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# AGRICULTURAL ECONOMICS RESEARCH

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## The Long-Run Demand for Farm Products

By Rex F. Daly

*No one knows exactly what the demands for farm products will be in 1960 and 1975. Nor can anyone foresee the exact supplies of agricultural commodities in these years. Yet farmers, legislators, and administrators of agricultural programs cannot work entirely in the dark. They must base their plans upon the best possible estimates of future demand and supply conditions. They expect the economist and the statistician to analyze current and prospective trends and to make useful projections indicating the probable direction of major changes in the future. With these needs in mind, the United States Department of Agriculture in the past has made and published several projections of the long-range demand for and supply of farm products. The present report brings up to date the Department's projections of potential demand for farm products around 1960 and 1975. While these projections show a substantial increase in total demand for farm products, they indicate some sharp differences in trends. For example, they point to sizable increases in the demand for livestock products and fruits and vegetables, and decidedly more limited increases for food grains and potatoes. Projections of demands and supplies are made on the basis of certain assumptions. We have assumed a stable price situation and a trend toward world peace. We have also made assumptions concerning such factors as population, labor force, employment, hours of work, and productivity. The projections shown in this report are not forecasts. Rather, they indicate what trends we would expect in the demand for farm products under a set of assumptions. The projections could go wrong if we suffered a long business depression, or if we became involved in a large-scale war, or if nutritional findings or consumer preferences brought changes in consumption patterns appreciably different from those indicated in this report.*

FREDERICK V. WAUGH

**G**ROWTH IN DEMAND for farm products during the next quarter-century will depend primarily on growth in population and consumer income. Total requirements for farm products for domestic use and export under conditions of full employment are projected for 1975 to a level around 40 to 45 percent above 1953. Population growth of 30 to 35 percent would contribute most to this expansion in demand. If current consumption rates are assumed, requirements for farm products would rise about a third. But with an approximate doubling in the size of the economy and rising consumer incomes, per capita consumption of farm products may increase about a tenth

from 1953 levels. The increase would reflect primarily a shift to higher unit-cost foods rather than consumption of more food.

Projected use of livestock products increases by about 33 percent if current consumption rates are assumed, and by more than 40 percent for the higher projected consumption rates. Increases for cattle, hogs, and poultry would be larger than for sheep, dairy products, and eggs. Food use of crops on the average may total around a third larger in 1975 than in 1953, with much of the increase in vegetables and fruits, especially citrus. Little increase in use of food grains and such crops as potatoes and dry beans is indicated.

The projected rise in requirements for feed concentrates and hay, for the two consumption levels assumed, range from about 25 percent to around 40 percent from 1953 to 1975. These gains reflect the rise in livestock production. Substantial increases in total use of such nonfood crops as cotton, tobacco, and some oils are in prospect. Most of the tabulations in this report were computed on the basis of a population of 210 million people by 1975. If the higher population assumption of 220 million people is used, projected utilization and needed output would be 5 percent higher.

Foreign markets could take relatively large quantities of our cotton, grains, tobacco, and fats and oils in coming years. The volume of agricultural exports projected for 1975 is about a sixth above 1952-53, and somewhat below the large volume exported during the 1955-56 fiscal year, when large export programs were in effect.

Different rates of growth in demand and trends in technological developments on the supply side will make supply increases more difficult for some commodities than others. Under the projected consumption rates, production of livestock products as a whole would need to increase more than 40 percent from 1953 to 1975—around 45 to 50 percent for meat animals and poultry products, nearly 30 percent for dairy products.

Output increases that would be needed to match projected requirements based on current consumption rates are in general smaller—possibly around 25 to 30 percent above 1953 for most types of livestock products. With crop output well in excess of requirements in 1952-53, an output increase from that base year of about a fourth would meet prospective expansion in utilization under projected consumption rates. A smaller output of food grains, and little increase in potatoes and beans, would be indicated for 1975. Sizable increases in production, however, are suggested for feed grains, many vegetable crops, and fruits.

### Why and How Projections Were Made

Appraisals of long-run demand for agricultural products are of continuing interest to farmers, consumers, industries that sell to farmers, other industries, legislators, and the Government. It should be realized that such projections are not forecasts. They are based on specific assumptions as to growth in population, labor force, and levels

of consumer income. The major assumptions on which these projections are based are as follows:

1. Population will increase to 210-220 million people by 1975.

2. Labor force and employment will grow commensurately with the growth in population. A high-employment economy is assumed with unemployment averaging around 4 to 5 percent of the labor force.

3. A trend toward world peace is assumed, with the proportion of the Nation's output devoted to national defense becoming smaller.

4. Productivity of the labor force will grow much as in the past. Even with fewer hours of work per week, real income per capita for the total population may increase by more than 50 percent.

5. Prices in general are assumed at 1953 levels both for agriculture and for the economy as a whole.

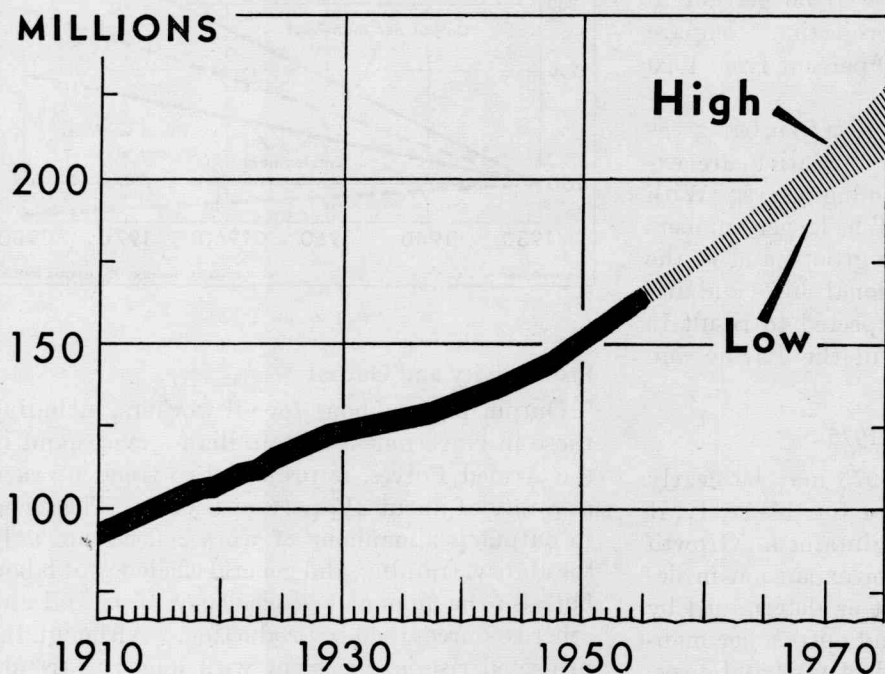
Projections of this kind are of value in looking ahead to the possible role of agriculture in the future. Despite the fact that such projections are bound by the assumptions under which they are made, they highlight the underlying trends that affect agriculture. Within this framework some indication of the problems that are likely to emerge in agriculture, the directions of the research needs, and the potential markets for farm products, can be appraised. This gives some basis for appraising what agriculture might be called upon to do in terms of the needs for food and fiber in a prosperous, growing economy.

In appraising long-term growth in demand we have no economic forecasting techniques that are highly accurate, or to which usual probability error limits can be applied. Long-run economic appraisals are not unconditional predictions of the future; they are at best projections made in a framework of assumptions. The nature of growth and change in the economy, over time, does not lend itself to the rigorous type of analysis used in short-period or static appraisals.

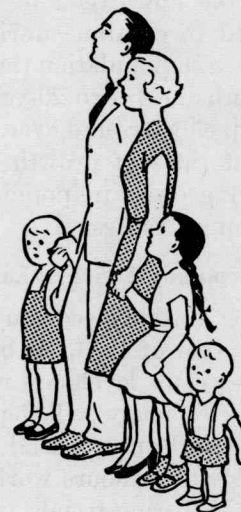
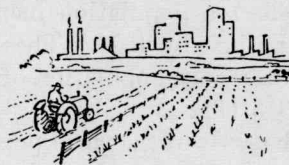
The long-run appraisal must be concerned not only with current relationships but with possible changes in these relationships over time. The influence of prices and incomes on consumption probably vary, over time, with changes in real income, popular changes in "taste," technological developments, nutritional findings, and changes in modes of living. Much of the increase in consumption of frozen food during recent years, for

With Projections to 1975

## GROWTH OF U. S. POPULATION



1910 - 55 ESTIMATES AND 1955 - 75 PROJECTIONS FROM CENSUS BUREAU



U. S. DEPARTMENT OF AGRICULTURE

NEG. 1058-56 (4) AGRICULTURAL MARKETING SERVICE

FIGURE 1.

example, can probably be attributed to factors other than changes in price and income. Likewise, some trends in per capita consumption of potatoes and cereals apparently reflect nutritional developments and changes in modes of living.

