A Look Ahead for Food and Agriculture

By R. F. Daly and A. C. Egbert[1]

No one can exactly anticipate future changes in demand, technology, production, and prices of farm products. Yet farmers, legislators, and administrators are forced to make decisions each day that have impacts extending well into the future. They look to the economist and statistician to appraise current and prospective trends in agriculture as guides in decision-making in a free economy. Projections in this article roughly sketch some trends and developments considered likely in agriculture during the next 10 or 15 years. They are not precise estimates nor are they plans based on specific program assumptions. The appraisal points out likely demand changes and probable growth in the output potential of U.S. agriculture.

AGRICULTURE in the United States is a complex, dynamic industry. There are many forces that will shape it in the future. These include population and income growth, technological changes both inside and outside agriculture, foreign market developments, and shifting consumer preferences. Agricultural output will continue to grow as domestic and export markets expand. Although per capita use of farm products is expected to change little, there will be substantial changes in diet, in relative prices, and in the organization and use of resources in agriculture.

Appraisals of output potential, resulting from technology and other economic forces, lead to the overriding conclusion that farm output can more than keep pace with population growth and other factors expanding the domestic demand for farm products in the next 10 to 15 years. It can also keep pace with an export expansion during the next 10 years equal to the increases of the 1950-60 decade and still leave around 10 percent of our cropland resource idle. Moreover, if all cropland currently diverted from production under various programs were brought under cultivation, crop output could be increased at least 60 percent above the 1959-61 average by 1980.

Further reductions in the number of farms are in prospect as smaller farms are consolidated into larger commercial family farms. Continued substitution of capital and other inputs for labor and land will result in great gains in productivity as well as shifts in the organization and use of resources in farming.

Although projections imply little overall change in total resource inputs, increases in land and capital inputs are indicated for the larger commercial farms. Large increases in investment and working capital would accompany shifts in the organization of agriculture. An agriculture of large units implies changes in traditional extension work, research, and possibly in the role of Government.

A number of changes during the last two and a half decades have raised agriculture's output potential 70 to 80 percent. Technological advances, including hybrid seed, fertilizer, insecticides, disease controls, and feeding techniques, have been rapid in agriculture. These

[1] Although the authors are largely responsible for preparing this report, the work was carried on under the general direction of the ERS Committee on Economic Projections--R. F. Daly, Chairman; Glen Barton, Robert Olson, Mark Regan, and Quentin West. Several ERS staff members, including J. D. Ahalt, Don Durost, and Jim Naive, participated in various phases of preparation. Others of the ERS staff provided basic data and assisted in developing and appraising the projections. These included W. Askew, H. Bluestone, M. Clough, A. Conover, J. Donald, G. Kromer, D. Kuryloski, A. Mathis, B. Pubols, and R. Rizek.

developments have led to a greater commercialization of farming with more and more of productive inputs coming from outside agriculture. Family farms have larger acreages per farm, with more capital, but with little change in labor use per farm. For agriculture as a whole, the downtrend in the use of labor has been largely offset by increased use of capital; combined resource inputs--land, labor, and capital--have changed little in the last 15 years.

Consumption patterns, too, have changed. With rising incomes, shifting tastes, development of substitute products, and lower relative prices, food consumption trends have in general been away from lower cost, starchy foods toward more costly high-protein and processed foods. Development of substitute products has made inroads on normal use patterns, particularly for fibers and industrial oils.

Foreign markets for U.S. agricultural products have increased more rapidly than domestic markets, with the expansion in commercial exports and the step-up in export assistance under Food for Peace programs.

Projections in this report draw on numerous analyses and appraisals. Some are based on formal statistical models, others only on trends and a knowledge of factors affecting them. Accordingly, the projections consider, implicitly or explicitly, important factors which will shape the growth and development in agriculture in the years ahead. The picture of the agriculture of the future is a rough sketch, rather than a map of estimates of demand, output, and organization of agriculture.

Export projections assume levels that would be attained if quantity increases for each decade from 1960 to 1980 about matched the quantity increase of the 1950-60 decade.[2] For some commodities, particularly feed grains and vegetable oils, this assumption may turn out to be low if more recent trends continue.

Although policy assumptions are difficult to specify in long-run appraisals, the projections imply some type of program to stabilize farm prices and income. Finally, the projections assume no extended war or depression.

