



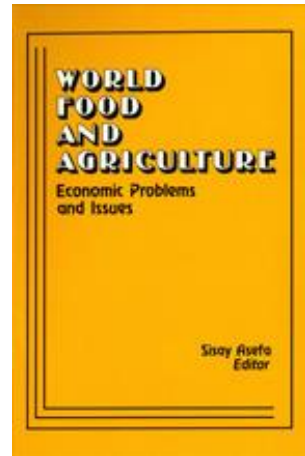
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# United States Agriculture in the Global Context

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# **United States Agriculture in the Global Context**

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United States agriculture is in a global context. On the order of half the farm land in the United States is used to produce for export. Without overseas markets, the amount of adjustment American agriculture would require to bring domestic supply and demand into balance is almost impossible to conceive. That adjustment would involve the movement out of agriculture of about half of the resources of American agricultural production. If comparative advantage was at work without overseas markets, the bulk of farmers would leave agriculture and well over half of all the land which is now in agriculture would convert to other uses. American farmers must think in a global context, must recognize that their future depends on export markets and must recognize where those export markets are. This hardly seemed a problem a decade ago, but it is very much a problem now.

Before I proceed, I would like to state a simple message and a broad thought. We should all be thankful for the bountiful harvests occurring in much of the world. We should be concerned that if we are complacent about those harvests, they will diminish in the future. We should be apprehensive that the extreme complexity of the task of using these bountiful harvests to banish hunger and to bring prosperity to those who produce them will turn us away from the policies needed to sustain and use that abundance.

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## The Current Situation

Today there appears to be an abundance and even a glut of food. In sharp contrast, a little more than a decade ago the World Food Conference was called to recommend immediate action to deal with scarcity and even famine in Asia and Africa. Global cereal stocks in the mid-1980s have been more than twice as large as in the mid-1970s. Real world cereal prices in 1985 were 30 percent lower than in 1981, compared to an almost twofold increase from 1972 to 1974. Real fertilizer prices have fallen to equal the lows of the late 1960s, after having more than quadrupled in real terms from 1971 to 1974. A lack of natural feedstock is now much less worrying than inadequate investment in fertilizer production. The focus of food shortage has switched from Asia to Africa.

In the early 1970s, not only was food scarce, but so were the inputs for producing it. If a low-income country had a crop failure, it was difficult for them to command the foreign exchange to import necessary food, food aid was greatly diminished, and it was difficult to purchase fertilizer on the open market even if the countries had the necessary financial resources. That was an extremely difficult time for all food deficit countries and particularly the low-income ones.

Finally, many developing countries were diverted from long-term development efforts by overwhelming debt problems and the need for major adjustments in foreign exchange rates and their national budgets.<sup>1</sup>

In comparing the 1980s with the 1970s, it is worth making note of the switch in emphasis of food problems from Asia to Africa. In Asia in the late 1960s famine was widespread and the scarcity of food was acute. People like the Paddock brothers, in *Famine 1975*, were writing in favor of triage. The Paddock brothers argued that the food situation was so hopeless in Asia that close to a billion people should be written off as having no hope for survival. Although that idea was foolish even then, it is well to note how bad the situation looked at that time. Africa, however, seemed to be a continent abundant with land and with ample supplies of food.

The Green Revolution in Asia accelerated the rate of growth of food production considerably in the late 1960s and the 1970s. That,

combined with the generally more favorable food situation in the world and growing incomes in many Asian countries—which allow them to increase food imports when in need—has switched the world food problem away from Asia. In Africa, however, per capita food production has been declining rapidly for a decade or two. Per capita consumption has also fallen. That has occurred in the midst of a miserable economic performance in most African countries that has resulted in acute food scarcity even in the face of the present global abundance.

### Underlying Trends

Food production and consumption data for many developing countries are notoriously poor. Thus in examining the data and drawing conclusions about past trends and certainly for extrapolations into the future, one must be cautious. For some commodities, such as cassava in Africa, different sources show trends going in opposite directions, not just differences in magnitude. Thus we will be particularly careful with the root crop data, and we will be careful to deal only with large aggregates, which, one can hope, average out discrepancies in the data.

