THE IMPACT OF FUTURE WORLD SUPPLY AND DEMAND PROSPECTS ON U.S. AGRICULTURAL TRADE

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It used to be, as someone recently remarked, that 25 years was not a very long time. Nothing much happened in 25 years. But today 25 years is a very long time. For those of us who spend much of our efforts trying to anticipate what lies ahead, even 10 years seems a long time.

Although the topic assigned is future-oriented, much of this paper will be devoted to reviewing the past. Before making any judgments concerning the future we must look to the past, at where we have been and where we are now. The early part of this paper identifies some of the principal forces bringing about changes in the world market for farm products. The latter part focuses on U.S. export prospects for individual commodities.

U.S. Agricultural Exports in Retrospect

Throughout most of U.S. history, three commodities—wheat, cotton and tobacco—dominated our agricultural exports. During most of the past century either wheat or cotton was the leading export item. Recently, however, wheat has moved well out in front, reflecting more than anything else the growing food shortages in Asia. Since the second world war, soybeans and feed grains have grown in importance so that we now have five major export commodities.

In the usual pattern of development the role of agriculture declines as an economy becomes more industrialized. Thus agricultural exports— accounting for about three-fourths of total exports at the time of the Civil War—declined until they reached a recent low of 18 percent in 1953. Since then, however, this long term trend has been reversed. In the early 1960's the agricultural share of total exports reached 24 percent; preliminary data for 1964 show a further gain to 25 percent. There is good reason to believe that this figure will climb still higher in the years ahead.

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U.S. Agricultural Exports in Perspective

The United States is today the leading exporter of agricultural products, completely dominating trade in temperate zone commodities. It is the principal source of such major commodities as wheat, corn, cotton, tobacco and soybeans.

Our exports of farm products exceed those of Canada, Australia and Argentina combined. In most years, exports of farm products under the Food for Peace program alone exceed the total agricultural exports of any of the other major exporting countries.

U.S. exports of farm products, averaging just over 4 billion dollars per year in the late 1950's and 5 billion dollars per year in the early 1960's, have exceeded 6 billion dollars in each of the last 2 years. The output of one acre out of every four now moves into export. In recent years two-thirds of the wheat crop, almost two-thirds of the rice crop, close to one-half of the soybean crop, one-third of the cotton crop and about one-fourth of the tobacco crop has moved abroad. These facts indicate a new era in agricultural trade. The broad outlines of this new era are evident in the shifting pattern of world grain trade.

The Shifting Pattern of World Grain Trade

Grains, providing a major share of man's food energy supply and occupying more than 70 percent of the world's harvested cropland, are a convenient commodity with which to measure shifts in world food trade.

Trade Trends by Geographic Regions

From the beginning of modern trade until about 1940 the regional pattern of world grain trade was rather constant. Western Europe was the big importing region. Other regions were net exporters. In the late 1930's North America exported 5 million tons of grain per year, Latin America 9 million tons and Eastern Europe (including the Soviet Union) 5 million tons. The other three regions Asia--Africa, and Oceania (Australia and New Zealand)--exported smaller quantities. The situation, then, was this: one importing region and six exporting regions.

Since World War II, however, the world grain trade pattern has changed dramatically. The only region maintaining essentially its prewar position is Western Europe. Its net grain imports, averaging 23 million tons in recent years, have changed little from the 24 million ton yearly average in the 1934-38 period.

North America and Oceania are now the only consistent net exporters. Asia and Africa have joined Western Europe as permanent net importing regions. Eastern Europe and Latin America appear to be losing
their surplus producing capacity, both having been net importers in some recent years.

Trade Trends by Economic Regions

The world now comprises two major economic groupings: the developed and the less developed. Asia, Africa and Latin America may be considered the less developed world. The other four regions mentioned above comprise the developed world.

Prior to World War II the less developed world exported to the developed world 11 million tons of grain per year. After World War II this flow was reversed. The flow from the developed to the less developed world was 4 million tons annually in the 1948-52 period, 15 million tons in the 1957-60 period, 21 million tons in 1961, and according to preliminary estimates, 25 million tons in 1964. According to this indicator, the less developed world is losing the capacity to feed itself. A growing share of each year's population increment is being sustained by food shipments from the developed world, primarily Food for Peace shipments from North America.

The Growing Demand for Food

What is it that creates additional demand for food? There are two important sources. One, of course, is population growth. The other is rising per capita incomes. These two forces are distinctly different. One is a demographic force, the other an economic force. Both are increasing faster than ever before in history.