Domestic Markets For Farm Products[3]

Population increased by 26 percent from 1950 to 1964, when it was 192 million. Projections of most likely population growth (Census Bureau B alternative) push the total to 245 million by 1980 (fig. 1). Growth in the next few years will approximate 1.4 percent per year compared with the 1.6 annual growth rate from 1950 to 1964. A population of 245 million people by 1980 would be about 28 percent above 1964, an annual growth rate a little below 1.6 percent. While most rapid growth occurred in age groups under 19 and over 65 years old from 1950 to 1964, largest increases in the next 15 years will be in age groups 20-24 and 25-34 years as the postwar upsurge in births moves into these age groups. Such changes in the age composition of the population will have important impacts on growth in the labor force, on family formation, on the burden of school facilities, and on consumer purchases for food and other goods

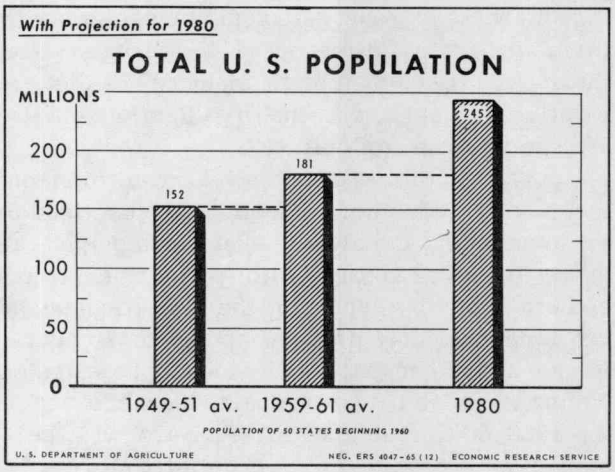

Figure 1

[2] There is great uncertainty about foreign import demand and its implication for U.S. agricultural exports. Much of this uncertainty arises from changing Government policies--both foreign and domestic--and the rate of economic development throughout the world.

[3] A statistical supplement which presents data on which the following charts are based and also presents commodity supply and distribution detail is available on request from the Outlook and Projections Branch, ESA, ERS, USDA.

and services. It is not possible, however, to measure accurately the impact of prospective changes in the age composition of the population on demand for farm products. The younger age groups are known to be heavy consumers of food, but at the same time, numbers in the older age groups, who consume less than the average, also will be increasing.

During the last 15 years the economy, as measured by the gross national product, grew at an annual rate of nearly 3.7 percent a year. With rising output per man-hour and a somewhat more rapid growth in prospect for the labor force, the economy is expected to expand by possibly 4 percent a year during the next 10 to 15 years (fig. 2). A projected increase in the gross product of around 75 percent from 1965 to 1980 would result in a gain of about 40 percent per capita in consumer buying power. This represents an annual gain of around 2.3 percent.

Food consumption per person does not change much in response to rising income at the high consumer-income levels of recent years. Buying power per person is estimated for 1965 to have been some 37 percent above the 1949-51 average. During this same period the index of per capita food consumption increased only 3 percent. Retail food prices rose, but more slowly than the consumer price index for all goods and services. The moderate rise in per capita food use reflected primarily an upgrading in the diet toward higher priced livestock products and processed foods. Pounds of food and calories consumed per person have trended slightly downward in the postwar years. Small changes are projected in these measures of combined food consumption per person during the next 10 to 15 years, although modifications in the diet will continue with rising incomes and changes in relative prices of different foods.

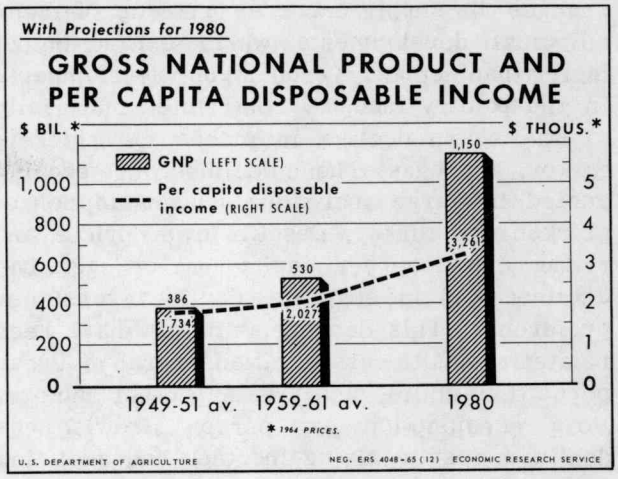

Figure 2

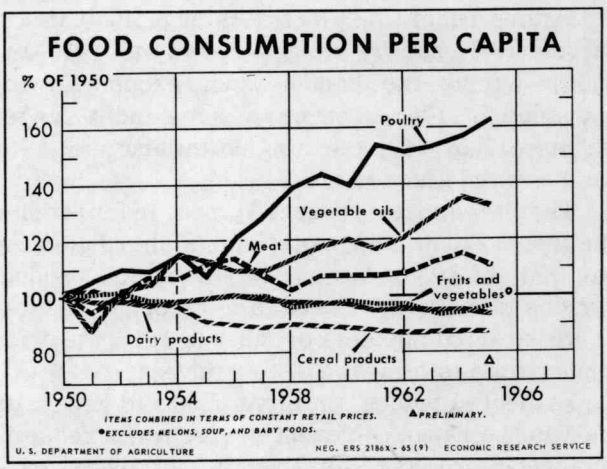

Figure 3

Trends In Our Eating Habits

The eating habits of the average American have changed materially in the past and are likely to do so in the future. Some of these diet changes have been underway for several decades. For example, the decline in per capita consumption of potatoes, wheat, and butter began five or six decades ago. On the other hand, per capita use of fluid and condensed milk has been falling for about two decades and the decline in egg consumption only began during the 1950 decade. Per capita use of food fats and oils and combined use of fruits and vegetables have remained relatively steady (fig. 3). These longer-run trends in consumption patterns result primarily from trends in relative prices, changing tastes, introduction of convenience foods, rising incomes, changes in the type of work, and farm-to-city migration of rural people.

