OUTLOOK 73

(*-*)

UNITED STATES DEPARTMENT OF AGRICULTURE
Economic Research Service

Possible Directions for Farm Production, Prices, and Income

Talk by David W. Culver
Economic and Statistical Analysis Division
at the 1973 National Agricultural Outlook Conference
Washington, D.C., 8:45 a.m., Wednesday, February 21, 1973

For farmers and farm-related businessmen to make realistic judgments regarding their investments, they need good estimates of volumes and prices over a period of several years, hence the need for a longer-term look at agricultural prospects.

Here is what we foresee as reasonable prospects for 1985, based on some specific assumptions I will discuss later.

Prices of farm products will continue to depend on the general price level, on the results of market expansion efforts, and on the success of agriculture in adjusting resource use to market demands. If crop acres harvested continue level or perhaps edge up a little as suggested by our data, prices of major field crops could increase some from 1969-71 levels to partly offset rising costs.

Given strong and expanding demand for meats and barring a substantial breakthrough in the technology of livestock production, prices of livestock products are likely to trend upward over the next several years. Even poultry and egg prices may move up a bit from the average of recent years despite further improvement in production efficiency. These indications suggest an uptrend in farm prices from the 1969-71 level of around 2-3 percent annually, probably a little less than the projected rise in general price levels.

We have specified general inflation at about 3 percent, and prices paid by farmers would rise at about the same rate or perhaps a bit less. However, this may be conservative for farm costs. Fertilizer prices, after trending down for most of 2 decades, have increased since 1969. The increase may continue even though industry production capacity remains large. The cost of energy of all types is now rising with continued gains likely. And farm wage rates--still well below nonfarm levels--appear likely to continue the spirited rise of recent years.

Farm cash receipts would continue to rise generally for both livestock and crops. However, livestock receipts could slow temporarily in the mid-1970's if cattle marketings increase enough to bring price dips, as seems likely. While rising prices for most inputs will keep production costs going up, operators' realized net income under these conditions would likely trend upward modestly.

We should point out that these or any other projections cannot be looked on as some inevitable unraveling of coming events. Rather, the projection is a sketch of possible developments, a tool to help us anticipate change, or perhaps a red flag to warn of undesirable consequences should current trends and policies continue. A wide array of alternative possibilities need to be examined to better understand the implications of different courses of action. I shall review briefly a little later the results of two alternative questions.

Changes in agriculture epitomize the technological revolution. Dramatic changes have occurred in U.S. farm production capacity and in the organization of resources and the production mix. Farm production has become more closely linked with the nonfarm economy. Costs of production and the resulting output levels are increasingly dependent on the nonfarm sector. Consumption patterns have been upgraded as incomes have risen. In addition, technological changes have influenced food consumption through their impact on production costs and product prices. Nonfood farm products such as fibers and industrial oils have faced strong competition from nonfarm substitutes.

The following sections summarize some of the major results of recent projections analyses. The information presented here focuses on the demand for U.S. farm products and then translates to possible farm production levels for 1985. Other papers at this conference provide the primary discussion of export demand, the use of farm inputs, and the organization of production and marketing.

Demand for Farm Products

Domestic markets for farm products generally increase only a little faster than population. As incomes rise, people usually do not consume much if any more food in terms of pounds or calories, but they do upgrade their diet with more red meats and other costlier kinds of foods. This results in a modest gain in the price-weighted index of per capita food consumption. Out diet is likely to continue to change in response to growth in income, changes in relative prices, development of substitutes, and shifts in consumer preferences.

Per capita food consumption

Let's look at projected 1985 consumption in relation to a 1969-71 base. With rising income levels and the strong consumer preference for beef, we project per capita consumption of beef and veal combined to rise from the 1969-71 level of 118 pounds to about 140 pounds by 1985. This compares with 71 pounds in 1950 and 91 pounds in 1960. By 1985 we foresee veal production down to very low levels; beef accounts for all of the increase.

