

The Emerging Policy, Production, Consumption Scenario***Stanley R. Johnson******1. Introduction**

United States development assistance policy is in a process of change. Factors responsible include the international financial reform, updated information on the status of disadvantaged populations, differing perceptions of the economic development process, patterns of technology change and adoption and, as well, the successes of the countries assisted by the United States and other donors in improving their health, nutrition, and income status. Of course, U.S. development assistance will always be influenced by catastrophic situations, unexpected events, and changes in political priorities. However, the anticipated situation for the targeted countries plays a major role in directing the U.S. development assistance program.

The purpose of this review is to provide information that may be useful in assessing the circumstances in which those responsible for U.S. development assistance programs will be establishing priorities. For convenience, this scenario has been dimensioned by policy, production, and consumption. The organization of the review is perhaps a function of the fact that over the past 20 years world agriculture has been on something of a roller coaster ride. Shortages, access, international price variability, and changing production technologies have contributed to a difficult planning environment for developing countries and the donors.

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Policy has been explicitly addressed in the scenario for three reasons. First, it is increasingly recognized that the roller coaster ride in agricultural production, consumption, and prices during the past 20 years has been in one way or another largely due to agricultural policy and policies influencing factors that condition agriculture. Second, with the GATT round and international financial reform ~~are~~ policies likely to bring domestic and international prices more in line for the developing countries. Third, there is fuller recognition of the importance of domestic agricultural policies of the European Community, the United States, and other major exporters for the international prices of food commodities and, as well, the traditional export crops for the developing countries.

The discussion scenario is organized to first review longer term factors conditioning policies, production, and consumption trends. The recent experience for agriculture in developed and developing countries should be viewed relative to these longer term trends. The record of modern development assistance policy is strewn with failures based on myopic assessments. Then, for the nearer term, the three areas, agricultural and food consumption policies, production, and consumption are assessed. From these assessments a most likely or emerging scenario is advanced. Finally, concerns relative to major sources of uncertainty for the emerging scenario and a few speculations on implications for U.S. development assistance are offered.

2. Longer Term Trends

Perhaps the most striking feature of the statistics on longer term trends in world markets is the secular decline in real prices of major

agricultural commodities. Figure 1 (to the left of the broken line), which contains an historical record of U.S. gulf port prices for soybeans, wheat, and corn, is indicative of this decline. Real prices of these commodities in 1986 were on the order of one-third of their levels in the early 1970s. It is difficult to argue that this trend will be reversed.

Implications of the trend for developing countries are double-edged. Declining real prices of agricultural commodities reflect technological change and policies that have promoted increased output and efficiency in production agriculture. Alternatively, for developing countries with large shares of their populations in agriculture, it is not likely that incomes will rise due to increases in real prices of primary agricultural commodities. Real income growth must come from other industries or sources.

Production, consumption, and stock levels for wheat and coarse grains are summarized (historically to the left of the broken line) in Figures 2, 3, and 4. Two factors are significant from these long term views. First, production and consumption are trending upward but at relatively modest rates. The dotted lines in the figures on production and consumption are based on compound rates of growth of 2 percent in Figures 2 and 3. Second, historical world stock levels for these major commodities have been 10-15 percent of consumption. In the recent past, these stock levels have been relatively high, 25-30 percent of consumption. However, from the normal ratio of stocks to consumption it is clear that variations in production due to policy and weather have the potential for exciting prices in international markets where price and income elasticities of demand are low.

Key factors which underlie the results provided in Figures 1 to 4 are resource endowments, technology, population, and policies external to the agricultural sector. Longer term trends and associated issues in these four areas are discussed below, albeit briefly. The objective is to abstract from the recent experience with agricultural and food production systems and assess their secular implications for positioning future U.S. development assistance.

Technology

A number of studies have documented the importance of the green revolution to food production and consumption in developing countries (e.g., Mellor and Johnston 1984; Paulino and Mellor 1984; Paulino 1986; Parikh and Timms 1986; World Bank 1986). The evidence of technical change in the developed economies has been equally impressive. Yield level increases in the range of 1 to 1.5 percent per year are commonly estimated for major crops in developed economies (RCA 1987). But, for the developing economies that have even higher yield growth rates due to adopting existing technologies for the higher yielding crops, there is a potential problem. For countries like Indonesia which reached self-sufficiency in rice production in 1985, it appears unlikely that the reservoir of new technologies for increasing agricultural productivity may be more limited in the future. Investments in technologies for food and export crops that are more country-specific may be required for sustaining productivity trends similar to those in the developed economies (Roundtable 1988). It is likely that trends for future technical change in agriculture for developing and developed countries will be more similar. Productivity increases induced by change in policy and institutional structure are, however, quite possible in many developing countries.

Population

Food demand in developing economies is conditioned largely by population and income change. For example, analytical models can be constructed which explain demand in world markets for soybean, wheat, and feed grains using only income and population growth (Devadoss et al. 1986; Meyers et al. 1986). Income is the major link to the macroeconomic policy as it influences food consumption patterns and agricultural production (Mellor and Johnson 1984; Bahrenian et al. 1986). Population growth in developing countries has been highly impacted by policies of donor agencies and changing social priorities. But, policy changes, improvements in contraceptive technology, and the adaptiveness of countries in adjusting rates of population growth will continue to be important in the equation balancing food consumption and production (Marks and Yetley 1987; Rossmiller and Tutwiler 1987). Rates of population growth in the range of 2 percent for developed countries and 2.5 to 3 percent for developing countries seem likely based on projections of the past (Figure 5).

Resources

There may be the most uncertainty about resource trends. A number of studies have been developed recently indicating that some of the increases in production of food and agricultural commodities particularly in developing countries, have occurred at the expense of the natural resource environment (Bachman and Paulino 1979; World Economic Survey 1986; Repetto 1987). In effect, the countries are argued to be exploiting their nonrenewable resources to achieve rapid increases in production. The result may be a rate of growth in production that cannot be sustained over the longer term. Productivity studies in the United States conducted

under the Resource Conservation Act analysis and incorporating estimates of technology and the importance of, for example, soil loss on productivity suggest that these concerns about the soil resources may not be well founded (RCA 1986). However, in tropical environments where many of the developing countries are located, the soils are considerably more frail than in the United States (Repetto 1987).

In addition to soil erosion, there are other natural resource problems related to current agricultural technologies. These involve largely off-site damages attributable to agricultural chemicals. The increased ability to detect the fate of agricultural chemicals and increasing information about the health risks associated with the chemical residuals from agricultural production point to potential future problems (Johnson 1986; Wolcott et al. 1988). These problems are particularly worrisome since the rapid gains in agricultural production experienced during the green revolution are a result of improvements in plant genetics and, as importantly, packaging of production methods that utilizes techniques highly dependent on agricultural chemicals (see nitrogen demand projection in Figure 6).

External Policies

Policies external to agriculture have obvious impacts on food consumption patterns, hunger, and agricultural production and distribution systems. The most direct link relative to longer term issues is through the interaction of these external policies with agricultural policies in determining income levels for developing countries (Lee and Shane 1985; Paarlberg 1986; Mitchell 1987; Langley et al. 1987). However, there are nonagricultural policies affecting international market prices that

deserve special attention. It is unlikely due to international monetary reform that the developing countries in the coming policy arena will be able to protect differences between domestic and international prices of staples as in the past. Major adjustments in food and agricultural policy may be required for countries bringing world and domestic prices in line. Also, many of the export crops of developing countries are governed by international marketing arrangements. These price stabilizing arrangements are also threatened by the movement on a worldwide basis to policies that involve less market distortion.

3. Agricultural Policy

Even for the nearer term, the aspects of agricultural policy most likely to affect the developing countries are largely external. Clearly, developing countries will change their domestic agricultural and food production policies. However, these policies will most likely be changed in response to external initiatives. In particular, the developing countries are generally small agents in the international commodity markets. But, domestic agricultural policy changes of major trading countries that affect these international markets have far reaching impacts for the developing countries. The three policies identified for comment are the GATT round, the domestic agricultural policies of developed countries that are major participants in international commodity agricultural markets, and financial reform.

GATT Round

A major feature of the proposals that have been tabled for the multi-lateral code to be developed in this GATT round is the idea of decoupling. Agriculture is included as was agreed in Punta del Este (GATT 1986;

Hathaway 1987). Currently, a number of analytical exercises are under way calculating developing proxy measures for the distortions implied by current agricultural policies of the GATT round participants. Many developed countries like less developed countries have elected to make income transfers to rural populations and/or other groups associated with the agricultural and food production systems through price distortions.