Population Growth and the Demand for Food

Until the outbreak of World War II, world population had never increased more than 1 percent per year. Since then the rate of increase has accelerated sharply. Today it is increasing 2 percent per year. Even without any further gain in per capita incomes, world food needs will rise 2 percent annually.

Population growth rates vary widely between countries. The populations of several countries in both Eastern Europe and Western Europe are growing at less than 1 percent per year. At this rate, these countries will require the better part of a century to double their populations. Some less developed countries such as Brazil are expanding at more than 3 percent per year. The number of people in these countries will double within a generation.

The relative importance of the two principal demand-increasing forces varies widely between countries. In the less developed countries where population is growing 2-3 percent per year or more, and where per capita incomes are rising slowly, if at all, population growth is the major demand-increasing force.
Rising Incomes and the Demand for Food

Per capita income levels also vary widely between countries. In subsistence-type economies such as India or Pakistan they may average only $60 to $70 per year. In the more advanced economies of the industrial West, they may range up to $3,000. Rates of increase in per capita income also vary widely between countries. Rates of gain are very high in several West European countries and Japan. The combination of high rates of overall economic growth and low rates of population growth in these countries over the past several years has resulted in extraordinary gains in per capita income. In Japan, the country with the most rapid rate of economic growth, income per person is doubling each decade.

As incomes rise, consumption patterns follow certain rather predictable changes. At the lower income levels, diets consist largely of starchy foods. Consumption of livestock products and other costly foodstuffs is low, often negligible. Thus in Asia, grain products, roots and tubers, account for three-fourths of total caloric intake. Livestock products supply only 5 percent. In North America, where incomes are quite high, starchy foods account for less than one-fourth of total caloric intake; livestock products provide more than 30 percent. The consumption of fats and oils also rises steadily with income levels.

One way of relating rising incomes and the resulting additional demand with agricultural resource requirements is to measure the quality of diet in terms of grain. About 1 ton of grain per person per year is required to maintain the high quality, high protein diets of North America. Per capita grain consumption in the less developed regions such as Asia is only 450 pounds per year. The difference between these two economies is the difference between one which can afford to convert large quantities of grain into meat, milk and eggs, and one which requires nearly all available grain for direct human consumption. With development we can expect per capita grain requirements in the low income areas to gradually rise from the current 450 pounds to much higher levels, gradually moving toward North American levels as incomes permit.

The Less Developed Regions--Growing Food Shortages?

We noted earlier that the less developed world, exporting an average of 11 million metric tons of grain per year to the developed world prior to World War II, has become a net importer, importing an estimated 25 million tons in 1964. This net shift of 36 million tons approximates the total grain production of Canada and Australia combined.
Why Has this Vast Deficit Developed?

The rapidly growing import deficit is readily explained. In traditional societies food output is expanded along with population by simply expanding the area under cultivation. But now relatively little new land can readily be brought under cultivation in many densely populated countries. Additional food output must come largely from raising yield per acre. Herein lies the problem, for underdeveloped economies, almost by definition, are not prepared to do this. Raising yields is far more difficult than merely moving to new land.

Historical evidence indicates that there are certain preconditions for generating and sustaining a steadily rising trend in yields per acre. One of these preconditions appears to be a reasonably high level of literacy. It is difficult to imagine a largely illiterate society, as in India or Indonesia, generating and sustaining a trend of rapidly rising yields such as those currently existing in the United States, Japan or some of the countries in Western Europe. In many countries, the level of literacy, though rising, is still quite low—especially in rural areas. Only a small fraction of the rural population is literate in such countries as India, Indonesia, Pakistan and Egypt.

A minimal level of literacy is but one of many preconditions. There may be a minimum level of per capita income, below which there is not enough difference between output levels and subsistence levels to finance the capital inputs needed to raise yields. Commercialization of agriculture may have to develop to a certain minimum extent before there are enough sales of farm products to permit the purchase of yield-raising capital inputs. The nonagricultural sector of the economy must reach a certain size and level of development and sophistication before it can provide capital inputs, such as chemical fertilizers and pesticides and the services needed in agriculture to increase per acre yields. Note that these preconditions were not needed so long as food output was expanded in the traditional manner, i.e., by simply expanding the area under cultivation. The nature of these preconditions shows why, historically, yield takeoffs have been confined to the more advanced economies.

