findings on the food situation in North Africa/Middle East, trends in world cereal production and consumption, and the ongoing assessment of Chinese agricultural statistics. The program also presented issues regarding the collection of agricultural statistics in West Africa.

## CASSAVA IN TROPICAL ASIA

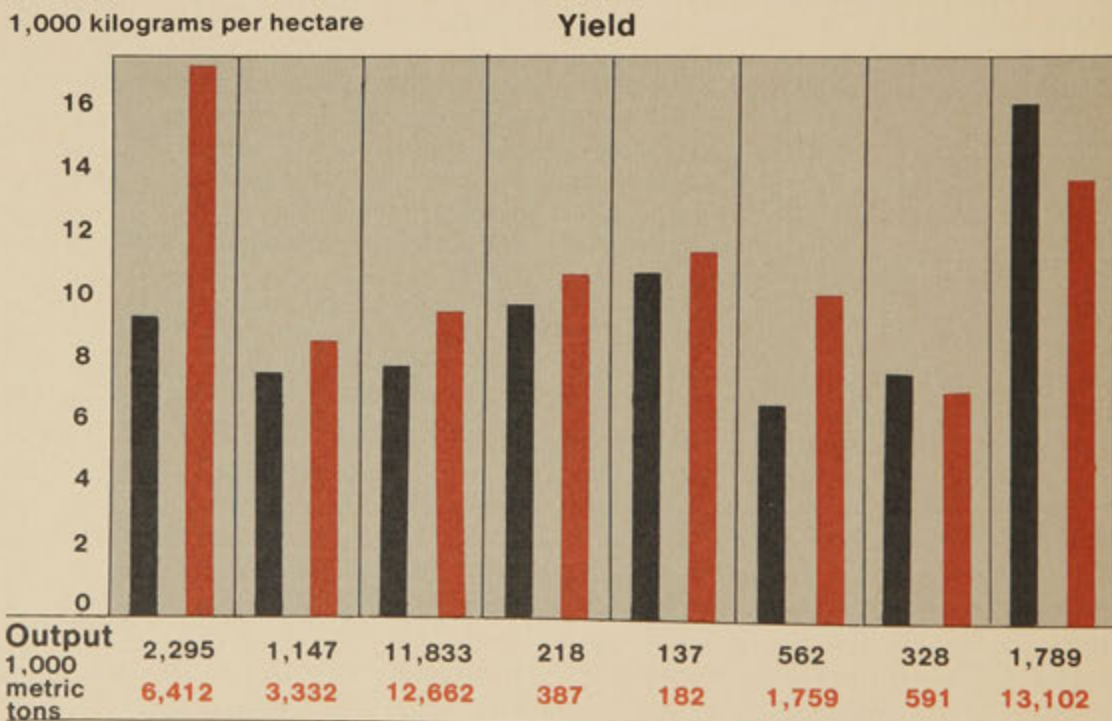
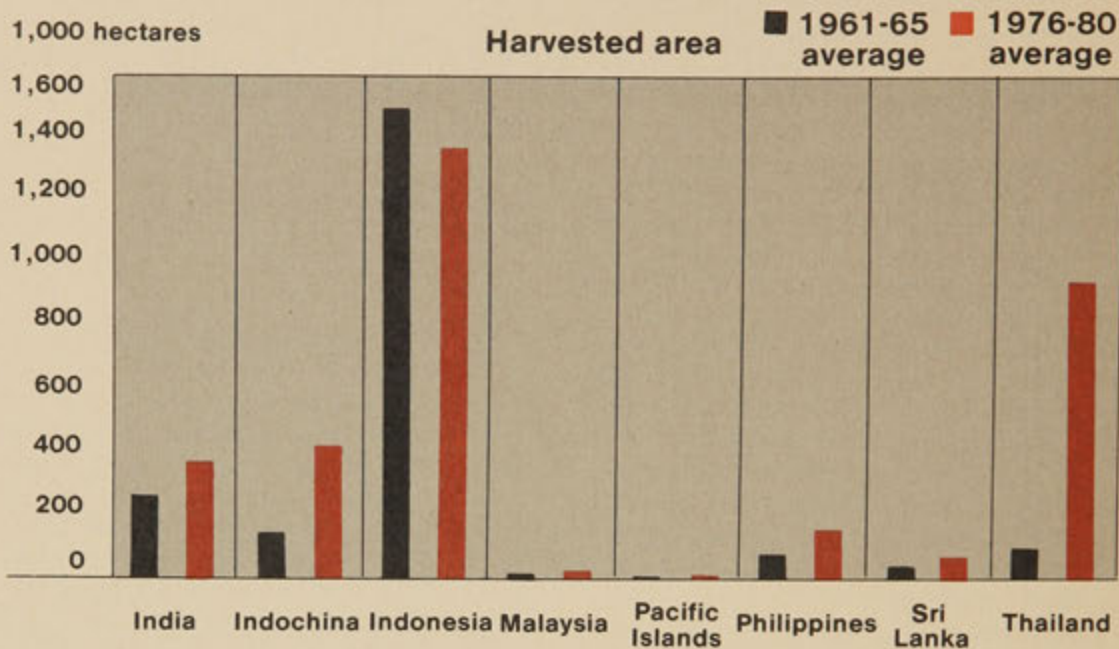
Tropical Asia (including China) produced nearly 49 million metric tons of fresh roots of cassava in 1982, which represents nearly 38 percent of the world production of the crop in that year. The average yield in Asia of about 11 tons per hectare was about the same as in Latin America but much higher than the 6.5 tons per hectare in Sub-Saharan Africa.

The output of cassava in the region more than doubled between the early 1960s and the late 1970s, expanding at a rate of 5 percent per year. This was largely the result of rapid growth in Thailand in response to an increased demand for imports by the European Community (EC) for use as cattle feed. Based on average annual outputs during 1976-80, the three major cassava-producing countries in the region were Thailand with 13.1 million tons, Indonesia with 12.7 million tons, and India with 6.4 million tons. Together these countries accounted for nearly 85 percent of the region's cassava production during the period (see Figure 1).

About a third of the cassava grown in the region in the late 1970s was exported. Of the amount kept for domestic use, nearly four-fifths was consumed as food either directly or in processed form. Feed use represented only about 3 percent.

Domestic utilization of cassava in Tropical Asia increased from 17 million tons a year in the early 1960s to 25 million tons a year in the late 1970s, indicating an average annual growth rate of 3.7 percent. As cassava exports increased from 15 percent of total output to 35 percent, domestic use as food declined from

Figure 1  
**Harvested area, yield, and output of cassava in Tropical Asia, 1961-65 and 1976-80 averages**



Sources: Food and Agriculture Organization of the United Nations (FAO), "Production Yearbook Tape," Rome, various years.

Notes: Indochina includes Kampuchea, Laos, and Vietnam. The Pacific Islands include Fiji and Papua New Guinea. Output and yield are in fresh root equivalents.

65 percent to 50 percent. The domestic use of the crop for feed grew most rapidly at 7 percent a year.

Cassava prospects for the immediate future do not appear favorable. Exports of cassava from Thailand to the EC will decline considerably as a result of recent voluntary quotas. The income elasticity of demand for cassava as food in many developing countries is low and declining, and cassava starch faces competition from substitutes.

In the long run, however, the use of cassava as feed for livestock may expand. With increases in per capita incomes, the demand for livestock products and the derived demand for feed are growing rapidly in Asia, as well as in other Third World countries. Provided prices are competitive, cassava, supplemented with soymeal or groundnut cake for protein, could substitute for maize and sorghum in the domestic manufacture of livestock feed.

Stimulating cassava production could help to improve socioeconomic conditions for people living on marginal lands where the crop is cultivated. Tapping the genetic potential of cassava through adoption of improved technology could make available cheaper calories per hectare. Improvement in yields and a decline in unit costs and prices could significantly affect nutrition and incomes of the vulnerable sections of the population for whom cassava is a major staple food.

## NORTH AFRICA/ MIDDLE EAST

During 1984, IFPRI published a report on the widening gap between the supply and demand of basic food staples and the simultaneous rising income from oil revenues. In *Evolving Food Gaps in the Middle East/North Africa: Prospects and Policy Implications*, Research Report 47, by Nabil Khaldi, the study countries are divided into three groups according to their primary source of income growth. The oil-exporting countries include Algeria, Iran, Iraq, Kuwait,

Libya, Oman, and Saudi Arabia. The labor-exporting countries comprise Egypt, Jordan, Lebanon, the People's Democratic Republic of Yemen, and the Yemen Arab Republic. The major food-producing countries are Afghanistan, Cyprus, Morocco, the Sudan, Syria, Tunisia, and Turkey.

The study looks at the period 1966-80, particularly noting changes in production, consumption, and trade after the oil boom of 1973. The trends for these years are then projected to 1990 and 2000.

The growth of per capita incomes in the region from the economic investments brought about by oil revenues caused the demand for basic staples to increase rapidly. The increased demand for primary livestock products—meat (including poultry), milk, and eggs—induced a sharp increase in coarse grain imports for animal feed. As incomes rose, preference for those high value foods began to affect the growth in basic staples consumed by humans, such as wheat and rice, while the increased use of coarse grains as feed helped widen the gap between supply and demand of basic staples. The region's deficit in basic staples increased an average of 1 million tons a year during the period 1973-80.

In the oil-exporting countries, the demand for wheat began to taper off as incomes and the demand for livestock products rose. In the poorer labor-exporting countries, however, the demand for foodgrains was climbing.

The major food-producing countries were relatively unaffected by the region's oil revenues. With the exception of wheat imports, production and consumption were almost in balance. Emphasis on application of new technology for wheat production could in fact lead to wheat surpluses for some countries in this group in the future. At the same time, however, the spread of economic benefits from oil investments throughout the region could lead to large imports of coarse grains as feed in these countries as well by the year 2000, unless efforts are directed toward increasing output of barley and sorghum on marginal lands.

# WORLD CEREAL PRODUCTION AND CONSUMPTION

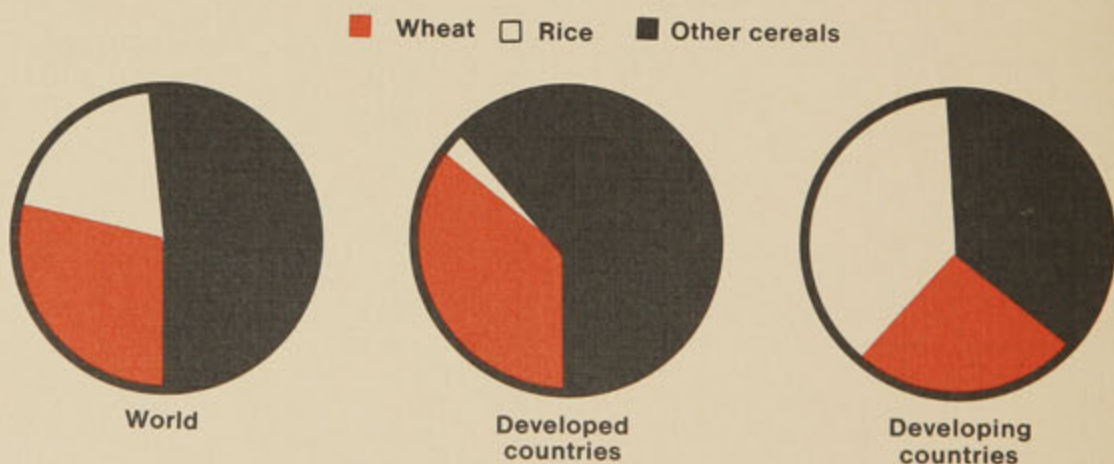
World production of cereals averaged 1.4 billion tons annually during the period 1976-80, about 56 percent of which was from developed countries. Developing countries, with nearly three-fourths of the world's population, contributed less than half of the world's production. Average per capita production during the period was 690 kilograms in developed countries and 190 kilograms in developing countries. Although cereal production in the Third World has expanded faster than in developed economies during the past two decades, the difference in their per capita output has widened because of the much faster population growth in the developing countries. The 1976-80 cereal output consisted of 30 percent wheat, 18 percent rice, and 52 percent

coarse grains (see Figure 2). Developed countries produced more than two-thirds of the wheat and coarse grains, while more than 90 percent of the rice output came from the developing countries.

Cereal production increased 3.0 percent a year during 1961-80, with annual growth rates of 2.8 percent in developed economies and 3.2 percent in developing countries. The faster growth of output in the Third World can be attributed to rapid increases in the People's Republic of China, which rose from abnormally low levels due to the major disruptions to Chinese agriculture in the early 1960s. If China is excluded, the rate of growth of cereal production in the rest of the Third World was about the same as that in developed countries.

Between the early 1960s and the late 1970s there was a noticeable trend toward production of more wheat and less coarse grains. The growth of wheat production between the two periods was 3.5 percent

Figure 2  
**Proportions of wheat, rice, and other cereals produced in the developed and developing countries, 1976-80**



Sources: Food and Agriculture Organization of the United Nations (FAO), "Production Yearbook Tape, 1975," Rome, 1976; FAO, "Production Yearbook Tape, 1980," Rome, 1981; Republic of China, Executive Yuan, *Statistical Yearbook of the Republic of China, 1982* (Taipei: Republic of China, 1982). Estimates for the People's Republic of China were obtained from Bruce Stone.

a year, compared to 2.9 percent for coarse grains. Although the output of coarse grains in developed countries expanded faster than that of rice or wheat, the pattern of world production shifted toward wheat because of the rapid output growth of this staple in developing countries. As incomes rose in Third World countries, wheat was substituted for rice and coarse grains in direct human consumption.

At 3.4 percent a year, cereal consumption expanded much faster in Third World countries than in developed economies, where consumption expanded at 2.6 percent a year. Feed use was the major influence in the growth of cereal consumption in the developed economies, but in the developing countries the increase in food use arising from rapid population growth and relatively higher income elasticities of demand of cereals was the main determinant. The rate of increase in feed use in the developing countries was actually higher at 4.6 percent a year, but it had little effect on total consumption growth because of the small share of animal feed in the domestic utilization of cereals. For the world as a whole, annual growth rates in cereal consumption were 3.0 percent for total utilization, 2.5 percent for food use, and 3.6 percent for feed use.

Based on 1973-77 world data on cereal utilization, 46 percent was consumed directly by humans; about 42 percent was used as animal feed; and about 12 percent went to seed, nonfood uses, and waste. In developed countries 67 percent was consumed as animal feed and only about 21 percent was consumed directly. However, 75 percent of the cereals consumed in the Third World was used directly for food and only 13 percent went to animal feed.

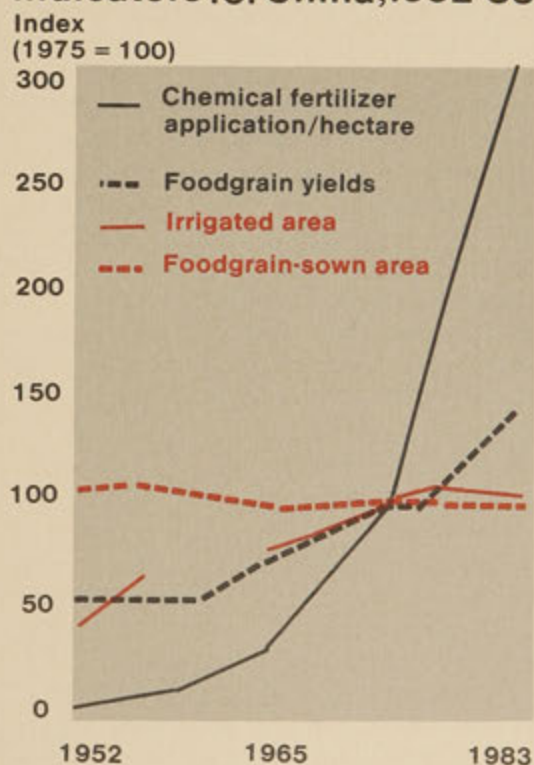
Future increases in world cereal demand depend largely on the rate of economic growth of developed countries and the rate of population growth in developing countries. However, in many developing countries, feed use is also assuming a more dynamic role in the growth of cereal consumption.