Methodology used for long-run appraisals must be largely historical insofar as past relationships and trends in economic, social, and political conditions provide a basis for appraising the future. Stability of rates of growth and the general inertia of consumer behavior patterns provide much of the foundation for an appraisal of prospective growth in demand for farm products during the next two or three decades. At best, refined statistical techniques must be supplemented by judgment. Despite the problems involved, projections of this type will be made as long as individuals are required to make decisions involving long-run commitments.

### General Economic Framework

Expansion in demand for products of the farm depends primarily on population growth and the influence of consumer income and "taste" changes on the consumption of farm products. With rising real incomes, increased population tends to result in a corresponding expansion in demand for farm products. Rising incomes may not greatly expand total consumption but they will vary the rate of growth in demand for individual commodities.

### Population Growth to Continue

Population in the United States in mid-1955 was estimated at more than 165 million people. Projections for 1975, prepared in 1955, range from 207 to 228 millions—somewhat above those made by the United States Bureau of the Census in 1953.

These projections range from about 30 to 43 percent above the base year 1953. Most calculations in this study assume a population increase of about 30 percent from 1953 to 210 million persons in 1975. However, some aggregates are adjusted to reflect a population increase of 36 percent to 220 million by 1975. These projections compare with a rise in population of 30 percent from 1929 to 1953 (fig. 1).

The shift of the rural population to urban areas and the downtrend in farm population are expected to continue during coming years. With growth in population there will be larger numbers in both the 10- to 20-year age groups and in the group 65 years and over. Regional shifts and different rates of growth are expected to result in rapid growth in population in the Pacific and Mountain States.

#### An Economy Twice As Large by 1975

The Nation's economy by 1975 may be nearly twice that of 1953, the base year for this study, if employment levels are well maintained. Growth of the economy will depend on expansion in demand and on potential output as determined by employment, hours worked, and output per man-hour. Recent trends in productivity and prospective growth in the labor force indicate that a doubling in the gross national product in the next quarter-century is highly possible for an expanding peacetime economy.

#### Employment

A labor force of around 72 million workers by 1960 and around 90 to 95 by 1975 is indicated, on the basis of population growth and trends in labor-force participation rates by sex and major age groups. These trends reflect the tendency for more schooling in the lower age groups included in the labor force, for earlier retirement in the older age groups, and for a pronounced increase in the number of women who work.

In the projected framework a growing peacetime economy and a high level of employment are assumed. The length of the work week is expected to continue its long-run downtrend. An assumed unemployment rate of about 4 to 5 percent of the labor force does not rule out the probability of minor ups and downs in the economy in coming years. Depressions as severe as that of the 1930's are not considered likely.

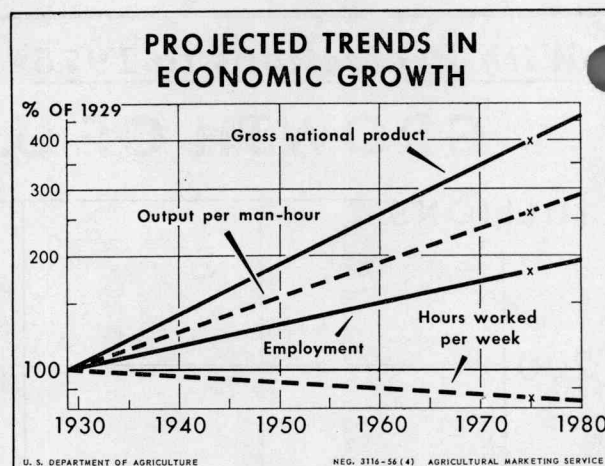


FIGURE 2.

#### Productivity and Output

Output per manhour for all workers, including those in Government and civilian services and in the Armed Forces, is projected to trend upward at a rate of about 2½ percent a year. The trend in output per manhour of work reflects not only the ability, training, and general efficiency of labor, but also the amount and efficiency of capital and other resources used in production. Although the projected rise is consistent with long-run trends, it may be conservative in view of the rapid growth in capital and recent developments in automation and possible new sources of power (fig. 2).

Output of goods and services under the employment and productivity assumptions indicated here would rise at the rate of about 3 to 3½ percent a year. The gross national product of the economy, after adjustment for price level change, doubled from 1929 to 1953, and it probably will at least double again by 1975. Real output of the economy could easily exceed projected levels, if demand increases continue to exert pressure on the economy as in recent years. But a somewhat higher level of total output and real income would not materially change the demand for farm products.

#### Consumer Income and Spending

A doubling of total output of the economy with the associated gain in employment would lead to an increase in per capita real income of around 60 percent between 1953 and 1975; the projected rise for 1960 is 10 to 15 percent. Such an increase in income will expand demand for all goods and services, including food, clothing, tobacco, and

other commodities made from farm products.

Government spending and revenue are expected to trend upward, but it is assumed that the Government will take a relatively smaller share of total output and income than in recent years. Investment outlays for new plant and equipment and residential building will rise with growth in the economy, possibly a little more rapidly than total output (table 1).

### Demand for Farm Products

Total demand for farm products over time can be thought of as a relatively inelastic relationship between consumption and price—a relationship that shifts rather continuously in response to growth in population and real income. Thus the demand for farm products during the next quarter-century will depend to a large extent on population growth. Rising incomes, however, will contribute not only to an expanding total demand for farm products, but will influence the types of products that consumers want. Trends in popular consumption habits and technological developments also will influence changes in demand for farm products. Although foreign takings of farm products are small compared with total demand, the foreign market will continue to be important for such crops as wheat, rice, cotton, tobacco, and oils.

### Population Growth a Major Demand Factor

Population growth during the next two or three decades may add 30 to 35 percent to total demand for farm products. This would be by far the most important contributor to growth in total demand for farm products. With rising incomes, population growth is assumed to add proportionately to the growth in demand for farm products. Some trends in the age composition and regional distribution of population may modify the effect of population on demand for farm products. But the uptrend in numbers of both younger and older persons, the decline in farm population, and regional shifts in population are not expected materially to influence total demand.

### Rising Incomes and Consumption

Consumption of farm products as a whole is not very responsive to changes in either price or income; price and income elasticities are relatively

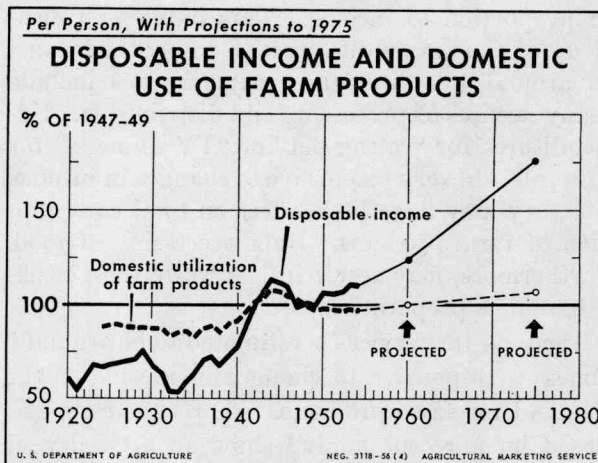


FIGURE 3.

small.<sup>1</sup> As a first approximation in this analysis, general price relationships existing in 1953 are assumed for the projections. Although this assumption temporarily rules out the effects of price change, such changes could have an important influence on consumption. The projected rise of around 60 percent in real income per person will probably result in a small increase in total per capita use of food and other farm products and will modify the pattern of consumption—the kinds of products desired (fig. 3).

*Income effect on consumption.*—Expenditures for food and other farm products tend to increase less, relative to income changes, than do expenditures for many nonfarm products.

Expenditures for food at retail stores and restaurants have increased during recent years about

<sup>1</sup> Income elasticity of consumption may be defined as the response of per capita use of a farm product to changes in per capita income. Suppose per capita consumption of a farm product is expressed in the following form:

$$q = kp^a y^c \quad (1)$$

where ( $q$ ) refers to quantity utilized per person, ( $p$ ) to price per unit, and ( $y$ ) to per capita real income. In terms of equation (1) income elasticity is represented by  $c$  and price elasticity by  $a$ .

This defines income elasticity as the relative change in quantity consumed divided by the relative change in income when other variables are held constant. For virtually all farm products, this relationship should be positive—consumption increases as real incomes rise. For some commodities, however, income elasticity is negative and consumers tend to use less of these products as their incomes rise. Price elasticity represents the relative change in quantity consumed divided by relative change in prices when other variables are held constant. The relationship is negative.

in proportion to income. This implies an elasticity of food expenditures with respect to income of around 1.0. But these expenditures include many services of processing and distribution. Expenditures for "eating out" or "TV dinners," for example, are very responsive to changes in income, but they may have little effect on total consumption of farm products. Bulk processing of food, furthermore, may result in less waste than comes from home preparation.