Shorter-term variations in diets also occur with changes in relative prices (fig. 4). These result mainly from changes in supply associated with production cycles, seasonal variations, and the weather. In some instances, dramatic

changes in supply occur as a result of technological developments which expand output faster than demand. Technological developments in the poultry industry contributed materially to the sharp decline in prices for chicken, turkey, and eggs. These declines were accompanied by large increases in consumption of chicken and turkey. Despite lower prices and rising incomes, per capita use of eggs has declined, and this suggests a decline in consumer preference. This demand shift may have been related to health considerations, rural-to-urban population shifts, and possibly other factors. Pork consumption per person likewise has declined despite rising incomes and declining prices. Except for cheese and ice cream, per capita consumption of dairy products has trended downward. Declines for these products have been accompanied by little change in prices.

Prices received by farmers have fluctuated in a relatively narrow range--230 to 240 (1910-14= 100)--during the last decade, except for the advance in 1958. The crop price index ranged from 222 to 240, trending downward until 1960 and upward since (fig. 5).

The livestock product price index varied between 225 to 255, except for a sharp advance to 273 in 1958. After 1958, livestock product prices trended downward to a low of 235 in 1964. With reduced supplies of meat in 1965, the price index rose to almost 270 by midyear.

Projected prices for farm products generally fall in the range of recent years. An increase in prices is projected for livestock products, particularly from the reduced levels of 1964. Projected prices for crops trend slightly lower than the average of recent years. On balance, price levels projected for farm products as a whole average close to 1964 levels.

The strong demand for beef and veal is expected to expand further and lead to increases in per capita consumption, possibly to around 117 pounds by 1980 (fig. 6). This level compares with around 105 pounds in 1964. Thus, total domestic demand for beef projected for 1980 ranges some 40 to 50 percent above the high 1964 production rate, which was near the top of the production cycle. On the other hand, per capita use of pork is expected to decline moderately, from 65 pounds in 1964 to less than 60 pounds by 1980. With this moderate decline in per capita use, the total domestic market for