## AGRICULTURE IN CHINA

The rate of foodgrain production growth in the People's Republic of China has been extremely rapid since the mid-1970s, as production increased from about 285 million tons a year during 1975-77 to 387 million tons in 1983 and more than 400 million tons in 1984. The average annual rate of growth has been close to 5 percent since 1978, when growing conditions were probably about average in the aggregate. This progress was made even though area sown in foodgrains declined from more than 120 million hectares in 1978 to 114 million hectares in 1983 (see Figure 3).

This impressive growth rate has been attributed to the success of the "produc-

Figure 3  
Indexes of agricultural indicators for China, 1952-83



Source: Based on data series constructed from official Chinese figures by Bruce Stone.

tion responsibility system," a package of liberal rural area reforms initiated around 1978. IFPRI research in 1984, however, indicates that a number of other interlinking factors were also important. These included pricing increases at the farm gate, reduced procurement pressure in rural areas, and elimination of certain domestic trading restrictions.

In addition, chemical fertilizer application more than tripled between 1975 (5.37 million tons of nutrients) and 1983 (16.60 million tons), the result of the opening of 16 large-scale nitrogen fertilizer complexes during the period, growth in the small-plant sector, and the expansion of fertilizer imports by more than 200 percent. Although irrigated area declined slightly during the period, there was still considerable potential to absorb fertilizer on the 44 percent of China's farmland that remained irrigated. Growth in the production of foodgrains, particularly rice, was greatly facilitated by continued dissemination of higher-yielding varieties.

This analysis raises questions about continued agricultural growth in the 1990s. For a few years, fairly rapid expansion may continue; however, investment in irrigation activities declined in the 1980s, only two large-scale nitrogen-plant openings are scheduled by 1990, and state farm-gate prices for incremental output have been reduced. It is unlikely that production from small-scale plants or imports will be able to generate rapid growth in fertilizer use on China's medium- and low-yield farmlands, which are expected to be the basis for expanding the use of fertilizer.

Supply growth in the 1990s could suffer without renewed concentration in institutional development and capital construction investment related to agriculture during the current decade, concentration that may be waning due to the present agricultural successes. This could, in the subsequent decade, cause a reversal in trends exhibited during the past few years that have cut China's immense agricultural import bill, which has underwritten the liberal rural and consumption policy changes.

## COLLECTION OF STATISTICS IN WEST AFRICA

Many African countries lack reliable national time-series data on basic agricultural information such as area and production of major food crops. During 1984 the Food Data Evaluation Program made an initial examination of various issues connected with the organization of appropriate data surveys and other steps needed to obtain reliable crop statistics in West Africa, where smallholder subsistence crop production and farming systems based on shifting cultivation dominate agriculture.

There are a number of conditions to be considered: many farms are located in areas not easily accessible by road; the amount of land that can be cultivated by a household with family labor and traditional tools determines the size of the farm and the cropping pattern; sowing and harvesting extend over long periods, and mixed cropping is practiced as insurance against weather-related risks; areas are not cadastrally surveyed and the rights of ownership/cultivation are not always precisely defined; many traditional farmers, especially the subsistence producers, do not keep records of the area they cultivate or the quantity of crop they harvest.

Reliable crop statistics can be obtained through objective methods including the physical measurement of crop area with range finders, compasses, and measuring tapes and the measurement of yields by crop cutting on randomly selected plots. Area-based or household-based crop surveys need to be organized using these methods. In countries where monitoring and evaluation systems are devised for agricultural development projects, the possibility of integrating the agricultural part of monitoring and evaluation surveys and the crop surveys could be examined. Further, where rural household surveys are organized, the feasibility of including or improving the collection of reliable agricultural statistics in these surveys needs to be explored.

# FOOD PRODUCTION POLICY PROGRAM

Research in the Food Production Policy Program is focused on how to improve policies to accelerate growth in food production. There are four factors to be considered: area expansion, yield expansion through appropriate technologies, institution building, and incentives. Technology, and related resource development for the generation and spread of new techniques, improved seeds, fertilizers, and irrigation systems, are crucial to the process of accelerated growth. The effectiveness of new technologies may be impeded by ineffective institutions and inadequate incentives. Strong marketing institutions for agricultural inputs and financial institutions coupled with improved technology provide the best way of extending attractive incentives to farmers. Nonetheless, monetary incentives through domestic marketing and price support policies for resource inputs as well as production may also be crucial to counterbalance imperfect markets and market facilities.

Expansion of the traditional resources of land and labor is the principal policy focus where the possibilities for new technology are not encouraging. Production policy research in many African countries, for instance, may have to focus on the use of land, labor, indigenous technology, and an appropriate mechanism for providing farm incentives, rather than on incentives in irrigation and irrigation-based modern technology. For the long-term, however, development of new and more productive technologies should be the focus of research.

Research projects in the Food Production Policy Program encompass work on strategic production factors for the development and spread of high-yielding

technologies. These are agricultural research, fertilizers, and irrigation. Research on specific production policies is also undertaken. This research includes projects that are more narrowly focused on specific issues pertaining to a given area.

## STRATEGIC PRODUCTION FACTORS

### RESEARCH RESOURCE ALLOCATION

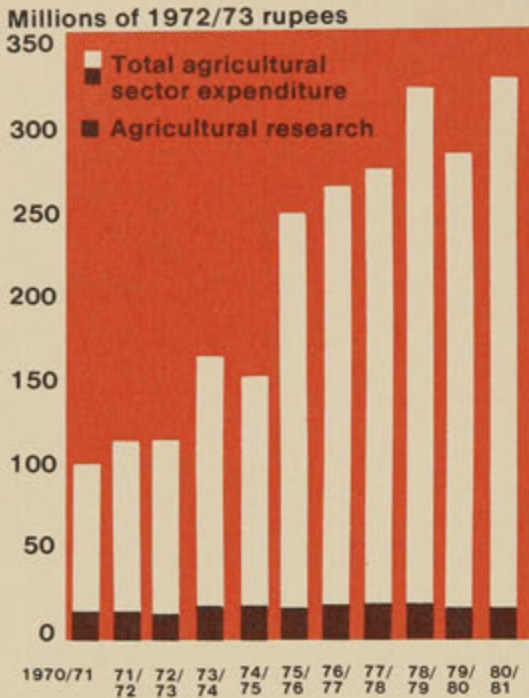
Increasing food production in the developing world is dependent on the agricultural research capability of Third World countries, but research resources are scarce, and knowing how to use them to the best advantage and how to expand their capabilities is extremely important. IFPRI has conducted research on agricultural research through studies of individual countries, regions, and the Third World as a whole. Work continued on three of these studies during 1984.

In Nepal, where expenditures for agriculture increased from Rs 106.6 million in 1970/71 to Rs 336.1 million in 1980/81, per capita net foodgrain production declined from 185 to 160 kilograms in the same period.

A study on Nepal's research capability indicates that the share of expenditures on agricultural research during this period, expressed as a proportion of total public development expenditures for the agricultural sector, gradually declined from 14 percent in 1970/71 to about 5 percent in 1980/81 (see Figure 4). However, only



Figure 4  
**Share of agricultural research  
 in government expenditures  
 on agriculture in Nepal,  
 1970/71-1980/81**



Source: Based on calculations by Ram Yadav.

about 35 percent of this was actually spent on research. The rest of the expenditure was allocated to nonresearch activities, including production and distribution of improved material, training, and advisory services. The study identifies the need for less fragmented and more focused research activities and notes that agricultural research in the hill and mountain region, where 38 percent of the cultivated land supports 56 percent of the population, will need to focus on the indigenous development of appropriate location-specific technology. However, before any of the major issues can be addressed, the study suggests that the serious motivational problems within the research system should be resolved and collaboration with external research

systems, particularly in neighboring countries, should be encouraged. It suggests that policies be made more consistent and agricultural research organizations be strengthened.

In a comprehensive review of the agricultural research systems of six African countries—Kenya, Tanzania, Malawi, Senegal, Cameroon, and Nigeria—IFPRI researchers are examining the research and extension activities in these countries to identify constraints inhibiting the supply of new technologies and the adoption and diffusion of agricultural innovations in different farming systems throughout these countries. Preliminary research suggests that although Kenya invested substantially in agricultural research during the last 10 years (1.5 percent of agricultural GDP in 1983), per capita food production has declined. External assistance has played a very important role in Kenya's agricultural research system, and, in the post-1970 period, has averaged nearly KSh 3 million per year. Yet, with the exception of maize, there is little evidence of successful food-crop research results. The study indicates that the very rapid growth in investment in the research system was undertaken without the building of institutional structures to manage this growth properly.

Research on national agricultural research systems suggests that a continuation of the 1970 growth rate for scientific staff in the Third World would result in about 60,000 agricultural scientists by 1985. Already in many developing countries, research staff members are increasing faster than national research budgets. This results in a lack of operating funds to enable research staff to do effective work, particularly in the field. Another concern is the continuing fragmentation of agricultural research systems among different ministries. Especially in Africa, there has been a move away from research being under the control of ministries of agriculture to dispersion across ministries of animal husbandry, natural resources, science and technology, and others.

## FERTILIZER POLICIES

During 1984, work on fertilizer policies continued, generating results in a number of areas. A study undertaken at the request of the Bangladesh government is examining ways to streamline the fertilizer and marketing policies in Bangladesh. Initial analysis indicates that increasing the price of fertilizer 20-23 percent above the 1984/85 price would eliminate the need for a fertilizer subsidy, which accounts for 9-13 percent of current public development expenditure in agriculture each year. This change alone would have a minimal effect (a 1.4 percent decrease) on foodgrain production. Improving the distribution system, expanding technological inputs, and correcting soil deficiencies could overcome even this small effect on foodgrain production. These nonprice factors have the strongest influence on long-term and sustained growth in fertilizer consumption and agricultural production. This study also considers methods for subsidy calculation, fertilizer price management, the effect on equity of subsidy withdrawal, and the relationship between rice and fertilizer prices.

Two studies on fertilizer use in Southeast Asian countries were completed in 1984. One incorporates random environmental inputs such as rainfall and solar radiation and managed inputs such as fertilizer and yield estimates with various types of irrigation systems, environmental factors, and technological inputs. Using this model it incorporates farmer attitudes toward risk. Results indicate that nitrogen fertilizer use might be reduced by 7-17 percent in selected rice-producing areas of the Philippines when farmers are moderately risk averse. The second study suggests that the use of *Anabaena azollae*, a small, nitrogen-fixing aquatic fern, is not currently an attractive alternative to chemical fertilizers in rice production. Research to reduce the costs of production of *azollae* and to increase the nitrogen contribution from *azollae* are needed before investments are made to spread the technology.

The extension of IFPRI's research on fertilizer policies to selected countries of Africa is in the planning stages. Preliminary investigations indicate that fertilizer use could accelerate production in many African countries. Policies that help realize this potential are the subject of a special research project developed in 1984.

## INVESTMENT IN IRRIGATION

The final report on an assessment of irrigation investment policy in the Philippines for a project funded by the Asian Development Bank was completed in 1984. The report assesses how much investment in irrigation is required to meet demand for rice in the year 2000, analyzes the cost-effectiveness of different types of irrigation systems, estimates the domestic resource cost of production of rice and secondary crops by region, and presents a preliminary analysis of benefits from alternative water distribution methods. It recommends a shift of investment from large-scale reservoir systems to small- or medium-scale diversion systems. Preliminary results indicate that a shift from traditional continuous irrigation water distribution to more intensive rotational irrigation provides only small gains in total income benefits within the irrigation system, but provides large income gains for poorer farmers with the least access to the water.

## SPECIFIC PRODUCTION POLICIES

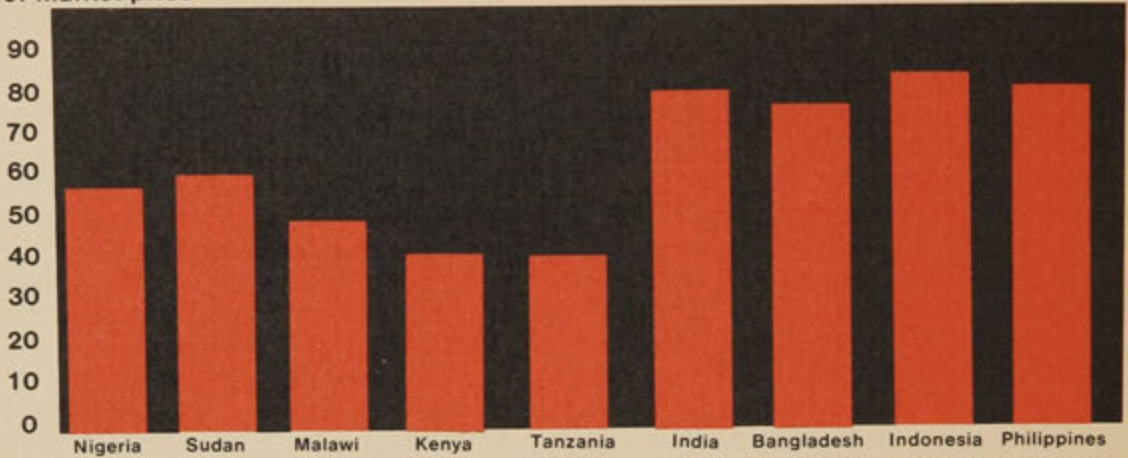
### PRICE AND MARKETING POLICIES

Research in the Production Program on price policies was undertaken in conjunction with the price policy workshop (see the Outreach section). Some preliminary results indicate that price incentives are a necessary but not, in themselves, sufficient condition for growth. Technical

Figure 5

## Differences between producer and consumer prices in selected African and Asian countries

Farm price as percent of market price



Source: Raisuddin Ahmed and Narendra Rustagi, "Agricultural Marketing and Price Incentives: A Comparative Study of African and Asian Countries," a paper prepared for the Food and Agriculture Organization of the United Nations (FAO), International Food Policy Research Institute, Washington, D.C., March 1985.

Note: The data are weighted averages of the differences for different crops and different years between 1975 and 1980.

progress, institutional structures for the distribution of new technology to farmers, and the development of infrastructure are all of crucial importance.

Work is continuing on marketing margins and their implications as incentives to farmers in a selected number of Asian and African countries. Results generated thus far indicate that the marketing margin for foodgrains in African countries, particularly East African countries, is more than twice the size of that in Asian countries. Farmers in some African countries receive only 35-50 percent of the price of foodgrains paid by food consumers. In contrast, farmers in selected Asian countries receive about 75-90 percent of the price paid by consumers (see Figure 5). As is generally the case in developed economies as well, this difference is not due to any additional services. If this wide marketing margin in African countries can be reduced, both producers and consumers would derive immense benefits.

Thus improving domestic marketing in order to reduce this margin can be an attractive price policy instrument that can simultaneously accommodate producer incentive and consumer welfare.