It is also worth adding that analysis of these trends is useful for getting an indication of the forces affecting supply and demand. Given that these forces tend to be stable and powerful, it gives us a basis for looking into the future. Despite the statistical difficulties, the policy conclusions which follow from the analysis are significant. They, of course, may lead inexorably to policy actions unacceptable to important interest groups. Thus, even analysis of past trends becomes a controversial matter. The facts of the global food situation are as contentious as the extrapolations.

As we discuss these underlying trends, we will see that the dynamic global food supply/demand balance links the interests of developed and developing countries and has important implications for foreign assistance, agricultural research policy, and the domestic agricultural policy of the United States.

For the period 1961-80, developing countries' cereal production grew at an annual rate of 2.9 percent per year; consumption grew at the

considerably faster rate of 3.2 percent per year (table 1).<sup>2</sup> Hence, net annual cereal imports of the developing countries increased more than fourfold in 20 years from about 15 million tons to 64 million tons.<sup>3</sup> These data exclude the People's Republic of China because the extreme variability of production caused by major political events associated with the "Great Leap Forward" and the "Cultural Revolution" grossly distorts trends that include these periods.

**Table 1**  
**Trend Annual Growth Rates of Cereal Consumption**  
**and Production for Developing and Developed Countries**  
**1961-80 and 1961-83**

Country group	1961-80		1961-83	
	Consumption	Production	Consumption	Production
Developing	3.6	3.5	3.6	3.5
(excluding China)	(3.2)	(2.9)	(3.3)	(2.9)
Developed	2.5	3.1	2.2	2.8

SOURCE: FAO, "Production Yearbook Tape, 1984," and "Agricultural Supply Utilization Accounts Tapes, 1984" (Rome 1985).

Cereal imports to developing countries grew slowly in the 1960s and then accelerated sharply after 1972, with that accelerated growth showing no sign of decline through 1984 (table 2).<sup>4</sup> Developing countries increased their share of total world imports of cereals from a 1961-63 average of 36 percent to a 1981-83 average of 43 percent—an absolute increase of 315 percent (table 3). The developing countries represent the only cereal market capable of rapid growth.

**Table 2**  
**Growth Rates and Relative Shares in Cereal Trade**  
**1961 to 1983**

Country group	Average annual growth rate*			Relative shares		
	1961-83	1961-72	1972-83	1961-65	1970-74	1981-83
	(percent)			(percent)		
<b>Imports</b>						
Developing	6.0	3.0	8.1	36	35	43
Developed	4.6	4.0	3.3	64	65	57
<b>Exports</b>						
Developing	3.4	2.7	6.2	19	15	15
Developed	5.5	3.9	4.8	81	85	85

\*Based on trended FAO data.

**Table 3**  
**Distribution of World Cereal Imports by Country Groupings**  
**1961-63 and 1981-83**

Country group	1961-63		1981-83	
	Million metric tons	Percent	Million metric tons	Percent
Developed countries	54.9	64	130.8	57
Developing countries	30.9	36	97.5	43
All countries	85.8	100	228.3	100

SOURCE: FAO, "Agricultural Supply Utilization Accounts Tape, 1984" (Rome 1985).

From 1961 to 1980, cereal production in the developed countries grew 3.1 percent per year. Consumption grew at a much slower pace, 2.5 percent per year, with the difference representing a rapidly growing exportable surplus.<sup>5</sup> Developed country imports and exports dropped sharply from 1981 to 1984, with a substantial recovery in 1985.<sup>6</sup>

### **The Future: Projections to 2000**

Projections of past trends for food supply and demand, though an uncertain indicator of the future, have three features that recommend them: they smooth the effects of short-term influences such as weather; they illuminate the effects of cumulative forces; and they show potential changes in a country's position from net importer to net exporter and vice versa, arising from given supply and demand changes. Such projections are particularly revealing for food, for which underlying structural forces of supply and demand only change slowly.

A standard projection from 1980 to 2000 for developing countries, assuming that trends in output and income from the 1960s to 1980s continue, shows an increase in the shortfall (or imports) of staple food crops of 40 million tons. Actual net imports in 1984 were on the projected trend line.<sup>7</sup>

Growth in the demand for livestock products is an important source of growth in the demand for basic food staples. While in developing countries waste and by-products initially sustain livestock production, accelerated growth of livestock output quickly surpasses the inelastic supply of such feed. Further increments to production are made largely on concentrate feeds, particularly cereals. The projections cited above assume constant feeding rates in livestock production.

