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Potential Demand for Farm Products

THE PURPOSE of this chapter is to translate the kind of economic growth projected by James Knowles into the potential demands for farm products over the next several decades. In the post-war period, we have realized a somewhat faster rate of economic growth than in our previous history — marred only by relatively mild interruptions or recessions. We have gained confidence in our economic potential from the prosperous fifties and have entered into the “golden sixties.” We look ahead now some 20-25 years under the basic assumption of a continuing prosperity, a process that has been aptly described as the “art of crawling on the ceiling.” We should note that with our new projection, we encompass some 40 years or so of rapid economic growth — a period of time approaching that associated with the long-run economic cycle described in business cycle literature. This is only to suggest that as we go along in the years ahead we may need to be concerned even more with how to maintain rapid growth. Fortunately for agriculture, consumer incomes have been well maintained during the post-war recessions and the demand for food was not significantly affected.

The last several years have witnessed a flowering of long-term projections for agriculture. We now have on hand projections of demand for farm products for 1965, 1975, 1980, 2000 and 2010. These include:

Prospects for Agriculture in a Growing Economy, by Barton and Daly, projecting to 1965 and 1975, presented at the Conference on Problems and Policies of American Agriculture in October, 1958.¹

A 50-Year Look Ahead at U. S. Agriculture. U. S. Department of Agriculture, June, 1959, projected to the year 2010.

¹Published in *Problems and Policies of American Agriculture*. Iowa State University Press, Ames, Iowa, 1959, pp. 28-46.

Land and Water Potentials and Future Requirements for Water. A report made by the department at the request of the Select Committee on National Water Resources, United States Senate, December, 1959, projecting demands to 1980 and 2000.

The projections of potential demand for farm products which follow are for 1980 as developed for the report to the Senate mentioned above. Let me acknowledge that they are not essentially different from the 1975 projections presented by Daly and Barton in 1958, but do coordinate in time with the other projections presented in this book. The Daly-Barton paper was well documented in terms of the data and relationships and procedures used, and I will not attempt to repeat what they have done. Rather, let me indicate the major rules or guide-lines for projecting demand which provide a sort of do-it-yourself kit.

1. Population growth. How fast our population grows will largely determine the potential demand for farm products. The domestic market for U.S. farm products accounts for some 90 percent of the total market, and food uses account for about 90 percent of the total domestic market. By 1960, population was increasing about 1.6 percent a year. By 1980, according to the projections of Resources for the Future, which provided the basic framework for the Senate Committee Study, population of the U.S. could range from a low of 225 million to a high of 278 million, depending on possible future rates of fertility, net immigration, etc. (This is a somewhat wider range than the Census Bureau projections of from 231 million to 273 million.) The medium projection of 244 million persons is at about the middle of the range. Thus, population could increase by 50 to 100 million persons by 1980, or from 30 to 60 percent. Since 1940, population has increased some 35 percent. It is worth noting that the possible range in population that might be forthcoming by 1980 is much wider than the excess of farm output over commercial takings of farm products in the 1950's.

There is a corollary question as to whether the changing age composition of the population will have a significant effect on the per capita takings of food. Much of the increase in population will likely come in the younger age groups, particularly heavy-eating teen-agers, but also in the older age brackets. By and large, these would appear to be offsetting in their effect on average per capita food consumption.²

2. Economic growth and per capita consumption of farm

²R. Lifquist. Jour. Farm Econ. Dec., 1958, p. 1289.