In summary, rapid population growth in the less-developed regions, coming at a time when little new land is left, is forcing the process of economic development, which required centuries in the Western World, to be telescoped into a period of a few decades. It does not seem likely that the disturbing tendency for food output per person to trend downward in several major less developed countries can easily be reversed.
Illustrating the Problem

It is too early yet to assess the impact of the current and projected population growth rates on the food economies of the less-developed regions. One of the most effective ways for us to grasp the magnitude of the problem is to interchange the projected population increases of the developed and less-developed regions.

Consider these facts. The agricultural land resources of the two economic regions, measured in terms of cropland, are not too different. The 1960 population of the developed world was less than 0.9 billion; that of the less-developed world, more than 2 billion. The projected increase between 1960 and 2000 for the developed world, according to the United Nations medium level projections, is 0.4 billion and that for the less-developed world, nearly 3 billion.

Now let us interchange the projected growth in population of the two regions. The developed world would then absorb the 3 billion and the less-developed world, the 0.4 billion. The United States, with about one-fourth of the agricultural land resources of the developed world, could expect to accommodate one-fourth of the 3 billion total (750 million). This amounts to an addition of about 190 million per decade--roughly the equivalent of our current population every 10 years.

What would happen to our food consumption levels under these circumstances? But we are much better prepared to absorb population increases of this magnitude than are the less developed regions. We have the capital, the agricultural and industrial technology, and the high levels of literacy and education. And we have a much more favorable land-man ratio to begin with.

Unfortunately, the vast increases in population are projected for the regions least prepared to feed them. The imbalances between population and food in the less developed regions are certain to grow.

Western Europe--Uncertain Trends

The trends in Europe are much less clear. The big question centers around the agricultural negotiations with the European Economic Community --the main negotiating focus of the Kennedy Round.

If the rates of economic growth prevailing in Western Europe in recent years continue, the demand for agricultural products will rise rapidly. How much of this additional demand will be translated into import needs will be heavily influenced by the outcome of the negotiations now under way.
Japan--Our First Billion Dollar Market?

Japan is today our leading overseas market, taking nearly $750 million worth of farm products in the year just ended. Because of its prominence as a market for U.S. farm products it deserves some special attention.

Japan's population growth rate, over the past decade, has been less than 1 percent per year, among the lowest in the world. But Japan now has 95 million people--half the population of the United States--compressed into an area smaller than California. As this population built up, mostly within the last century or so, the Japanese were forced to look to the sea for their animal protein, using their scarce land resources to produce starchy food staples, mostly rice. Thus the Japanese developed and became accustomed to a very plain diet, consisting largely of fish and rice.

In recent years, however, as Japan's phenomenal economic growth rate of 7-8 percent per year has permitted per capita incomes to double within a decade, the Japanese have begun to develop a taste for meat, milk, eggs and other livestock products. But with nearly all the cropland devoted to the production of food crops such as rice, the Japanese must either import these livestock products or the feed grains needed to produce them domestically. Feed grain imports, averaging 2-3 million metric tons per year in recent years, are projected to reach 10 million tons by 1975.

A continuation of the explosive rate of increase in per capita income prevailing over the past several years will require ever growing quantities of imported food. It now appears to be only a matter of time until Japan becomes our first billion dollar market for farm products.

The Outlook for U.S. Farm Exports

Proceeding from this background, what is the outlook for U.S. farm exports?

Wheat Export Prospects

The United States is today the leading world exporter of wheat, supplying some 40 percent of all the wheat entering the world market. With exports increasing, we have, within the past five years, made the transition from producing primarily for the domestic market to producing primarily for the export market. During the past two years, two-thirds of our wheat crop has moved abroad, mostly under the Food for Peace program.

The past quarter century has witnessed some pronounced changes in the geographical destination of our wheat exports. Up until World War II, Europe took most of our wheat. In recent years the less developed regions, especially Asia, have taken the bulk of our exports. Thus far this fiscal year, the less developed regions, in addition to taking the usual large volume of Public Law 480 shipments, are taking a major share of our commercial exports as well.
Japan, importing better than 2 million tons of wheat in recent years, is expected to increase its imports to well above 3 million tons by 1970. In Western Europe where both per capita and aggregate consumption of wheat for food is declining as incomes rise, and where output is trending steadily upward, dependence on imported wheat is certain to decline. More and more of the indigenously produced wheat will be used for feeding purposes.