If, however, we project the trend growth of feed use during the base period and further assume market relationships for livestock products at constant relative prices, the production shortfall in developing countries increases by another 40 million tons.<sup>8</sup> It must be emphasized that this projection of feed use requires a return to the per capita income growth of the 1966-80 period. The debt and structural adjustment crises must be met and passed beyond.

Developing countries have been expanding livestock product imports rapidly. Since livestock production is generally labor intensive, it is logical for developing countries to displace projected imports with domestic production. Success in such an effort would, conservatively, add another 40 million tons to food crop imports.

These favorable circumstances in essence mean that developing countries would improve their development strategy and return to the growth

rates of the 1960s and 1970s. If they did this, developing country imports would grow at a rate similar to or higher than in the past two decades.

Three caveats must be noted about such projections. First, one must take these numbers in aggregated form and not look at individual countries. That is because so many of the unpredictable events in the world benefit some countries and not others. For example, in the 1970s growth in most of the oil-producing countries surged ahead, it is said, at the expense of many oil-importing developing countries; perhaps the reverse will happen in the 1990s. Countries differ in their natural resource bases: Argentina and Thailand have very different ratios of people to agricultural production resources from Taiwan or Bangladesh. On all these matters, grouping countries helps us see central tendencies—at times we do want to see the forest and not the trees.

Second, and very important, when we look at food gaps and trade figures, we are looking at small residuals from large estimates of consumption and production—small differences in production and consumption data give large differences in “trade.” It is rash indeed to predict trade volumes and their effects on global prices.

Third, we are poorly placed to judge the effects of pure science breakthroughs in biology on agricultural production. Keep in mind that while such breakthroughs add to demand as well as supply in developing countries, they add only to supply in developed countries.

## Theory

Before drawing conclusions, it is useful to briefly outline the theory that lies behind the trends and relationships just presented, a theory that gives credibility to such projections. I abstract grossly for brevity.<sup>9</sup>

In developed countries, food demand is virtually satiated and hence does not increase with income. In contrast, food output grows continuously through research and various complementary institutions. Without export growth, the benefit of technological change can only be realized by undertaking the socially difficult task of rapidly withdrawing resources (land and people) from agriculture.



In sharp contrast, in developing countries, the rising incomes of low-income people, derived from employment growth, are converted by remarkably high demand elasticities into effective demand for food—60 to 80 percent of incremental incomes are so spent. Thus in developing countries, increased food supplies and increased employment are two sides of the same coin; one cannot proceed long without the other.

Furthermore, accelerated growth of food production can set in motion powerful multiplier forces on the growth of income and, especially, employment in other sectors. That, coupled with growth arising autonomously in the other sectors, results in the picture of fast growth in basic food staples production accompanied by even faster growth in consumption.

These relationships make reasonable the remarkable finding that from the early 1960s to the late 1970s, the 29 developing countries with the fastest growth rates in basic food staple production increased their imports of basic food staples by 360 percent in the same period.<sup>10</sup> This potential for developing countries to expand demand for food faster than even high rates of growth of food production needs to be understood and nurtured. It offers exciting prospects for the reduction of poverty and malnourishment.

### **Implications: Developed Countries**

The credibility of projections for developed countries is reduced by the large year-to-year fluctuations in food production. However, a simple projection to the year 2000 of domestic use and production for the period 1961-80 shows an exportable surplus from developed countries more than double the largest projection for developing country net imports.<sup>11</sup> These estimates assume no diminution of growth rates for livestock feed in the Soviet Bloc from the high rates of 1961-80. Such estimates confirm the need for a large reduction in developed country agricultural production.

These estimates are extraordinarily fragile. If, for example, the production growth rate in developed countries were to drop to equal rate of 1972-83 and consumption growth rates were maintained, then the

developed countries would actually become net importers.<sup>12</sup> Unfortunately, while prediction of developed country exports is highly uncertain, it matters immensely to the choice of development strategy in developing countries.

Since the production trends in developed countries are very much subject to policy, it is well to keep in mind the following points.

First, developing countries as a group will prosper more if they do not face rapidly rising food prices driven by their own demand. Conversely, they will be harmed by intermittent dumping on international markets and the consequent unpredictable periods of sharply depressed prices.

Second, demand is much more responsive to price in developing countries than in developed countries, while supply is more responsive in developed countries than developing countries. Thus, rising global food prices foster surpluses in developed countries and reduce demand in developing countries, primarily through effects on the poor.