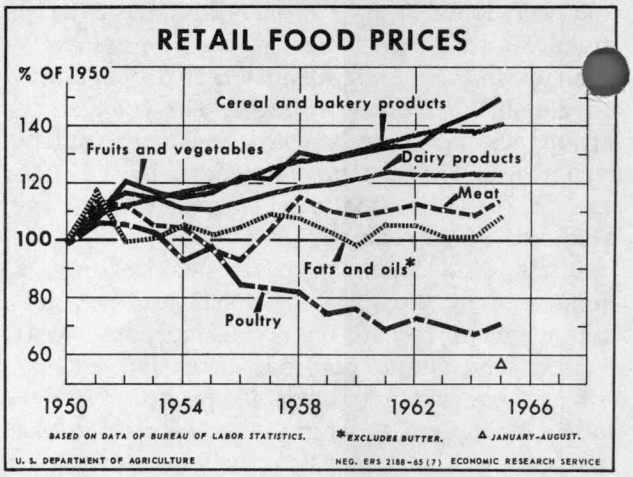

Figure 4

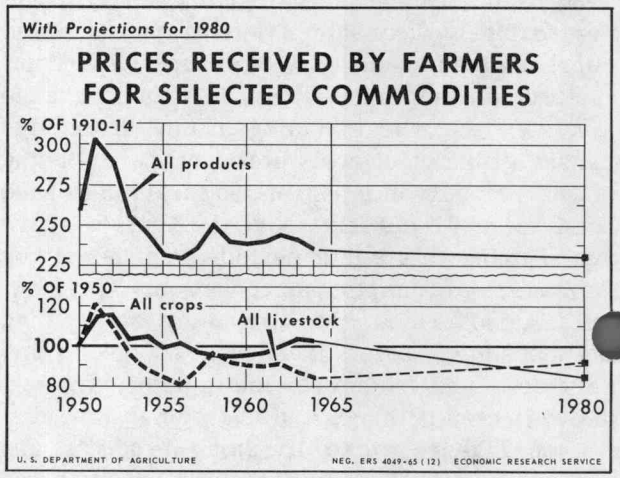

Figure 5

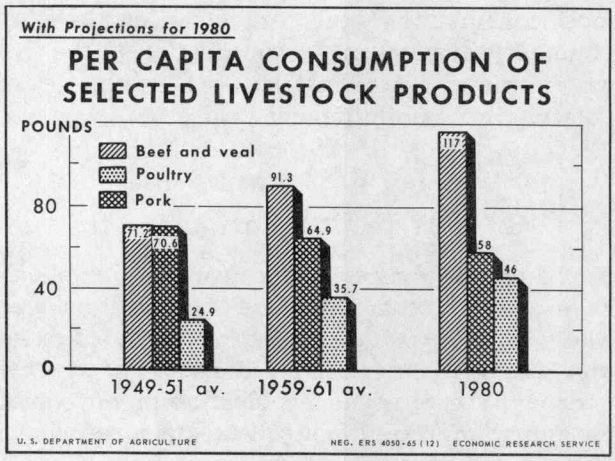

Figure 6

hogs is projected to increase around 16 percent from 1964 to 1980. Consumption of chicken and turkey per person probably will continue to expand with rising incomes and prospects for further price declines as production efficiency improves. Projections for 1980 point to an increase of around 50 percent from 1964 in total consumption of poultry.

The downtrend in per capita consumption of eggs is expected to continue, though at a slower rate than during the last decade. Accordingly, domestic consumption of eggs is projected to rise nearly one-fifth from 1964 to 1980 (fig. 7). Similarly, a further, but moderating, decline in per capita consumption of all milk products is projected. Declines in per capita use are in prospect mainly for fluid milk and cream, condensed milk, and butter; consumption gains appear likely for ice cream and cheese. Combined domestic use of milk products projected for 1980 totals around one-fifth larger than in 1964.

Per capita consumption of food fats and oils is likely to remain steady over the next 15 years, much as it has in the past (fig. 8). Moreover, the shift from animal to vegetable sources is expected to continue. The proportion of animal fats in total per capita consumption of food fats and oils was nearly 50 percent in 1949-51, but it fell to 30 percent in 1959-61. This proportion is projected to decline, possibly to around 20 percent of the total by 1980.

Potato consumption per person over the next 15 years may change little (fig. 9). An uptrend in use of potatoes in frozen and processed products is likely to be largely offset by further reductions in fresh uses. Total consumption of potatoes projected for 1980 is around one-fourth larger than in 1964, or about equal to population growth. Per capita consumption of fruit and other vegetables is projected to rise some in the coming years with increased use of processed (canned, frozen, dried) items. Vegetable consumption in total is projected to be one-third larger in 1980 than in 1964. A somewhat bigger gain is indicated for fruits from the relatively low level in 1964 when citrus production was still recovering from earlier freeze damage.

As noted earlier, per capita consumption of wheat products has been declining over a half century. The decline in the future is expected to moderate as the rural-to-urban population shift