## COARSE GRAIN PRODUCTION AND CONSUMPTION IN WEST AFRICA

In recent years consumption per capita of millet, sorghum, and maize—the traditional foodgrains in West Africa—has decreased, while consumption of rice and wheat has increased (see Table 1). An analysis of aggregate trends shows that the per capita growth rate for consumption of wheat was 8.5 percent and that for rice was 2.8 percent between the 1960s and 1980. Rice, with a 0.74 percent annual production growth rate per capita, is the only major food staple

Table 1  
**Per capita consumption of selected foodgrains in West Africa, 1966-70 and 1976-80 averages<sup>a</sup>**

Commodity	Senegal			Burkina Faso			Ivory Coast		
	Average 1966-70	Average 1976-80	Growth Rate <sup>b</sup>	Average 1966-70	Average 1976-80	Growth Rate <sup>b</sup>	Average 1966-70	Average 1976-80	Growth Rate <sup>b</sup>
	(kg/capita/year)	(kg/capita/year)	(percent/year)	(kg/capita/year)	(kg/capita/year)	(percent/year)	(kg/capita/year)	(kg/capita/year)	(percent/year)
Wheat products	11.5	14.7	2.5	2.7	3.3	2.0	10.7	15.1	3.5
Rice (paddy)	54.4	60.6	1.1	4.8	5.7	1.7	41.5	47.1	1.3
Maize	11.2	10.6	-0.5	15.2	12.7	-1.8	31.8	24.0	-2.8
Millet	64.8	63.5	-2.0	52.4	52.7	0.1	5.3	4.6	-1.4
Sorghum	n.a.	n.a.	n.a.	86.4	83.3	-0.4	1.8	2.5	3.3

Commodity	Sahel			Nigeria			West Africa (excl. Nigeria)		
	Average 1966-70	Average 1976-80	Growth Rate <sup>b</sup>	Average 1966-70	Average 1976-80	Growth Rate <sup>b</sup>	Average 1966-70	Average 1976-80	Growth Rate <sup>b</sup>
	(kg/capita/year)	(kg/capita/year)	(percent/year)	(kg/capita/year)	(kg/capita/year)	(percent/year)	(kg/capita/year)	(kg/capita/year)	(percent/year)
Wheat products	4.3	6.6	4.6	2.2	8.5	14.7	5.3	8.0	4.2
Rice (paddy)	17.9	22.0	2.0	2.9	7.8	10.7	24.6	28.1	1.3
Maize	10.3	8.9	-1.4	10.8	13.0	1.9	21.2	19.7	-0.7
Millet	92.5	80.1	-1.4	29.8	26.0	-1.4	46.7	39.8	-1.6
Sorghum	26.1	24.3	-0.7	41.4	34.3	-1.9	13.6	12.2	-1.1

Source: Christopher L. Delgado and Cornelia P. J. Miller, "Changing Food Patterns in West Africa: Implications for Policy Research," *Food Policy* 10 (February 1985): 57; and calculations made by Christopher L. Delgado.

<sup>a</sup> Consumption is calculated using the disappearance concept by adding production, net imports, net stock changes, and subtracting independent series for feed, seed, brewing, and waste.

<sup>b</sup> Annual compound growth rate between mid-points.

in West Africa to exhibit positive growth during the last 20 years. Nevertheless, imports of rice have soared. Wheat production remains problematic for climatic reasons. There is some evidence that maize and rice are displacing sorghum production in the more humid parts of the Savanna. Despite evidence that pricing policies in many countries have contributed to shifts from consumption of domestically produced coarse grains to imported staples by lowering the relative price of imported cereals, remarkably little is known about the response of consumption to policy-induced price changes and whether these changes are reversible.

Generally, policymakers have only the sketchiest information on which to base their views of the demand outlook for various commodities. Two field studies to improve this knowledge were initiated in Burkina Faso in 1984. Studies by collaborating institutes were also launched in the Ivory Coast and Senegal. The short-term considerations in this work focus on how price policies affect production and consumption of traditional and nontraditional crops. Long-term considerations of the research focus on future consumer acceptance of traditional grains in the region.

Research in this project has also im-

proved methodological insights for price policy analysis in the region. Results indicate that using average measures of protection and efficiency for foodgrain production in West Africa, where weather and other conditions are highly variable, may lead to misleading results, which could lead to erroneous policies. An example would be generalizing over different regions in a given country about the comparative advantage of specific crops.

## VARIABILITY IN FOODGRAIN PRODUCTION

IFPRI's work on the sources of increasing variability in foodgrain production continued during 1984. Analysis completed at the global level (excluding China) showed that the probability of a shortfall

in world cereal production of 5 percent or more below trend increased from 0.04 in the 1960s to 0.07 in the 1970s. Increases in production instability were even larger for many individual countries.

IFPRI's work shows that increases in yield variability and a loss in offsetting patterns of yield fluctuations between crops and countries were the predominant sources of increase in the instability of world cereal production. This finding reinforces previous and more detailed work for India and the United States, where increasing yield variability and more synchronized patterns of yield fluctuations across regions were found to be the major sources of change. Work has now begun on analyzing the factors responsible for these changes, and hence on appropriate approaches to reducing them. A major workshop on these issues has also been planned for late 1985 (see the Outreach section).

# AGRICULTURAL GROWTH LINKAGES AND DEVELOPMENT POLICY PROGRAM

Following the recommendation of the External Program Review, the Agricultural Growth Linkages and Development Policy Program was formed in mid-1984. The basic thrust of the program is to research the contribution of technological change in agriculture to national economic growth and to the welfare of the poor. These objectives were originally undertaken under the auspices of the Food Production Policy and Development Strategy Program, now the Food Production Policy Program. The ongoing projects of this new program, which were initiated in the Production Program, fall under three topics.

## AGRICULTURAL TECHNOLOGY AND GROWTH AND EQUITY IN RURAL AREAS

IFPRI is conducting a number of in-depth case studies to understand more fully the short- and long-term effects of technological change on rural poverty and to show how institutional changes and government policies might enhance desirable effects and reduce undesirable ones.

One study of a rice-growing district in South India is based on a comparison of detailed socioeconomic survey data collected in 1973/74, 1982/83, and 1983/84. The 1973/74 data were collected by a

team from Cambridge and Madras Universities. The later surveys were conducted jointly by IFPRI and the Tamil Nadu Agricultural University.

Initial results show significant increases in agricultural production and incomes over the decade, largely as a result of the widespread adoption of high-yielding varieties of rice, increased use of fertilizers, and expansion of irrigated area. The average household more than doubled the real value of its total expenditures on food and consumer goods and services during the period. In addition, the poorer households participated in this growth. Real wages and employment increased significantly, providing improved opportunities for the landless, and the distribution of land changed little. There was a small decline in the average farm size for the first three farm-size quartiles, but only a modest increase in the top quartile.

The research indicates that the relative distribution of income (as measured by total household expenditures on foods and consumer goods and services) changed very little over the decade. If anything, the agricultural laborers did relatively better than the nonagricultural households in the villages (see Table 2).

Initial estimates also show strong growth linkage effects to nonagricultural employment in the local towns. The total number of full-time workers in the region increased by 30 percent between 1971 and 1981. Of this increase, about one-third of the jobs were created in non-agricultural activities. Each 1 percent

Table 2  
**Indexes comparing the expenditures of different groups in North Arcot, India, 1973/74, 1982/83, and 1983/84**

Household Type	1973/74	1982/83 <sup>a</sup>	1983/84
	(agricultural laborers = 100)		
Small farms	129	208	166
Large farms	240	269	227
Paddy farms	167	225	173
Nonpaddy farms	138	157	180
Nonagricultural	111	90	85
Agricultural laborers	100	100	100

Source: Based on calculations by Peter B. R. Hazell.

Note: Small farms operate 2.5 acres or less; large farms operate more than 2.5 acres.

<sup>a</sup> Severe drought year.

growth in the value of agricultural output was associated with a 0.6 percent increase in agricultural employment, and a 0.9 percent increase in nonfarm employment.

During 1984 plans were also made to begin a regional study of technological change in Zambia. Preliminary evidence suggests that the effects of technological change on rural welfare in Sub-Saharan Africa may be very different than what has been seen in South Asia. Because Sub-Saharan Africa has less well-developed rural infrastructure and markets, shorter agricultural seasons as a result of the predominance of dryland agriculture, and relatively low population densities and thus smaller rural towns, it is less able to sustain diverse and vibrant nonfarm activities. It is hoped that by comparing the cases of Zambia and South Asia new light will be shed on the cause-and-effect relationships between technological change and rural poverty, which will assist in identifying appropriate policy interventions.

## AGRICULTURAL TECHNOLOGY AND POLICIES TO IMPROVE GROWTH AND EQUITY

An important determinant of the growth and equity effects of agricultural technology is the degree of development of rural infrastructure. Some investments in infrastructure—such as irrigation, roads, and telecommunication systems—help increase agricultural productivity and generate the potential for important secondary rounds of growth in the local nonfarm economy. But other infrastructure investments, in bus and truck transport, banks, markets, and so forth, are also necessary to facilitate the flow of commerce, without which the growth of the local nonfarm economy will be inhibited.

In an ongoing study of food-for-work projects in Bangladesh, survey data from a diverse sample of villages are being used to analyze the effect of rural infrastructure on agricultural productivity, employment, and rural household investment and expenditure behavior. The infrastructures being studied include those constructed under the food-for-work projects but also the broader transportation, communication, and institutional settings. Preliminary results show that there are substantial differences in the agricultural productivity of villages with different levels of infrastructure development; in some cases yield differences of 27 percent can be directly attributed to differences in infrastructure. The higher yields are attained through the increased use of modern inputs and better water control, both of which require adequate infrastructure development.

The villages with better infrastructure were also found to have more employment in productive nonfarm activities, with a higher degree of self-employment and more even patterns of seasonal employment. Household investment in

nonfarm trade and business activities was also proportionally higher in the villages with better infrastructure.

The importance of farmers' access to farm inputs and agricultural marketing and processing facilities is clear, but much less is known about the importance of their location and about the effects of farmers' access to rural goods and services for household consumption. An ongoing project in India is examining the desired sequencing of investments in infrastructure and service provision when capital is scarce as well as exploring cost-effective ways of providing them. Plans were made in 1984 to extend this work to Zambia.

If agricultural growth is to generate secondary rounds of growth in income and employment in the rural, nonfarm economy, small businesses providing farm inputs, processing and marketing services, and local consumer goods and services must be responsive to increases in those demands. In 1984 IFPRI completed a case study of the growth of the agricultural implements industry in Punjab, India in an attempt to identify the factors that facilitate or retard the development and performance of small firms. The study found that the agricultural implements industry sprang up spontaneously with the minimum of direct official intervention. It was found that the capital for establishing and expanding firms came largely from family savings and profits, and training of new entrants was through apprenticeship schemes. Few of the firms sampled had made use of various official programs for small-scale industries.

The research indicates that the key to the growth of the agricultural implements industry was the rapid growth in demand for its output following the "green revolution." However, although the direct role of government in encouraging this industry may have been limited, an official policy of reserving the manufacture of agricultural implements for the small-scale sec-

tor may have provided important indirect support to the industry. Thus although direct aid to small firms may be of limited value, governments can play an important role in establishing the kind of legal, regulatory, and tax environment in which small firms can vigorously respond to increases in the demand for their output.

## AGRICULTURAL GROWTH AND THE NATIONAL ECONOMY

In a setting of dynamic technological change with sustained and continuing increases in the productivity of agricultural resources, the agricultural sector can stimulate growth in income and employment in many sectors of the economy. There are two types of linkage mechanisms that produce these growth effects: resource transfers, which comprise the flows of food and raw materials, capital, foreign exchange, and labor from the agricultural to the nonagricultural sectors, and demand linkages, which comprise farmers' demands for farm inputs and marketing and processing facilities and rural household demands for consumer goods and services. Studies on the latter mechanism are described above.

IFPRI's work on resource transfers includes a series of historical, quantitative studies of the intersectoral resource flows that occur between agriculture and the rest of the economy during the process of economic growth. These research efforts attempt to clarify how agricultural investment and technological change enhance long-term, national economic growth by selecting countries at different levels of agricultural success. IFPRI has already completed studies on the interaction of these relationships in Argentina, India, and Japan. Work is now continuing on studies in Chile and Punjab, India.



## RESEARCH RESULTS

# FOOD CONSUMPTION AND NUTRITION POLICY PROGRAM

The Food Consumption and Nutrition Policy Program undertakes research on how public policies affect real incomes, food consumption, and the nutritional status of the poor. During 1984 research was conducted on the effect on consumption and nutrition of food price and subsidy policies, the commercialization of agriculture, technological change in agriculture, and structural changes in food demand.

## FOOD PRICE AND SUBSIDY POLICIES

Analyses to improve the understanding of how various subsidy policies can be expected to influence human nutrition, real incomes of the poor, fiscal costs, food production, and foreign trade continued with studies on the food stamp programs in Sri Lanka and Colombia, food price subsidies in Egypt, rice price subsidies in Thailand, wheat subsidies in Brazil, food discount programs for rice and edible oils in the Philippines, and food ration shops in selected states of India. In addition, a comparative analysis of the effectiveness of subsidy policies and other transfer programs was undertaken.

Integrative analyses of the findings from past and current case studies were initiated during 1984. This included an international workshop and an international conference for analysts and policymakers (see the Outreach section).

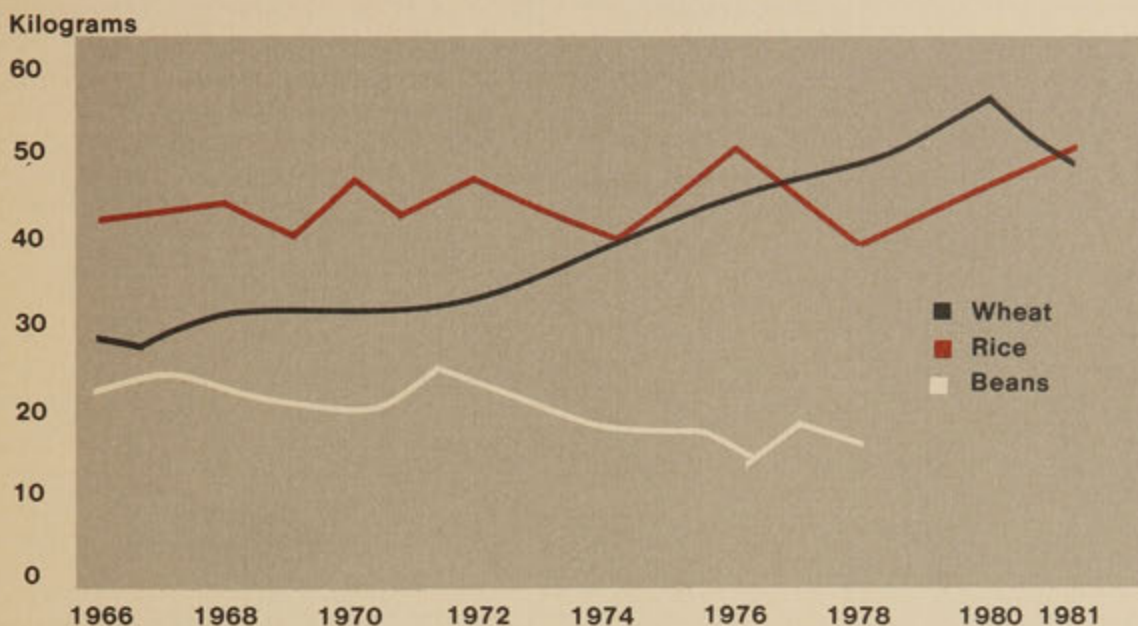
## WHEAT PRICE SUBSIDIES IN BRAZIL

Per capita wheat consumption in Brazil rose from 29 to 57 kilograms between 1966 and 1980. The major increase occurred after 1972 when explicit subsidies on consumer prices of wheat were introduced in response to large international price increases and the termination of concessionary wheat imports from the United States. As a result of these subsidies, the price of wheat fell relative to the price of other basic staples such as rice and beans, thus causing a shift in consumption patterns (see Figure 6). Preliminary research on the Brazilian wheat subsidy indicates that, although the sizes of the explicit consumer subsidies varied during the 1970s and early 1980s, they exceeded 50 percent of the consumer price in most years and were as high as 83 percent during 1980. An overvalued exchange rate further reduced consumer prices through an implicit subsidy paid by the producers through lower prices.

The resulting increases in wheat imports amounted to an outlay of almost Cr \$5 billion during 1973-82. The cost to the government of wheat subsidies amounted to 3.5 percent of all government expenditures during 1973-82.

The research indicated that higher income groups benefited most from the wheat subsidies and that they were not a cost-effective means of transferring incomes or improving nutrition of the poor.

Figure 6  
Per capita consumption of wheat, rice, and beans in Brazil,  
1966-81



Source: Based on calculations by Geraldo Calegar.

Price subsidies on other commodities such as rice, beans, and cassava could be more cost-effective at doing so if they were targeted to the poor.

## FOOD STAMPS IN COLOMBIA

The Colombian food stamp program was initiated in 1976 as part of a national food and nutrition plan to help poor households with malnourished preschool children and pregnant or lactating women improve their nutritional status. Although targeted to selected regions with a high incidence of poverty and malnutrition, the program included only 20 percent of the households eligible and was the equivalent of a transfer of 2 percent of household income. Research on the effectiveness of the program in one region suggests that the program was successful in reaching those most in need. Adminis-

trative costs of the program were low—about 10 percent of the value of the food stamps—and the effect of food stamps on household food consumption was the same as the effect of an equivalent increase in cash income. On the average, participating households received 96 Colombian pesos worth of food stamps per month, which resulted in a monthly increase in food consumption of 1,920 calories per family. If the increase were evenly distributed among all household members, each person would gain about 11 calories per day or about 0.5 percent of the daily calorie requirement. If the total increase were captured by one household member, such as a malnourished preschooler, the increase would be about 64 calories per day. The absolute benefits from this program were small because the amount of food stamps transferred to each household was small, not because the program design was ineffective.