Third, however, the pace at which export surpluses are generated in developed countries now appears to be rapid enough to depress international prices severely, suggesting a need for structural adjustments in developed countries despite the rapidly growing Third World market.

Fourth, given the social costs in developed countries of drastically reduced food production and the potential to raise food demand in developing countries through food aid-based employment growth, it is logical to develop such programs on a much larger scale than at present.

### **Implications: Developing Country Exporters**

There are now few developing country net exporters of cereals. Two countries, Argentina and Thailand, with their favorable land-to-person ratios, accounted for 68 percent of total developing country cereal exports in 1979-83 and will export considerably larger amounts by 2000.<sup>13</sup> There are probably one or two other developing countries with similar land resources and export potential but with unfavorable policies that hold back their agricultural potentials. These few countries are severely injured by food dumping by high-income countries.

It is important for American farmers to recognize that while their markets lie in developing countries, there are very few developing countries that have a potential to be major exporters. They have in the past supplied about a quarter of the increment to developing country commercial food imports; three-quarters has been left for the developed countries, including the United States.

In sharp contrast to Thailand and Argentina, the bulk of the countries projected to export food in the future are poor countries with high-population pressure. That is a quite different story.

In projections to 2000, countries with per capita incomes less than \$500, strikingly, provide 83 percent of developing country net exports of major staple foods other than those of Thailand and Argentina. In particular, four countries—China, India, Indonesia, and Pakistan—account for 71 percent of projected developing country net exports, excluding Argentina and Thailand (table 4).<sup>14</sup>

**Table 4**  
**Relative Shares of Projected Developing Country Net Production Surpluses**  
**by Level of Per Capita GNP (1980), 2000**

Projected net surplus countries by level of per capita GNP 1980	Net production surplus 2000		Percentage of total production 2000 (Percent)
	(Million metric tons)	(Percent)	
Less than \$500	50.1	43	61
(China, India, Indonesia, Pakistan)	(42.9)	(37)	(58)
Greater than \$500	66.3	57	11
(Argentina, Thailand)	(56.2)	(48)	(6)

SOURCE: Data set used in preparing IFPRI Research Report 52, *Food Trends in the Third World: Past Trends and Projections to 2000*. Projections based on FAO "Production" and "Agricultural Supply Utilization Accounts" tapes according to methodology described in Appendix 1 of Research Report.

Exports of food clearly represent a failure in employment generation and poverty alleviation for countries with per capita incomes less than \$500. Half or more of their populations are deficient in food intake. The countries in the low-income group projected to become exporters tend to be large and populous, to have a substantial percentage of their total GNP in nonagricultural sectors, but a large percentage of total labor force in agriculture—the former typically twice the latter.<sup>15</sup> Their low per capita GNPs are, in general, increasing slowly. These characteristics suggest that they have capital-intensive investment policies causing low growth in employment, to the detriment of their low-income people. A change in investment strategy would foster faster and more equitable growth, accelerate the food production growth rate and change these countries from food exporters to food importers.

We now see an interesting question. Is the tendency of some low-income countries with large, hungry populations to export a result of bad policy or is it a passing structural problem? One could argue that since the problem is concentrated in the under \$500 per capita income countries, and seems to resolve itself when income exceeds that level, that we should just wait. But there are difficulties in getting a country well enough organized so that the small and medium scale service and manufacturing sectors, which are so employment intensive, can expand rapidly. The argument would run that as the development process proceeds, the infrastructure is built, the trained personnel are developed, and the institutional structures necessary for rapid growth in employment are created. The lower-income countries simply have not yet finished these complex tasks, but they will.

Alternatively, one might argue that countries such as Indonesia, India, Pakistan and the People's Republic of China, the principal countries in this category projected to have large exports despite widespread hunger, have simply followed wrong development policies, that they have concentrated their capital on a few, large-scale, highly capital-intensive industries that create little employment. This leaves little capital to spread over most of their population, meaning that activities that are employment-intensive are starved for capital. In this argument, a change in the policies these countries have for prices, the allocation of capital,

and public sector investment would bring about much more rapid growth in employment and the demand for food. Those countries would then cease to be exporters and would move on to the import market as do so many other developing countries with a similar economic situation. I will return to this issue later under the question of policy for foreign assistance and for American agriculture.