Demand for services is estimated to be around 5 times as responsive to changes in income as the demand for farm products. Empirical estimates based on a recent study<sup>2</sup> show an elasticity of outlays for marketing and processing (real terms) relative to real income of more than 0.7. The income elasticity of deflated farm value (an approximation of quantity) is only 0.15. The flexibility of retail expenditures (in real terms) relative to income, a weighted average of these elasticities, is about 0.4.<sup>3</sup> Weights are approximated on the basis of the farm share and the margin. The very low income elasticity of demand for farm products at the farm level will result in a long-run decline in the farmers' share. As this would give progressively less weight to the lower income

<sup>2</sup> These analyses are based on estimates of food expenditures, the marketing margin, and the farm value developed in *Changes In Food Expenditures, 1929 to 1954*, a manuscript by Marguerite C. Burk.

<sup>3</sup> Value at retail is the sum of value at the farm and costs of processing and marketing as follows:

$$V_r = V_f + V_m$$

and

$$V_r = a + bI, b = \frac{dV_r}{dI}$$

$$V_f = a_1 + b_1I, b_1 = \frac{dV_f}{dI}$$

$$V_m = a_2 + b_2I, b_2 = \frac{dV_m}{dI}$$

then,

$$V_r = a_1 + a_2 + b_1I + b_2I \text{ and}$$

$$\frac{dV_r}{dI} = \frac{dV_f}{dI} + \frac{dV_m}{dI}$$

The elasticity is,

$$\frac{dV_r}{dI} \cdot \frac{I}{V_r} = \frac{\frac{dV_f}{dI} \cdot I + \frac{dV_m}{dI} \cdot I}{V_f + V_m}$$

and

$$\frac{dV_r}{dI} \cdot \frac{I}{V_r} = \frac{\left[ \frac{dV_f}{dI} \cdot \frac{I}{V_f} \right] V_f + \left[ \frac{dV_m}{dI} \cdot \frac{I}{V_m} \right] V_m}{V_f + V_m}$$

elasticity, some change over time is implied for income elasticities at retail or for the marketing margin.

Changes in consumption are much less responsive to changes in income than are retail expenditures for farm products. For example, pounds of food consumed per person increased some during World War II, but they have not changed much during the last two or three decades. Consumer-purchase studies, based on a cross section of families, indicate that quantities of food consumed per person increase very little as incomes rise. Projected per capita use of food in pounds is about the same as the 1947-49 average.

Most indexes of food use per person are price-weighted to reflect up-grading of the diet as consumption shifts to livestock products and foods of higher cost. Analyses based on the Agricultural Marketing Service Index of Per Capita Food Consumption indicate an income elasticity of 0.2 to 0.25.<sup>4</sup> That is, an increase of 10 percent in real income per person is associated with an increase of 2 to 2½ percent in per capita use of food when prices are unchanged. But since the AMS index reflects some processing and marketing services, the elasticity may be higher than it would be at the farm level.

Moreover, some evidence suggests that income elasticities tend to decline at the higher income levels and may decline as incomes rise over time. Available statistical data show that income elasticities for most major farm products are somewhat smaller at the higher than at the lower levels of income. Estimates of per capita consumption of food in one study show an elasticity relative to income of 0.3 for consumer unit income levels \$750 to \$1,250 and an elasticity of about 0.15 for income groups \$2,500 to \$4,000.<sup>5</sup> It appears reasonable to expect that, as families move from lower to higher income levels, their consumption patterns reflect

<sup>4</sup> See GERSHICK, M. A., and HAAVELMO, T., STATISTICAL ANALYSIS OF THE DEMAND FOR FOOD, Cowles Commission Papers, New Series, No. 24, 1947, p. 109; TINTNER, G., MULTIPLE REGRESSION FOR SYSTEMS OF EQUATIONS, *Econometrica*, 14: 34-36. 1946. BURK, MARGUERITE C., CHANGES IN THE DEMAND FOR FOOD FROM 1941 to 1950, *Journ. Farm Econ.* 33: 281-98. 1951. WORKING, ELMER J., APPRAISING THE DEMAND FOR AMERICAN AGRICULTURAL OUTPUT DURING REARMAMENT, *Journ. Farm Econ.* 34: 209-15. 1952.

<sup>5</sup> CONSUMPTION OF FOOD IN THE UNITED STATES, 1909 TO 1948. U. S. Dept. Agr. Misc. Pub. No. 691, 1949. Page 142.

TABLE 1.—*Income, output, employment, and price level 1929, 1951-53, 1953, and projections for 1960 and 1975*

Item	Unit	1929	Average 1951-53	1953	Projection		
					1960 <sup>1</sup>	1975	1975 <sup>2</sup>
Gross national product.....	Bil. dol.....	104. 4	346. 0	364. 5	430	705	740
Personal consumption expenditures for goods and services.	Bil. dol.....	79. 0	219. 1	230. 6	284	476	500
Per capita.....	Dol.....	640	1, 376	1, 424	1, 590	2, 272	2, 272
Personal disposable income.....	Bil. dol.....	83. 1	237. 7	250. 4	308	513	540
Per capita.....	Dol.....	673	1, 493	1, 547	1, 725	2, 449	2, 449
Consumer price index.....	1947-49=100.....	73. 3	113. 0	114. 4	114. 4	114. 4	114. 4
Wholesale prices, all commodities.....	1947-49=100.....	61. 9	112. 2	110. 1	110	110	110
Population <sup>3</sup> .....	Mil.....	123. 5	159. 2	161. 9	178. 6	209. 5	220. 0
Labor force <sup>4</sup> .....	Mil.....	49. 4	66. 6	67. 4	72	91	95. 5
Employment, including military.....	Mil.....	47. 9	64. 9	65. 7	68. 5	86. 5	91. 0
Unemployment.....	Mil.....	1. 6	1. 7	1. 6	3. 5	4. 5	4. 5
Prices received by farmers.....	1910-14=100.....	148	283	258	258	258	258
Prices paid, interest, taxes and wage rates.....	1910-14=100.....	160	283	279	279	279	279
Parity ratio.....	1910-14=100.....	92	100	92	92	92	92

<sup>1</sup> The higher population of about 180 million in 1960 would raise the gross national product by around 5 billion dollars

<sup>2</sup> Assuming population of 220 million for 1975.

<sup>3</sup> Total population of continental United States as of July 1, including Armed Forces overseas, adjusted for underenumeration.

<sup>4</sup> Includes Armed Forces. Figures may not add to total, because of rounding.

some of the consumer behavior observed for higher income families. Assuming no change in the general price level or the relative income position of families, projected incomes for 1975 would put more than two-thirds of all families in income levels above \$5,000. This compares with about 45 percent in 1950.

*Income effect on kinds of goods consumed.*—Although rising income may effect a relatively small increase in total use of food per person, it will influence the kinds of products consumers want. The nature and direction of these changes under given price assumptions are suggested by elasticities which approximate empirically the relationship of consumption to income.

*Livestock Products.*—Livestock products in general show more response to changes in income and price than do most crops. Consumption of beef and veal in a given framework of prices is more responsive than pork to changes in income. Consumption of chicken and turkey also is fairly responsive to changes in income. Dairy products in total apparently respond little to income change, and fats and oils in total show almost no response. Of course, there are many influences other than price and income which determine trends in consumption. For example, per capita use of lamb

and veal will depend to a considerable extent on demand for dairy products and wool. Likewise supplies of chicken available are partly a function of the demand for eggs. In addition, for some commodities there are trends in popular consumption habits that appear to be largely independent of economic considerations (table 2).

*Major crops.*—A major part of the demand for crops is derived directly from the demand for livestock products as reflected in use of feed. In most years around 40 to 50 percent of total crop production is used for feed; food use may range from 25 to 30 percent; the remainder, in order of importance, goes into nonfood use, exports, and seed.

Feed supplies come primarily from the four major feed grains (corn, oats, barley, and grain sorghums) and from hay and pasture. But some wheat, rye, and several other crops are used for feed. Mill byproduct feeds, oilseed cake and meal, and animal proteins also provide an important part of the supplies of feed concentrates.

For feeds that are essentially a byproduct, supplies are determined largely by projected demand for major uses; cottonseed meal production, for example, will depend on output of cotton; mill feeds on quantities of grains milled. Supplies of



TABLE 2.—Income elasticities assumed as a basis for projecting per capita consumption of major farm products<sup>1</sup>

Major crops	Income elasticity	Major livestock products	Income elasticity
Vegetables (farm weight equivalent)		Meat	0.25
Tomatoes	0.40	Beef	.40
Leafy, green and yellow <sup>2</sup>	.25	Veal	( <sup>3</sup> )
Other vegetables <sup>4</sup>	.20	Lamb	( <sup>3</sup> )
All vegetables	.25	Pork	.20
Melons and cantaloups <sup>5</sup>	-.40	Poultry products	
Potatoes and sweetpotatoes	-.25	Chicken and turkey	.30
Fruits		Eggs	.15
Apples	( <sup>6</sup> )	Dairy products	
Citrus	.65	Total milk equivalent	.10
Other <sup>7</sup>	.13	Fluid milk and cream	.12
All fruit	.32	Fats and oils	.06
Other food crops			
Wheat and flour	-.20		
Dry beans and peas	-.20		
Sugar	-.07		

<sup>1</sup> These elasticities were assumed on the basis of statistical evidence, trend influences, and judgments relating to other factors. Thus some elasticities are implied by projected consumption.