## FOOD SUBSIDIES IN EGYPT

To obtain a complete picture of the effects of food subsidies and other consumer-oriented pricing policies, it is necessary to look at both the economic and fiscal costs and the welfare and distributional benefits. This has been the scope of the study of the Egyptian food subsidy system.

Past research examined the impact of the subsidy system on foreign trade, government expenditures, and the inflation rate, and the relationships between the subsidy system and the agricultural sector. In *The Effects of the Egyptian Food Ration and Subsidy System on Income Distribution and Consumption*, Research Report 45, Harold Alderman and Joachim von Braun show how the benefits of the system are distributed and discuss its impact on nutrition. This report, which completes the series, should enable planners to balance benefits and costs in view of national goals. It is based on data collected in 1982 from more than 2,400 urban and rural households. Its conclusions are in opposition to conventional wisdom on a number of issues related to food subsidies.

The subsidy system transfers purchasing power to all Egyptians. Measured as the difference between food import prices and consumer prices, the transfer amounts to 15 percent of the income of the poorest quarter of the urban population and nearly 17 percent for the rural poor. The rural poor also save more from buying grains on the open market than they lose as a result of depressed agricultural prices. All income groups pay more for animal products on the open market, but this cost falls more heavily on the urban rich who consume proportionately more animal products. This price distortion, while economically inefficient, is a transfer of resources back to the rural sector.

Protein deficiency is not widespread in Egypt; therefore, contrary to widespread belief, there is not a specific need for a policy to increase protein consump-

tion. There is scope for substantial savings from reductions in subsidies on frozen products, on staples distributed through the cooperative system, and on pasta, most of which is obtained by the middle and upper classes. A reduction of other subsidies, particularly on bread, flour, and some other staples distributed through the ration system may have more severe nutritional consequences. Unless such reductions are limited to higher-income groups, they could have an appreciable effect on the real incomes of both the rural and urban poor.

Per capita calorie consumption in Egypt exceeds that of all countries with up to twice the per capita income of Egypt. This is undoubtedly due in part to the low food prices maintained through the subsidies. These subsidies are costly, however, and may not be sustainable in the long run.

## FOOD RATION SHOPS IN INDIA

The Indian government has intervened in foodgrain markets through domestic procurement, monopolizing imports, trade regulations, price controls, food distribution through ration shops, and buffer stock operations. During the last 20 years, the volume of government procurement has increased substantially from 1.1 million tons in 1963/64 to 15.5 million tons in 1983/84, the latter consisting of about 7.0 million tons of rice, 8.3 million tons of wheat, and 0.2 million tons of coarse grains. In 1981 there were about 280,000 ration shops, which represents an increase of 133 percent over 1971. The estimated coverage of these shops was 660 million persons, and on the average each shop catered to 2,335 persons.

Results from ongoing research indicate that the public distribution of foodgrains in India has helped the vulnerable groups of the population in the major urban areas and in the chronically food-deficient states. Furthermore, some redistribution of income appears to have resulted. However, the distribution of benefits differs among states. In Kerala,

Figure 7

## Shares of income groups in the distribution of foodgrains from ration shops in Gujarat, Kerala, and Tamil Nadu

### Foodgrain distribution



### Population distribution



Kerala

Gujarat

Tamil Nadu

■ Poorest (incomes under Rs 3,600)    □ Less poor (income Rs 3,600 – 4,800)    ■ Richest (incomes over Rs 4,800)

Source: P. S. George, "Aspects of Procurement and Distribution of Foodgrains in India," International Food Policy Research Institute, 1984 (mimeographed).

for example, the poorest 60 percent of the population received almost 90 percent of the benefits. In comparison, benefits were distributed almost evenly among all income groups in Gujarat while the poor in Tamil Nadu received a considerably smaller share of the benefits than their share of the population (see Figure 7).

The impact of the ration shops on food consumption of the poor was large in Kerala. It is estimated that households with annual incomes below Rs 1,200 would experience reductions in their calorie consumption from cereals equal to almost one-fifth of current consumption

if the ration shop program were abolished. Similar estimates are not available from other states due to lack of basic data.

## FOOD PRICE DISCOUNT EXPERIMENT IN THE PHILIPPINES

A pilot scheme of consumer food price discounts for rice and edible oils was undertaken in three regions of the Philippines during 1984. This study was designed to assess the technical, economic, and administrative feasibility of introducing food price discounts to poor house-

holds. The discounts used in the experiment amounted to about 9 percent of the incomes of households in the lowest income group. Preliminary results indicate that the calorie consumption of the households was increased by about 16 percent at an annual subsidy cost to the government of about U.S. \$9 per capita.

Several conclusions may be drawn from this study. Area targeting schemes appear to be a viable method for targeting consumer food price subsidies in countries where the poor tend to be concentrated in certain areas. The cost-effectiveness of subsidy programs may be increased by selecting foods that provide cheap sources of calories, by using local personnel to administer the programs, and by relying on the private sector for procurement and food distribution. Neighborhood variety stores offer excellent prospects for distribution of subsidized food in low-income areas of the Philippines, but viability depends on enough capital for uninterrupted operation, a compatible local political situation, the location of the stores, and the size of the population to

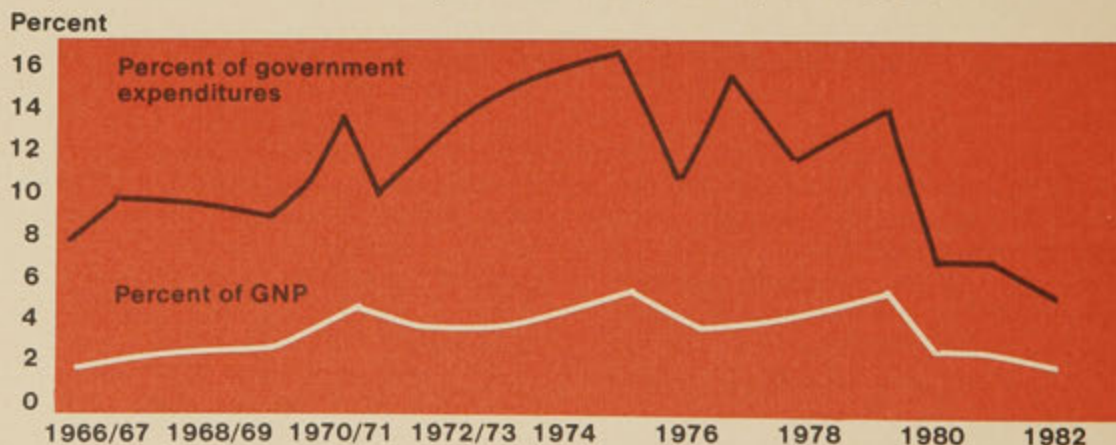
be served. Finally, leakage of benefits to households that are not severely deficient in food can be reduced through monitoring and nutrition education.

## FOOD STAMPS IN SRI LANKA

A number of changes in the economic policy of Sri Lanka took place during the last half of the 1970s, including a shift from free and subsidized rations of certain foods to a food stamp program, adjustments of domestic prices to better reflect international markets, and efforts to expand investment in the private sector. IFPRI's collaborative research with the Sri Lankan government and the U.S. Agency for International Development is assessing how these changes have affected low-income people, with emphasis on the implications for current and future food subsidy policies.

The real fiscal cost of food subsidies has fallen rapidly since the replacement of the combined ration shop/price subsidy scheme with the current food stamp program (see Figure 8). The cost reduc-

Figure 8  
**Shares of subsidy and transfer program costs in government expenditures and GNP, Sri Lanka, 1966/67-1982**



Source: Neville Edirisinghe, "The Implications of the Change from Ration Shops to Food Stamps in Sri Lanka for Fiscal Costs, Income Distribution, and Nutrition," a paper prepared for a workshop on food subsidies held at the International Food Policy Research Institute, Washington, D.C., May 1984 (mimeographed).

Note: The 1970/71 figures are four-fifths of the expenditures of the 15-month fiscal year of October 1, 1971-December 31, 1972.

tion was achieved by fixing the nominal value of the stamp during a period of rapidly increasing prices. Price increases were particularly pronounced for food, and the amount of food that households could purchase with the food stamps gradually declined. At the same time, economic growth accelerated, causing household incomes to rise rapidly.

How were poor people affected by these changes? A comparison of the incomes and the food consumption of the poor in 1969/70 and in 1980/81 indicates that the consumption of calories among the poor declined markedly. This reduction was matched by an increase in calorie consumption among the better-off households, thus leaving the overall average daily calorie consumption unchanged at about 2,250 calories per person for each of the two years.

The deterioration of calorie consumption among the poor is caused at least in part by a reduction in their purchasing power brought about by increasing food and nonfood prices and the inability of the poor to capture a sufficiently large share of the growth in overall income to compensate for their losses from price increases and the shift from subsidized and free food rations to food stamps. In an attempt to adjust to these adverse developments, the poor substituted less desirable lower-cost staples for more preferred but costly foods in their diets, and increased the share of their budgets going to food. However, because they were already spending more than three-fourths of their budgets on food in 1980/81, requirements for basic nonfood needs prohibited a large increase for food.

## RICE PRICES IN THAILAND

Domestic rice prices to the Thai consumer have been kept below international prices by government export taxes. In *The Effects on Income Distribution and Nutrition of Alternative Rice Price Policies in Thailand*, Research Report 46, Prasarn Trairatvorakul estimates the effects on

the nutritional status of the poor of a policy change that would permit the domestic price of rice to reflect export prices.

The study indicates that the short-run net gains to the rural poor from increases in the rice price would be minimal, largely because many of the rural poor consume all of the rice they grow and may purchase additional rice as well. The larger commercial farmers, however, would gain. In urban areas all consumers would lose, but the loss from rice price increases would affect the poor more because rice expenditures represent a larger share of their total budget.

In addition to estimating the effects on wages and incomes, the report examines the impact on the nutritional status of the poor. About half of all Thais now consume less than the 2,500 calories a day recommended per adult equivalent. When the sample population is divided into four groups based on caloric intake and income, it can be seen that those with incomes below a designated cutoff point do not always consume fewer calories than those with incomes above it. Some families above the cutoff point prefer to consume fewer but more expensive calories than those whose incomes are lower but who devote a larger portion of their incomes to the purchase of greater quantities of inexpensive calories. Those in the low-income, calorie-deficient category may simply have incomes too low or families too large to enable them to provide enough calories per person, even if they choose the least expensive calorie sources.

This difference in food acquisition behavior is most striking at the margin. The rural poor who maintained calorie adequacy spent 33 cents of an additional dollar on food as compared to 13 cents per dollar for the rural poor who were calorie deficient. Because rice is the major source of calories for the poor, an increase in the rice price could cause these groups to reduce their consumption, with serious consequences for their nutritional status.

The socioeconomic groups found to

be most vulnerable to changes in rice prices are small paddy farmers (many of whom are net buyers of rice), small farmers of other crops, those in fishing and forestry, the self-employed who do not employ paid workers, farm workers, and other groups of general workers.

## COMPARISONS OF OPTIONS FOR IMPROVING NUTRITION

Comparative analyses may be the most beneficial tool for the policymaker in providing information for determining the kinds of programs that can be most useful for alleviating malnutrition. During 1984 a comparative review of different programs in various countries was undertaken. The studies reviewed included family-oriented programs, subsidies, food stamps, food-for-work programs, and programs focused on individuals within households such as supplementary feeding and integrated health programs.

In general, it was found that the cost per calorie of food transferred varied little between programs, but due to differences in services—including education and health monitoring—as well as targeting, the cost per intervention did vary. However, the analysis illustrates that these differences reflect the different goals. For example, screening programs may increase costs per food recipient but simultaneously reduce total costs. Furthermore, the screening may include health or growth monitoring that may influence the nutrition of nonrecipients as well.

## COMMERCIAL- IZATION OF AGRICULTURE

Modernization of the rural sector, including shifts from subsistence or semisubsistence food production to the production of agricultural commodities for sale, is a corner-

stone of successful economic development in most developing countries. Increasing farmer participation in the exchange economy has benefited not only individual farmers and agriculture but also other segments of society, and has contributed to general self-sustaining economic growth. Yet, a number of studies have concluded that specific projects or policies to promote cash cropping can have negative effects on food consumption and the nutritional status of the rural poor. By analyzing the process through which a switch to cash cropping affects the nutritional status of the rural poor in several countries, it may be possible to guide the choice and design of future projects and policies to avoid these negative effects on nutrition and to enhance the positive ones.

Studies are under way in four countries—Guatemala, India, Kenya, and the Philippines—and will soon begin in the Gambia and Rwanda. In addition, researchers representing 14 other developing countries (Ethiopia, Sierra Leone, the Sudan, India, Nepal, Papua New Guinea, Solomon Islands, Thailand, Tonga, Brazil, Chile, Haiti, Jamaica, and Mexico) joined IFPRI in a research network formed during an IFPRI workshop in December 1984. (See the Outreach section.)

## TECHNOLOGICAL CHANGE IN AGRICULTURE

Existing and expected future energy-protein deficiencies have been used extensively in support of technological change in agriculture. Decisionmakers in agricultural research and other technology-related projects and policies who wish to incorporate nutritional goals into the planning and design of activities are severely constrained by the lack of data, workable analytical approaches, and supporting research on this topic.

IFPRI is currently undertaking research in this area in Malaysia, India, and Colombia. Preliminary findings from the Malaysia and India studies are available for 1984.

## MALAYSIA

The introduction of modern varieties and irrigation in rice production caused dramatic increases in rice yields in the Muda region of Malaysia. Research completed in 1984 indicates that technological changes in rice production had a positive effect on the incomes and food expenditures of the poor, their calorie and protein intake, and the nutritional status of preschool children.

With irrigation, rice yields increased from 700 kilograms per hectare to 1,200 kilograms per hectare and incomes from rice sales almost doubled. Expenditures on food increased by 10 percent. Consumption of homegrown rice increased by 15 percent. However, the quantity of rice purchased was reduced, and the net

increase in rice consumption was about 8 percent. The only other food group significantly influenced by technological change was meat and fish, the consumption of which increased by 22 percent. Total calorie consumption increased by 7 percent for all farm households but by 14 percent for the poorest 30 percent of the households.

The number of households with calorie consumption below the recommended daily allowance (RDA) fell by 20 percent and the number of households among the poorest 30 percent of the sample that consumed less than 80 percent of RDA fell by one-third. The improvements in protein consumption were even more impressive: the number of households with protein consumption below RDA fell from 16 percent to 3.4 percent, a reduction of 80 percent (see Table 3).

Table 3  
**Sufficiency of calorie and protein consumption of households consuming traditional or high-yielding varieties of rice, Muda, Malaysia, 1972/73**

Calorie/Protein Consumption Level	Households Using Traditional Varieties		Households Using Modern Varieties	
	Total	Poorest 30 Percent	Total	Poorest 30 Percent
Household calorie consumption as percent of RDA	97.62	86.87	104.15	98.79
Percent of households below:				
100 percent of RDA	70.46	76.92	56.43	66.67
90 percent of RDA	56.82	61.53	45.28	53.51
80 percent of RDA	31.82	53.85	30.45	36.40
Household protein consumption as percent of RDA	167.62	135.12	188.33	171.66
Percent of households below:				
100 percent of RDA	15.91	46.15	3.41	8.77
90 percent of RDA	15.91	46.15	1.71	4.83
80 percent of RDA	6.82	15.39	0.07	2.19

Source: Based on calculations by Per Pinstrup-Andersen and Don Cox.

Note: RDA stands for recommended daily allowance.



## NORTH ARCOT, INDIA

Introduction of modern rice varieties during the late 1960s and early 1970s resulted in large production expansions in the North Arcot region of Tamil Nadu, India. Rice is the source of more than half of the calories consumed in the region. IFPRI research is trying to assess how the production expansions influenced calorie consumption and nutritional status.