Pork consumption is projected to continue near 70 pounds per person, about the same as recent levels but a little above the average of the 1960's. This presumes some further improvement in pork quality and in the demand for pork.

These projections are based on the presumption that new products of vegetable origin will not substantially replace meat in our diet over the next several years. It's possible, however, that significant substitution of vegetable protein for animal products could occur by 1985. If so, it will have a major impact on farm production and the food industry. Preference for meat texture and taste has limited the substitution to this point, but advances in food technology continue to improve the acceptability of meat substitutes, especially as extenders.

Consumption of poultry meat seems likely to rise. The very rapid increase in per capita consumption of poultry meat over the last 2 decades resulted in large part from major technological advances in production, processing, and marketing which brought lower prices relative to other animal products and expanded market outlets.

Future developments are not likely to be as favorable toward increased production and consumption of poultry as were developments of the last 2 decades. Nevertheless, further gains in efficiency of production and marketing should continue to encourage expanded consumption of both chicken and turkey. Thus, chicken consumption seems likely to go above 50 pounds per person by 1985, up from 41 pounds in 1969-71 and around 20 pounds 2 decades ago. Turkey is projected to rise from 8-1/2 pounds in 1969-71 to around 10 pounds per person by the middle 1980's.

Milk consumption per person has declined sharply over the last 2 decades as butter and other high-fat dairy products have faced strong price competition from substitute products. In addition, these same products have been adversely affected by diet and health questions. Per capita milk consumption (milk equivalent of all uses) may decline a tenth or more by 1985 from the 1969-71 level of 563 pounds. A decline of this magnitude would about offset the effect of population growth and would imply total use near recent levels.

Per capita consumption of eggs is projected to decline slightly as the continued decline in fresh egg use may not be fully offset by growth in processed uses. However, total food use may rise around 15 percent by 1985.

The demand for feed is a function of livestock production and prices, and the price of feed. Total livestock production in 1985 is projected to increase by over one-fourth from the 1969-71 level. The feeding rate may rise slightly over the next decade if livestock-feed ratios continue relatively favorable. Milk and beef production is likely to come increasingly from concentrate feeding--from the grain and high-protein feeds rather than from roughages. Thus, even though physical feeding efficiency is expected to increase for most livestock items, total concentrates fed in 1985 should be up by around 40 percent from the 186-million-ton average of 1969-71.

Until the early 1960's, use of high-protein feeds had been rising more rapidly than use of total feed concentrates. However, in the last few years, the rate of increase for high-protein feeds has slowed somewhat, apparently in response to the increasing use of urea in cattle feeding. Projected feed use for 1985 assumes a further modest increase in the use of urea and possibly other protein feed substitutes such as petro-protein meal.

Use of food fats and oils has increased perceptibly in the last few years, partly because of the increase in quick service retail food outlets. Per capita disappearance is projected to increase moderately in the next decade, possibly by 6 to 8 pounds (fat content) from 52 pounds in 1969-71. The shift from animal fats to vegetable oils is likely to continue, with vegetable oils accounting for over four-fifths of the total by 1985.

Per capita consumption of all fruit may rise slightly in the next few years as a result of an expected increase in citrus production. There have been large tree plantings in major citrus areas in recent years. Thus, per capita consumption of all citrus fruit may rise from the 1969-71 average of 93 pounds to about 105 pounds or more by 1985. Use of deciduous fruit per person could show some further decline despite favorable prospects for apples.

Consumption of all vegetables and melons on a per capita basis has been relatively stable in recent years. However, the form of consumption has shifted considerably from fresh to processed; this shift is expected to continue but perhaps at a slower pace. Per capita consumption in processed form may rise to around 130 pounds, 10 to 15 pounds above recent levels. Fresh consumption, however, is expected to decline further, perhaps to 90 pounds or less by the mid-1980's.

Per capita consumption of potatoes in all forms was declining several years ago and reached a low of 102 pounds in 1952. Consumption turned back up in the 1960's and has been around 120 pounds per person recently. We think the level of use could rise a bit more before levelling off.