These price distorting instruments are surprisingly efficient when the deadweight welfare losses and the amount of income transferred are compared (Choi and Johnson 1988). But, these efficiency calculations are on a single market basis. The initiatives are for the countries bound by the GATT code to modify domestic agricultural policies so that they are more decoupled. Then, the associated income transfers will be more neutral for production, trade, and consumption. Currently, the calculations being made to index these distortions are broadscoped, including such things as research and development for agriculture, rural development, farm financial services, etc. (Miner 1988). However, realistically it would appear that only policies more directly related to production, consumption, and trade will be encompassed by the GATT agreement, e.g., price supports, export assistance, price stabilization, etc. (Miner 1988).

The GATT round will be concluded in approximately four years. If the decoupling policies or anything like the proposals tabled by the United States and participants with similar views are adopted, significant modifications in international agricultural markets and food production and distribution systems will be likely (Hathaway 1987). A general conclusion of most of the "free trade" studies that have been undertaken

is that prices of major food grains and oilseeds will increase if the subsidies to agriculture, particularly in the developed countries, are decoupled (e.g., Meyers et al. 1987).

Financial Reform

The debt situation and the financial reforms that have been adopted as a result of this debt situation are most influential factors for domestic agriculture and food policies of developing countries (Bretton Woods 1986; Rosensweig et al. 1986; Wharton 1987). Strong pressures are being applied to realign currencies, reduce government budget outlays and, more generally, bring these economies into a position that can assure the payment of debts and as well continued international investment, private and public. An interesting consequence of this restructuring is that the flow of funds from the developed to the developing countries has been reversed. World Bank figures summarizing this reversal in the flow of funds between the developed and developing countries are shown in Table 1.

Large Exporter Domestic Policies

The Food Security Act of 1985 and the CAP for the EC are two policies that have and are having major impacts on international markets in which developing economies participate. The Food Security Act of 1985 resulted in the moving of large stocks of U.S. agricultural commodities on world markets, significantly depressing prices. Developing countries which had been concerned about food security and participation in international markets with high food prices were suddenly faced with external prices for major food commodities that were considerably lower than projected based on European Community and United States policy to 1985.

Depressed international prices of major agricultural commodities during the past two years have caused a number of these countries who had embarked on food security policies to reconsider their priorities (Roundtable 1988). The result of these aggressive export policies by the United States has been a significant decrease in stocks. In fact, these stocks are now down to "through put levels" for many of the major agricultural commodities, implying intermediate term price strength. An additional major area of policy uncertainty involves the planned economies. Agricultural reform in the Soviet Union and developments in China have and will perhaps continue to influence international commodity markets.

4. Production

For the intermediate term scenario, production can be viewed as driven by technology, resources, and policy. In the emerging scenario, Section 6, the implicit assumption is that production levels in the near term, 5 to 10 years, will be driven primarily by policy. Trend yield levels are used in the analysis. Rates of growth in production are, as indicated in Section 2, on the order of 1 to 2 percent. Thus, for technology of the scenario is essentially more of the same. That is, in the emerging scenario technology is assumed to continue to develop and be adapted at rates similar to those experienced by the developed countries during the past 15 years.

For natural resources, the situation is highly uncertain. In the United States, for example, natural resource driven policies will have idled 45 million cropland acres by 1990. If the U.S. situation is indicative of that in other major exporting countries, concerns about natural resources may begin to have increasing impacts on domestic production

levels and prices. Unfortunately, these policies are difficult to predict. Rapid changes could occur on the basis of relatively limited new information on the environmental consequences of current agricultural production systems.

Large amounts of land are idle in many of the major producing countries. These idle lands are a result of either supply control policy or "abnormally low" policy induced prices. A conclusion to be drawn is that without the current policies of the developed countries that are major agricultural export market participants, significant adjustments in production levels would occur by region of the world. Since the United States, European Community, Soviets, and other major participants in international agricultural commodity markets are considering and undergoing policy change, it is highly important that the policy assumptions be identified in the emerging scenario.

5. Consumption

For the near term scenario, consumption is viewed as driven by technology, demographics, and policy. As with production in Section 4, the most interesting of the near term consumption impacts relates to policy. Technology influences consumption in a number of ways which seem more subtle than in the case of production. Changing food supplies, changing relative prices, improved storage, and other technological effects alter consumption. However, these effects are more long term in nature. For the emerging scenario, these types of technology effects are not included directly.

Demographics are incorporated in the emerging scenario through population growth. As indicated in Section 2, modest population growth

consistent with adjustments in population policy and population patterns of the 1980s, seems most likely for the near term future. The scenario is then for populations growing at a slower rate than in the 1960s and 1970s. As the population grows more slowly, it will age. Thus, in countries like Indonesia which have relatively modest growth of population currently, food consumption requirements will increase much more rapidly than the population. These scaling effects are only beginning to be incorporated in the food and agricultural policy planning of developing countries. The view seems to be that if populations grow more slowly, food requirements will be more manageable. Simple calculations using recommended requirements of different age/sex groups will show, however, that the growth in food requirements will slow long after the population growth has slowed or stabilized.

Prices and incomes which determine consumption are, in turn, conditioned by agricultural and trade policies and macroeconomic outcomes. Given the world debt situation, it seems unlikely unless there is major relief that incomes in developing economies can grow rapidly. Investment will be slowed by the instability in the international financial markets. The debt situation for many developing countries is significant and will require a large share of export earnings. It is difficult in this situation to project economic growth rates much in excess of those currently experienced. The implication is then for slow growth in food demand conditioned by prices at or near current levels and incomes growing at modest rates.

Perhaps the most interesting policy issue for consumption involves food assistance programs. Widespread interest by developing countries in

food assistance programs is being evidenced currently. A reason is that for compliance with international monetary reform in these countries, prices of agricultural commodities and staple foods are being brought to world market levels. Pricing systems had been used as mechanisms for providing income transfers to the poor. In absence of these price-related policy instruments, alternatives are being considered. If the countries adhere to the reforms and unless there is significant growth in income and improvement in the income distribution, massive food assistance programs are likely to be required if the real incomes of the poor are to be maintained or increased and the prevalence of hunger and malnutrition is to be curtailed.

6. The Emerging Scenario

The emerging scenario for policy, production, and consumption of agricultural commodities is highly determined by macroeconomic policies and conditions and the domestic agricultural policies of the major trading countries. The results presented have been developed recently in a conducted exercise (CARD/FAPRI 1988). The projections are for 10 years and conditioned by a macroeconomic scenario from Wharton Econometrics Associates and a highly detailed set of assumptions on the domestic agricultural policies of the major participants in international markets for key agricultural commodities.

The macroeconomic projection is for modest rates of growth in the developed economies. The scenario is, however, more positive for Africa and Latin America. Average growth rates of around 3 percent are projected for this group of countries. These rates of growth are higher than those experienced in the most recent 2 or 3 years and reflect, among other

factors, optimism about how the debt situation will be handled. For the Pacific Rim countries, annual rates of growth lower than those of the late 1970s but higher than those experienced in recent years are included, 5 to 6 percent. The U.S. currency holds at about current levels for developed countries and increases in value relative to the currencies of the developing economies.

The policies governing the agricultural sectors of the major trading countries are incorporated directly in the model. The equilibrium process in the models for these countries are different depending on whether they are planned or market economies. For the European Community, the continuation of current policies and variable levy, in particular, is presumed. For the U.S., it is assumed that another agricultural policy similar to the Food Security Act of 1985 will be passed in 1990. Target prices and loan rates will be continued at existing levels, and additional land will be cropped as acreage reduction provisions are reduced and higher market prices cause lower participation in the voluntary commodity programs.

The emerging scenario is reviewed for prices, trade, an example supply and use table, and government cost for the United States. Government cost for the United States has been included since the cost of farm programs have contributed in part to the current rethinking of agricultural development assistance policy. Also, the cost of the program will influence the United States in staying the course with policies like the Food Security Act of 1985.