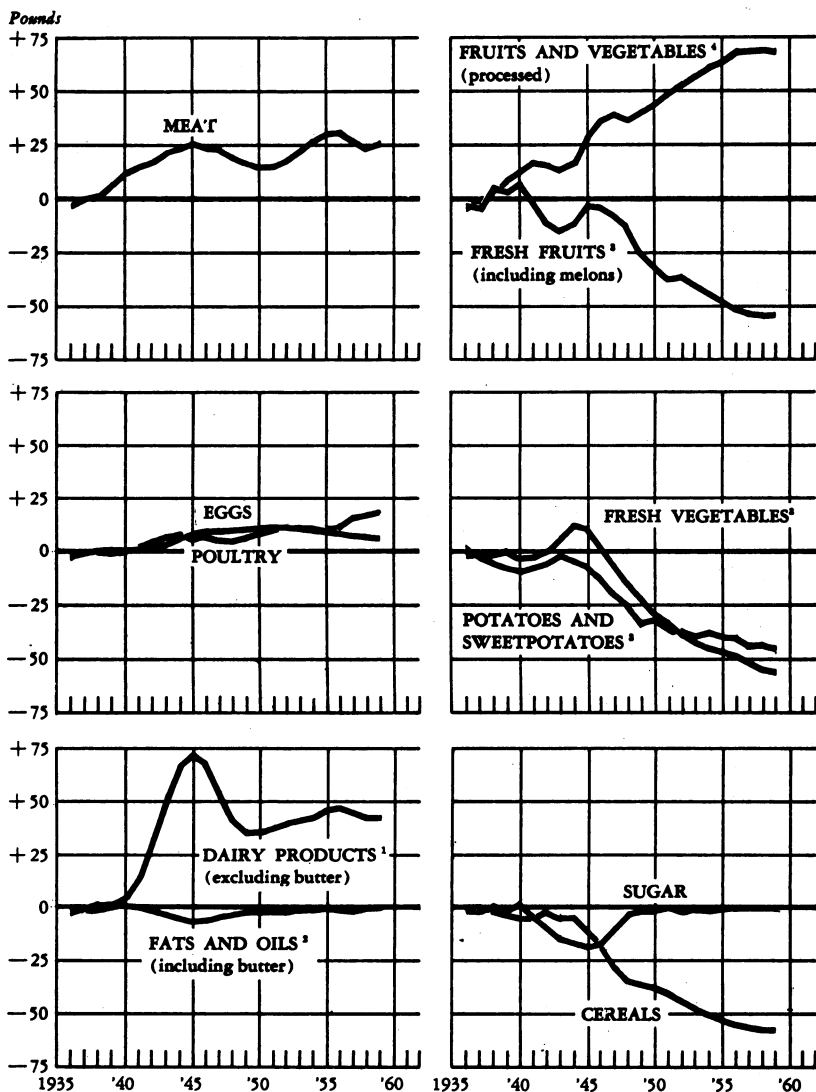
products. The effect of economic growth and rising consumer incomes on food consumption per person is relatively small and appears to be diminishing. Total pounds of food consumed per person remain much the same, but there has been a substantial upgrading in the average consumer diet and considerable shifts among the several foods (Fig. 3.1). In 1960 we ate on the average over 100 pounds more meat and livestock products than in 1935, but less cereals and potatoes by an equal amount. Shifts and trends such as those illustrated in the chart have been influenced by the search for better nutrition, by innovations in production and marketing and, particularly in the case of butter and margarine, by the price factor.

This upgrading in diet is reflected in the Department's index of per capita food use, inasmuch as it is a price-weighted index giving allowance to the trend toward more expensive foods — a factor which has meaning for the farmer since more resources are required to produce a pound of meat than a pound of grain. Thus, since 1940 the index of per capita consumption of food has risen about 10 percent. In the post-war period, there are some indications, as Daly reported in 1958, that the long-term income elasticity of demand for domestically produced food of about 0.20 may be getting smaller. The same may be the case for price elasticities — and prices appear to be somewhat more sensitive to changes in supplies than before World War II. It is logical that as purchasing power rises (at the rate of 2 percent or more a year), more and more people are eating the kinds of food they want to eat. If we apply this income elasticity of food consumed to the projected 45 percent increase in real income per person, per capita food consumption might rise an additional 9 or 10 percent by 1980.

There is some support for this estimate from the cross-section analysis of the 1955 Survey of Food Consumption.³ When we compare indexes of per person food consumption for the average income group, \$4000 to \$5000, with the group some 50 percent higher, the latter shows an increase of 8 percent. These cross-section indexes also show a leveling off at about that income level, suggesting that after 1980 further gains in food consumption per capita might well be quite negligible.

As our trend chart has indicated, the response to income growth varies among the major food groups. Table 3.1 shows the historical income and price elasticities for major groups of farm food products. All that is new here as compared with the Daly

³USDA, National Food Situation, July, 1959, p. 17 ff.



Variations in retail weight. Civilian only. 3-year moving average centered.

¹ Product weight, except milk and cream content of ice cream.

² Fat content.

³ Includes home garden produce.

⁴ Includes frozen concentrated citrus juice on single strength basis.

Fig. 3.1. Changes in food consumption, from 1935-39 average per capita.

paper are new coefficients for eggs developed by Martin Gerra.⁴ The income elasticity for eggs is much smaller than previous studies indicated and for all practical purposes appears to be approaching zero. In projecting into the future, there must be some measure of judgment. Trends do change. For example, the decline in the use of cereals appears to be flattening out, and some experts in nutrition suggest we might do well to increase our consumption a little. Nor does it seem likely that the recent sharp increases in broiler consumption can continue as large in the future.