It was found that a shift from traditional to modern varieties caused production to increase by 340 kilograms per hectare which in turn increased net farm incomes considerably. Total labor demand increased with adoption of modern varieties but it appears that farmers substituted family labor for hired labor and the net impact on hired labor was negative although small.

The preliminary findings indicate that the impact on calorie consumption of the introduction of modern rice varieties was positive and large for rice producers and negative but small for landless labor.

## STRUCTURAL CHANGES IN FOOD DEMAND

IFPRI's concern with changes in food demand has led to analyses of various causes of these changes, in addition to the work on demand parameters, food consumption patterns of urban and rural areas, and the effect of demographic shifts on rice

demand, all of which constitute the ongoing efforts of the Rice Policies in Southeast Asia Project (see the Regional Projects section).

Preliminary analysis has been completed in a study investigating the food consumption and nutritional consequences of deforestation and the increasing labor demands for fuelwood, fodder, and water collection in the hill areas of Nepal.

The main source of cooking fuel is wood, and there is a clear positive association between dietary calorie intake and the quantity of fuelwood used. It was found that as the time required to collect a unit of fuelwood increased by 10 percent, the time spent collecting wood increased by 6 percent, and the quantity used declined by 3 percent. The consequences of deforestation and the increasing labor constraints for women who collected 80-90 percent of fuelwood were even clearer when the consequences for production were examined. It was found that for upland crops, predominantly maize and ragi, the primary labor constraint in production is women's labor input. In contrast, for the two rice crops, men's labor was the main labor constraint. Wage labor generally provided an insignificant share of total labor input in the study area. These relationships, as well as their implications for the nutritional status of the population, are being analyzed further. The consequences of women's time constraints may be far-reaching, both for structural changes in diet composition and for the nutritional status of preschoolers.

# INTERNATIONAL FOOD TRADE AND FOOD SECURITY PROGRAM

Developing countries typically have open economies in which agriculture is of substantial if not dominant importance. From a domestic perspective, a country's trade policy affects its ability to meet short-term food consumption needs, its structure of incentives for growth in food production, its opportunities for foreign exchange earnings through agricultural exports, and its long-run prospects for income growth. In the international context, world market conditions and the trade behavior of other countries exert a significant influence on the food system of developing countries.

Accordingly, the two major lines of research being undertaken in the International Food Trade and Food Security Program are analyses of national trade policies of developing countries and examinations of international policy issues relating to the food security of developing countries.

## DEVELOPING- COUNTRY POLICIES

During 1984 research on domestic policy issues focused on trade and exchange rate policies and short-term food supply management.

## FOREIGN TRADE REGIMES

Past studies of foreign trade regimes and their effects on economic development have generally emphasized the consequences of trade on the domestic manufacturing sector. Such trade policies may have repercussions affecting the

whole economy and particularly the relative incentives in the agricultural sector in developing countries. The protection of domestic manufacturing through tariffs and other import restrictions, which has characterized the industrial and trade policies of many developing countries since 1950, can have deleterious effects on production and export incentives in agriculture. The magnitude of these effects depends on the extent of substitution in production and demand.

Trade and exchange rate policies directly affect the domestic price of exportables relative to importables, which in turn affects the domestic price of exportables relative to nontradable goods and services, so-called home goods. These two price ratios are commonly used to represent the relative profitability of export production. Empirical examination of these relationships for the Philippines indicates that the country's foreign trade regime has discriminated heavily against exports in favor of import competing products. This was true not only during the period of import and foreign exchange controls in the 1950s but also during the export promotion decade of the 1970s. Trade and exchange rate policies biased against exportables relative to importables reduced the incentive to produce export goods compared to home goods by about 86 percent. Another finding indicates that agricultural export production was effectively penalized relative to the production of industrial exports, importables, and home goods from 1950 to 1980. Except for a short period during the 1960s, the effects on the relative domestic prices of agricultural export products were negative.

Table 4

**Rates of protection for selected agricultural commodities, Zaire, 1970-83**

Period	Import-Competing		Nontraded		Exportables		
	Maize	Rice	Cassava (dry)	Groundnut	Coffee	Palm Oil	Cotton
	(percent)						
1970-74	8.6	-0.4	52.8	58.5	37.6	-43.1	88.5
1975-79	-49.1	-90.9	-224.9	41.2	54.8	-8.5	83.0
1980-83	28.4	-65.9	-295.2 <sup>a</sup>	52.6 <sup>b</sup>	58.0	16.3 <sup>b</sup>	93.2

Source: Tshikala B. Tshibaka, "Effects of Trade Regime and Exchange Rate Policy on the Structure of Incentives to Agriculture in Zaire," International Food Policy Research Institute, Washington, D.C., March 1984.

Notes: Positive numbers indicate that the domestic price was below the world price at the official exchange rate. The world price is measured as the c.i.f. cost for importables and the f.o.b. price for exportables.

<sup>a</sup> This figure is for 1980-81.

<sup>b</sup> This figure is for 1980-82.

A study conducted in Zaire, funded by a research grant from the International Development Research Centre, calculates implicit tax rates on seven major crops to show the effects of trade and exchange rate policies on domestic prices during 1970-83. During this period prices for most food crops, particularly rice, were kept above world prices, while prices for export crops, such as coffee and cotton, were kept below the world price (see Table 4). In more general terms, the incidence of price-distorting trade policies in Zaire appears to be high: a 10 percent increase in the domestic price of goods that are imported, as the result of import tariffs and quantitative restrictions such as quotas, leads to a 6.6 percent fall in the domestic price of exported crops relative to home goods.

On the whole, Zaire's export and food crops do not compete with each other, nor do export crops compete with one another. This permits a high degree of crop specialization within Zairian export

agriculture. The exception is the production of palm oil, which does compete with the production of staple food crops. However, palm oil, a major export crop, is also the principal source of edible oil in Zaire.

A study of Peru's foreign trade regime during 1949-83 also concluded that the implicit taxation of agricultural tradables was considerable. During the period 1966-83 a 10 percent increase in the domestic price of import-competing goods as a result of tariffs and quantitative restrictions would result in an implicit tax to agricultural import-competing activities of about 5.6 percent relative to home goods and 10 percent relative to non-agricultural import-competing goods. For agricultural exports the same calculations result in implicit export taxes of 6.6 percent and 10 percent, respectively. This study, which is still in progress, also traces the effects of these policies on the output and consumption of various agricultural products and on the real income of farmers and urban consumers in Peru.

In *Constraints on Kenya's Food and Beverage Exports*, Research Report 44, Michael Schluter hypothesizes that Kenya should promote agricultural exports to the oil-exporting countries, choosing a selected group of these countries because they have rapidly increased their imports of food and beverages in recent years.

Eight potential products are evaluated, and the numerous barriers restricting their export growth are explored. For beef, the subsidized exports of the European Community would make it difficult for Kenya to compete. On the other hand, Kenya has a market advantage in sheep and goats, but there are domestic restrictions on their export. Maize and sugar are grown far from the port, and transport costs are too high for these products to compete on world markets. Pulses could be exported if quality standards could be maintained. Horticultural crops, such as mangoes, also have great potential, provided the needed research, pest and disease control, improved varieties, and transport can be acquired. Finally, coffee and tea, Kenya's traditional exports, could be expanded by improving yields. The main constraint for these crops lies in the inefficiencies of their marketing systems.

Before all of these constraints can be addressed, however, Kenya must resolve its primary policy question: Should a country that sometimes experiences food shortages concentrate more of its resources on agricultural exports?

Research on foreign trade regimes in Nigeria and Thailand continued in 1984. A sequel to an earlier work on Colombia was also initiated and a study on Brazil is in the planning stage.

## SHORT-TERM FOOD SUPPLY MANAGEMENT

Another research project on Peru, commissioned by the Inter-American Development Bank, has developed data on production, consumption, and imports of selected commodities to examine the

principal determinants of government pricing policies affecting consumers and producers and their implications for food imports in Peru. This is part of a larger study that has already examined this issue in Egypt and India.

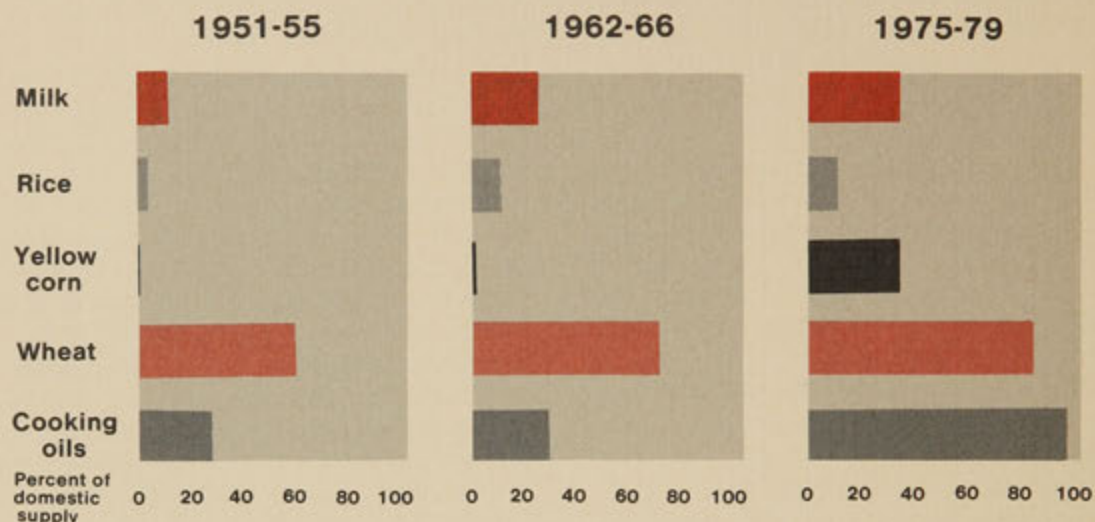
The proportion of imports in total domestic supply has increased dramatically in Peru since the mid-1950s (see Figure 9). This growing food import dependency may be the result of pricing policies. To examine this, three hypotheses were defined for a study of food imports. First, decisions about food imports reflect domestic pricing policies affecting those food products that are also influenced by inflation and by the balance-of-payments position of the country. Second, decisions about quantities of food imports are part of the balance-of-payments adjustment mechanism. And third, because some agricultural exports compete for domestic resources used to produce food, how they are priced is extremely important.

Two types of external disturbances were examined: the effects of changes in world prices of agricultural products, especially cereals and cotton, and of changes in foreign exchange receipts on the level of price intervention, domestic production, consumption, and food imports of cereals and cotton. Such an analysis could help illuminate how price interventions on imported agricultural products respond to shocks to both the food system as affected by world prices and to the import capacity of the country.

In response to a change in the world price of rice or cotton, Peru has not followed a policy of completely insulating domestic prices from changes in world prices. It is estimated that a 10 percent rise in the world price of rice leads to a 2 percent increase in the producer price and a 1.3 percent increase in the consumer price of rice. An increase in the world price of rice of U.S. \$50 per ton would lead to a decline of 2,766 tons in imports of rice in the first year and 3,276 tons in the second year. Domestic production increases only slightly in the second year by 3,275 tons, and domestic

Figure 9

## Dependence of Peru on imports of selected commodities, 1951-55, 1962-66, and 1975-79



Source: Alberto Valdés and Elena Alvarez, "Government Policy and Food Supply Management in Peru, 1950-81," a report to the Inter-American Development Bank, International Food Policy Research Institute, Washington, D.C., 1984, p. 30.

Notes: The 1975-79 figure for rice is actually for 1975 and 1976. The 1975-79 figure for cooking oils is actually for 1975-77.

consumption declines by only 1 percent—2,766 tons—in the first year.

The corresponding results for cotton, an export crop in Peru, indicate that a 10 percent increase in the world price of cotton leads to a 7 percent increase in the farm-gate price of cotton, and a 2 percent increase in cotton production in the following year. Although significantly less than 1.0, the elasticity of transmission of the world price to the domestic price is considerably higher for the export crop than for the food crop.

As a result of these policies in Peru, the agricultural export sector is relatively more responsive to external shocks than is the food sector, reflecting the priority given to food security objectives.

to be self-sufficient in food, as opposed to placing greater reliance on imported food, will depend not only on the domestic policies adopted but also on external factors. In seeking to improve the understanding of the international framework in which national policies are formulated, research in this area has focused on a number of specific policy issues.

### FOOD AID

Food aid has been an important though controversial component of development assistance for more than a quarter of a century. Despite criticism, food aid remains a major element of foreign assistance programs. In 1984 research in the area of food aid culminated in *Closing the Cereals Gap with Trade and Food Aid*, Research Report 43, by Barbara Huddleston. The construction of an adequate data base where none existed previously, the analysis of historical data, and the projections of food aid requirements in 1990

## INTERNATIONAL POLICY ISSUES

42 The extent to which developing countries may wish

in this report provide the groundwork for deeper analyses of food aid's contribution to equitable growth and economic effects.

In compiling the food aid data presented in this report, information on food aid was gathered from four major donors: Australia, Canada, the European Community, and the United States. Total cereal imports were broken down into commercial imports, grant aid, and concessional aid for each of the 99 countries included in the study.

The volume of cereal imports of all types has tripled since 1961, rising to 98 million tons in 1981. Of this amount, about 88 million tons were imported by middle- or high-income developing countries, and only about 10 million tons by low-income countries (those with average per capita incomes of less than U.S. \$300 a year). The high- and middle-income developing countries acquired only a small share of their total cereal imports through aid or grants, but the low-income countries purchased less than 5 kilograms a year per person commercially, while 3 kilograms per person came from aid (see Figure 10).

The study projects future food aid needs under four different scenarios. Assuming that the low-income countries will require food aid when imports exceed exports by 2 percent, 14-19 million tons of cereals could be needed for food aid by 1990. Under a scenario that considers meeting nutritional requirements, about 24 million tons could be required.

The middle- and high-income developing countries are highly reliant on the world market, but they seldom require food aid. The low-income countries, however, import relatively little, but about half of their cereal imports come from food aid. Despite the rapid expansion of cereal imports per year, average calorie intake is still inadequate in a quarter of the countries studied.

The study suggests that import dependence does not arise from food aid. Instead, the countries with fast-growing incomes experience a surge of food

demand, with which growth of domestic production cannot keep pace. In the lower-income countries not enough is earned from exports to pay for imports. As more developing countries move into the higher-income bracket, the food aid they receive could be redirected to those who are clearly underfed without increasing the total volume of food aid.

There is an upper limit to how much direct food aid a country can use effectively. Alternatives considered in this report include selling food aid commodities on the open market and using the proceeds to increase farmers' incentives or using food aid to create additional demand for food. Because of the political implications, any changes in food aid policy are likely to be phased in gradually.

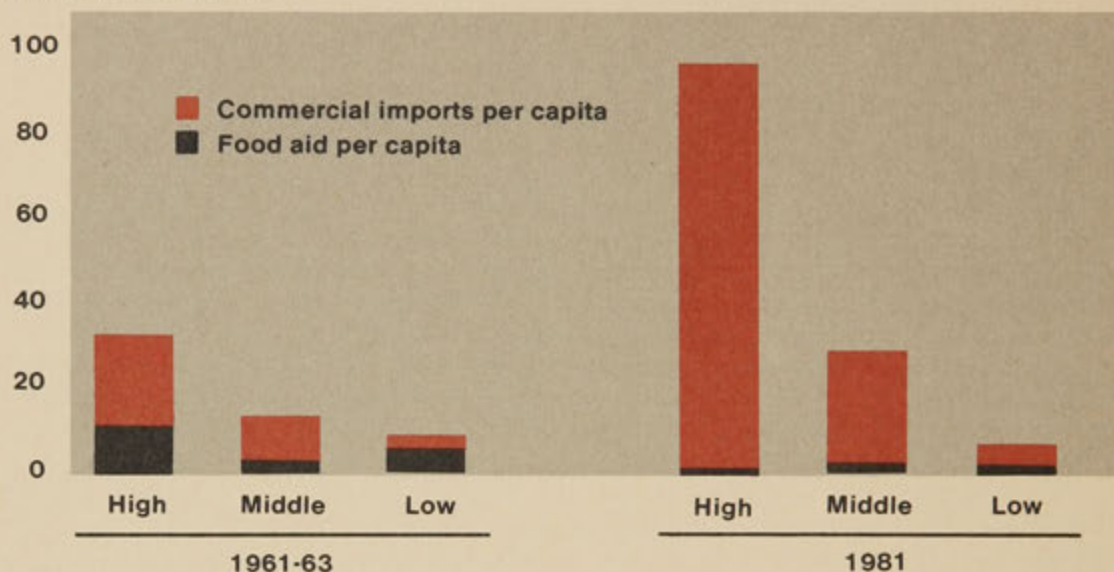
## REGIONAL FOOD SECURITY

Traditional approaches to food security have stressed national and/or international grain reserves as the appropriate means of ensuring food supplies in developing countries. Yet, for many poor countries, the burden of building up and carrying large buffer stocks as a hedge against bad years is excessive. Past IFPRI research has also shown that an international grain reserve agreement would be an inefficient way of providing greater food security for developing countries. Moreover, it is extremely difficult to get grain exporting and importing countries to agree on the size, price bands, and organization of any international grain reserve.