Figure 1 (to the right of the broken line) shows the gulf port price projections for wheat, soybeans, and corn. These are U.S. gulf port prices but reflect the general conditions in world markets as depicted by

the model under the macro and domestic agricultural policy assumptions. Prices stabilize in 1988-89 and hold through the end of the projection period. Soybean and oilseeds prices are higher, largely due to the impact of the acreage reduction programs for corn in the United States. Prices of rice and cotton (not shown), which were covered by the marketing loan in the Food Security Act of 1985, have rebounded rapidly from the very low levels of 1986. These price projections are more optimistic than those developed in a similar exercise last summer (CARD/FAPRI 1987). This is due to the impact of the Export Development Program on stocks, significant revisions in stocks, consumption, and production level estimates for the USDA, and a more rapid than projected reduction in the exchange rate making U.S. commodity prices even lower relative to those of other countries in world markets.

Trade results are summarized for three commodities, feed grains, soybeans (soybean equivalents), and wheat. These trade results are provided in Tables 7 through 9. They are organized to show the shares of the market accounted for by developing, developed, and centrally planned economies. Two factors emerge from these three tables. First, the markets in the developing countries are growing. This is largely due to population growth and the optimistic scenario on income. Second, there is growth in the planned economies imports. Here, there is less certainty as to the cause of growth. Imports are largely estimated as residuals with production and consumption driven by persistence. Thus, changes in policies, like the reforms currently under way in the Soviet Union, could dramatically alter the results.

The changing situation for the United States is suggested by the supply and use table for wheat provided in Figure 10. Observe that the stock levels have decreased dramatically and are now nearly in line with longer term averages. This is one of the reasons for the stabilizing of real wheat prices shown in Figure 1. These prices are, however, highly dependent on policy. For example, in the United States, approximately one-third of the wheat acreage is currently idled by government programs. Changes in the government program could significantly change the production, stocks, and international market price levels for wheat. Similar results hold for the other commodities.

The last feature of the emerging scenario is the government cost for the United States. Government farm program costs for the United States are projected to drop around \$15 billion from \$24/25 billion in 1987. These reduced costs are largely due to the lower costs of operating the loan program. Normal prices for most of the commodities are currently and in the out-period at or above the loan rates. The budget pressure on the U.S. agricultural program, which has perhaps caused commodity associations to become more concerned than usual about agricultural development assistance, will be lessened.

7. Special Concerns

Various conditions could cause the emerging scenario to reverse or change. In this section, we briefly review five concerns for change. They relate more to the conditions driving the modeling system from which the emerging scenario was developed than to the models themselves. When we have been wrong in the past with our CARD/FAPRI models, we have been wrong more because of assumptions on policy and external factors than

because of the modeling system, which although obviously is in continual need of improvement, has adequately characterized the situation for making the projections.

Policy

As emphasized throughout, the emerging scenario is one characterized not by consumption demands that cannot be met by technology and production levels or population growth rates that give rise to alarm relative to future food requirements, but instead one governed by domestic policies of major trading countries, domestic agricultural policies of the developing countries, food assistance policies, and trade or multilateral policies. The emerging scenario is one in which policy actions will have major influences on the economic fortunes of the developing countries and on the success of their own domestic agricultural and food policies. The theme for policy change should it occur, is toward reducing distortions in agricultural markets. This will affect the developing countries, ultimately raising prices since agriculture has been so highly subsidized in the developed exporting countries. But, the price rises may be slow and erratic. And, they will depend as well on the growth rates of the developing countries. GATT and decoupling policies are a major uncertainty. Developing countries may be exempt in one way or another from these multilateral agreements. However, the impacts on those participating will be heavily felt in the international agricultural commodity markets and perhaps in the markets for the agricultural commodities that have been used traditionally by the developing countries for export earnings.

Macroeconomic Conditions

The macroeconomic conditions presumed for the scenario are relatively optimistic. Rapid growth rates could stimulate sharp increases in international prices. Slower growth rates will not reduce these prices significantly since there are still significant commodity stock levels. Choices made by the United States and other developing countries in dealing with the deficit problem will have an influence on international financial markets. These policy courses are difficult to predict but if the United States turns to inflation as a way of eliminating the deficit, it should cause further revaluations of the currency and associated adjustments in international financial markets.

Planned Economies

The poorest information for the emerging scenario is from the planned economies. China and Russia account for major portions of production, consumption, and trade in the major agricultural commodities. Both countries are undergoing significant economic reform. If the reform in Russia produces productivity results similar to those in China, significant changes could occur in the feed grains, wheat, and oilseeds markets. The scenario assumes that the changes in Russia will be relatively slow. If the reform in Russia increases in pace, the question for the scenario will be a balancing of the growth in income and associated increased food demand against increases in agricultural production through increased efficiency and their consequences for world markets and prices.

World Debt

The world debt situation continues to be a major concern for developing countries. Simple calculations of debt service requirements relative

to foreign exchange for many of the more indebted countries suggest that if the debt commitments are met, little externally generated currency will be available for investment. The consequence may be growth rates for the developing countries much lower than have been utilized for the analysis. There is evidence that the debt problem is being handled in ways that involve mark-downs. The extent of these policies and the movements of capital implied by debt repayment will be an important factor in conditioning the growth of the developing countries, their income levels, and their food consumption and agricultural production patterns.

Food Assistance

A policy that deserves special attention is food assistance. Clearly, if the economies are to be politically stable and the traditional policy instruments for transferring income to the poor have been eliminated through international price, monetary, and policy reform, alternatives must be developed. The most likely alternatives are various types of food assistance programs. These food assistance programs promise to become larger in scope, with broad implications for their financing, concessionary sales of food products by the United States and other developed countries and, of course, their impacts on the agricultural production and consumption patterns in the developing countries.

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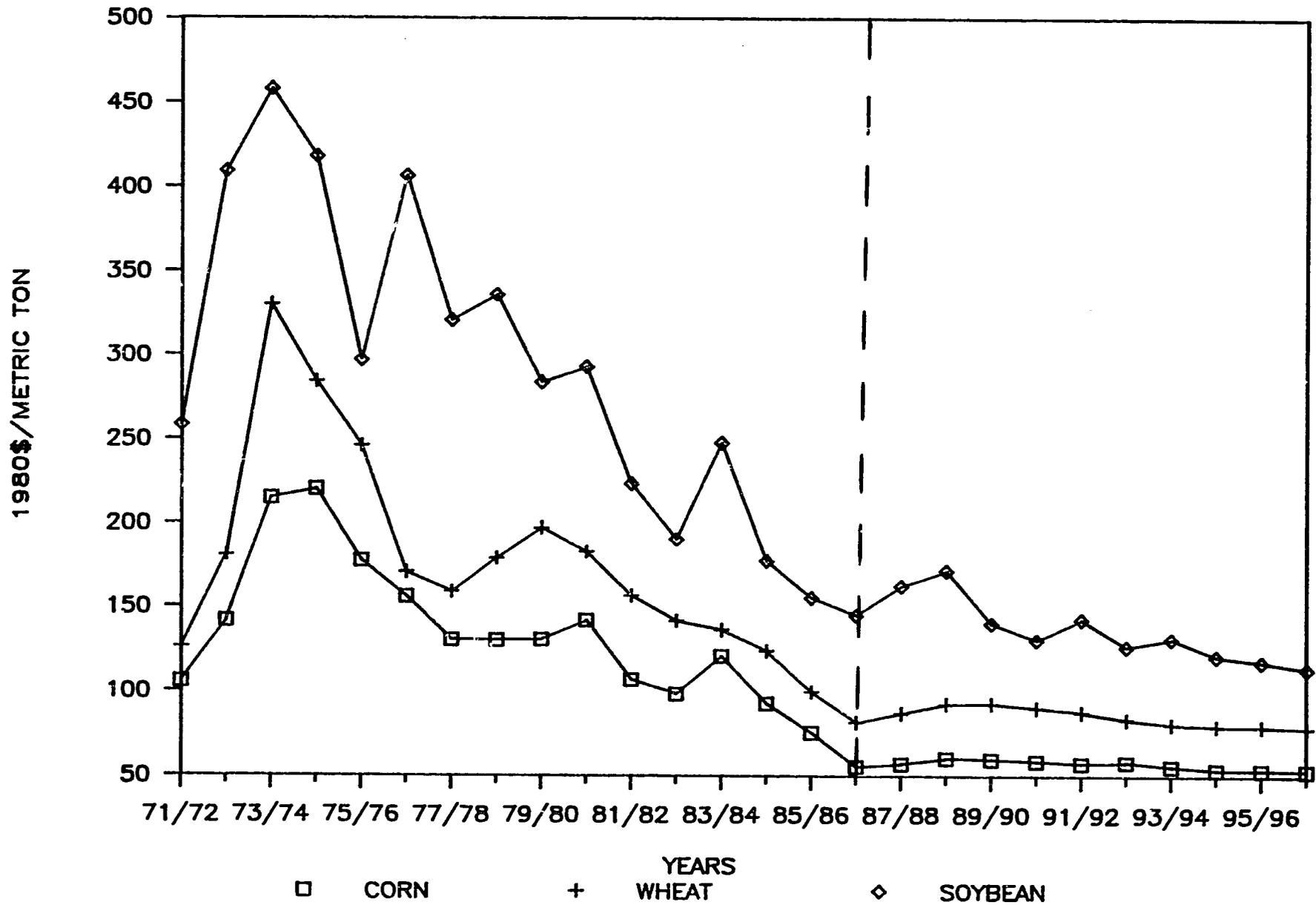
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Figure 1