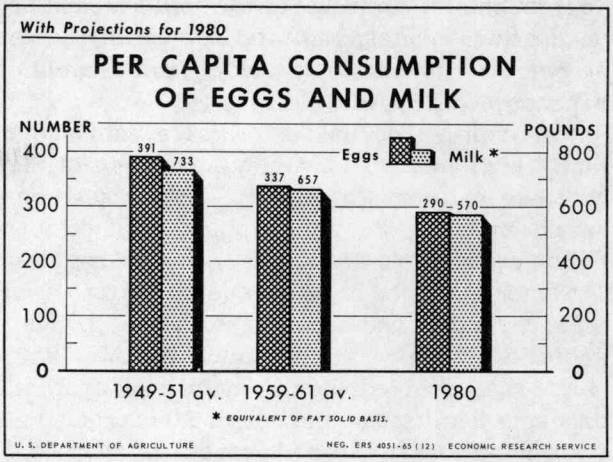

Figure 7

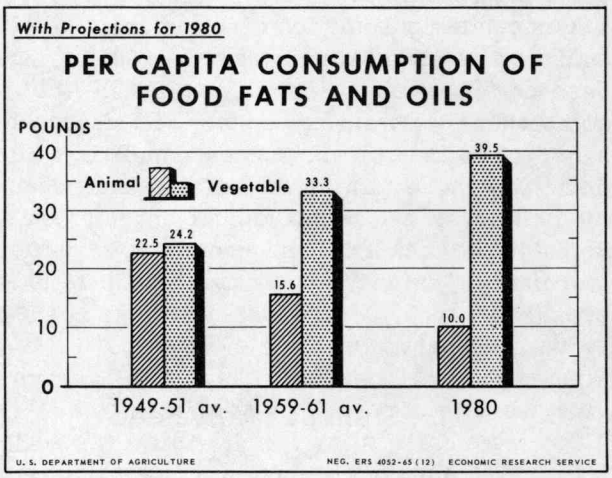

Figure 8

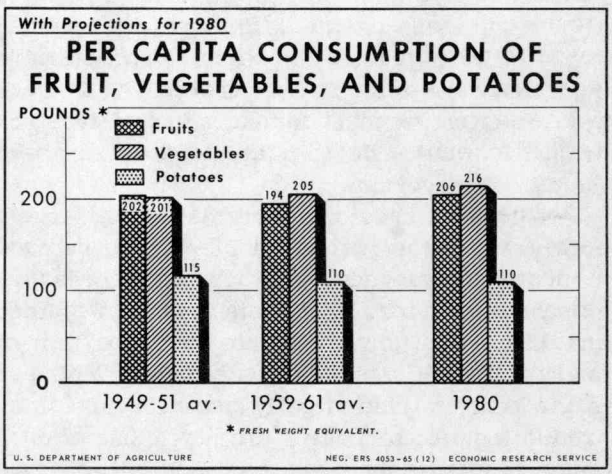

Figure 9

approaches its limit and as the shift to sedentary occupations abates. But total domestic food use of wheat may increase little from levels in recent years (fig. 10).

Per capita food use of other cereals--corn, rice, rye, oats, and barley--as a group may continue to increase slightly. There has been a small increase in per capita consumption of corn products and of rice in recent years.

Nonfood uses of farm products--cotton, wool, tobacco, fats and oils, and some grains--dropped sharply during much of the 1950's (fig. 11). Increased use of a number of synthetic products has limited the use of farm products in traditional markets for fibers, soaps, and paints. Nonfood uses in total are projected to decline further, but at a much slower pace than in postwar years.

Per capita consumption of cotton, in the face of stiff competition from man-made fibers, has been declining since World War II. The future competitive position of cotton will depend to a large degree on the prices domestic mills must pay for cotton, prices of substitute man-made fibers, and technological developments. Some improvement in the competitive position of cotton in domestic and export markets is in prospect.

The Demand For Feed

Total domestic demand for livestock and livestock products is projected to increase by 1980 somewhat more rapidly than the expected rise in population. Per capita consumption of all livestock and livestock products, in terms of 1957-59 farm prices, is projected some 5 percent above the 1959-61 average by 1980. At these per capita rates, total domestic use of livestock products would be about 40 percent above the 1959-61 average.

Projected expansion in livestock output largely accounts for the estimated rise in the demand for feed concentrates (fig. 12). But with favorable livestock-feed price relationships assumed and the trend toward a larger proportion of grain-fattened beef, the increase in feed use is projected to rise slightly faster than livestock production. Accordingly, projected use of total concentrates rises to about 231 million tons by 1980. This is an increase over the average of