### **Implications: Developing Country Importers**

It is notable that, virtually without exception, developing countries with per capita incomes greater than \$500 are able to generate demand for food more rapidly than domestic production growth. Developing country importers with per capita incomes less than \$500 also manage to increase employment and hence effective demand more rapidly than production. Of course the least developed countries with the lowest incomes simply have low growth rates in food production. They are able to use foreign assistance and food aid to keep consumption somewhat higher than would otherwise be possible.

The number one policy need for net food importing countries is an international environment in which food supplies are reliable. If they are to expand employment more rapidly than food production, they must believe, first, that the shortfalls generated by these divergent trends can be met without steadily rising prices. That means there must be a reliable international market. Second, and perhaps even more important, they need to be protected from radical fluctuations in domestic and international supplies. For the latter, one needs a source of international finance such as a well-operating International Monetary Fund cereal facility. Whether enlarged stocks are needed as well is a moot point.

In order for employment growth to increase demand for food more rapidly than domestic supply, there must be wide participation in the development process. This, in turn, requires a rural infrastructure that brings most people into close contact with the improved markets and technology necessary for the modernization of agriculture. There is also a need for the development of employment linkages between agriculture

and the rest of the economy so that growing agricultural incomes will produce expenditure patterns and responses to those patterns favorable to the growth of rural industry and employment. Agricultural growth through cost-decreasing technological change is the basic engine for such growth.

### **A Note on Foreign Assistance Policy**

Foreign assistance policies that support a strategy of growth oriented toward increasing agricultural production and employment are favorable both to growth and to poverty alleviation in developing countries and to increased markets for food exporters. What are the broad policy outlines of such a strategy?

First and foremost is investment in agricultural research and its support services to start the engine of growth. Agriculture is a difficult sector to move because of the constraints on the land area. Thus the growth of agricultural production is subject to rapidly diminishing returns and hence increasing cost unless agricultural research is performed, as has been so dramatically successful in the United States, effectively so as to come up with new technologies that increase yields per acre. Those same technologies, which are essential in land-limited Asia, also raise labor productivity under the conditions in Africa where labor productivity is a more serious problem than land productivity.

Second is assistance to growth of infrastructure to ensure breadth of participation in growth. In a world of food surpluses, hungry people, and inadequate rural employment, investment in infrastructure offers immense potential for the effective use of food aid, particularly in the low-income countries. It is puzzling that hunger and lack of labor for building infrastructure, can coexist with huge food surpluses.

Third is increasing food security nationally and internationally. That is needed because a strategy relying on food and employment growth is terribly vulnerable to the effects of normal fluctuations in food production.

Behind all these processes is a rapid expansion of trained people—a high-employment strategy of growth is accompanied by extraordinarily rapid growth in demand for educated people at all levels. Foreign assistance is most effective when helping meet that demand.

### **Agricultural Research Policy**

.I want to comment specifically on agricultural research policy for developing countries in the current global food context because of the central role of research to agricultural progress. The onset of the Green Revolution in Asia was very much a product of American foreign assistance, in part from the foundations, particularly the Rockefeller Foundation and the Ford Foundation, and in part from U.S. government foreign assistance. Assistance to agricultural research development in Asia, and now in Africa, continues to be an important element of foreign assistance.

At the same time that agricultural research forms such an important element of foreign assistance, we find farmers in the United States who are concerned at loss of export markets, wondering whether helping developing countries to do agricultural research that brings about increased production is going to provide competition in the domestic markets of those countries and even from exports. As we can see from a few countries such as Argentina and Thailand, and looking into the future, even more from some of the poorer countries, that is a legitimate concern. I have tried to emphasize how foreign assistance may be constructive in helping demand to increase more rapidly than the supply of food in the low-income countries characterized by great poverty, shortage of food, and malnutrition.

The new environment of apparent global abundance of food brings somewhat differing requirements for food production research.

First, there must be an even greater emphasis than in the past on reducing the costs of production and hence raising incomes. In Asia, cost reductions occur by raising yields per acre. In Africa, the problem is

more complex. Labor productivity is the greatest limitation to production in Africa. We can already substantiate that, in general, the appropriate way to raise labor productivity in Africa is through yield-increasing technology.