Table 3.1. Income and Price Elasticities
For Major Groups of Farm Products

Item	Income elasticity	Price elasticity
Livestock products		
Meat animals	0.48	-0.30
Dairy products ^a	0.09	-0.05
Poultry	0.62	-0.50 ^c
Eggs	0.04	-0.10
Crops		
Fruits and vegetables	0.16	-0.06
Cereals, potatoes and beans	-0.23	0.002
Other crops ^b	0.16	-0.02

^a Based on price weighted combined consumption of fat and nonfat milk solids.

^b Excluding imported crops.

^c This equation also included a cross elasticity of demand for poultry with respect to relative price of meat animals of 0.05.

Among the nonfood products, the downtrend in cotton consumption per capita has come to a halt and with new technology, particularly the blending with other fibers, might well show some increase in the years ahead. On the other hand, technology in the tobacco industry has slowed the increase in requirements at the farm level.

So, there is a substantial element of judgment in the long-term projection do-it-yourself kit.

3. Total domestic requirements. We have now reached the point where we can put together population growth and per capita consumption and arrive at some total domestic requirements for farm products (Table 3.2). According to the rate of population growth assumed, domestic use of all farm products might increase

⁴Martin Gerra, "The demand and price structure for eggs," USDA Tech. Bul. 1204.

from 50 to 80 percent by 1980, with meat animals showing a larger rise. However, feed requirements do not rise as much, reflecting the trend toward rising feeding efficiencies per animal. Nonfood uses are projected to rise somewhat faster than food uses. This could well occur in view of the expanding research effort in this field.

Table 3.2. Total Requirements For Farm Products,
1954 and 1958, and Projections to 1980

(Index numbers, 1954=100)

Item	1954	1958 total	Projections 1980 total		
			Low	Medium	High
Population	100	107	139	150	171
Domestic utilization of					
all farm products	100	106	157	169	192
Food	100	107	155	167	189
Nonfood	100	101	171	185	211
Livestock products:					
Food	100	107	156	168	190
Meat animals	100	104	162	175	199
Dairy products	100	107	148	160	182
Poultry	100	129	168	182	206
Eggs	100	99	137	148	168
Nonfood	100	86	105	114	129
Crops:					
Food	100	107	152	165	188
Cereals and potatoes	100	102	129	136	151
Fruits and vegetables	100	113	164	176	201
Nonfood	100	113	138	150	171
Feed and seed	100	117	131	143	162
Other	100	100	164	177	201
Exports total	100	136	172	172	172
Livestock exports	100	126	100	100	100
Crop exports	100	138	188	188	188

Source: "Land and water potentials and future requirements for water," a report by USDA to the Select Committee on National Water Resources, U. S. Senate.

These projections of consumption assume a price situation over-all much the same as we have had in recent years — that is, a price index for farm products of 240-250 on a 1910-14 base.

4. Foreign requirements. Our colleagues in the Foreign Agricultural Service developed estimates of the potential foreign commercial demand for U. S. agricultural products for the purposes of the Senate Committee report. These were based on projections by the United Nations of population growth in the rest of

the world, some increase in real per capita income and some improvement in diets in underdeveloped areas. They also assessed the likely trends of production in other surplus-producing areas and their ability to meet world needs. Summarizing very briefly, the major opportunities for increases in commercial channels appear to be for fats and oils, particularly in low-income areas, and for feed grains in Europe, where an increasing volume of imports will be required for an expanding livestock industry (Table 3.3).

Table 3.3. Foreign Commercial Demand For Selected United States Agricultural Products, Average 1950-54, 1954 and 1956, and Projection 1980

Commodity	Unit	Exports ^a			Projection 1980
		Average 1950-54	1954	1956	
Cotton	Mil. bales	4.0	3.8	7.6	7.6
Tobacco	Mil. lbs.	474	462	510	440
Wheat	Mil. bu.	330	274	546	390
Rice	Mil. cwt.	13.8	8.9	26.3	21
Feed grains	Mil. cwt.	100	155	136	305
Fats and oils ^b	Mil. lbs.	2,882	2,897	4,950	8,500
Index ^c	1950-51 to 1954-55=100	100	99	161	186

^a Year beginning January 1 for tobacco, July 1 for wheat and feed grain, August 1 for cotton and rice and October 1 for fats and oils.

^b Including oil equivalent of oil seeds.

^c Index calculated on market value basis.