In the absence of international commodity agreements, regional cooperation offers another mechanism to improve the food security system among developing countries. During 1984 research on regional security continued, focusing on the potential for improving food security among the Southern African countries of Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zimbabwe, and Zambia, which are members of the Southern African Development Coordination Conference set up in 1980.

Figure 10  
**Per capita cereal imports and food aid received by developing countries, 1961-63 and 1981**

Kilograms per capita



Source: Barbara Huddleston, *Closing the Cereals Gap with Trade and Food Aid*, Research Report 43 (Washington, D.C.: International Food Policy Research Institute, 1984), p. 30.

Notes: Income groups are based on per capita GNP in 1976-78 expressed in 1977 U.S. dollars. High-income countries had per capita incomes greater than U.S. \$900; middle-income countries, between U.S. \$300 and U.S. \$900; and low-income countries, less than U.S. \$300.

Regional cooperation can increase a country's income level and reduce instability of income, and thus improve food security by raising the level of consumption and avoiding shortfalls in food consumption. Raising the income level could be the consequence of regional projects that have external effects and economies of scale in transport, communication, and other infrastructure; coordination of national policies to achieve regional policy objectives; and liberalization of trade among the countries of the region, allowing for more specialization in the output mix, which could raise resource productivity in agriculture.

Regional cooperation could contribute to stabilizing the fluctuation of food consumption or to food security by counteracting fluctuations in food production;

reducing the cost of storage through regional food reserve systems; supplying a regional portfolio approach in determining the production pattern; stabilizing foreign exchange; and providing cost advantages on early warning systems, coordinated planning of imports and exports, and regional marketing units.

## INTERDEVELOPING-COUNTRY TRADE

Most studies on the expansion of trade between developing countries have focused on trade in manufactured products, giving little attention to rapidly growing trade in agricultural commodities. The International Food Trade and Food Security Program has conducted research

on the latter. In a study completed this year it was found that prospects for increased trade among developing countries is favorable, particularly in some fast-growing commodity markets. Whereas current trade among developing countries represents roughly 18 percent of total developing-country exports of non-fuel primary products, the rapid growth of some developing countries has increased the potential for interdeveloping-country trade in these products.

Between 1962 and 1979, the value of agricultural products exported by all developing countries to developing countries increased in real terms from U.S. \$3.232 billion to U.S. \$6.325 billion annually. The highest rates of growth of exports occurred in commodities such as vegetable oils, sugar, fertilizers, food preparations, and animal feed. The distribution of trade by developing countries shows increased diversification among regions during this period, with the proportion of trade to developed countries decreasing slightly and trade to other developing countries increasing (see Figure 11).

Analysis of market share showed that

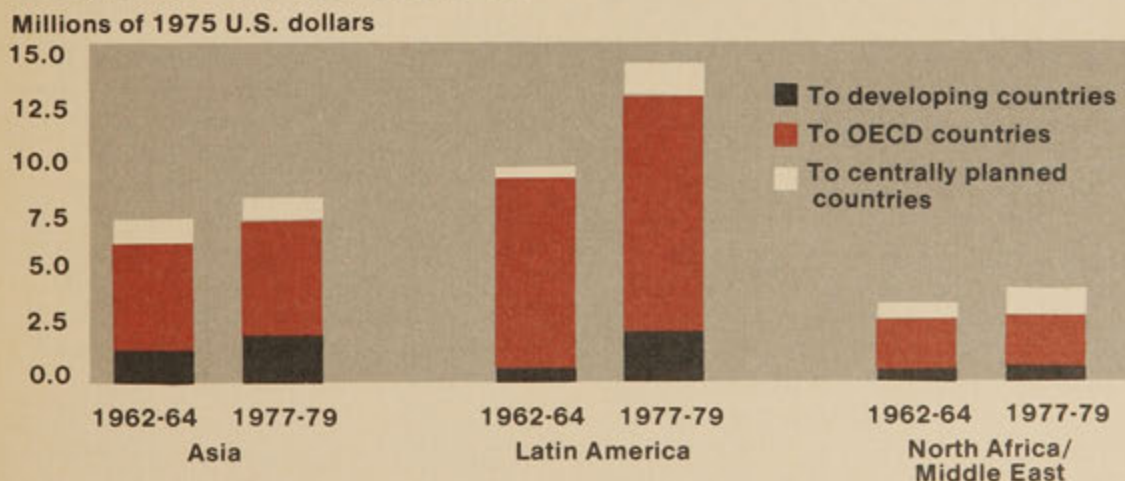
Asia led the regions with the highest actual growth in agricultural exports, followed by Latin America, Sub-Saharan Africa, and North Africa/Middle East. However, in terms of potential export growth lost to competition or the direction of trade to relatively slow-growth markets, all regions suffered losses of between 17 percent and 1,000 percent of their actual growth.

## AGRICULTURAL PROTECTIONISM

As an update of earlier IFPRI research on agricultural protection in OECD countries and at the request of the World Bank, new estimates of the effects of agricultural protectionism have been derived based on more recent trade flows and rates of protection.

The study analyzes the potential benefits to developing countries of liberalizing trade in beef and sugar, as well as wheat and maize. The results seem to support the conclusion that liberalizing trade in cereals would probably cause developing countries as a whole to suffer

Figure 11  
**Distribution of the agricultural exports of developing countries, 1962-64 and 1977-79**



Source: Alberto Valdés and Suzanne Gnaegy, "Trends and Structure of Agricultural Trade Among Developing Countries, 1962-1979," International Food Policy Research Institute, Washington, D.C., March 1984 (mimeographed).



Table 5

## Effects of liberalization of trade in beef and sugar on the foreign exchange earnings of developing countries

Region	Beef		Sugar	
	Foreign Exchange Earnings	Distribution of Foreign Exchange Earnings	Foreign Exchange Earnings	Distribution of Foreign Exchange Earnings
	(million 1980 U.S. \$)	(percent)	(million 1980 U.S. \$)	(percent)
Sub-Saharan Africa	263	4.5	140	4.2
North Africa/Middle East	126	2.2	80	2.4
Asia	171	3.0	1,627	48.9
Latin America	5,216	90.3	1,482	44.5
Total	5,776	100.0	3,338	100.0

Source: Joachim Zietz and Alberto Valdés, "The Costs of Protectionism to Less-Developed Countries: An Analysis for Selected Agricultural Products," a report for the World Bank, International Food Policy Research Institute, Washington, D.C., January 1985.

a net welfare loss, especially in the case of wheat. It also seems that low-income countries would bear the brunt of the increase in the cost of cereal imports resulting from an increase in world prices following trade liberalization. Most of the gains would accrue to the large developed-country exporters, such as the United States, Canada, and Australia, at the expense of the European Community.

Trade liberalization in sugar and beef, on the other hand, seems to be in the interest of developing countries. For both commodities together, a complete removal of tariff barriers would result in net welfare gains of up to \$1 billion in 1980 U.S. dollars per year. The corresponding increase in foreign exchange earnings would be close to U.S. \$10 billion, a large sum compared to the preliberalization export earnings of developing countries or the flow of development aid to them (see Table 5).

Trade liberalization in sugar almost exclusively benefits developing countries. Only a fraction of total benefits is cap-

tered by developed-country exporters. For beef, total benefits in foreign exchange are split about equally between developed and developing countries. As for the regional distribution of benefits, Latin America and Asia could expect to split almost equally the foreign exchange increases resulting from trade liberalization in sugar. Latin America has the most to gain from a removal of tariffs on beef. It would capture 90 percent of the foreign exchange gains going to developing countries. The countries of North Africa/Middle East are likely to suffer a net welfare loss from trade liberalization in both sugar and beef. Sub-Saharan Africa could expect a net welfare gain from trade liberalization in beef along with substantial increases in foreign exchange earnings.

This research suggests that taking developing countries as a group, liberalizing trade for beef and sugar would provide the greatest benefit. Also, by focusing on two commodities, the chances of negotiating an agreement on liberalization would be more feasible.

# REGIONAL PROJECTS

## RICE POLICIES IN SOUTHEAST

**ASIA** IFPRI has continued its collaborative research on rice policies in Southeast Asia with the International Rice Research Institute (IRRI), the International Fertilizer Development Center (IFDC), and national institutions in Indonesia, Malaysia, the Philippines, and Thailand. Work is under way in five areas: irrigation, trade and reserve stocks, fertilizer, consumption, and the integrating model.

Research on irrigation includes the analysis of irrigation investment policy and water management methods in the Philippines, reported in the Food Production Policy Program, and studies of the effect of irrigation on income distribution in all four countries. Preliminary results for all countries from the latter show that irrigation provides large increases in income to all factors of production and income earners in rice production. Although there tends to be a small increase in the relative share of output of land and a small decrease in the share of labor, these shifts are more than offset by the large increases in absolute gains for all factors. The set of studies on the income distribution impact of irrigation will be completed in 1985. Studies in the trade and reserve stock area examine the effects and costs of government interventions in rice markets. Preliminary results from an assessment of intrayear price movements in Indonesia indicate that government market intervention has dramatically reduced the variability in intrayear rice prices.

Research on fertilizer includes estimation of the production response to fertilizer and the assessment of the performance of fertilizer marketing systems. Preliminary results for the Philippines indicate that production and marketing costs are substantially higher for locally produced fertilizer than for imported fertilizer. Government price determination

based on costs of production of fertilizer has caused domestic prices to be higher than world prices. The total marketing margin between production cost/import price and the farm-gate price is very large, but the largest mark-up is at the producer or importer level. The marketing system at wholesale and retail levels is relatively efficient.

Research on consumption is estimating demand parameters for Indonesia and the Philippines and analyzing how modern rice technology and rice prices affect farm labor use and real wages in agriculture. Results are expected in 1985.

A prototype integrating model has been developed for the Indonesian rice sector. The model consists of a production sector that determines fertilizer use and area, yield, and production of rice; an income distribution sector that determines incomes for different groups of farmers; and a consumption sector that determines demand for rice by income class. The sectors are linked through market clearing equations. The models can be used to simulate the effects of changes in various policy instruments. Final validation of the model is under way.

## FOOD-FOR-WORK: BANGLADESH

During 1984 work was completed on an in-depth evaluation of the food-for-work project in Bangladesh. This project has been funded by the World Food Programme and a consortium of bilateral donors including Canada, the United Kingdom, Australia, and Sweden. Researchers from IFPRI and the Bangladesh Institute of Development Studies (BIDS) conducted the work on questions of management practices; the extent to which food-for-work reaches the target group; employment, income, and consumption effects; quality of work; and short-run effects on productivity.

Since its inception following the 1974 famine in Bangladesh, the food-for-work program has used an average of 280,000 tons of wheat annually, of which the World

Food Programme has supplied a little more than half. In food-for-work projects, activities intended to contribute to the development of rural infrastructure are undertaken during the dry season (mid-December through mid-May). As a proportion of total cereal imports food provided through this program has varied from about 8 to 34 percent over the past several years, averaging about 18 percent. Thus, the size of the program has a significant effect on food availability within the country.

Under the current plan of operation, 80 percent of the World Food Programme's wheat is allocated through centrally planned projects for canal excavations and construction and rehabilitation of river and coastal embankments under the authority of the Water Development Board, although the share actually utilized by the Water Board is usually somewhat less. Since 1981/82—the year of the field survey—the remainder of the wheat provided by the World Food Programme has been allocated entirely for local initiative schemes, primarily rural roads, administered by the Relief and Rehabilitation Division of the Ministry of Food (formerly the Ministry of Relief and Rehabilitation).

The food-for-work program has achieved considerable success in reaching the target group. Whereas less than 50 percent of the population of the whole country belongs to the functionally landless category (that is, those with less than half an acre of land), about 50 percent of its participants are drawn from completely landless households and 70 percent belong to the functionally landless category. Ninety percent own less than two acres. The per capita income of worker households prior to the work season was less than half the national average, and 85 percent of the workers are illiterate.

Employment in food-for-work largely represents a shift from self-employment in extremely low-productivity activities and, to a somewhat lesser extent, from other forms of wage employment. When wage employment is not available, landless laborers try to sell their services or

engage in some form of petty trade in order to subsist. Survey results show that when food-for-work employment was available, the net income earnings of participant households was 55 percent higher during the six-week survey period than what they would have earned during the same period without it. On an annual basis this amounts to about a 10 percent income increase.

Households with food-for-work participants and comparable households in control villages had relatively high levels of food consumption, especially wheat consumption, compared to the national average for their income group, and there was no significant difference between the food consumption of participants and that of a control group during the work season. However, participants in food-for-work who were heavily involved in the projects (that is, those comprising the top 50 percent in days employed) had a marginally higher level of food consumption. Other uses of additional income earned through food-for-work could include loan repayment and nonfood consumption. Data were not collected on nonfood consumption, but those collected on loan repayment suggest that some additional income was used for this purpose. To the extent that extra earnings were used for loan repayment, the positive consumption effect of the food-for-work projects was distributed over time. These preliminary findings reflect a smaller increase in food consumption than is commonly found among low-income groups when their income increases. The basis for these counterintuitive findings is being explored.

The share of wheat in the consumption basket is only somewhat higher for participants in these projects compared to nonparticipants. Of all those households receiving wheat, 54 percent sold some amount of wheat. However, the total amount of wheat sold was only 14 percent of the total receipts. In 61 percent of the cases, wheat was sold to meet urgent cash needs; only about 24 percent reported preference for rice as the reason for selling wheat.

# OUTREACH

Through its activities at the national and regional levels, IFPRI seeks to meet the needs of its main audience—policymakers and researchers in developed and developing countries—through the dissemination of research results and through the convening of workshops and seminars and other, more informal interactions with this audience. Institutional collaboration between IFPRI and national institutions in the developing countries and other centers in the CGIAR also plays a vital part in IFPRI's outreach efforts.

The two-way interactions of workshops, seminars, and collaborative research and the worldwide dissemination of the results of IFPRI's rigorous analytical research are aimed at helping governments formulate alternative food policy strategies that benefit overall economic development and at strengthening institutional research capacity at the national level.

**PUBLICATIONS** IFPRI's published research, which is listed in the following section, is distributed to some 7,300 individuals and organizations, almost half of these being individuals, libraries, educational institutions, and research organizations in the Third World. IFPRI continued to exhibit publications at international meetings and book fairs in 1984, which included exhibits in New Delhi, Harare, Kiel, Frankfurt, and various cities in the United States.

**COLLABORATION WITH CENTERS IN THE CGIAR** The main thrust of the CGIAR system is to generate technologies for increasing food production in the developing world. IFPRI utilizes such research in order to identify and

analyze national and international policies related to food production, consumption, and trade.