<sup>2</sup> This group includes cabbage, a major vegetable, which in the 1948 consumer purchase survey showed a negative income elasticity of about -0.2 and possibly some trend in per capita consumption.

<sup>3</sup> Per capita use of veal and lamb was determined by output of the dairy and sheep industry which was dependent on other factors.

<sup>4</sup> The "other group" contains onions, a major vegetable, and the 1948 study shows a negative elasticity of nearly -0.3.

<sup>5</sup> A gradual downtrend in consumption was assumed.

<sup>6</sup> Apples may show some positive income effect but a slight downtrend in consumption.

<sup>7</sup> May depend largely on composition and proportion used as fresh, canned, or frozen.

byproduct feeds and projected total demand for feed based on livestock production, fix the requirements for major feed grains.

Although combined use of crops for food tends to change little in response to changes in income, per capita use of most vegetables and fruits, especially citrus, is fairly responsive to income changes. But per capita use of potatoes and sweetpotatoes, cereals, dry beans, and some vegetables, have tended to decline as incomes rise. Exact measurement of these tendencies—income elasticities—is more difficult than for livestock products, yet they can be approximated from available studies.

Empirical approximations of these income elasticities, based on consumer-purchase surveys, time-series analyses,<sup>6</sup> and judgment of commodity

<sup>6</sup> See for example Fox, Karl A., FACTORS AFFECTING FARM INCOME, FARM PRICES, AND FOOD CONSUMPTION. Agricultural Economic Research, 3: 65-82, 1951. NORDIN, J. A., Judge, G. C., and WAHBY, O., APPLICATION OF ECONOMETRIC PROCEDURES TO THE DEMANDS FOR AGRICULTURAL PRODUCTS. Iowa State College Research Bul. No. 410. 1954. ROJKO, ANTHONY S., AN APPLICATION OF THE USE OF ECONOMIC MODELS TO THE DAIRY INDUSTRY, Jour. Farm Econ. 35: 834 ff. 1953.

specialists, were used as a basis for projecting demand for individual farm products. These are summarized in table 2. In some instances, elasticities are implied by an independent projection of per capita consumption.

#### Consumption per Person

With a rise in real consumer income per person of about 60 percent from 1953 to 1975, and with no change in relative prices, what do the income elasticities imply for per capita consumption of farm products in total, and for major commodities?

Food consumption per person, as indicated by the Agricultural Marketing Service Index, would be expected to increase about 12 percent on the basis of the projected rise in income and an income elasticity of about 0.2. This would increase the index to around 113 percent (1947-49=100) by 1975.

Independent projections for individual commodities summarized in the AMS Index also push the total up about 12 percent by 1975, and 3 percent by 1960. Consumption increases reflect the continued shift to higher unit-cost foods and away

from cereals and potatoes. In the projected diet, the pounds of food and calories consumed per person are changed only a little. Increases in proteins, minerals, and other requirements for an improved diet are provided.

As the Agricultural Marketing Service Index of Per Capita Consumption reflects some processing and marketing services, projected requirements were expressed at the farm level, and an index was constructed using prices received by farmers as weights. Requirements are worked back to the farm level by expressing, for example, meats in liveweight of meat animals and fruits and vegetables on a fresh farm-weight equivalent basis. This index would reflect the shift to higher unit-value foods at the farm level but not, for example, the shift to frozen and processed food. Projected per capita consumption of farm products summarized in this index increases nearly 10 percent from 1953 to 1975, about 2 percent by 1960.

A comparison of per capita consumption indexes for major groups of farm products suggests a tendency for the AMS retail price weighted consumption index to increase somewhat more, relative to income, than the increase at the farm level. For most livestock products, results for the two indexes appear consistent and only moderately different. In both, the increase in per capita consumption of livestock products is about a tenth from 1953 to 1975. Comparisons were somewhat more difficult to make for major crops. The same tendency for a smaller gain in the consumption index at the farm level was observed. Differences are sizable for grains and fruits which require considerable marketing and processing services.

*Livestock products.*—Per capita consumption of meats is projected to around 173 pounds by 1975 from 154 pounds in 1953. This increase reflects the rise in real income and its effect on consumption, as well as possible restrictions on the supply of veal and lamb. The gain of around 20 pounds in total meat consumption per person is about the same as the increase from 1925–29 to 1953. In the case of cattle and calves, prices were considered relatively low and consumption correspondingly high in 1953, the base year. Also, hog prices were relatively high and consumption low in 1953.

In appraising consumption prospects for 1975, prices of cattle are assumed about 12 percent higher and hog prices nearly a fifth lower than

in 1953. Projected demand for dairy products indicates little change in per capita consumption of veal. Thus combined use of beef and veal is less than a tenth above the relatively large consumption per person in 1953. On the other hand, per capita consumption of pork projected for 1975 is nearly a fifth above the relatively small consumption in 1953. Consumption of lamb per person reflects primarily expected growth in the sheep industry.

Per capita consumption of dairy products in 1953 totaled 682 pounds (milk equivalent, fat-solids basis) compared with 798 pounds average for 1925–29. The decline of the last two to three decades was due to a drop of around one-half in per capita use of butter. Combined per capita demand for milk products is expected to increase slowly in response to the projected rise in income. Total milk consumption per person is projected to around 720 pounds (milk equivalent) for 1975. Most of the increase is in consumption of fluid milk. Butter consumption is held at about the 1954 level. Use of milk and butterfat in ice cream has held relatively steady in recent years but may decline some if use of vegetable fats becomes more widespread (table 3).

Consumption of chicken and turkey per person in 1953 totaled about 27 pounds (eviscerated weight), an increase of about 50 percent from the 1925–29 average. The projection for 1975 is almost a fifth above 1953. Egg consumption is projected to more than 400 eggs per person, an increase of nearly 8 percent from 1953; the increase from the 1925–29 average to 1953 was more than a fifth. The big increase in consumption of poultry products since 1925–29 reflects substantially lower prices relative to livestock products as a whole, and relative to all farm products. Technological developments in feeding and production of poultry products have been rapid in the last two or three decades.

Per capita consumption of food oils is not expected to change much during the next quarter-century. In 1953, consumption of food fats and oils totaled 43.5 pounds (fat content). This compares with an average of around 43 pounds in 1925–29. Stability in the total reflects a downward trend in consumption of butter and an uptrend in margarine. Consumption of oils in lard and shortening has changed little, but in salad oils and

TABLE 3.—Per capita consumption of major livestock products, selected periods 1925 to 1955 and projections for 1960 and 1975

Commodity	1925-29	1951-53	1953	1955	Projections	
					1960	1975
Meat (carcass weight):	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Beef.....	53.8	64.5	76.7	81.2	74.0	85.0
Veal.....	7.3	7.7	9.5	9.4	9.5	9.0
Lamb and mutton.....	5.3	4.0	4.6	4.6	4.5	4.0
Pork (excluding lard).....	66.9	68.4	62.9	66.0	68.0	75.0
Total.....	133.3	144.6	153.7	161.2	156.0	173.0
Poultry and eggs:						
Chicken (eviscerated wt.).....	14.3	22.6	22.6	20.9	24.0	27.0
Turkey (eviscerated wt.).....	n. a.	4.4	4.5	5.0	4.5	5.2
Total (eviscerated wt.).....	n. a.	27.0	27.1	25.9	28.5	32.2
Eggs (number).....	330	382	374	366	380	403
Dairy Products:						
Total milk (fat solids basis).....	798	693	682	700	698	720
Cheese.....	4.5	7.3	7.3	7.7	7.5	8.0
Ice cream (net milk used).....	24.1	46.0	47.6	48.4	45.0	40.0
Fluid milk, cream, condensed and evaporated milk, milk equivalent.....	364	389	385	387	395	415
Fats and Oils: Food (fat content).....	n. a.	42.9	43.5	45.0	44.7	45.5

dressings, and in ice cream, it has increased materially during the last few years. Per capita use of oils is projected to 45.5 pounds for 1975, close to current consumption rates. In general, past trends in use of oils are expected to continue in the coming years (fig. 4).