REAL U.S. GULF PORT PRICES

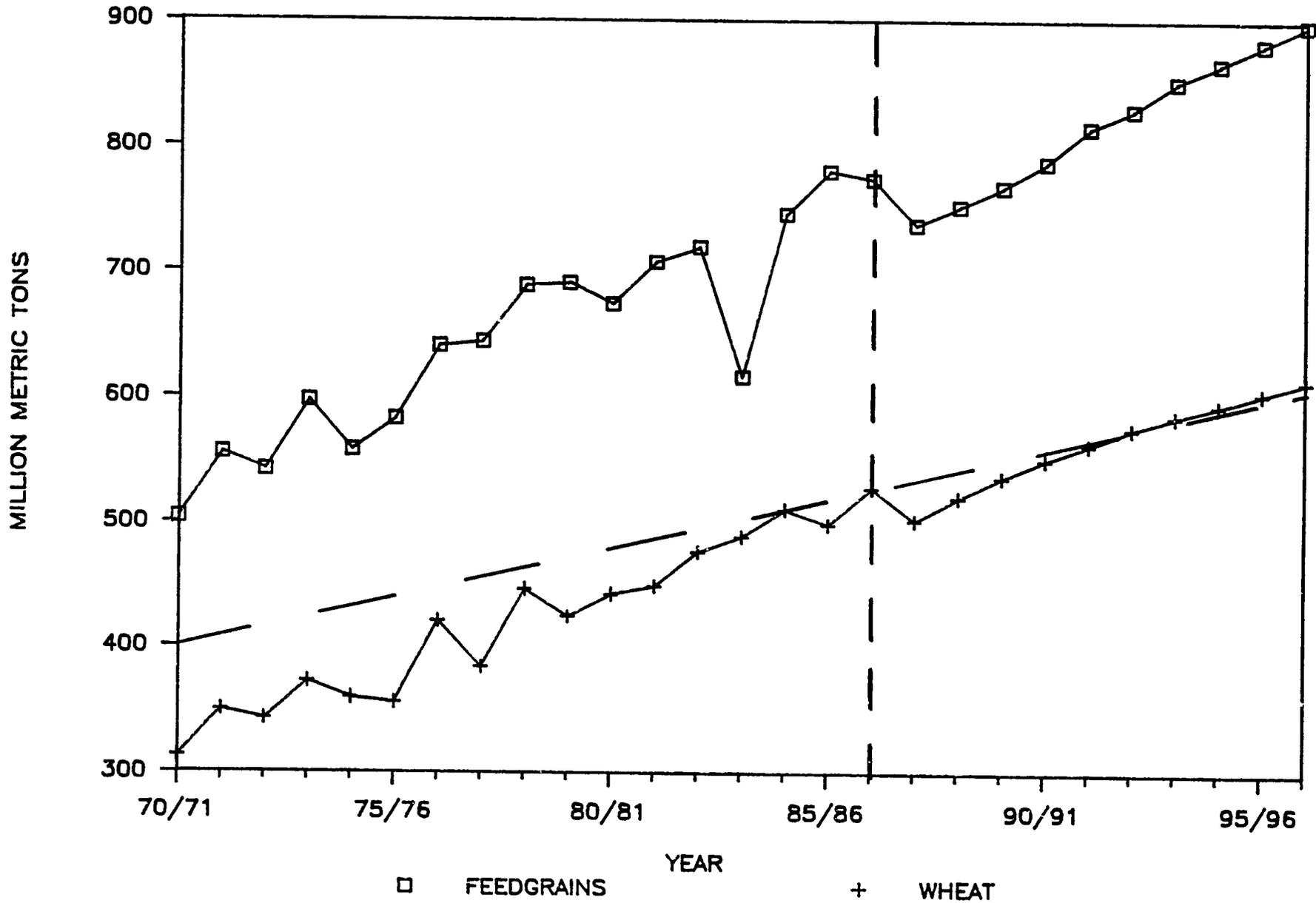


Source: CARD/FAPRI 10-Year Projections, Spring 1988.

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Figure 2

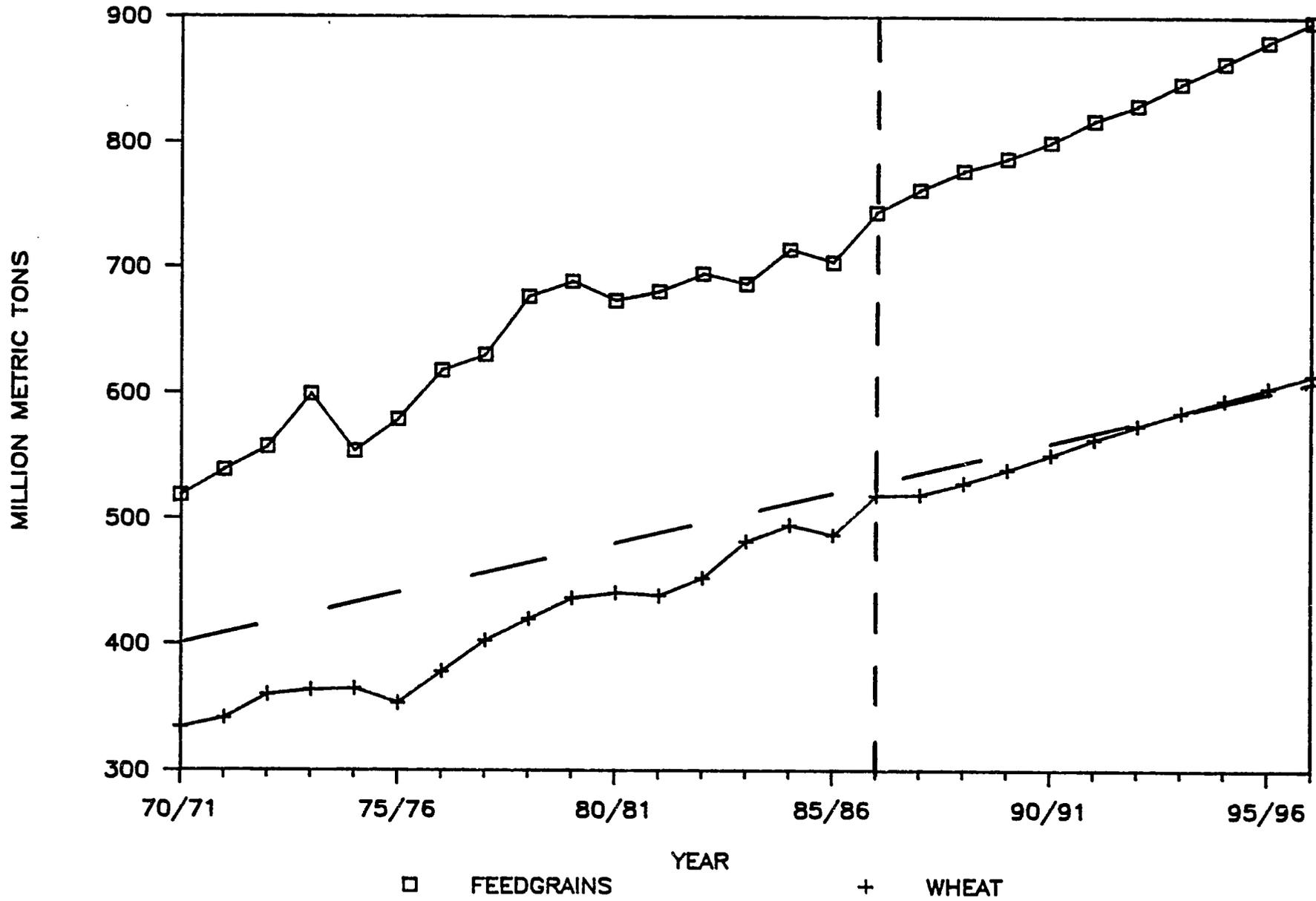
WORLD GRAIN PRODUCTION



Source: CARD/FAPRI 10-Year Projections, Spring 1988.