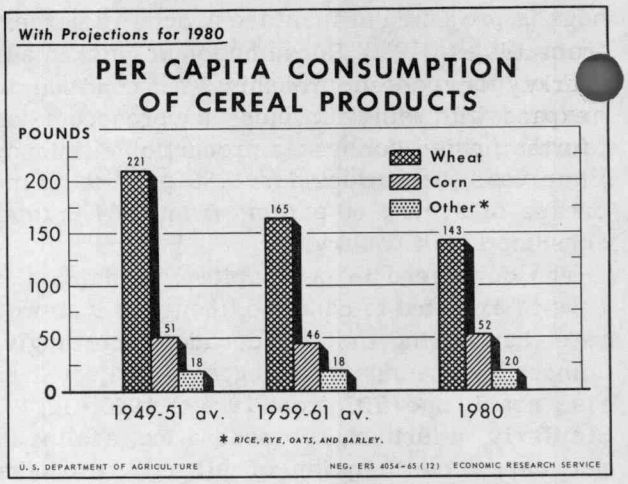

Figure 10

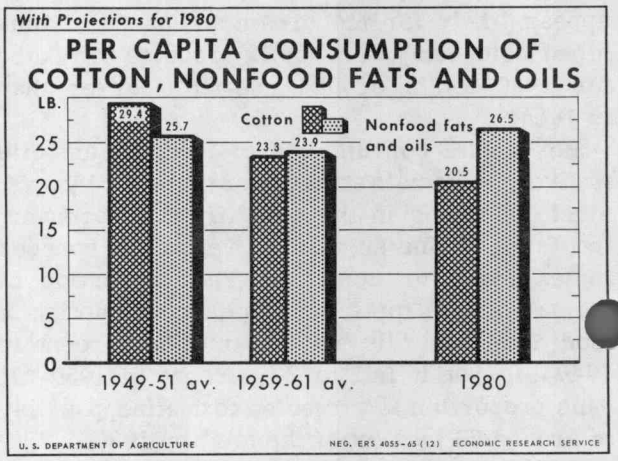

Figure 11

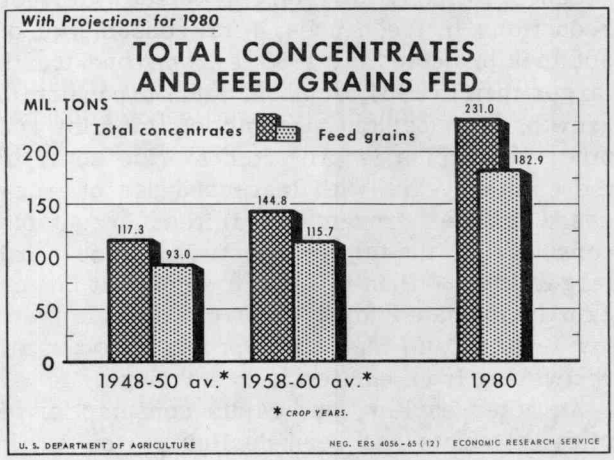

Figure 12

1958-60 feed years of about 60 percent. Use of the four major feed grains is estimated to expand by about 53 percent over 1958-60 by 1980. Consumption of high-protein feed is estimated to increase slightly faster than that of other concentrates, reflecting a continuation of postwar shifts to higher protein rations and projected changes in the livestock output mix. However, use of urea as a high-protein feed supplement--a recent innovation--may significantly depress the demand for conventional high-protein feeds.

Export Markets

Over the last decade, U.S. crop exports have more than doubled, reflecting expanding commercial markets and greatly increased exports under P.L. 480 and other export assistance programs. In recent years, there has been an upsurge in commercial exports, especially of soybeans, soybean meal, and feed grains. Exports of livestock products have nearly tripled since 1950, but the dollar value is still small compared to crop exports. The large increases have come in poultry, nonfat dry milk, and butter (fig. 13).

Exports in the years ahead will depend on number of factors. Among these are export programs of the United States, agreements set up among competing nations of the world, domestic policies affecting imports and exports, growth in population and income, and technological developments at home and abroad that affect food and fiber production. Because of the uncertainties surrounding these factors, exports are assumed to increase much as they did during the 1950's.

A further rise in both crop and livestock exports is assumed, although livestock exports will likely remain a small percentage of total agricultural exports.

Crop exports are projected to rise about 75 percent above the 1959-61 average by 1980. Over this period, crop exports will continue to be about 20-25 percent of total crop output.

Under the export assumption, wheat exports would be about 85 percent above 1959-61 by 1980 and amount to about 1,100 million bushels (fig. 14).

Feed grain exports are expected to expand, especially to Western Europe and Japan where

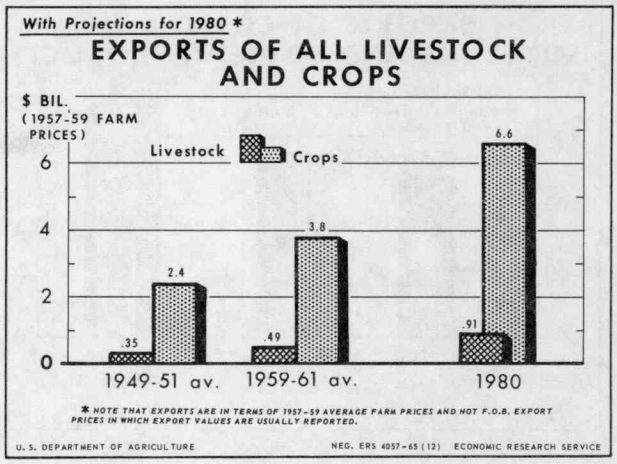

Figure 13

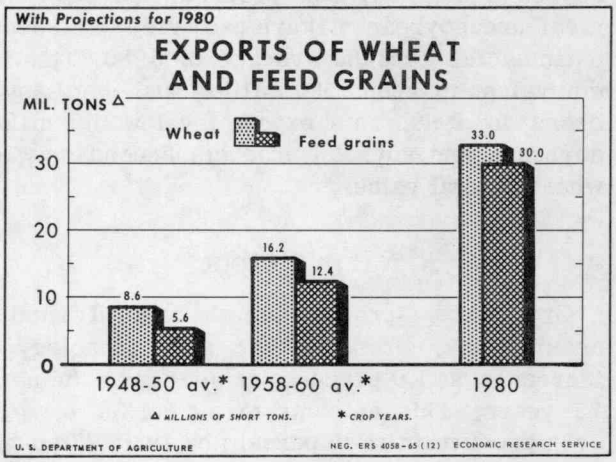

Figure 14

rising incomes are stepping up the demand for livestock. These exports would reach 30 million tons by 1980. This rate of increase is well below the rapid increase during the past 5 years. However, with full use of diverted land feed grain exports could easily be more than doubled.

Cotton exports have varied widely over the last decade, averaging about 5 million bales. In recent years there has been increasing competition from Mexico, Egypt, and a few other areas. However, cotton exports under the assumed trend would total about 7 million bales by 1980 (fig. 15).