*Crops.*—Consumption of fruit per person may increase nearly a fifth from 1953 to 1975. As indicated by the elasticities assumed, the increase would be greatest for citrus fruits—possibly more than a third. The projection of 27 pounds of commercial apples for 1975 compares with a per capita consumption (both commercial and noncommercial) of about 49 pounds for the 1925-29 average. On the other hand, per capita consumption of citrus more than doubled from 1929 to 1953. This large increase was due to much lower prices for citrus relative to other fruit, to innovations in processing, and to the gain in income. Consumption of other fruits in 1953 was down to 88.5 pounds from 98.9 pounds in 1925-29.

Vegetable consumption per person (excluding potatoes) is projected for 1975 to about a sixth above 1953. This compares with a gain in consumption of 38 percent from 1925-29 to 1953 due in part to lower relative prices for truck crops. The largest relative gain in per capita use of vegetables is projected for tomatoes, although con-

sumption of most leafy, green, and yellow vegetables may increase as much or more than tomatoes. The leafy, green, and yellow group contains cabbage, and the "other vegetable" group contains onions. Per capita consumption of both these major vegetables probably will decline as real incomes rise (table 4).

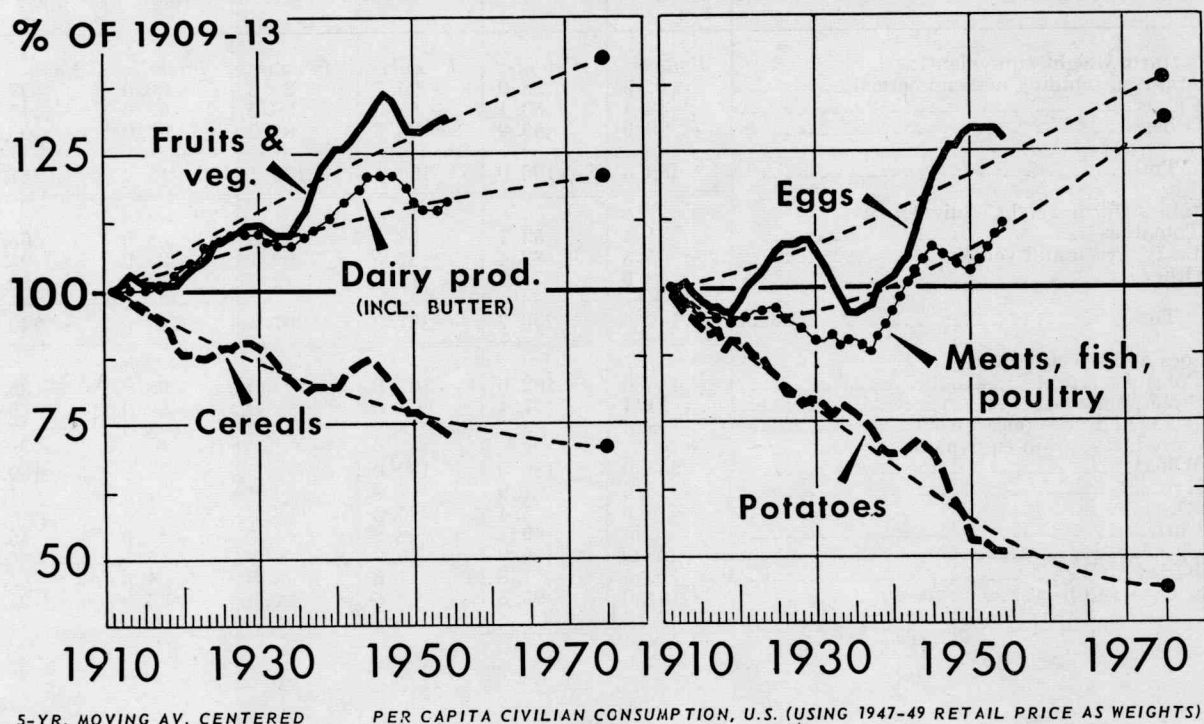
Consumption of potatoes, dry beans and peas, and grain products is projected to continue their downtrend during the next two to three decades. Consumption of potatoes in 1925-29 averaged 144 pounds per person and by 1953 was down to 102 pounds. The projected decline to 1975 is expected to be somewhat less rapid; an expansion in such uses as potato chips and frozen french fries may moderate the downtrend in consumption. The grain equivalent of wheat and flour consumption in 1953 totaled 179 pounds per person compared with an average of 254 pounds in 1925-29. A continued, but somewhat slower, decline in consumption of wheat is projected for the next two decades.

#### Nonfood Use of Farm Products

Nonfood use of such commodities as cotton, wool, tobacco, some oils, and grains for industrial uses probably total, in most years, around 12 to 14 percent of farm production. Combined per

With Projections to 1975

## TRENDS IN OUR EATING HABITS



5-YR. MOVING AV. CENTERED

PER CAPITA CIVILIAN CONSUMPTION, U.S. (USING 1947-49 RETAIL PRICE AS WEIGHTS)

U. S. DEPARTMENT OF AGRICULTURE

NEG. 1009B-56 (6) AGRICULTURAL MARKETING SERVICE

FIGURE 4.

capita use of these nonfood products is projected to rise around 8 percent from 1953 to 1975.

Demand for cotton is derived primarily from the demand for clothing, household furnishings, and industrial uses. Thus the level of income and economic activity is an influential determinant of per capita use of cotton. In recent decades, however, use of cotton per person has shown no pronounced upward trend. The same is true for wool although there have been sizable variations from periods of widespread unemployment to periods of swollen wartime demands. But use of synthetic fibers has expanded rapidly in recent decades, making substantial inroads in the market for natural fibers.

Although synthetic fibers will continue to compete with cotton and wool, with the substantial rise in consumer income an increase in per capita

use of cotton is projected for 1975. Consumption of wool per person is held at about 1.8 pounds, somewhat below per capita use in 1953 but about at the current rate of use per person (table 5).

Use of tobacco per person has trended strongly upward during recent decades. With a substantial rise in income in prospect, a continued increase is projected for the next two or three decades. But recurrent publicity on possible adverse effects of smoking may moderate the uptrend in per capita use of tobacco.

Major nonfood uses of fats and oils are in the manufacture of such products as soap, paints, varnishes, linoleum, greases, and industrial products. Demand for these products in general tends to be relatively elastic. But the value of the raw materials used generally represents a small part of the final product cost. Moreover, in recent years

TABLE 4.—Per capita consumption of major food crops, selected periods 1925 to 1955 and projections for 1960 and 1975

Commodity	1925-29	1951-53	1953	1955	Projections	
					1960	1975
<b>Fruits (farm weight equivalent):</b>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Apples (excluding noncommercial).....	n. a.	28.0	25.7	26.3	30.0	27.0
Citrus.....	32.4	83.1	84.3	88.6	92.0	115.0
Other.....	98.9	86.9	88.5	84.2	93.0	95.0
<b>Total.....</b>	<b>180.3</b>	<b>198.0</b>	<b>198.5</b>	<b>199.1</b>	<b>215.0</b>	<b>237.0</b>
<b>Vegetables (farm weight equivalent):</b>						
Tomatoes.....	31.4	53.1	53.1	54.3	55.0	65.0
Leafy, green and yellow.....	65.3	82.4	82.5	80.7	85.0	95.0
Other.....	52.9	71.2	71.7	72.1	74.0	80.0
<b>Total.....</b>	<b>149.6</b>	<b>206.7</b>	<b>207.3</b>	<b>207.1</b>	<b>214.0</b>	<b>240.0</b>
<b>Potatoes and sweetpotatoes:</b>						
Potatoes.....	144.0	102.0	102.0	101.0	98.0	85.0
Sweetpotatoes.....	21.1	7.4	8.0	9.0	9.0	9.0
Dry beans and peas (clean basis).....	8.4	8.4	8.2	8.2	8.0	7.0
<b>Grain products (grain equivalent):</b>						
Wheat.....	254.0	186.0	179.0	172.0	175.0	160.0
Rye.....	3.6	1.9	1.8	1.7	1.5	1.5
Rice.....	5.6	5.4	5.3	5.3	5.5	5.5
Corn.....	n. a.	49.4	48.2	47.3	47.0	45.0
Oats.....	n. a.	6.9	6.9	6.8	6.5	6.5
Barley.....	n. a.	1.8	1.8	1.8	1.8	1.8
Sugar, cane and beet.....	101.0	95.3	96.5	96.3	95.0	93.0

TABLE 5.—Per capita nonfood use of major farm products, selected periods 1925 to 1955 and projections for 1960 and 1975

Commodity	1925-29	1947-49	1951-53	1953	1955	Projection	
						1960	1975
<b>Nonfood fats and oils:</b>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Soap.....	n. a.	13.6	8.8	8.1	6.7	6.5	4.0
Drying oil.....	n. a.	6.6	6.3	6.1	6.3	6.0	5.0
Other industrial.....	n. a.	4.9	6.8	7.0	7.1	8.5	11.5
<b>Total.....</b>	<b>n. a.</b>	<b>25.1</b>	<b>21.9</b>	<b>21.2</b>	<b>20.1</b>	<b>21.0</b>	<b>20.5</b>
Cotton.....	27.7	29.5	29.3	27.9	26.5	30.0	32.0
Wool, apparel.....	2.1	3.1	2.3	2.2	1.7	1.8	1.8
Tobacco <sup>1</sup> .....	9.0	12.0	12.8	12.9	12.2	13.8	15.4

<sup>1</sup> Unstemmed processing weight, per person 15 years and over including Armed Forces overseas.

synthetic detergents have taken over a large part of the market for soap manufactured from fats and oils.