In Asia, since the International Rice Research Institute's pioneering work, which generated the variety IR8, we have not seen a major increase in rice yield potential or reduction in the cost of producing rice. In fact, the real cost of production has been slowly rising over the past decade. Recent efforts have been dedicated largely to maintaining the yields produced by IR8 and widening the benefits of such varieties by increasing their adaptability and improving their resistance to diseases and pests. In this context, one can truly talk about saturation of the rice area with these high-yielding varieties. How will the growth rates of the recent past be maintained into the next decade or so? That is a serious problem in Asia. Our impression of food abundance will disappear within a decade or two without another research breakthrough.

Second, with a more bountiful food supply in the world, we have the opportunity to take more meaningful steps towards sustainable growth in agriculture. On the one hand, we must increasingly shift higher-yielding, more productive farming systems into environments whose ecosystems can sustain such increased intensity. That should allow a gradual increase in the proportion of population in areas more able to sustain it, while reducing population pressures in areas that cannot sustain arable agriculture. We must ask ourselves what the implications are of this to two related research questions: (1) Under what circumstances and by what mechanisms can we use the increased abundance of food in the world to reduce population pressures more rapidly in areas that cannot support arable agriculture? (2) Should that then push our research resources more towards the perennial grasses and tree crops that can be sustained in such areas?

Third, when the abundance of food increases, we must maximize the linkages between agricultural growth and employment growth in nonagricultural sectors. That too requires research. Increasingly, lack of effective demand for food is proving to be a constraint for developing countries with per capita incomes less than \$500, in spite of



progress in agricultural production. We have done a good job of documenting the existence of linkages between agricultural growth and employment in other sectors, but we have not gone far in producing the policy prescriptions for maximizing the size of those linkages.

Fourth, where food is more abundant, we can turn more vigorously to increasing employment by developing smallholder livestock production. Here we face elastic demand for the product and hence a substantial increase in demand from a small decline in prices. There are, however, clear technical problems, not only in production but also in marketing. Because of the inelasticity of waste and by-product feed supplies, research must have a twofold emphasis on increasing the productivity of grasslands and improving our knowledge about the productive use of concentrate feeds. Any enhancement of livestock production will also help to solve the difficult problem of inferior grains, such as millets and sorghums, and even maize. They are well-suited to large areas and there are good possibilities for increasing their yields. Yet the demand for them is highly inelastic except as livestock feed.

Fifth, with an increasing abundance of food, we need to focus our attention more on the problems of the poorest countries and the poorest people within those countries. However, these two sets of problems call for different treatment.

There undoubtedly needs to be an emphasis on the better areas within the poorest countries in order to increase the returns to investment in agriculture and to generate the funds for tackling the much more difficult problems of the more backward areas.

We must differentiate clearly between short-term needs to mitigate the problems of the poorest people in the poorest regions, and longer-term adjustments that can be made as population densities in those areas are gradually reduced through more intensive and sustainable development elsewhere.

## Conclusion

Two things seem clear from the foregoing analysis, the first somewhat more than the second. The future of American agriculture lies with the

development of developing countries. They must raise their incomes, not just generally but among the lower-income half of their population specifically, so that those people have the purchasing power to increase their expenditures on food and to improve their diets. Thus it is in the interest of American agriculture to see development move quickly in developing countries. Because those countries are largely agricultural, that can only happen by developing their agriculture. Because they have either a shortage of land or extremely low labor productivity, incomes in agriculture can only be increased through research-based technological advance. Thus we find the anomalous situation that it is good for American agriculture to vigorously support agricultural research in developing countries so that they can increase the productivity of their agriculture. That proves not to be an anomaly because, as incomes in those countries rise, people spend a high percentage of their increased income on food. That is in sharp contrast to the developed countries where rising incomes of even quite low-income people essentially do not increase demand for food.

The second conclusion is that, at their rate of growth of food production over the last two decades, the developed countries will produce far more than is necessary to meet the import needs of developing countries. Thus there will undoubtedly have to be structural adjustment in the agricultures of the developed countries. This is not just the United States and Canada, but also Western Europe. That structural adjustment need not necessarily come from reduced prices, but our experience is that without lower prices the fiscal cost to governments is far more than they are willing to bear for long, although one cannot help but note that the willingness to bear high fiscal costs to support agriculture seems to be quite great. In both Western Europe and the United States, we are shouldering subsidies to agriculture that are multiples of what was thought the largest possible a decade or so ago.