Exports of oilseeds and oilseed products, particularly soybeans, have increased dramatically during recent years, usually exceeding

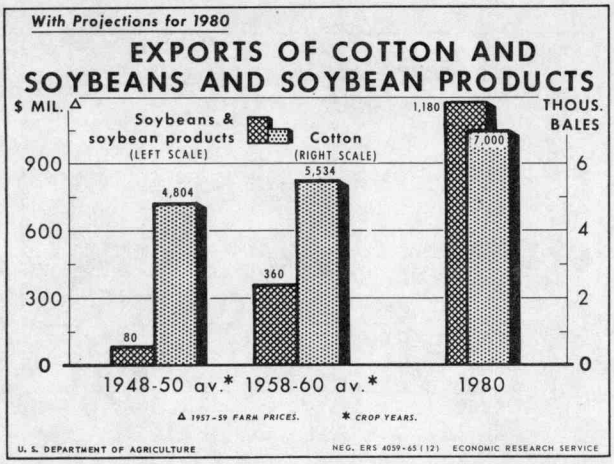

Figure 15

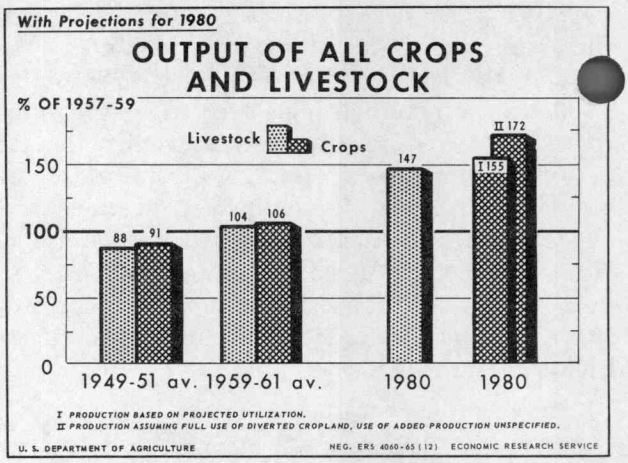

Figure 16

the most optimistic expectations. Exports of soybeans and soybean products (soybean oil meal and soybean oil) are projected to be over 3 times the 1958-60 average by 1980. This is equivalent to about 580 million bushels of soybeans by 1980. This export level would make soybeans and soybean products second only to wheat in total value.

Farm Output

Crop output--projected on the basis of demand assumptions, crop prices, and technology--increases at 1.9 percent per year over the next 15 years. This amounts to a total increase in crop production of 46 percent by 1980. Although food use of crops is expected to rise slightly less than this rate, feed uses which make up 40 percent of total crop output are projected to increase a bit faster as demand for livestock products increases. Exports, too, are expected to increase at a rate more rapid than output. Largest production gains among the crops are expected for soybeans, feed grains, and some fruits and vegetables.

Crop production, however, could be much higher than this projected level if all the cropland presently diverted under the various programs were planted to crops. If we assume that this will be the case and also that cropland use will be in line with current trends, crop production could be almost 60 percent above the 1959-61 output level by 1980 (alternative II in figures 16-19 and table 1). These output levels