Recent technological developments in the chemistry of the manufacture of paint and varnish have resulted in the use of more synthetic resins and

rubber. Although these trends may continue, technological developments probably will expand other uses of industrial oils. Therefore little change is projected in total nonfood use of fats and oils. Industrial uses of grains are expected to expand as population and the economy grow.

## Foreign Demand

The foreign market for United States farm products depends on a complex of forces, many of which are noneconomic in nature and difficult to appraise. World demand for food and fiber will increase, and world markets probably will continue in coming years to take relatively large quantities of our production of cotton, grains, tobacco, and fats and oils.

World population is expected to increase around 40 to 45 percent from 1950 to 1975 with larger than average gains in India and in countries of the Far East, Latin America, and the Middle East. Increases somewhat smaller than average are in prospect in Western Europe, Oceania, Japan, and Africa.

Population growth alone does not assure a corresponding increase in demand. But with consumer income and the level of living generally expected to rise, demand for food should increase more rapidly than growth in population.

Estimates based on income growth for major world areas and rough measures of income elasticity of demand for food were compared with estimates based on Food and Agriculture Organization targets for improved diets. These data suggest a world demand in 1975 some 50 to 65 percent above 1950. Larger than average gains are indicated for such areas as India, Communist China and Asian satellites, Latin America, the Middle East, and non-communist Far East (excluding Japan).

Rising incomes will lead to changes in the pattern of consumption in favor of more nutritive and protective foods. These changes can be only roughly appraised, but per capita demand for meat, dairy products, fruit, vegetables, and pulses (beans, peas, lentils) are likely to increase much more rapidly than the demand for cereals, starchy roots, and sugar. It appears probable that, with existing technology and readily accessible new lands, foreign agricultural production could be increased rapidly enough to meet a large part of projected needs in most areas of the world. Further, the trend toward self-sufficiency in the production of food and fiber will continue in most foreign countries, or groups of related countries, for reasons of politics and security.

World markets are expected to take relatively large quantities of our cotton, grain, tobacco, and fats and oils. The volume of agricultural exports projected for 1975 is about a sixth above the relatively small exports in 1952-53 and somewhat below the large volume exported during the 1955-56 fiscal year, when large export programs were in effect. The projected increase for fats and oils from 1952-53 to 1975 looks large but the big exports of fats and oils in the 1954-55 marketing year are close to levels projected for 1975 (table 6).

Agricultural exports in 1952-53 approximated less than a tenth of total output. Foreign takings are expected to continue to be a relatively small proportion of the total demand for farm products.

TABLE 6.—Exports and shipments of major agricultural products, average 1947-49, 1952-53 and projection for 1960 and 1975

Commodity	Crop year beginning	Unit	1947-49	1952-53	Projection	
					1960	1975
Wheat, including flour and products	July 1	Mil. bu.	433.6	321.6	250	275
Corn	Oct. 1	do.	74.8	139.6	125	150
Cotton	Aug. 1	Mil. bales	4.2	3.0	<sup>1</sup> 4.0	<sup>1</sup> 4.5
Nonfood fats and oils	Oct. 1	Mil. lb.	<sup>2</sup> 308	1,169	1,265	1,620
Food fats and oils	do.	do.	<sup>2</sup> 945	1,078	1,369	2,587
Tobacco	July-Oct. <sup>3</sup>	do.	540	570	620	670
Total volume of exports	( <sup>2</sup> )	1947-49=100	100	86	85	101
Total volume of imports	( <sup>2</sup> ) ( <sup>4</sup> )	1947-49=100	100	112	117	140

<sup>1</sup> Assumes United States export prices will be substantially competitive with foreign prices.

<sup>2</sup> Computed from supply and disposition index made for this study.

<sup>3</sup> July for flue-cured and cigar wrapper. October for all other types. Tobacco exports include leaf equivalent of manufactured tobacco products exported.

<sup>4</sup> Volume of imports would be approximately comparable to the index of volume of supplementary or similar competing agricultural products grown in the United States.

*Imports.*—Imports of agricultural products are expected to rise with the growth in population and in economic activity. Imports of products similar to those produced in the United States, usually designated as supplementary, are projected for 1975 at about a fourth above 1953, and for 1960 possibly 4 or 5 percent higher. Imports of complementary products such as rubber, coffee, raw silk, cocoa beans, carpet wool, bananas, tea, and spices, probably will rise relatively more. Total consumption of these products, which is fairly responsive to rising incomes as well as to population growth, may well increase 50 percent or more from 1953 to 1975.

### Projected Total Requirements

Population growth and domestic use per person, together with foreign takings, will determine total requirements for farm products. In this study, appraisals were made in some detail for two levels of consumption. The lower projection of requirements is based on approximately current rates of consumption. This assumes a situation in which the economy fails to grow as rapidly as expected, with conditions unfavorable enough to hold per capita consumption at about current (1955) levels. Exports were assumed at 1953 rates for the lower level of requirements.

The higher requirements are based on a projection of per capita consumption which reflects an increase of about 60 percent in income per person and trends in popular consumption habits. A population of 210 million was assumed for 1975, an increase of about 30 percent from 1953; the increase by 1960 may be around a tenth from 1953. This growth in population is conservative, especially the projection for 1975. Recent higher population projections suggest the possibility of about 220 million people by 1975. This assumption of a 5-percent larger population would add proportionately to projected requirements for farm products. Projected utilization shown in figure 5 is based on the higher projected consumption rates with the population for 1975 ranging from 210 to 220 million (fig. 5).

Requirements for farm products projected for 1975 on the basis of current consumption rates, which are only a little above 1953 base levels, reflect primarily population growth. On this basis, total utilization for 1975 would be nearly a third

TABLE 7.—Utilization of major livestock products, 1953 and alternative projections for 1960 and 1975<sup>1</sup>

[1953=100]

Commodity	1953	Projection 1960		Projection 1975	
		I <sup>2</sup>	II <sup>3</sup>	I <sup>2</sup>	II <sup>3</sup>
Meat animals:					
Cattle and calves.....	100	109	105	127	138
Pork (excluding lard)....	100	113	118	132	152
Sheep and lambs.....	100	111	108	130	113
Total.....	100	110	110	129	143
Dairy products, total:					
Milk (fat solid basis)....	100	113	111	131	134
Poultry products:					
Eggs.....	100	108	112	126	140
Chicken and turkey....	100	105	115	123	153

<sup>1</sup> Utilization includes domestic use (food and nonfood) and exports.

<sup>2</sup> Level I assumes approximately current consumption rates per person for both 1960 and 1975.

<sup>3</sup> Level II is based on a projection of per capita consumption reflecting the effects of an increase in real per capita income—about 60 percent from 1953 to 1975—and trends in popular consumption habits.

above 1953 with the increase for livestock products slightly in excess of that for crops.

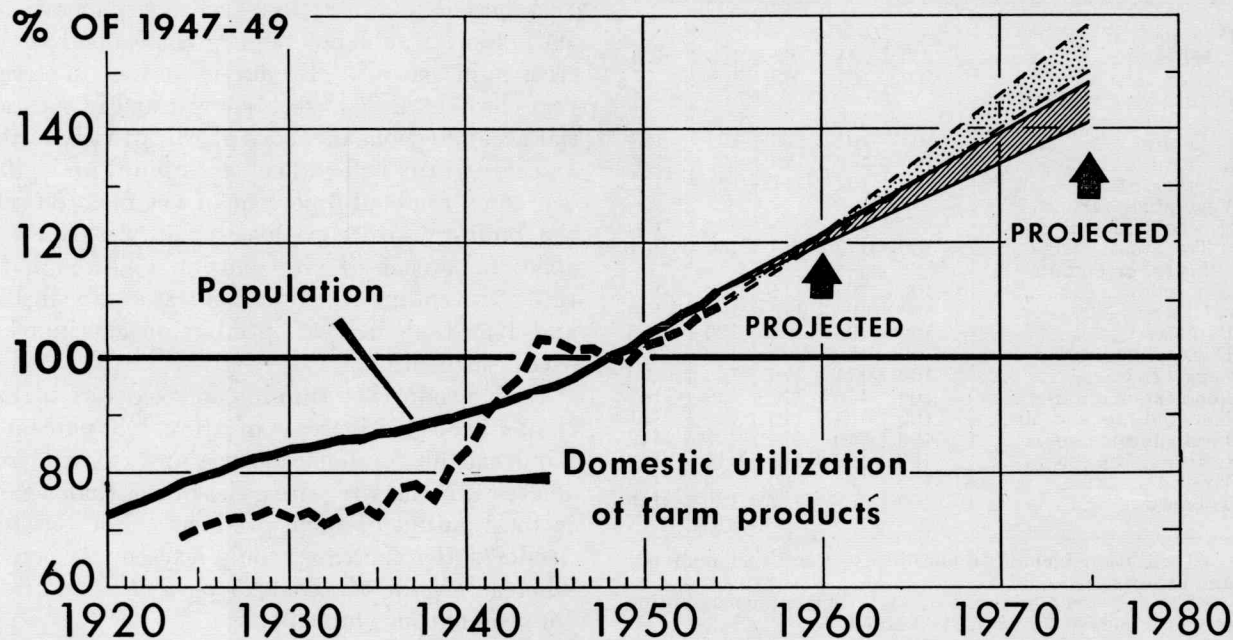
Requirements would increase by around 40 percent from 1953 to 1975 on the basis of the projected higher consumption levels. Requirements for livestock products increase by more than 40 percent while the gain for crops would be around 36 percent.