IFPRI's collaborative ventures with other centers have increased in number since it joined the CGIAR and during 1984 included the following:

- IFPRI is examining food problems in Indonesia, Malaysia, the Philippines, and Thailand with IRRI and IFDC. (See Regional Projects section for details.)
- Research continued with IRRI and the University of the Philippines at Los Baños and Diliman on the assessment of food demand/supply and related strategies for developing member countries of the Asian Development Bank.
- IFPRI is providing overall coordination of a study to assess the magnitude, determinants, and consequences of the substitution in production and consumption of wheat and rice for traditionally grown millet and sorghum in semiarid West Africa. The collaborating institutions are the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the Groupement d'Etudes et de Recherches pour le Développement de l'Agronomie Tropicale (GERDAT), the Centre Ivoirien de Recherches Economiques et Sociales (CIRES), the Centre d'Etudes, de Documentation, de Recherche Economique et Sociale (CEDRES) of the University of Ouagadougou, and the Institut Senegalais de Recherches Agricoles (ISRA). The first planning workshop was held this year with a major conference scheduled for 1986.
- IFPRI and ICRISAT are collaborating on a study of the geographical aspects of equity and efficiency effects of market access for farmers in Nagpur District, India.

- During 1984, an IFPRI staff member completed a two-year secondment to the International Service for National Agricultural Research (ISNAR) where work was pursued on assisting developing countries plan and manage research more effectively.
- IFPRI is working on the agroclimatic delineation of Chinese wheat zones with the Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT) and the Chinese Academy of Agricultural Sciences to facilitate the testing of wheat varieties in China. Once zones are delineated for seed testing, agro-economic information on irrigation, fertilizer application, yields, etc., will be synthesized from Chinese provincial data banks and subprovincial information compiled continuously at IFPRI. Background information on food production in China is also being provided to other centers as needed.
- A researcher from the Centro Internacional de la Papa (CIP) is on sabbatical leave at IFPRI, completing work on a study of potatoes in the tropics. Part of the research deals with production and consumption trends of the crop.
- A workshop was sponsored by the Centro Internacional de Agricultura Tropical (CIAT), CIMMYT, CIP, and IFPRI on selected economic research issues in Latin America and the Caribbean. The workshop analyzed the socioeconomic circumstances in which agricultural production takes place in the region. Participants explored the possibility of collaborative research between centers on the issues that might have important implications for food policy and the design of new agricultural technology.
- IFPRI and the UN Administrative Committee on Co-ordination/Sub-Committee on Nutrition (ACC/SCN) convened a workshop at the International Livestock Centre for Africa (ILCA) on incorporating nutritional goals into

agricultural research. Researchers from all centers examined current methods used by each center to address nutritional issues and explored ways of further integrating nutritional concerns into the planning and execution of agricultural research. The proceedings of the workshop were published by IFPRI along with a report that provides an overview of the discussions and recommendations of the workshop.

- IFPRI is collaborating with all centers in the CGIAR on a research priorities project sponsored by the Australian Center for International Agricultural Research. The main objective of this project is to assist international institutions in determining more clearly the regional, commodity, and disciplinary foci of their activities.
- With several centers, IFPRI was involved in consultations on concepts and common approaches regarding farming systems research.

## COLLABORATION WITH INSTITUTIONS IN DEVELOPING COUNTRIES

IFPRI'S policy analyses are aimed at offering alternative policy choices to decisionmakers, and many of these analyses are undertaken in conjunction with institutions in developing countries. This interaction not only provides opportunities to incorporate research results into policy planning, but also enhances the capacity for national agricultural research systems to undertake food policy analysis. Through exposure to the broad range of analytical and methodological techniques employed in IFPRI's integrated approach to food policy research, collaborating researchers enhance their professional skills in a variety of areas including problem definition, project design, survey

technique, and data analysis. Through this interaction IFPRI contributes to the development of appropriate frameworks for policy analyses. IFPRI researchers also gain from this two-way exchange as both national problems and the relationship of research to national problems come into focus.

In 1984 IFPRI undertook collaborative surveys with 14 institutions in developing countries, involving 31 collaborating researchers and 342 survey personnel. The collaborative process served to generate data, increase local expertise, and provide information relevant to policy design and implementation. Collaborative ventures varied considerably in emphasis but generally fell within five areas of concern to IFPRI research—food price and subsidy policies, growth linkages, trade and exchange rate policies, structural demand changes, and specific production strategies and policies.

Research projects on food price and subsidy policies included joint work with the Food and Nutrition Policy Planning Division of the Sri Lankan Ministry of Plan Implementation on a case study of the effect of food stamps on low-income people's food consumption, nutritional status, and real income. Sri Lanka's switch from ration shops to food stamps affords an opportunity to expand the body of knowledge on consumer-oriented food subsidy programs, and IFPRI is involved in conducting a socioeconomic survey and analyzing the data in order to identify the most important factors and processes that influence the performance of the food stamp scheme and to estimate the effects of policy-induced changes in these factors and processes.

Work on growth linkages is being undertaken in India, Chile, Bangladesh, Zambia, and Zimbabwe and has ranged from analysis of food-for-work programs with BIDS to that of the role of service provision in rural development. A collaborative project with the Tamil Nadu Agricultural University in India is focusing on

the effects of technological change in agriculture on rural welfare. The benefits of high-yielding varieties to North Arcot, a rice-growing district in Tamil Nadu, are being studied to examine linkage structures. Data collected from a household survey under way will be compared with data from an earlier survey conducted before the introduction of new technology to better understand the linkages between different kinds of farm and nonfarm households in rural areas.

An example of IFPRI's research on trade and exchange rate policies is a collaborative project with the Agricultural Farmers Association (SAC) in Bogota examining the effect of incentives in agriculture in Colombia during 1970-83. The study focuses on fiscal and monetary policies as well and examines the effects of all these policies on the structure of incentives for various agricultural subsectors as compared with the rest of the economy.

A study with the Agricultural Projects Services Centre of the Government of Nepal (APROSC) continues IFPRI's work on structural demand changes. The joint effort, which includes the participation of the Food and Agriculture Organization of the United Nations, is investigating ways in which the depletion of wood as fuel influences time allocation, nutrition, and agricultural productivity in the hill areas of Nepal and how infrastructure development affects these relationships.

Collaboration with BIDS, the Bangladesh Rice Research Institute (BRRI), the Bangladesh Ministry of Agriculture, and the Indian Institute of Management at Ahmedabad is contributing to IFPRI's work on specific production strategies and policies through an analysis of fertilizer pricing policy and strategies for foodgrain production in Bangladesh. The study is examining desirable fertilizer price adjustments in view of the government's decision to reduce input subsidies and instead provide production incentives through an increase in crop prices.

These projects are discussed in greater detail in the descriptions of the various programs, as are those with other collaborators listed here:

Badan Urusan Logistik (BULOG)  
*Jakarta, Indonesia*

Bureau of Agricultural Economics  
*Manila, Philippines*

Center for Agro-Economic Research  
*Bogor, Indonesia*

Fundación Mediterránea  
*Cordoba, Argentina*

Institut Facultaire des Sciences  
Agronomiques  
*Yangambi, Zaire*

Institute for Nutrition in Central  
America and Panama (INCAP)  
*Guatemala City, Guatemala*

Institute of National Planning  
*Cairo, Egypt*

Kasetsart University  
*Bangkok, Thailand*

Kenyatta University College  
*Nairobi, Kenya*

Ministry of Agriculture  
*Lima, Peru*

National Council for Science  
and Technology  
*Nairobi, Kenya*

National Nutrition Council  
*Manila, Philippines*

Philippine Institute of  
Development Studies  
*Manila, Philippines*

Thailand Development Research  
Institute  
*Bangkok, Thailand*

Thammasat University  
*Bangkok, Thailand*

Universidad Católica de Chile  
*Santiago, Chile*

Universiti Pertanian Malaysia  
*Kuala Lumpur, Malaysia*

University of Gadjah Mada  
*Yogyakarta, Indonesia*

## SEMINARS AND MEETINGS

In 1984, IFPRI expanded its outreach activities by launching a new series of food policy seminars, conferences, and workshops designed to share with policymakers in developing countries, data, analyses, and conclusions growing out of IFPRI's research on major food policy issues.

On April 29-May 2, IFPRI sponsored the first meeting in this series, a workshop on "Food and Agricultural Price Policy." Participants included members of the IFPRI research staff and senior officials from nine countries in Asia, Africa, and Latin America representing key ministries and agencies involved in price determination. The meeting dealt with a range of issues and provided an opportunity for comparative examination of policymaking experiences and recent IFPRI research findings in the area of price policy.

Treating price determination as a process involving decisions in different sectors and institutions, the workshop considered the complexity of policy formulation and prices, the often conflicting objectives underlying current interventions, and the consequences for the structure of incentives in agriculture. Participants discussed a variety of policy instruments that affect food and agricultural prices, including public intervention in domestic marketing, trade and exchange rate policies, public procurement, stockholding, subsidized distribution, and diffusion of new technology. Particular attention was devoted to the global and national environments in which prices operate.

Sixteen papers on these and related topics were prepared by IFPRI as a basis for the discussion. These are currently being edited for publication as a book. The contributions of all participants will be reflected in a forthcoming report summarizing the workshop's discussion.

IFPRI's second meeting in this series, a conference on "Consumer-Oriented

Food Subsidies," was held November 13-15, in Chiang Mai, Thailand. Policymakers and advisers having operational responsibility for food subsidy policies and programs in 18 developing countries and researchers from several international institutions and agencies met with IFPRI researchers to discuss issues centering on the benefits and costs of food subsidies, the appropriate elements of food subsidy policy under varying circumstances, and the criteria for policy choice in this area. The purpose of the meeting was to provide information and perspectives useful to governments in future policy design and implementation.

The conference focused on the macroeconomic, fiscal, and foreign trade implications of consumer food subsidies, giving particular attention to the distribution and production effects of these programs. It also considered how subsidies have contributed to rationing and income transfer goals in past and current programs of various countries. Similarly, the nutritional consequences for specific population groups were evaluated, drawing on evidence from IFPRI studies in a range of developing countries. How food subsidies influence domestic agriculture through their effects on fiscal resources, structure of incentives, producer prices, and distributional outcomes was also examined. Approaches to minimizing these risks were identified and discussed.

Eleven papers synthesizing the results of 15 IFPRI case studies on consumer-oriented food subsidies were presented at the conference. These are currently being edited for publication as a book.

IFPRI sponsored two research-oriented meetings in 1984, both in collaboration with the ACC/SCN.

A workshop on "Incorporating Nutritional Goals into International Agricultural Research" was held at ILCA, Addis Ababa, Ethiopia, on February 29-March 2. Its purposes were to discuss methods now being used by the international agricultural research centers (IARCs) for incorporating nutritional goals into agricultural research and to explore ways of further integrating

nutrition concerns into the planning and execution of agricultural research. Participants in the workshop included economists, other social scientists, nutritionists, and agricultural scientists supported by or associated with the CGIAR. The proceedings of the workshop were published by IFPRI in 1984 in *International Agricultural Research and Human Nutrition*, edited by Per Pinstруп-Andersen, Alan Berg, and Martin Forman. The book presents a comprehensive review of the nutrition-related activities undertaken by those centers and suggests how local, national, and international agricultural research institutions can incorporate nutrition goals into research design and planning.

The review reveals that the centers are undertaking a large number of activities to strengthen the nutrition effects of their work. These activities play a significant role in decisions on relative commodity priorities, specification of desired commodity and technology characteristics, design of production systems research, and research on government policy. However, it indicates that follow-up activities are necessary as well.

To encourage research in an area of increasing priority—the income and nutrition effects of the shift from semisubistence to commercial agriculture—IFPRI and SCN sponsored a workshop with IFPRI staff and experts from countries in Africa, Asia, the South Pacific, and Latin America. One of the outcomes of the workshop, which was held December 3-5, in Airlie, Virginia, was the establishment of a research network to facilitate interaction among the group's members.

IFPRI is currently undertaking studies on this subject in collaboration with national and international institutions in the Gambia, Guatemala, India, Kenya, the Philippines, and Rwanda. Expanding on these efforts, the workshop considered 13 research proposals for studies on the commercialization of farming in Ethiopia, Sierra Leone, the Sudan, India, Nepal, Thailand, Papua New Guinea, Solomon Islands, Tonga, Brazil, Chile, Mexico, Haiti,



and Jamaica. A common research framework was formulated and presented by IFPRI to assist researchers in these countries to assess the effects of cash cropping on household real incomes, family food consumption, the nutritional status of preschool children, and related indicators.

The case studies to be undertaken by the network will examine a common set of research issues and hence permit lessons to be drawn across countries. A major objective of the project is to help policymakers to evaluate alternative options for the design of policies and programs to cope with possible income and nutrition problems arising from the shift to commercialized agriculture.

IFPRI's in-house seminar program serves the Washington area's network of research and policymaking institutions concerned with food policy. These meetings typically involve researchers, administrators, and visiting officials from developing countries in informal but intensive discussions of the results and policy implications of IFPRI research. Seminars are also occasionally given by

guest speakers. In 1984, 21 seminars were held on such topics as the impact of climate on Soviet grain yields, Third World food projections to 2000, and administering food producer prices in Africa.

During 1984 preparations were made for meetings of interest to both the research and policymaking communities. An international workshop scheduled for June 1985 on the political economy of nutritional improvement will examine the role of interest groups in the policy process in shaping the design and performance of nutrition policies and programs.

In addition, IFPRI and the German Foundation for International Development (DSE) initiated plans to convene a workshop in November 1985 dealing with the problem of increased variability in cereal yields. Its purpose is to determine whether new agricultural technologies are an important source of variability at the farm and national levels and, if so, what the implications are for research and policy. The meeting will be attended by biologists, economists, and policymakers.

# PUBLICATIONS

## RESEARCH REPORTS

### Research Report 43

*Closing the Cereals Gap with Trade and Food Aid*, by Barbara Huddleston, January 1984. 107 pages.

### Research Report 44

*Constraints on Kenya's Food and Beverage Exports*, by Michael Schluter, April 1984. 118 pages.

### Research Report 45

*The Effects of the Egyptian Food Ration and Subsidy System on Income Distribution and Consumption*, by Harold Alderman and Joachim von Braun, July 1984. 127 pages.

### Research Report 46

*The Effects on Income Distribution and Nutrition of Alternative Rice Price Policies in Thailand*, by Prasarn Trairatvorakul, November 1984. 102 pages.

### Research Report 47

*Evolving Food Gaps in the Middle East/North Africa: Prospects and Policy Implications*, by Nabil Khaldi, December 1984. 74 pages.

### IFPRI Abstract

Issues of *IFPRI Abstract* are available for all research reports in English, French, and Spanish. *IFPRI Abstract* is also available in Arabic for Research Reports 45 and 47.

## OTHER PUBLICATIONS

### IFPRI Report

The newsletter, *IFPRI Report*, is published three times a year in English, French, and Spanish.

*International Agricultural Research and Human Nutrition*, edited by Per Pinstrup-Andersen, Alan Berg, and Martin Forman, September 1984. 326 pages.

## REPRINTS

Alderman, Harold. "Attributing Technological Bias to Public Goods." Reprinted from the *Journal of Development Economics* 14 (April 1984): 375-393.

Desai, Guntant M. (With N. V. Namboodiri.) "The Deceleration Hypothesis and Yield-Increasing Inputs in Indian Agriculture." Reprinted from the *Indian Journal of Agricultural Economics* 38 (October-December 1983): 497-508.

Hazell, Peter B. R. "Sources of Increased Instability in Indian and U.S. Cereal Production." Reprinted from the *American Journal of Agricultural Economics* 66 (August 1984): 302-311.

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- Alderman, Harold. "Effect of Income and Food Price Changes on the Acquisition of Food by Low-Income Households." Presented at an internal workshop of international agricultural research centers on Selected Economic Research Issues in Latin America, Centro Internacional de Agricultura Tropical, Cali, Colombia, August 27-29, 1984.
- \_\_\_\_\_. "Food Subsidies and State Policy in Egypt." Presented at the Social Science Research Council conference on The Food Problem and State Policy in the Middle East, Rome, September 17-18, 1984.
- Bautista, Romeo M. "Instability in Food and Export Crop Incomes: The Philippine Case." Presented at the staff seminar of the Institute of Agricultural Development and Administration, University of the Philippines, Los Baños, January 25, 1984.
- \_\_\_\_\_. "Trade Liberalization in the Philippines." Presented at the research meeting of the Trade Policy Research Centre on Participation of Developing Countries in the International Trading System, West Sussex, England, October 22-25, 1984.
- Braun, Joachim von. "Food Subsidy Policies—Chances and Problems." Presented at the Institute for Nutrition in Central America and Panama, Guatemala City, October 31, 1984.
- \_\_\_\_\_. "Impact of Consumer-Oriented Food Subsidies on Domestic Agriculture." Presented at the Fourth European Congress of Agricultural Economists, Kiel, September 3-7, 1984.
- Hazell, Peter B. R. "Rural Growth Linkages and Rural Development Strategy." Presented at the Fourth European Congress of Agricultural Economists, Kiel, September 3-7, 1984.