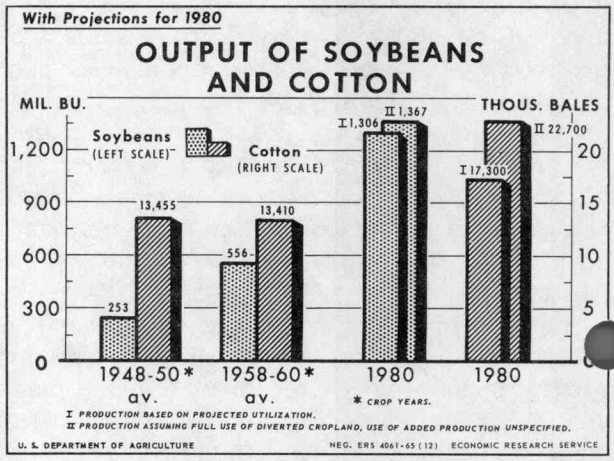

Figure 17

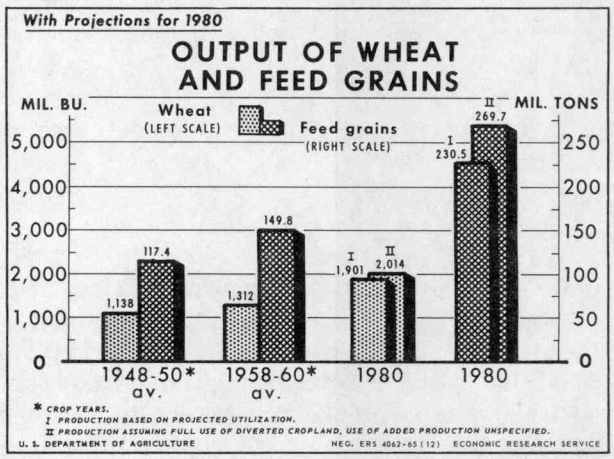

Figure 18

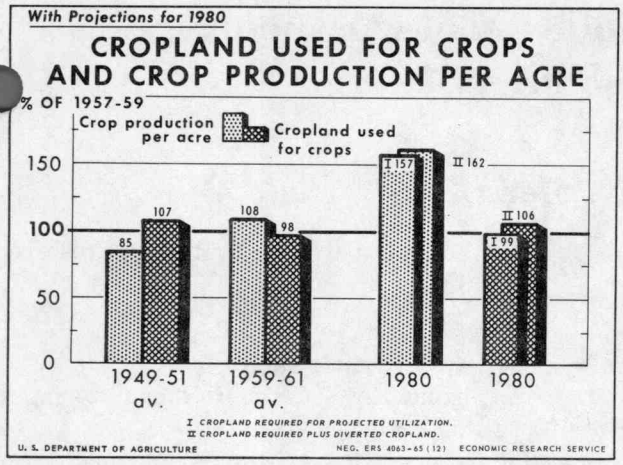

Figure 19

Table 1.--Crop acres harvested, yield per harvested acre, 1949-51 and 1959-61 averages, 1964, and projections for 1980 under two alternatives

(calendar year)

Commodity	Average		1964	Projections to 1980	
	1949-51	1959-61		I [2]	II [3]
Acres harvested:					
Corn for grain....Mil. acres.	73.6	67.4	57.1	64.2	78.2
Oats.....do....	37.4	26.1	20.4	13.5	11.5
Barley.....do....	10.2	13.9	10.7	11.9	10.0
Grain sorghum.....do....	8.5	14.0	11.9	16.3	21.0
Wheat, all.....do....	66.5	51.7	49.2	57.1	62.0
Rice.....do....	1.8	1.6	1.8	1.6	2.2
Soybeans.....do....	12.6	24.4	30.7	43.2	45.4
Peanuts.....do....	2.2	1.4	1.4	1.0	1.4
Cotton.....do....	24.1	15.4	14.1	11.5	15.0
Hay, all.....do....	74.3	66.9	67.9	57.3	60.3
Other crops.....do....	38.6	34.3	35.9	40.0	40.0
Total cropland harvested[1].....do....	341.3	310.0	294.6	312.6	340.0
Yield per harvested acre:					
Corn for grain.....Bu....	37.8	56.2	62.1	101.1	100.1
Oats.....do....	34.5	41.1	43.2	60.0	60.0
Barley.....do....	26.1	29.9	37.8	42.0	42.0
Grain sorghum.....do....	21.4	39.4	41.1	52.7	51.3
Wheat.....do....	15.6	23.9	26.2	33.1	32.5
Rice.....Lb....	2,328	3,381	4,095	5,200	5,200
Soybeans.....Bu....	21.6	24.1	22.8	30.1	30.1
Peanuts.....Lb....	842	1,218	1,551	2,300	2,300
Cotton.....do....	275	449	524	725	725
Hay, all.....Tons..	1.39	1.72	1.71	2.50	2.50

[1] Does not equal total harvested acreage due to double cropping.
[2] Cropland use and yields based on projected utilization.
[3] Cropland use and yields assuming full use of diverted cropland, use of added production unspecified.

are more than 10 percent above projected use of crops in 1980, and they illustrate how much total demand for U.S. crop production could be expanded both for domestic use and for exports without any special land or other resource development programs. Moreover, if this production potential could be used to increase exports alone, exports in total could be at least 40 percent higher than the projected levels in 1980.

Production of livestock products, responding to projected increases in demand, rises slightly faster than population. Largest output increases are expected for beef and poultry. Production of hogs, milk, and eggs is projected to rise, but at a rate slower than population growth.

Around 335 million acres of cropland are currently used for crops, with some 55 to 60 million acres withheld from production under the Conservation Reserve and grain programs. The decline in acreage used for crops in the last decade was accompanied by improved technology, increased resource use per acre, and a dramatic increase in crop yields. With continued improvements in farm technology and rising yields, projected output requirements, under alternative I, point to little if any increase in the acreage of cropland used for crops. Large yield increases and limited demand expansion point to smaller acreages for cotton and minor feed grains and possibly for wheat. Larger acreage requirements are projected for soybeans, corn, and a number of miscellaneous crops.

Under alternative II, with the diverted acreage coming back into production, there would be major shifts in crop production, particularly for wheat, cotton, soybeans, corn, and grain sorghum. It was assumed that acreage withheld from production would in general move back as wheat, corn, or cotton land, for example. However, such trends as the contraction in oat acreage and the expansion in soybean acreage were assumed to continue. Total cropland used for crops would about equal the average level for 1949-51. It should be pointed out, too, that demand pressures and relative prices also could modify the acreage pattern.

Output under full use of diverted cropland would rise sharply as land was brought back into production. After this initial upsurge, output could continue along the present trend in output growth as a result of the development and adoption of new technology. Output per acre, consequently, would be nearly the same under both land use alternatives. The slightly higher output per acre under the higher acreage alternative results from an acreage mix which includes proportionately more high-yielding crops, particularly cotton and corn.

799-558 O-66—2