*Livestock products.*—Projected requirements for meat animals increase by nearly 30 percent from 1953 to 1975 under the lower consumption rate, and increase by nearly 45 percent under the higher. The increase by 1960 is about a tenth above 1953 under both assumptions. Projected increases for pork from the relatively low levels in 1953 are generally larger than those for beef and lamb. Requirements projected for poultry products both in 1960 and 1975 are considerably smaller for current consumption rates than for the higher projected consumption rate. Requirements projected for dairy products are not materially different for current and projected consumption rates (table 7).

Assuming little change in average weight of animals and about average death loss and calf crop, projected requirements for the higher consumption rates point to around 125 million head of cattle on farms by 1975. There were 94 million

With Projections to 1975

## INCREASE IN POPULATION AND DOMESTIC USE OF FARM PRODUCTS



U. S. DEPARTMENT OF AGRICULTURE

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FIGURE 5.

head on January 1, 1953 and 96½ million in 1955. With a continued rise in milk output per cow, the required increase in number of cows milked may be small. The pig crop under the higher consumption rate would increase to around 130 million head from about 78 million in 1953 and 95 million in 1955. Sheep numbers increase to about 33 million stock sheep from 27.6 million in 1953 and 27 million in 1955. Chickens raised would increase under the higher consumption rates by more than a sixth, broilers by possibly 80 percent, and turkeys by around 50 percent from 1953 levels to meet expanded requirements in 1975. A larger population would require proportionately more livestock products.

*Crops.*—Use of crops is projected under the higher consumption rates to rise by about 36 percent from 1953 to 1975 and by more than a tenth

by 1960. If approximately current consumption rates are assumed, projected use of crops increases from 1953 by about a tenth for 1960 and by about 30 percent by 1975. Variation in requirements for individual crops and groups of crops, however, is considerable.

Projected requirements for food grains and potatoes in general would change little from 1953. The assumption of current rates of consumption increases the requirements for these crops from 1953 to 1975 by more than would be true if projected consumption rates were used as a basis for calculating total requirements. This is because per capita consumption of cereals and potatoes in the projected consumption rates, trends downward rather than being assumed at current rates.

Larger requirements by 1975 were projected for vegetables, citrus fruits, feed concentrates, fats and



TABLE 8.—Utilization of major crops, 1953 and projections for 1960 and 1975<sup>1</sup>

Commodity	[1953=100]				
	1952-53	Projection 1960		Projection 1975	
		I <sup>2</sup>	II <sup>3</sup>	I <sup>2</sup>	II <sup>3</sup>
Food grains:					
Wheat.....	100	94	95	108	104
Rice.....	100	104	92	109	95
Fruits, fresh weight equivalent: <sup>4</sup>					
Apples.....	100	104	120	123	128
Citrus.....	100	117	122	135	176
Other.....	100	104	111	121	132
Vegetables, farm weight equivalent: <sup>4</sup>					
Tomatoes.....	100	112	113	130	154
Leafy, green and yellow.....	100	105	111	123	145
Other.....	100	105	110	123	138
Potatoes <sup>4</sup> .....	100	105	103	120	106
Dry, edible beans <sup>4</sup> .....	100	108	96	122	98
Sugar, raw <sup>4</sup> .....	100	111	110	130	126
Food fats and oils.....	100	113	115	130	148
Nonfood fats and oils.....	100	104	110	119	131
Feed concentrates.....	100	109	114	125	142
Cotton.....	100	107	118	116	143
Wool.....	100	85	90	99	105
Tobacco.....	100	107	117	129	155

<sup>1</sup> Utilization includes domestic use (food and nonfood) and exports.

<sup>2</sup> Level I assumes approximately current consumption rates per person for both 1960 and 1975.

<sup>3</sup> Level II is based on a projection of per capita consumption reflecting the effects of an increase in real per capita income—about 60 percent from 1953 to 1975—and trends in popular consumption habits.

<sup>4</sup> Calendar year 1953 is base year.

oils, cotton and tobacco. The gains, however, assuming current consumption rates, reflect primarily the growth in population and are smaller than requirements based on projected consumption rates (table 8).

Under the higher consumption rates, requirements for feed concentrates and hay are up about 40 percent from 1953 to 1975. This expansion may call for an increase of 40 to 45 percent for the major feed grains—corn, oats, barley and sorghum grains. It should be pointed out, in this connection, that feed requirements assume feeding rates per livestock production unit around 1951-53 levels. If there are extensive new efficiencies in feeding, concentrates fed per livestock production unit may decline some and thus moderate the projected rise in feed requirements.

A higher population assumption of about 220 million people by 1975 would add about 5 percent to projected utilization of major farm products.

## Output Required to Meet Projected Demand

Growth in demand gives purpose and direction to productive activity, but it is not the purpose of this section to give an appraisal of probable changes in output during the next two or three decades. That is, it is not an appraisal of the probable supply response to rising demands.<sup>7</sup>

Projected total requirements for domestic use and export would not require corresponding increases in output. Production rates in recent years have exceeded use; they resulted in substantial accumulations in stocks of wheat, rice, cotton, and feed grains. Total net stock build-up in 1953 was equal to about 6 percent of net farm output; the build-up of crop inventories was equal to about 8 percent of crop output. Although the rate of inventory accumulation was slower in 1954 and 1955 than in 1953, production continued to exceed utilization.

With production running in excess of utilization, a projected increase of around 40 percent in requirements for domestic use and export, from 1953 to 1975, may require a rise of less than a third in total output of farm products. For livestock products the increase would exceed 40 percent whereas a gain of about 25 percent is indicated for crop output (table 9).

The lower level of requirements probably would require an increase of less than a fourth in total farm output; this would imply a rise of nearly a third for livestock products and possibly a fifth for crops.

Production of livestock products as a whole would need to increase under the higher consumption rates by more than 40 percent—about 45 to 50 percent for meat animals and poultry products and more than 25 percent for dairy products. The increase in production of cattle and calves from the high output in 1953 probably would be somewhat smaller than the required increase from the relatively low level of hog production in 1953. Sheep production may increase much less than output of cattle or hogs. Production of chicken and turkey may need to increase around 50 percent and egg production around 40 percent from

<sup>7</sup> A more complete discussion of the nature of the production job is reported in a companion report, *Farm Output, Past Changes, and Projected Needs*, by Glen T. Barton and Robert O. Rogers of Agricultural Research Service, U. S. Department of Agriculture.

TABLE 9.—Output of major livestock products, 1953 and projections of output needed to meet projected requirements for 1960 and 1975<sup>1</sup>

[1953=100]

Commodity	1953	Projection 1960		Projection 1975	
		I <sup>2</sup>	II <sup>3</sup>	I <sup>2</sup>	II <sup>3</sup>
Livestock and products.....	100	111	111	131	142
Meat animals.....	100	111	111	131	146
Beef and veal.....	100	109	104	128	138
Lamb and mutton.....	100	113	110	132	114
Pork (excl. lard).....	100	115	121	135	156
Wool.....	100	114	114	118	118
Poultry products.....	100	115	115	148	148
Chicken and turkey.....	100	105	115	123	153
Eggs.....	100	108	112	127	140
Milk, total fat solid basis..	100	107	106	125	129

<sup>1</sup> Output required to meet projected requirements.

<sup>2</sup> Level I output assumes approximately current consumption rates per person for both 1960 and 1975.

<sup>3</sup> Level II output is based on a projection of per capita consumption reflecting the effects of an increase in real per capita income—about 60 percent from 1953 to 1975—and trends in popular consumption habits.