The situation in several of the less developed tropical countries, however, is quite different. Per capita consumption of wheat, a preferred staple in nearly all less developed countries, is rising. Population growth rates of 2 to 3 percent per year, coupled with rising per capita consumption, is resulting in an impressive rate of gain in the aggregate demand for wheat.

In Brazil, where demand is growing and production is declining, the need for imported wheat has grown rapidly. Brazil now imports close to 3 million tons of wheat per year—half as much as China and two-thirds as much as India. About half of this wheat is imported commercially and about half under the Food for Peace program. Brazil now produces only one-tenth of its annual wheat requirements.

Nigeria, the most populous country in Africa, has had a similar lack of success in expanding wheat production. Although its imports of wheat are rather small compared with Brazil's, they are growing steadily. The Philippines, producing less than 1 percent of its wheat requirements and now importing half a million tons per year, has doubled its imports in the past few years. Further increases in imports are projected. Indonesia, another tropical country, also produces little or no wheat. Its rising internal demand can be met only through imports.

The above countries were singled out because they represent a group of countries where wheat consumption is rising rapidly but which produce little of their wheat requirements. Another group, including such countries as India, Pakistan and Egypt, have growing wheat import needs, not because they do not or cannot produce wheat, but because they cannot expand production fast enough to keep up with the rapidly growing demand. U.S. exports of wheat, more than any other commodity, will reflect the growing imbalances between food needs and food production in the less developed regions.

Rice Export Prospects

Rice, along with soybeans and grain sorghums, is a relatively new U.S. agricultural export. Prior to World War II, quantities of rice

\[ \text{Production in Brazil has declined from 500,000 metric tons in the early 1950's to less than 300,000 tons in recent years.} \]
exported were negligible. Exports of rice in 1963/64 at 1.5 million metric tons nearly doubled the average exports of the 1950's.

A large part of our total rice exports now go to Asia. India, largely a concessional market, and the Philippines, buying most of its rice commercially, are our big outlets. The dropping of Indonesia from our list of concessional markets is partly offset by the return of Japan as a large commercial purchaser of U.S. rice.

Mainland China, which ranked third as a major rice exporter behind Burma and Thailand until a few years ago, has now lost most of its exportable surplus. The United States with its steadily rising volume of rice exports has moved into third place. With neither Thailand nor Burma expanding production or exports very rapidly in recent years, the United States has come very close to overtaking both of these traditional exporters. The United States has the potential to become the leading supplier of rice in the world market if favorable export conditions should develop.

Feed Grain Export Prospects

In this discussion we will use the North American definition of feed grains, including corn, barley, grain sorghums and oats. Grains used almost exclusively as feed in this country are important sources of food in many parts of the world. Corn, for instance, is the leading food staple in Latin America. In Africa, grain sorghums are the principal food. In some African countries, grain sorghums supply a major share of the total food energy supply.

Corn is the leading U.S. feed grain export, accounting for some three-fourths of the total. Grain sorghums rank next in importance, followed by barley.

Feed grain exports go mostly to Western Europe and Japan, both characterized by rapidly rising per capita incomes and rapid gains in the per capita consumption of livestock products. With little additional land available to support expanding livestock industries these countries must look to the world market for feed grains.

Exports from Argentina, a longstanding feed grain exporter, have not kept pace with growth in world feed grain exports. Newly emerging corn exporters such as Thailand and the Republic of South Africa have picked up much of the slack. The United States supplies one-half of all the corn and four-fifths of the grain sorghums entering the world market. In the export of barley, the United States, competing with Canada, Australia and more recently France, enjoys a much less favorable position.
U.S. feed grain exports have increased steadily over the past decade, nearly tripling the levels of the early 1950's. This country is an efficient, highly competitive producer of feed grains. As long as we keep our prices competitive, we should experience little difficulty in at least maintaining our present share of a rapidly growing world market.

**Soybean Export Prospects**

Soybeans merit the title of outstanding performer among the major export commodities. Though a relatively new export crop their rise as an export crop has been phenomenal. During the 1930's, U.S. soybean exports averaged 2 million bushels per year; during the early 1950's they averaged almost 30 million bushels. Since then exports have risen dramatically, reaching 186 million bushels in the fiscal year just ended. These exports this past year earned half a billion dollars in foreign exchange. If the value of soybean oil and oilcake exports is added, the total approaches three quarters of a billion dollars.