Figure 3

WORLD GRAINS UTILIZATION

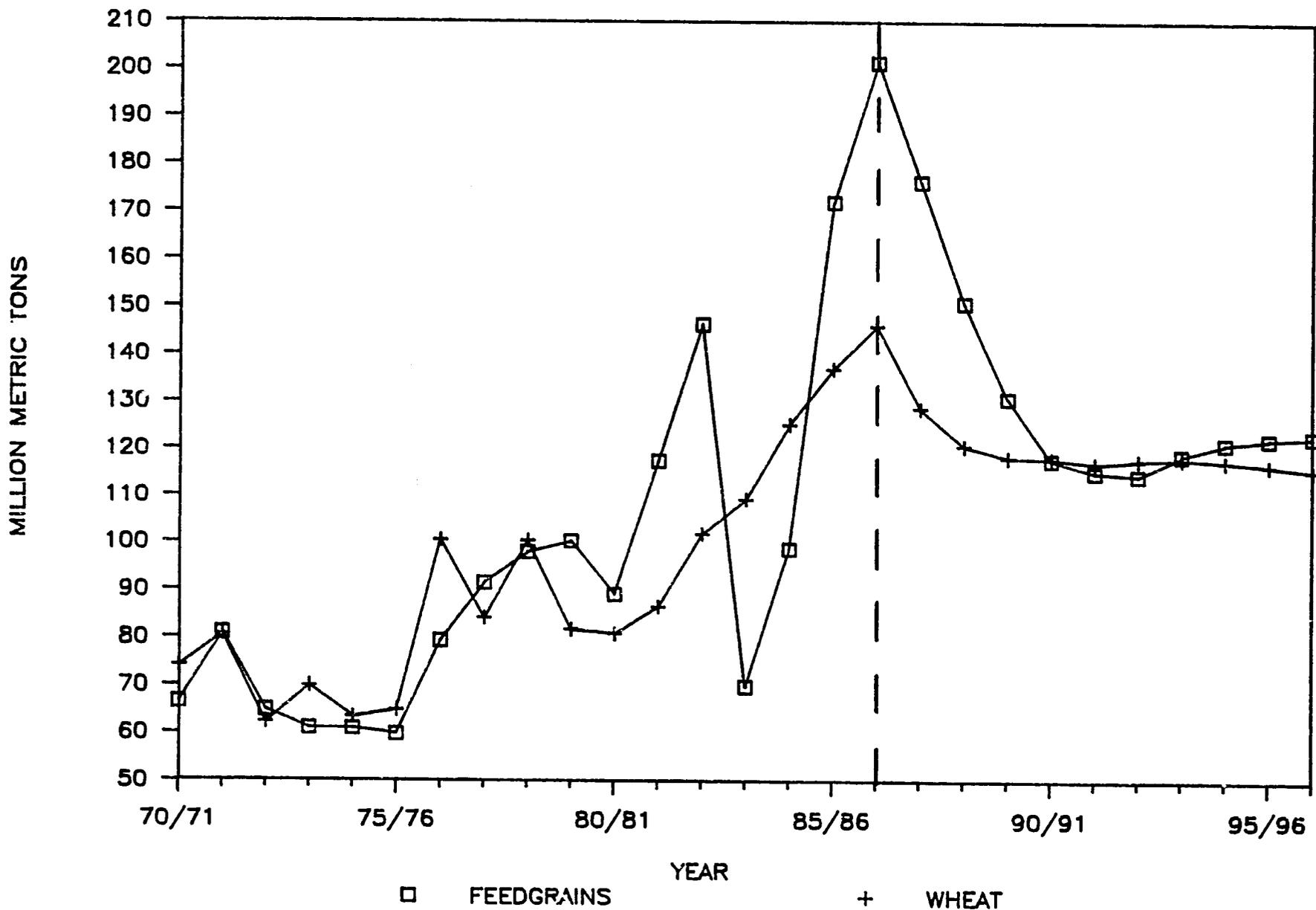


Source: CARD/FAPRI 10-Year Projections, Spring 1988.

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Figure 4

WORLD GRAINS ENDING STOCKS

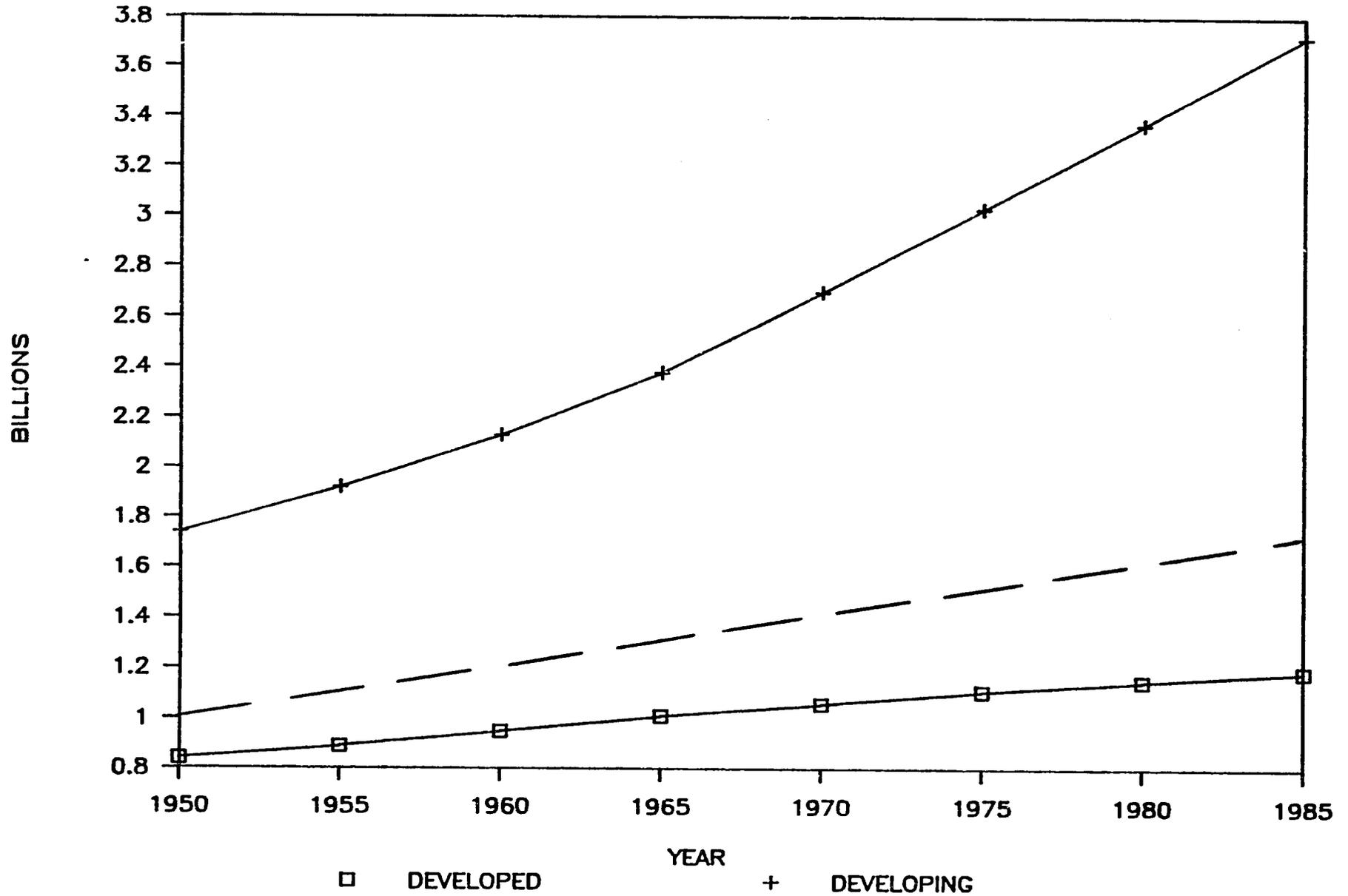


Source: CARD/FAPRI 10-Year Projections, Spring 1988.