1953 to 1975 to match the higher level of requirements. These increases are about the same as the projected rise in utilization of livestock products.

Output increases needed to match projected requirements for 1975, based on current consumption rates, are in general smaller than those based on the higher projected consumption rates for livestock products; they would range from 25 to 30 percent for most livestock products. The higher population assumption for 1975 would require correspondingly larger expansion in output of all livestock products (table 9).

Projected requirements for crops under the higher consumption rates are up about 36 percent from 1953 to 1975. But since the net build-up of crop inventories in the 1952-53 marketing year was equal to around 8 percent of total crop output, including feed and seed, an increase of about a fourth in crop output would meet expanded requirements.

With excess productive capacity in feed grains, the higher projection of requirements for livestock products would suggest an increase of around a third in combined output of the four major feed grains—corn, oats, barley, and sorghum grains. Assuming a further decline in per capita use of wheat, projected utilization of food

grains for 1975 would require a smaller output than in 1952-53.

Furthermore, very little increase in output of potatoes and beans would be needed to meet projected requirements. Expanded needs for protein feed may result in a substantial increase in output of soybeans—possibly around 60 percent from 1952-53—which would probably lead to relatively large supplies of oil available for export.

The higher projection of requirements for 1975 would call for an increase of more than 40 percent in combined output of fresh vegetables and nearly 50 percent in production of fruits; much of the gain would be in citrus fruits.

With further increases in per capita use, tobacco production would have to rise by possibly 50 percent to meet the higher level of expanded domestic

TABLE 10.—Output of major crops, 1953 and projections of output needed to meet projected requirements for 1960 and 1975<sup>1</sup>

[1953=100]

Commodity	1952-53	Projection 1960		Projection 1975	
		I <sup>2</sup>	II <sup>3</sup>	I <sup>2</sup>	II <sup>3</sup>
Crops.....	100	103	103	124	124
Feed grains.....	100	103	108	117	135
Food grains.....	100	75	75	82	82
Wheat.....	100	72	74	83	81
Rice, milled.....	100	103	92	109	94
Rye.....	100	113	130	129	138
Fruits <sup>4</sup> .....	100	115	115	141	141
Apples.....	100	104	121	124	129
Citrus.....	100	117	121	136	176
Other.....	100	106	114	130	135
Vegetables <sup>4</sup> .....	100	109	109	141	141
Tomatoes.....	100	119	119	139	165
Leafy-green and yellow.....	100	103	109	120	142
Other.....	100	99	104	116	131
Potatoes <sup>4</sup> .....	100	101	99	116	102
Dry edible beans <sup>4</sup> .....	100	110	98	124	99
Sugar.....	100	101	101	101	101
Food fats and oils.....	100	105	106	120	137
Nonfood fats and oils.....	100	106	112	125	138
Cotton.....	100	88	96	95	117
Tobacco.....	100	103	114	123	150
Total farm output.....	100	106	106	131	131

<sup>1</sup> Output required to meet projected requirements.

<sup>2</sup> Level I output assume approximately current consumption rates per person for both 1960 and 1975.

<sup>3</sup> Level II output is based on a projection of per capita consumption reflecting the effects of an increase in real per capita income—about 60 percent from 1953 to 1975—and trends in popular consumption habits.

<sup>4</sup> Base year is calendar year 1953.

use and export. The higher level of cotton utilization projected for 1975 would require a cotton crop about one-sixth larger than in 1953.

If the lower consumption rates are assumed, projected 1975 requirements point to need for a smaller cotton crop than in 1952-53. Even though per capita use of wheat is held at about the 1955 rate, output of wheat needed to match requirements would be well below the nearly 1.3 billion bushel 1952 crop and not much above the 1955 crop. But larger output would be required by 1975 for potatoes and dry beans if current consumption rates are assumed. The lower level of requirements for fruits, vegetables, feed grains, fats and oils, and tobacco, points to moderate increases in required output for these crops.

For both consumption levels, the higher population assumption of 220 million people by 1975 would add proportionately around 5 percent to output increases in the preceding paragraphs, which are based on a population of 210 million.

#### **Prospective Demand for Farm Products by 1960**

Some of the most pressing problems facing agriculture today revolve around the outlook for the next few years. The extent to which demand for farm products expands in coming years will be an important factor influencing programs that are designed to limit production and work down excessive stocks of some farm products. With continued growth in population and a further increase in consumer income, projected requirements for farm products by 1960 may total around 12 percent above the base year 1953. As current production rates are above 1953, and carryover stocks of some products are large, little or no further increase in output would be needed to meet projected requirements for 1960. However, some adjustment in the pattern of farm output is indicated.

To a considerable extent the small rise in per capita use of farm products projected for 1960 had already occurred by 1955. Per capita consumption of meat-animal products in total would change little from the base year 1953 and may not equal the high rate of use in 1955 when prices were relatively low. Milk consumption per person projected for 1960 and per capita use of poultry products for 1960 would be up some from 1953 levels. Per capita consumption of citrus fruits

and most fresh vegetables is projected to increase from 1953 levels, in line with past trends. Although per capita use of wheat and potatoes is expected to trend downward, projections for 1960 are fairly close to current consumption rates. Per capita use of cotton and tobacco are a little above current rates (1955). Little change in per capita use of food and nonfood oils is in prospect.

#### **Projected Requirements Rise Moderately**

With population growth of about a tenth from 1953 to 1960 and a small rise in per capita use, domestic requirements for farm products would increase around 12 percent from 1953 to 1960; the required increase from 1955 may be less than a tenth. Total volume of agricultural exports are carried at levels about as large as in 1952-53. The same relative increase in requirements (12 percent) is indicated for both livestock products and crops. However, use of food grains, potatoes, and dry beans may total less than in 1953. Requirements for feed increase about the same as livestock products. Other nonfood uses, mainly cotton, tobacco, wool and oils, are projected to rise by nearly 12 percent from 1953 to 1960.

With continued population growth, per capita use of beef by 1960 may depend largely on the course of the cycle in cattle numbers during the next few years. Current trends suggest cattle numbers are at or near the top of their cycle. Projected requirements for 1960 suggest upward of 100 million head of cattle; there were 97½ million head on January 1, 1956. Thus supplies per person by 1960 may be smaller than the relatively large supplies in 1955. A total pig crop of between 100 and 105 million head is projected for 1960 compared with 95 million head in 1955. A moderate rise in requirements for dairy products is indicated. Projected requirements for poultry products, in total, increase more than an eighth from 1953 to 1960.

#### **Required Farm Output Near Current Levels**

An appraisal of output needed to meet projected utilization of farm products by 1960 requires some assumptions relative to accumulated stocks and probable production cycles. It is questionable whether a further increase in output will be needed to balance the projected increase in requirements for 1960. In 1953 we produced about

6 percent more farm products than were utilized; so an output increase of about 6 percent, with adjustments in composition, would match the projected increase of 12 percent in total requirements. With output in 1955 already up some 3½ percent above 1953, total output may be within 2 or 3 percent of that required to meet projected utilization of farm products by 1960.

Although projected requirements point to an increase in output of livestock products from 1953 to 1960, part of the gain had occurred by 1955. Cattle and calves on farms January 1, 1956 totaled 97½ million head, close to probable requirements for 1960. A pig crop of 100 to 105 million head is indicated compared with 95 million in 1955. The rise in requirements for dairy products probably can be met without increasing the number of cows milked. A larger output of poultry products is indicated by projected requirements (table 11).

The 1955 crops of wheat, major feed grains, potatoes, and cotton were about the same as the output that will be required for 1960. In addition to current high production rates for major crops, the carryover stocks are large for wheat, rice, feed grains, and cotton. Stocks of wheat and cotton exceed one year's production and feed grain stocks equal almost a third of feed grain output in 1955.

A major deviation in domestic and foreign de-

TABLE 11.—Production of major farm products 1955 and required output for 1960, assuming projected consumption rates

Commodity	Unit	1955	Projected 1960
<b>Livestock products:</b>			
Cattle and calves on farms January 1.	Million.....	96.6	98.5
Pig crop.....	do.....	95.3	103
Eggs produced.....	Mil. doz.....	5,403	5,960
Milk produced.....	Bil. lbs.....	123.5	127.5
<b>Crops:</b>			
Wheat.....	Mil. bu.....	938	962
Major feed grains <sup>1</sup> .....	Mil. ton.....	130	129
Corn.....	Mil. bu.....	3,185	3,340
Soybeans.....	do.....	371	341
Potatoes.....	do.....	382	377
Cotton.....	Million running bales.	14.5	14.5

<sup>1</sup> Corn, oats, barley, and grain sorghums.

mand from the gradual increase indicated in these calculations could modify demands by 1960. But it is clear that the supply situation could continue burdensome for food grains, cotton, and feed grains, for several years, if growing conditions are favorable. These conditions also point to the need for considerable adjustment in the pattern of farm output during the next few years.