Source: "Land and water potentials and future requirements for water," *op. cit.*

On this basis, an increase in our exports of some 25 percent is projected from 1958 to 1980 (also Table 3.2). With economic growth proceeding rapidly in Europe, some additional optimism over commercial export potentials has been generated, particularly for feed grains and poultry which have shown substantial gains during 1960. Further, it is difficult to assess how the role of food might develop in the economic cold war between East and West and the needs of newly emerging countries. To keep perspective, we need to remember that we export about 10 percent of our production, including a substantial amount under Public Law 480. While events may turn out that exports might rise appreciably beyond those projected, the effect on total requirements — the sum of domestic and foreign — would not be large. For example, we could double the level of exports by 1980, and

total requirements would rise 5 percent or less. Further, the possible alternative levels of exports that might prevail 20 or 25 years ahead will probably depend to a considerable extent on how well domestic demands are met. In other words, if our population increases relatively slowly, a higher level of exports is more likely than if population and domestic requirements increase rapidly.

Total Requirements

Table 3.4 summarizes for major crops the projected requirements, domestic and foreign, for 1980 according to the 3 population projections. It can be seen that for some commodities, production in 1958 was within or above the range of projected requirements. These include wheat, rye, potatoes, soybeans, flaxseed, grain sorghums and, in 1959, corn. Pasture production would need to increase by 30-60 percent from 1958 to support the increase in output required in the livestock sector.

Table 3.4. Production of Major Crops, 1954 and 1958, and Projected Requirements in 1980

Commodity	Unit	Production		Projected requirements 1980		
		1954	1958	Low	Medium	High
Corn	Mil. bu.	3,058	3,800	4,310	4,643	5,234
Oats	Mil. bu.	1,410	1,422	1,551	1,683	1,905
Barley	Mil. bu.	379	470	720	769	858
Sorghums	Mil. bu.	235	615	354	381	428
Hay	Mil. tons	108	122	137	149	170
Cotton	Thous. bales	13,890	12,059	21,296	22,247	24,507
Tobacco	Mil. lb.	2,244	1,758	2,697	2,734	3,001
Wheat	Mil. bu.	984	1,462	1,217	1,287	1,411
Rye	Mil. bu.	26	32	28	30	33
Rice (rough)	Mil. cwt.	53	43	64	66	71
Potatoes	Mil. cwt.	220	266	257	278	317
Sweetpotatoes	Mil. cwt.	17	17	27	28	32
Sugar (raw):						
Beets	Thous. tons	2,186	2,202	2,654	2,654	2,654
Cane	Thous. tons	610	579	757	757	757
Dry beans	Mil. lb.	1,894	1,898	2,079	2,254	2,567
Soybeans	Mil. bu.	341	574	512	532	568
Flaxseed	Mil. bu.	41	40	37	39	43
Peanuts (farmers' stock)	Mil. lb.	1,008	1,886	2,283	2,449	2,744
Cottonseed	Thous. tons	5,709	4,798	6,889	7,467	8,502

Source: "Land and water potentials and future requirements for water," *op. cit.*

In view of the surplus situation and prospective continuing feeding efficiencies, total farm output would need to increase about 35 percent from the 1958 level to meet requirements for the low population projection, about 45 percent for the medium projection and 60 percent for the high projection. Also, in 1958 some 27 million acres were in the acreage reserve and conservation reserve of the Soil Bank.

We have not made allowance for possible changes in requirements for stocks. Clearly in the case of wheat, there would be no need for a higher "normal" carryover than presently — and very substantially below the existing carryover stocks level. For corn, "normal" stocks in 1980 might well be 30-50 percent greater than present needs — but again still substantially below what we actually have. For cotton, we might well consider an increase of 50 percent in our "normal" stock level by 1980 — perhaps not much different than the level of stocks we have at present.

SUMMARY

What have we learned from our exercise? In essence it is that agriculture faces a wide range of possibilities. If population grows slowly, there is little prospect, in view of current technology and persistently rising costs, for demands to rise fast enough to alter significantly the current situation of surpluses and lagging incomes in agriculture. If, on the other hand, population increases rapidly, we may be hard put to meet requirements, and the low price elasticities for farm products which are agriculture's weakness today, could become a source of strength in terms of the prices and incomes that farmers might then realize. Crop and livestock inventory requirements could add some further tightness. We might well have to find room not only for 100 million more people, but also for 100 million more livestock.

Considering the range in possibilities, it is very difficult to be dogmatic. To narrow the range appreciably, we need to be able to project population with closer tolerances. Perhaps as a nation we should aim at the mid-point as being the most likely, recognizing that demands could be plus or minus some 10 percent or so. In our programs, we might hope to retain enough flexibility so that if either eventuality occurs, we would not be unduly embarrassed.