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Figure 5

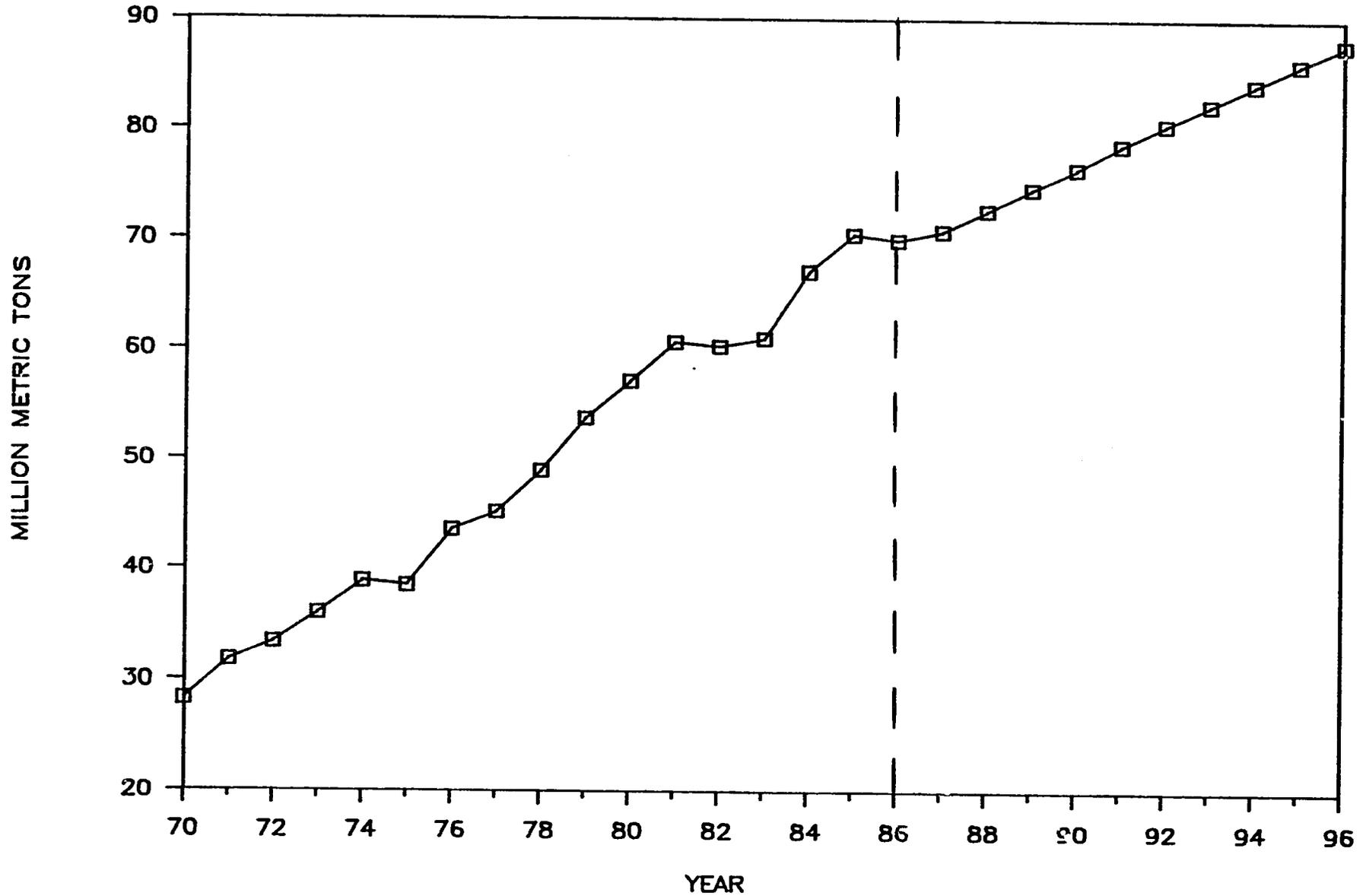
WORLD POPULATION



Source: CARD/FAPRI 10-Year Projections, Spring 1988.

Figure 6

WORLD NITROGEN DEMAND

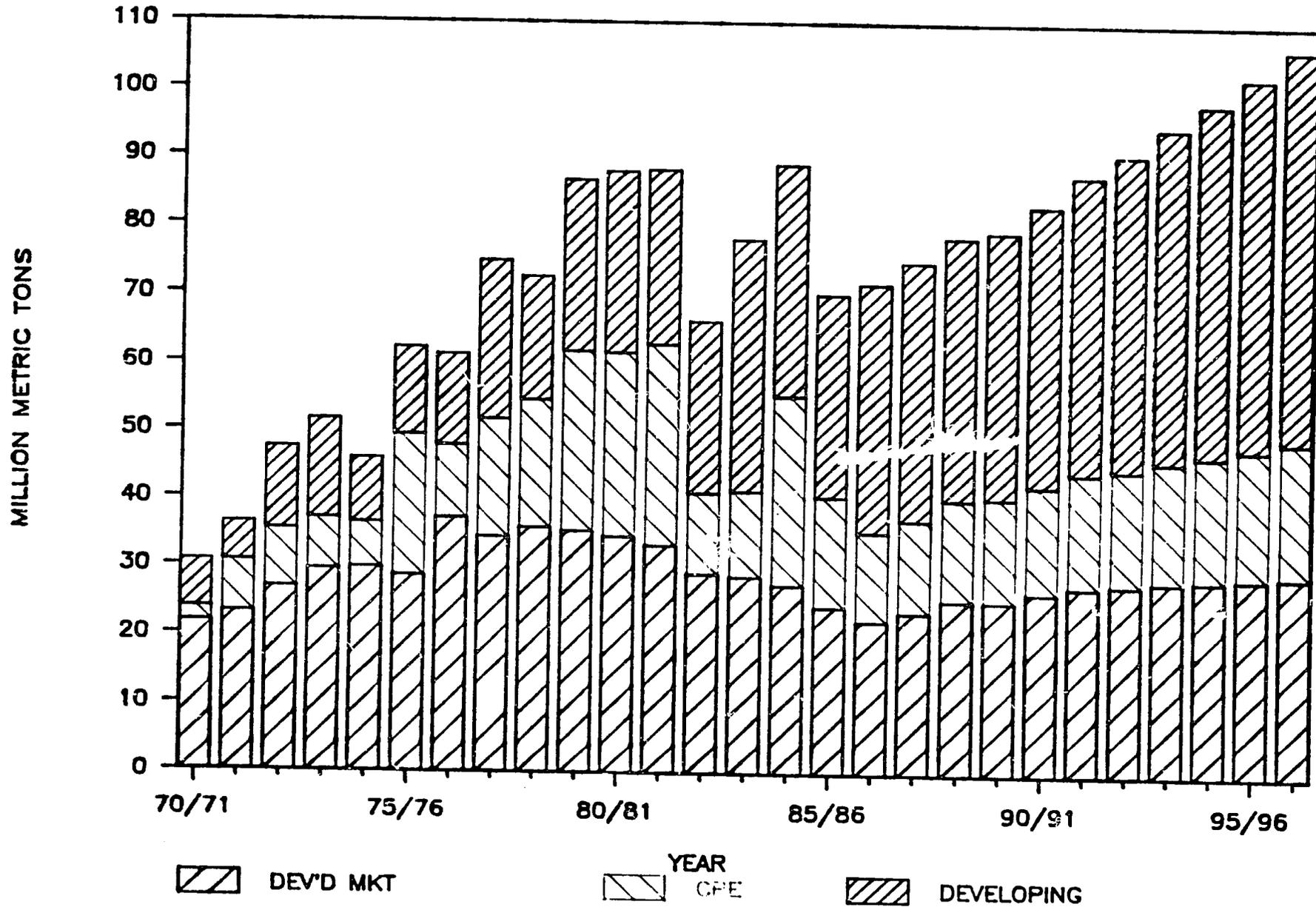


Source: Wharton Econometrics Associated Data Base, 1988.