In the 1920's and 1930's, when soybeans were just catching on here, Mainland China completely dominated world soybean trade, supplying some four-fifths or more of total soybean exports. Today, however, the United States dominates soybean trade, supplying a similar share of total exports. China has lost its traditionally large exportable surplus. Lagging agricultural output and the addition of 15 million people per year will likely prevent China's reemergence as a serious competitor in soybean market.

U.S. soybeans and soybean oil have proved formidable competition for other oilseeds and vegetable oils in the world market. Soybeans are today the leading oilseed, having eclipsed such traditional oilbearing commodities as peanuts, copra and palm kernels. As U.S. soybean exports continue their expected rapid expansion, the U.S. role in the international market for vegetable oils and oilseeds will become even more dominant. If past trends continue, it is only a matter of time until exports of soybeans and soybean products reach the billion dollar mark.

**Cotton Export Prospects**

The longterm trend in our cotton exports contrasts sharply with that of other major commodities. During the 1890's, cotton exports ranged from 5 to 8 million bales per year. As recently as the 1930's, cotton exports averaged close to 7 million bales per year. But since World War II, two important developments—the emergence of several new exporting countries and growing competition from synthetic fibers—has made the expansion of cotton exports difficult. The use of synthetic fibers is expanding much more rapidly abroad than the use of cotton, thus reducing cotton's share of the overseas fiber market. Cotton exports, facing continuing keen competition from other suppliers and synthetic fibers, are likely to remain at about current levels.
Tobacco Export Prospects

Tobacco exports, though edging upward during the past several years, have been rather stable during the postwar period. But, like cotton, tobacco faces stiff competition from newer producing countries, especially Rhodesia. Most of the growth in world tobacco trade in recent years has been accounted for by the expansion in exports of the newer exporting countries. With a sustained effort to improve our quality advantage, tobacco exports should expand modestly over the next few years.

Export Prospects for Livestock Products

Until quite recently prospects of significantly expanding our exports of livestock products did not seem good. However, annual exports, ranging from $500 to $700 million between 1955 and 1963, are now beginning to expand. Preliminary figures for fiscal year 1964 show the value of livestock product exports moving up toward $800 million.

Nonfat dry milk, frozen poultry, pork and variety meats have made significant gains over the past few years. Exports of nonfat dry milk this past year reached a record level, more than doubling the level of the late 1950's. In addition to sizable shipments of nonfat dry milk for use under the Food for Peace program, growing quantities are beginning to move to Western Europe, where they are used largely as an ingredient in feedstuffs.

Exporting nonfat dry milk to the less developed regions is a practical way of using our agricultural production potential to alleviate diet deficits in animal protein. Nonfat dry milk ships and stores well. It is especially important in the U.S. sponsored school lunch programs now operating in many less developed countries as part of the Food for Peace program.

Beginning in the late 1950's, there was a rapid rise in our exports of frozen poultry. But this was seriously set back by the imposition of import restrictions in the EEC countries. With rapid growth in exports to non-EEC countries, however, the long-term prospects for expansion are good.

Exports of variety meats, approaching 200 million pounds this past year, are expected to continue to gain. The rapid growth in variety meat exports reflects the rapidly rising income levels in the major importing countries of Western Europe. Exports of pork, the other livestock product doing very well in recent years, have nearly doubled over the past several years. Other developments such as exports of small quantities of feeder cattle and young calves to Europe, also hold some promise for the future. It now appears that exports of livestock products are beginning to rise, perhaps initiating a long-term trend.
Summary

A review of the various projections of U.S. farm exports made over the past several years is revealing. The one consistent element in all the projections is the tendency to underestimate future export levels. This has been true for most individual commodities as well as for total agricultural exports.

Both population and per capita incomes are increasing more rapidly than ever before. In Europe and Japan, where population growth rates are low, demand is expanding largely as a result of rising per capita incomes. Given their limited land resources and the high production costs associated with attempting to get more and more output from a fixed land area, these regions must turn to imports to fill their needs.

In the less developed regions of Asia, Africa and Latin America most of the additional food needs will arise from increases in population. Many less developed countries, lacking both new land to bring under cultivation and the capacity to raise yields rapidly, will be faced with growing shortages of food.

The forces which have resulted in a doubling of U.S. farm exports over the past decade still exist. They may have an even greater impact on the level of U.S. farm exports in the years ahead, further increasing the share of our farm output moving abroad.