If we put the first point and the second point together, we have a caveat: that if we expect developing countries to emphasize both increasing their demand for food and increasing production of food in their countries, we are asking them to throw themselves open to the vagaries of weather to a much larger extent than with alternative strategies. If they are to do that, they will want to believe and will want to know that food security

is assured to them. That can be done through the financing facilities of the International Monetary Fund so that poor people in poor countries can bid food away from livestock during periods of scarcity. It also means that the developed countries, while making adjustments to their agricultures, must be careful not to go too far and bring back the food scarcities of the 1970s.

Let us hope that the present abundance of food is not an illusion or a quickly passing aberration. Let us recognize abundance for the blessing it is. Let us respond by raising incomes in developing countries with new, cost-effective food production technology; by using food surpluses to back labor-intensive investment in the infrastructure that so broadens participation in growth; by providing food security measures that reduce the risks governments face; by caring about poverty and acting to reduce it; and most important, by learning now how to bring the lower-income countries to the stage of development where effective demand for food outruns effective agricultural development policies.

## NOTES

1. As cited in "Commentary: The Changing Global Food Scene—Opportunities for Development and Poverty Alleviation," *IFPRI Report*, Vol. 8 (3) (Washington, D.C.: International Food Policy Research Institute, October 1986).
2. Food and Agriculture Organization of the United Nations, "Production Yearbook Tape, 1984" and "Agricultural Supply Utilization Accounts Tape, 1984" (Rome: FAO, 1985).
3. Food and Agriculture Organization of the United Nations, "Agricultural Supply Utilization Accounts Tape, 1984" (Rome: FAO, 1985). "Developing Countries" includes China, the twenty-year period referring to 1961-65 to 1979-83 averages of net annual cereal imports.
4. Food and Agriculture Organization of the United Nations, "Agricultural Supply Utilization Accounts Tape, 1984" (Rome: FAO, 1985). The annual growth rate of cereal imports to developing countries changed from 3.0 percent (1961-72) to 8.1 percent (1972-83).
5. Food and Agriculture Organization of the United Nations, "Production Yearbook Tape, 1984" and "Agricultural Supply Utilization Accounts Tape, 1984" (Rome: FAO, 1985).
6. Food and Agriculture Organization of the United Nations, "Agricultural Supply Utilization Accounts Tape, 1984" (Rome: FAO, 1985).
7. As cited in L.A. Paulino, *Food in the Third World: Past Trends and Projections to 2000*, Research Report 52 (Washington, D.C.: International Food Policy Research Institute, 1986), Table 12, p. 42. The projection excludes China, and assumes trend growth in production (1961-80) and consumption (based on per capita income growth trends 1966-80 and FAO elasticities for food and meat consumption).

8. Paulino, *Food in the Third World*, Table 15, p. 62.

9. This argument is developed fully in John W. Mellor and B.F. Johnston, "The World Food Equation: Interrelations Among Development, Employment, and Food Consumption," *Journal of Economic Literature*, 22 (June 1984).

10. Twenty-nine rapid agricultural growth developing countries increased their food imports from 2.37 (1966-70) to 8.57 (1976-80) million metric tons, an increase of almost fourfold.

11. Projections were done for developed countries as a group and compared production and total domestic use by a methodology similar to but simpler than that of Paulino—i.e., based on not income elasticities of demand but trend consumption patterns. Feed was projected on a trend; food was projected to remain constant at 1966-80 per capita consumption levels times the expected increased population.

Different base years chosen for production yielded varied outcomes, ranging from a high net surplus of production of 400 million metric tons (1961-80) production trend to a low net deficit of production of 57 million metric tons (1972-83) production trend. When developed countries were projected by regional groupings, the net surplus was 136 million metric tons, reflecting a high rate of feed consumption in Eastern European countries.

12. See footnote 11.

13. Food and Agriculture Organization of the United Nations, "Production Yearbook Tape, 1984," and "Agricultural Supply Utilization Accounts Tape, 1984"; (Rome: FAO, 1985), and projections in Paulino, Research Report 52. Argentina is a net exporter of 17 million metric tons and Thailand of 6 million metric tons (1979-83 averages), and they are projected to have net surpluses of 26 and 30 million metric tons respectively, in 2000, or 50 percent of the total projected net surplus.

14. From data set on individual countries used in Paulina, *Food in the Third World*. Assumptions of projections are the same as described in footnote 7.

15. Data from World Bank, *World Tables*, Volumes 1 and 2 (1983).

### Additional Readings and References

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