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Figure 7

FEEDGRAINS IMPORTS

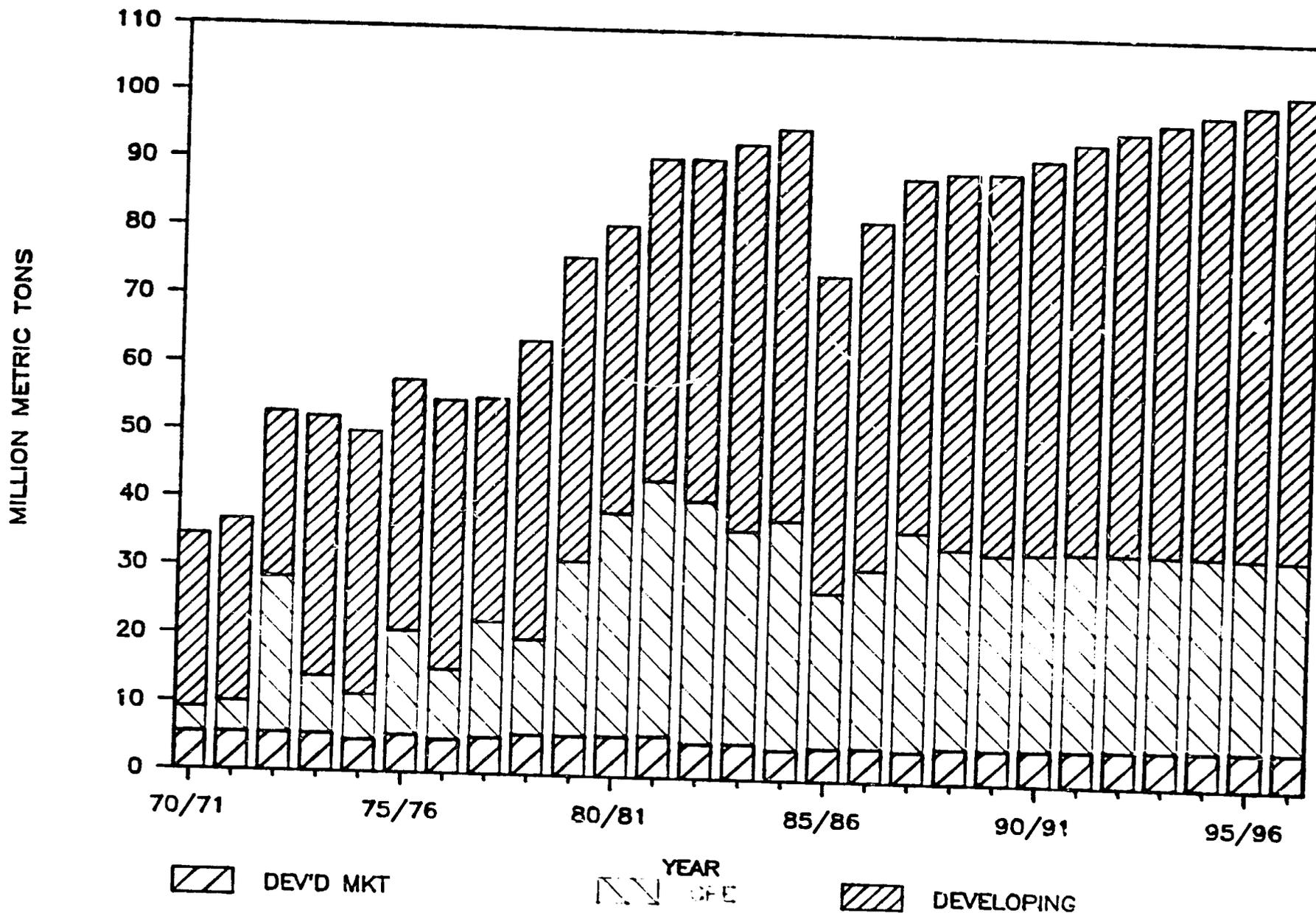


Source: CARD/FAPRI 10-Year Projections, Spring 1988.

1972

Figure 8

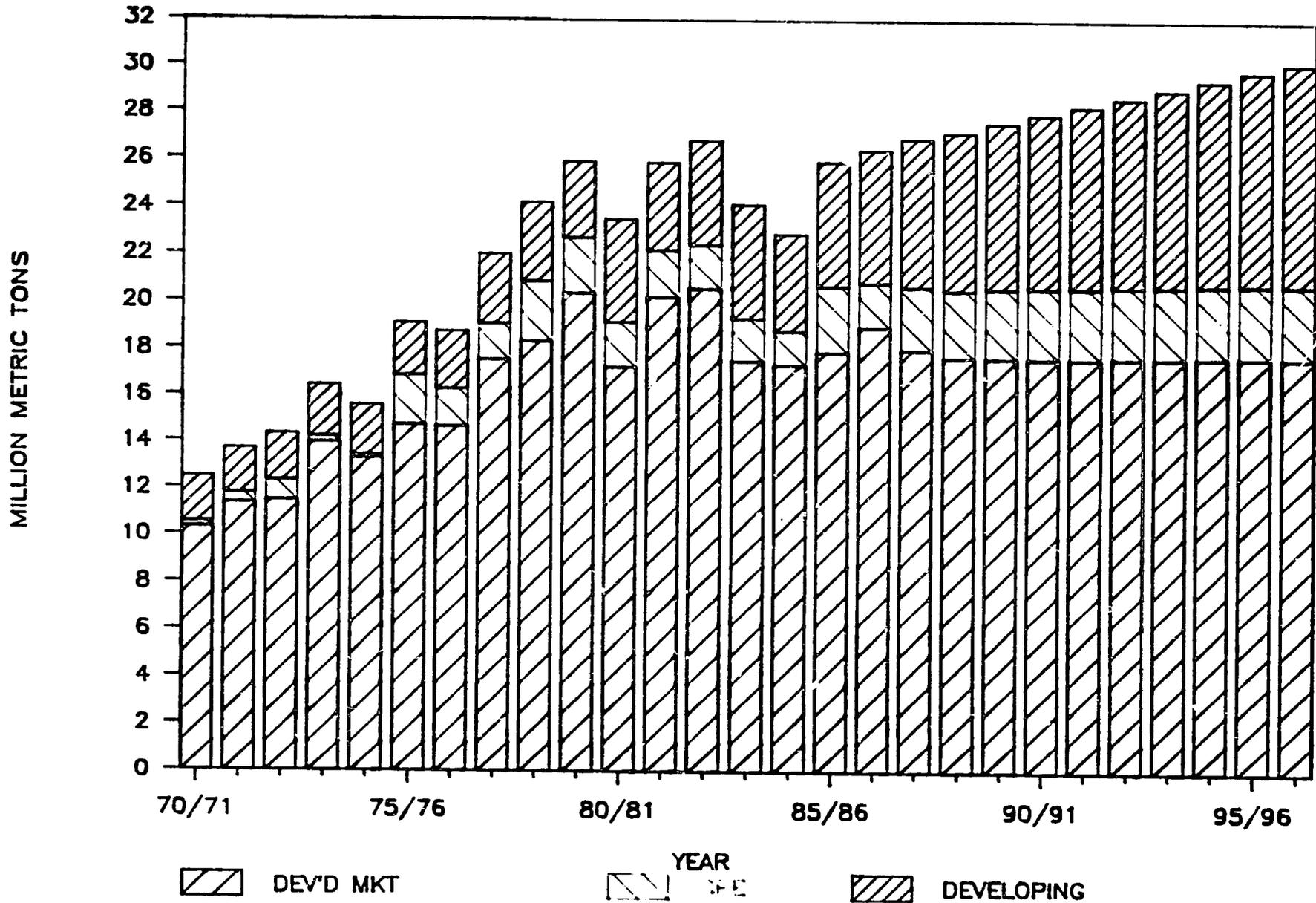
WHEAT IMPORTS BY REGION



Source: CARD/FAPRI 10-Year Projections, Spring 1988.