- Koester, Ulrich. "Agricultural Market Intervention and International Trade." Presented at the Fourth European Congress of Agricultural Economists, Kiel, September 3-7, 1984.
- \_\_\_\_\_. "The Common Agricultural Policy of the EC: Causes for Past Bad Performance and Future Prospect." Presented at an International Monetary Fund staff seminar, Washington, D.C., September 19, 1984.
- \_\_\_\_\_. "Experiences of Non-EC Countries with Milk Production Quotas." Presented at the Kieler Hochschultagung, Kiel, October 1984."
- \_\_\_\_\_. "International Aspects of the Common Agricultural Policy of the EC." Memorial lecture presented in honor of Ferdinand Ulmer, Innsbruck, June 1984.
- \_\_\_\_\_. "The Role of CAP in the Process of European Integration." Presented at the workshop on The Reform of the Common Agricultural Policy, Siena, Italy, February 17-18, 1984.
- \_\_\_\_\_. "The Scope for Regional Cooperation in the Food Sector Among Developing Countries." Presented at a seminar of the University of Minnesota, St. Paul, October 4, 1984.
- Kumar, Shubh K. "Differential Control over Consumption and Spending as a Function of Productive Roles." Presented at the workshop on Methods of Measuring Intrahousehold Resource Allocation, Tufts University, Medford, Mass., October 23-26, 1984.
- Mellor, John W. "African Development Bank Lending for Agricultural Development in Africa." Presented at a symposium for the Board of Governors of the African Development Bank, Tunis, May 10, 1984.
- \_\_\_\_\_. "The Changing Role of Developing Nations in Agricultural Trade." Presented at a meeting of the Food and Agriculture Committee of the National Planning Association, Washington, D.C., April 3, 1984.
- \_\_\_\_\_. "The Changing World Food Situation—A CGIAR Perspective." Presented at International Centers Week, World Bank, Washington, D.C., November 7, 1984.
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- Paulino, Leonardo A. "Meat Supply and Demand in Developing Countries." Presented at a conference on Soy Protein and National Food Policy organized by the Ralston-Purina Co., St. Louis, December 17, 1984.
- Petit, Michel. "U.S.-EEC Confrontation in the International Trade of Agricultural Products: Consequences for Third Parties." Presented at a meeting of the Canadian Agricultural Economics and Farm Management Society, Winnipeg, August 1984.
- Pinstrup-Andersen, Per. "Food Prices and the Poor in Developing Countries." Presented at the Fourth European Congress of Agricultural Economists, Kiel, September 3-7, 1984.

- \_\_\_\_\_. "A Methodological Note on the Measurement of the Nutrition Impact of Agricultural Research." Presented at the workshop on Methodological Problems in Measuring Research Impact organized by the Consultative Group on International Agricultural Research, Washington, D.C., April 26-27, 1984.
- \_\_\_\_\_. "A Note on the Assessment of the Potential Impact of Technological Change on Food Consumption and Nutrition." Presented at an internal workshop of international agricultural research centers on Selected Economic Research Issues in Latin America, Centro Internacional de Agricultura Tropical, Cali, Colombia, August 27-29, 1984.
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- Rosegrant, Mark. "Potential Benefits from Improved Water Management Practices and Irrigation System Rehabilitation." Presented at an internal meeting of the Asian Development Bank, Manila, June 1984.
- Rosegrant, Mark. (With Joyotee Smith, Gloria Umali, and Abraham M. Mandac.) "Risk and Fertilizer Use on Rainfed Rice: Bicol, Philippines." Presented at the annual meeting of the American Agricultural Economics Association, Ithaca, N.Y., August 5-8, 1984.
- Sarma, J. S. (With Leonardo A. Paulino.) "Trends in the Production and Utilization of Cassava and Other Selected Food Crops in Tropical Asia." Presented at a workshop on The Future Potential of Cassava in Asia and Research Development Needs organized by the Centro Internacional de Agricultura Tropical and the United Nations Economic and Social Commission for Asia and the Pacific, Bangkok, June 1984.
- Senauer, Ben. "Eating Patterns: An Economic/Nutritional Perspective." Presented at the National Research Council Symposium on What is America Eating, Food and Nutrition Board, Washington, D.C., December 10, 1984.
- \_\_\_\_\_. "Food Program Policy: Discussion." Presented at the Allied Social Science Association Meeting, Dallas, December 28, 1984.
- Stone, Bruce. "Fertilizer Sector Development in China and Bangladesh." Presented at the Food and Agricultural Policy Research Center, Tokyo, December 26, 1984.
- \_\_\_\_\_. "Foodgrain Production, Price Policy and Fertilizer Development in the People's Republic of China." Presented at the Bangladesh Institute of Development Studies, Dhaka, September 1984.
- Valdés, Alberto. "Trade Policy and Incentives for Agriculture in Chile." Presented at the Annual Meeting of Agricultural Associations, sponsored by Sociedad Nacional de Agricultura, Santiago, September 4, 1984.
- Valdés, Alberto. (With Eugenia Muchnik.) "Structure and Trends in Production, Consumption, and Trade of Agricultural Products in Latin America." Presented at the Centro Internacional de Mejoramiento de Maíz y Trigo and Inter-American Development Bank workshop on Research and Agriculture in Latin America, Mexico City, September 10-12, 1984. (In Spanish.)
- Wanmali, Sudhir. "Patterns of Service Use in Asia." Presented at the 13th Annual Conference on South Asia, University of Wisconsin, Madison, November 2-4, 1984.

# PERSONNEL

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# FINANCIAL STATEMENT

## INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

### BALANCE SHEET as at December 31, 1984 and 1983

#### ASSETS

	<u>1984</u>	<u>1983</u>
<b>Current Assets:</b>		
Cash and short-term investments	\$ 329,502	\$581,245
Grants receivable	334,286	29,822
Employee and other receivables	117,586	90,841
Contracts-in-process	445,474	174,273
Prepaid expenses and other current assets	39,880	43,432
	<u>1,266,728</u>	<u>919,613</u>
<b>Property and Equipment:</b>		
Furniture and equipment	285,598	198,217
Leasehold improvements	65,454	34,614
	<u>351,052</u>	<u>232,831</u>
Less - accumulated depreciation and amortization	201,777	161,949
	<u>149,275</u>	<u>70,882</u>
<b>TOTAL ASSETS</b>	<u>\$1,416,003</u>	<u>\$990,495</u>

#### LIABILITIES AND FUND BALANCE

<b>Current Liabilities:</b>		
Accounts payable	\$ 121,629	\$ 97,637
Note payable	320,000	100,000
Current portion of long-term debt	8,819	-0-
Accrued vacations	195,575	161,944
Advance payment of grant funds	75,727	330,000
Unexpended contract funds	329,021	258,513
	<u>1,050,771</u>	<u>948,094</u>
<b>Long-term Debt</b>	<u>47,041</u>	<u>-0-</u>
<b>Fund Balance</b>		
Working capital fund	25,000	-0-
General fund	293,191	42,401
	<u>318,191</u>	<u>42,401</u>
<b>TOTAL LIABILITIES AND FUND BALANCE</b>	<u>\$1,416,003</u>	<u>\$990,495</u>

The accompanying notes are an integral part of these statements.

# INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

## STATEMENT OF REVENUE, EXPENSE, AND FUND BALANCE

For the Years Ended December 31, 1984 and 1983

	<u>1984</u>	<u>1983</u>
<b>Revenue:</b>		
Grant income	\$4,272,751	\$3,400,003
Special project income	1,578,488	1,106,036
Expense reimbursements and other income	231,723	229,090
Investment income	34,549	23,394
	<u>6,117,511</u>	<u>4,758,523</u>
<b>Expenses:</b>		
Personnel	2,653,497	2,440,321
Employee benefits	595,367	575,849
Field and collaborative research	703,773	334,609
Travel	656,867	362,318
Computer services	225,144	269,529
Publications and conferences	283,805	234,341
Trustees' expenses	113,636	66,112
Office operation and administration	569,264	494,345
Depreciation	40,368	33,535
	<u>5,841,721</u>	<u>4,810,959</u>
<b>Excess of Revenue (Expense) Over Expenses (Revenue)</b>	275,790	(52,436)
<b>Fund Balance, Beginning</b>	<u>42,401</u>	<u>94,837</u>
<b>FUND BALANCE, ENDING</b>	<u>\$ 318,191</u>	<u>\$ 42,401</u>

The accompanying notes are an integral part of these statements.

# INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

## STATEMENT OF CHANGES IN FINANCIAL POSITION For the Years Ended December 31, 1984 and 1983

	<u>1984</u>	<u>1983</u>
<b>Funds Provided by (Used in) Operations:</b>		
Excess of revenue (expenses) over expenses (revenue)	\$ 275,790	\$(52,436)
Items not requiring funds:		
Depreciation	40,368	33,535
	<u>316,158</u>	<u>(18,901)</u>
<b>Funds Provided (Used) by Changes in Operating Working Capital (Except Cash and Short-term Investments):</b>		
Grants receivable	(304,464)	(4,135)
Employee and other receivables	(26,745)	(65,239)
Contracts-in-process	(271,201)	(108,209)
Prepaid expenses and other current assets	3,552	847
Accounts payable	23,992	(68,421)
Accrued vacations	33,631	42,316
Advance payment of grant funds	(254,273)	250,000
Unexpended contract funds	70,508	119,478
	<u>(725,000)</u>	<u>166,637</u>
<b>Funds Provided (Used in) Operations</b>	<u>(408,842)</u>	<u>147,736</u>
<b>Funds (Used in) Provided by Investment Transactions:</b>		
Acquisition of property and equipment	(119,301)	(17,042)
Disposals of property and equipment	540	-0-
	<u>(118,761)</u>	<u>(17,042)</u>
<b>Funds (Used in) Provided by Financing Transactions:</b>		
Short-term borrowings (repayments)	220,000	100,000
Long-term borrowings	55,860	-0-
	<u>275,860</u>	<u>100,000</u>
<b>INCREASE (DECREASE) IN CASH AND SHORT-TERM INVESTMENTS</b>	<u><u>\$(251,743)</u></u>	<u><u>\$230,694</u></u>

The accompanying notes are an integral part of these statements.

# INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

## NOTES TO FINANCIAL STATEMENTS December 31, 1984 and 1983

### Note 1. Summary of Significant Accounting Policies

#### Organization

By Executive Order 12359, the Institute is a public international organization entitled to enjoy certain privileges, exemptions and immunities conferred by the International Organizations Immunities Act, including exemption from Federal income tax under Sec. 501(c)(3).

#### Revenue

Grants are recorded as revenue in the period stipulated by the donor. Grants which have been pledged for the current year but not received at year end are recognized as revenue and the related receivables are recorded. Grants received for funding of future periods are recorded as liabilities.

Special project income is recorded as the related costs are incurred. Contracts-in-process represent income which has been earned but for which funds have not yet been received. Unexpended contract funds represent funds received for which costs have not yet been incurred.

Other income is recorded when earned.

#### Property and Equipment

Property and equipment is stated at cost. Depreciation is provided over an estimated useful life of 5 years for furniture and equipment and over the life of the lease for leasehold improvements. Expenditures for additions are capitalized and expenditures for maintenance and repairs are charged to earnings as incurred. When properties are retired or otherwise disposed of, the cost thereof and the related accumulated depreciation are removed from the respective accounts and the resulting gain or loss is reflected in earnings.

### Note 2. Leases

The Institute occupies office space under various leases expiring through 1987. The leases provide for additional rents based on increases in building operating costs and the Consumer Price Index.

Minimum lease payments for all noncancellable operating leases having a remaining term in excess of one year at December 31, 1984, are as follows:

1985	\$171,000
1986	182,000
1987	<u>134,000</u>
	<u>\$487,000</u>

### Note 3. Pensions

The Institute purchases retirement annuity contracts for employees under agreement with the Teachers Insurance and Annuity Association and the College Retirement Equities Fund. The costs were \$307,000 and \$284,000 for 1984 and 1983 respectively.

# INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

## NOTES TO FINANCIAL STATEMENTS December 31, 1984 and 1983 (continued)

### Note 4. Grant Income

Grant income is core program support received from agencies participating in the Consultative Group on International Agricultural Research. Funds were received in 1984 and 1983 as follows:

	1984	1983
January	\$ 222,581	\$ 21,195
February	70,262	312,000
March	503,415	127,090
April	337,390	711,505
May	290,759	273,530
June	439,490	625,845
July	321,558	29,642
August	473,727	496,068
September	264,100	160,000
October	350,700	168,797
November	176,156	148,682
December	263,876	571,514
	<u>3,714,014</u>	<u>3,645,868</u>
Increase (decrease) in grants receivable	304,464	4,135
(Increase) decrease in advance payment of grant funds	<u>254,273</u>	<u>(250,000)</u>
<u>Grant Income</u>	<u>\$4,272,751</u>	<u>\$3,400,003</u>

### Note 5. Note Payable

The note payable at December 31, 1984 is a loan from the World Bank without interest, and is due on or before December 31, 1985.

The note payable at December 31, 1983 was based on a line of credit from the First American Bank of Washington, D.C. The note was unsecured and carried interest at the bank's prime rate plus 1.5%.

### Note 6. Long-term Debt

Installment note, dated December 9, 1984 for \$55,860, due to Eastman Kodak Company in 60 monthly installments of \$1,221, including interest at 11.25% per annum. The Kodak Ektaprint copier serves as the collateral for this note.

Note balance, December 31, 1984	\$55,860
Current portion	<u>8,819</u>
Long-term debt	<u>\$47,041</u>

Future payments of principal are as follows:

1985	\$ 8,819
1986	9,864
1987	11,033
1988	12,340
1989	13,804

**RAYMOND E. LANG & ASSOCIATES, P.A.**  
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March 19, 1985

Officers and Trustees  
International Food Policy Research Institute  
1776 Massachusetts Avenue, NW  
Washington, DC 20036

We have examined the balance sheet of the INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE as at December 31, 1984 and 1983, and the related statements of revenue and expense and changes in financial position for the years then ended. Our examination was made in accordance with generally accepted auditing standards and accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion the financial statements present fairly the financial position of the Institute as at December 31, 1984 and 1983, and the results of its operations and the changes in its financial position for the years then ended in conformity with generally accepted accounting principles applied on a consistent basis.

*Raymond E. Lang & Associates, P.A.*



The International Food Policy Research Institute was established in 1975 to identify and analyze alternative national and international strategies and policies for meeting food needs in the world, with particular emphasis on low-income countries and on the poorer groups in those countries. While the research effort is geared to the precise objective of contributing to the reduction of hunger and malnutrition, the factors involved are many and wide-ranging, requiring analysis of underlying processes and extending beyond a narrowly defined food sector. The Institute's research program reflects worldwide interaction with policymakers, administrators, and others concerned with increasing food production and with improving the equity of its distribution. Research results are published and distributed to officials and others concerned with national and international food and agricultural policy.

IFPRI is now one of 13 nonprofit international research centers supported by the Consultative Group on International Agricultural Research (CGIAR). The CGIAR consists of 40 donor countries, international and regional organizations, and private foundations. IFPRI receives support as a constituent of the CGIAR from a number of donors including the governments of Australia, Brazil, Canada, the People's Republic of China, the Federal Republic of Germany, India, Italy, Japan, the Netherlands, the Philippines, Spain, Switzerland, the United Kingdom, and the United States; the World Bank; the United Nations Development Programme; the Ford Foundation; the International Fund for Agricultural Development; the International Development Research Centre (Canada); and the Rockefeller Foundation. In addition, a number of other governments and institutions contribute funding to special research projects.



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