Figure 9

SOYBEAN IMPORTS BY REGION



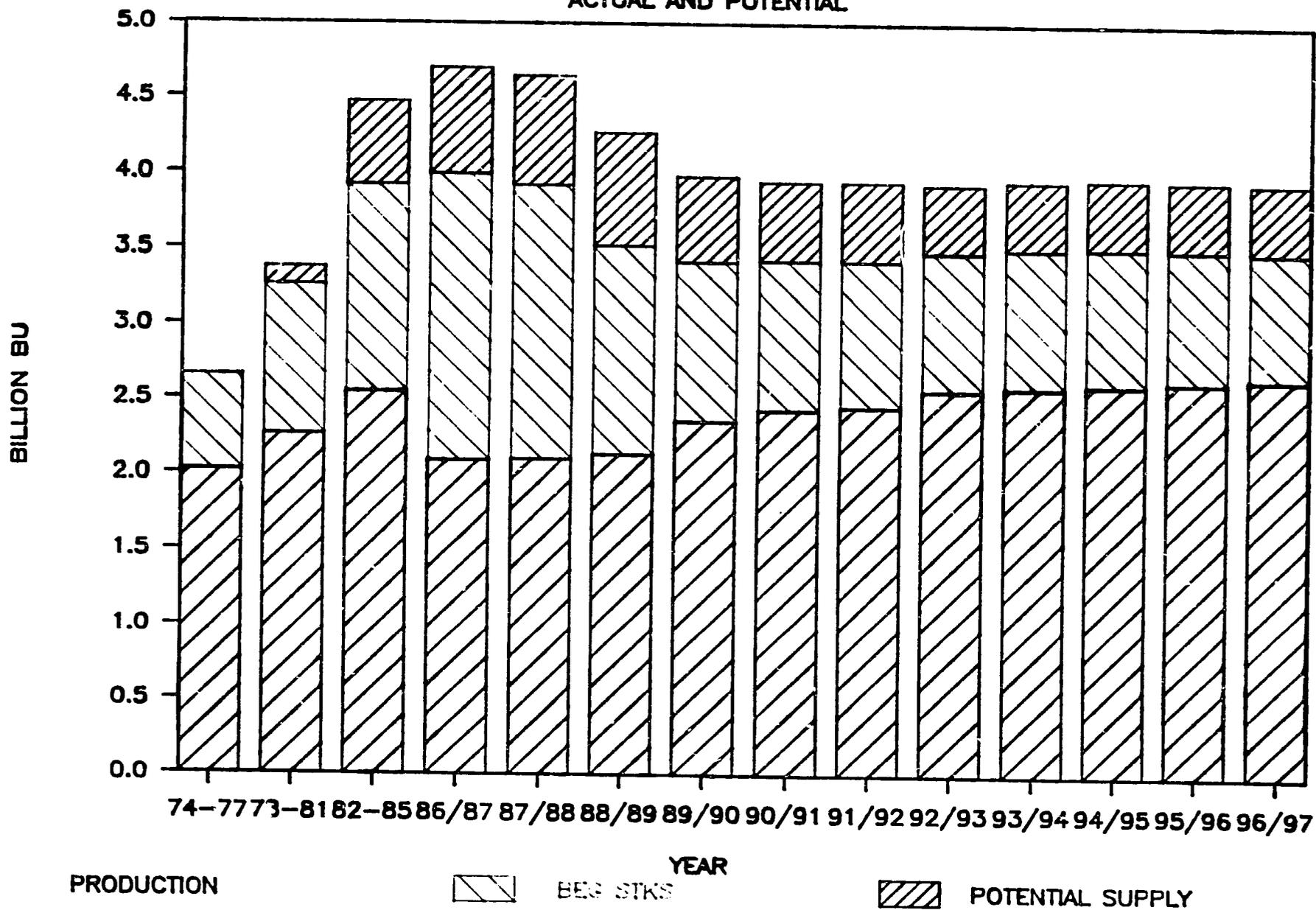
Source: CARD/FAPRI 10-Year Projections, Spring 1988.

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Figure 10

WHEAT SUPPLY

ACTUAL AND POTENTIAL

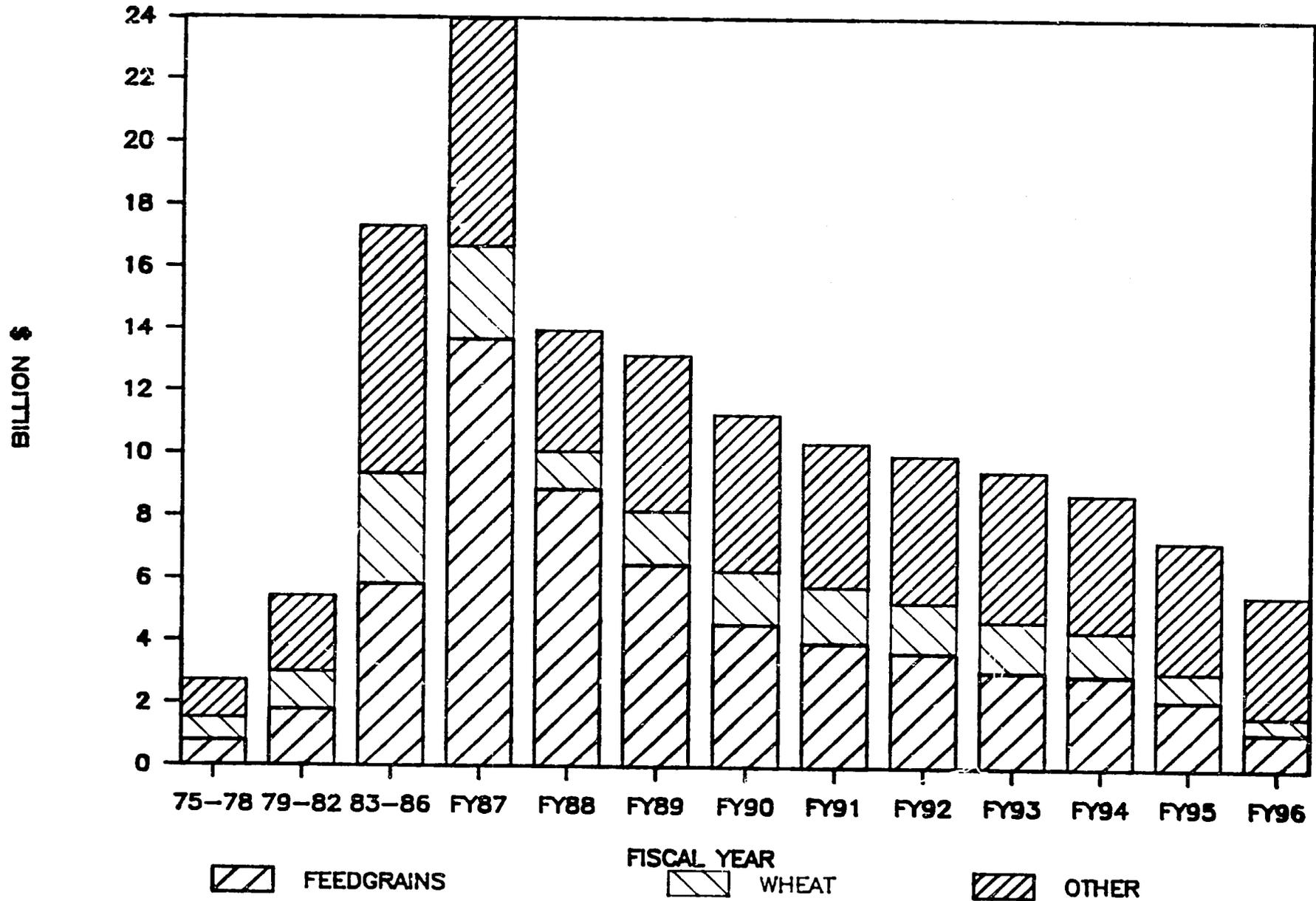


Source: CARD/FAPRI 10-Year Projections, Spring 1988.

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Figure 11

GOVERNMENT COSTS



Source: CARD/FAPRI 10-Year Projections, Spring 1988.

Table 1. Debt Indicators for Selected Countries.

Country	Current Account Deficit 1970-80 (% of 1981 GDP)	Debt-GDP Ratio 1981	Debt-Export Ratio 1981	Debt service Ratio 1980-83
Latin America				
Argentina	2.3	31.6	334.7	214.9
Brazil	22.8	26.1	298.7	132.6
Chile	19.8	47.6	290.0	153.3
Mexico	13.9	30.9	258.8	161.8
Peru	19.3	44.7	223.5	122.2
Venezuela	-7.5	42.1	134.0	117.8
Weighted Average	13.6	31.3	271.5	153.8
Colombia	0.4	21.9	182.9	103.8
East Asia				
Indonesia	0.6	24.1	87.1	n.a
Korea	24.6	27.6	76.6	90.1
Malaysia	-2.0	27.8	51.8	16.9
Thailand	22.4	25.7	103.1	58.1
Weighted Average	11.9	25.9	82.1	61.7
Philippines	18.3	40.6	214.6	152.7

Source: From Table 4. Sachs, 1985.