The long-term downtrend in wheat consumption has moderated in recent years. Use per person in 1985 is projected to decline only slightly from the 153 pound level in 1969-71. Food use of corn declined up to the mid-1950's, but has increased during the last 15 years, due largely to the increasing importance of corn sirup and sugar and partly to the introduction of new types of breakfast cereals and other processed products. Per capita food use of corn is likely to increase further in the next dozen years, perhaps 4 to 6 pounds above the 61 pounds in 1969-71. Consumption of rice is trending upward while use of oats and other grains is about stable.

Sugar consumption has been up recently, partly as a result of problems with the cyclamates. It appears that the noncaloric sweeteners are acting primarily to expand the total market rather than to substitute for sugars.

When we combine the various projected food items, we find the price-weighted index of per capita consumption for 1985 up about 3 percent, with livestock products up a little more than crops. Total pounds and calories per person do not change much.

Cotton Use

Cotton continues to face severe competition from man-made fibers. Recent penetration by synthetics has been based heavily on greater price competition. Also, the newer fibers have shown important advantages such as easy care and longer life which heightens their competition with cotton. Per capita consumption of cotton lint is projected to decline to about 17 pounds by 1985, compared with 19 pounds in 1969-71, and nearly 30 pounds 2 decades earlier. However, with expanding total fiber use, cotton use may rise slightly.

Tobacco Use

Consumption of tobacco has declined from an annual average of 14 pounds per adult in 1949-51 to less than 12 pounds in recent years. Our projection is for per capita use to continue around 11-1/2 pounds by 1985. Per capita use of cigarettes, the largest outlet for tobacco, peaked in 1963; tobacco continues to face serious charges of being harmful to health.

Exports

Exports have provided important markets for farm products particularly for such crops as rice, wheat, soybeans, cotton and feed grains. Future growth in U.S. exports will depend on the rate of economic growth in both the developed and the less developed countries. Rising incomes encourage improved diets, including more animal products. This in turn generates rising demand for our feed grains and soybeans. We assume continued markets for our feed products in the USSR and Eastern Europe. Actually, export prospects appear particularly uncertain at this point. Nevertheless, we've gone ahead and developed what we think are reasonable export estimates under the conditions specified.

In capsule, exports of crops are projected to rise nearly 60 percent from 1969-71 to 1985. The most favorable prospects are for soybeans, followed by feed grains; prospects are less bright for wheat, rice, cotton, and tobacco. Exports in 1985 would account for a little more than a fifth of our total crop output. Livestock exports are small but may rise moderately.

Our soybean exports have grown rapidly as worldwide demand has risen for high-protein feeds. Soybean exports are projected to more than double the 1969-71 average. Feed grain exports would also rise sharply under our assumptions, going above 35 million short tons by 1985 in comparison with 23 million tons in 1969-71.

For food grains, we assume the USSR and Eastern Europe will not regularly buy wheat in world markets. Thus, wheat exports are projected at around 800 million bushels by 1985, well below the indicated current year level but above the 1969-71 average. World trade in rice is expected to grow only modestly. We project U.S. rice exports to trend generally upward from the 54 million cwt. level in 1969-71.

The uncertainties in international cotton trade include competition from synthetic fibers as well as among producing countries. We project cotton exports in 1985 to be a little higher than the 1969-71 average of 3.4 million bales.

Our tobacco exports have held fairly steady in recent years as other countries supplied a larger part of the growing world market. The demand for U.S. tobacco has been based on our high quality, but rising U.S. market prices have restricted the competitiveness of our tobacco leaf. With current programs geared to achieve steadily rising tobacco prices, we have projected exports by 1985 to decline, perhaps dropping by a fourth from current levels.

Imports

Commodities which are labor intensive or those with high price supports are likely to lose competitiveness; and imports of such items are likely to rise, unless protected by quota or other restraints. For example, crops where mechanization has not been successful such as some fruit and vegetable crops and possibly tobacco may provide attractive markets for foreign producers. In addition, imports of beef and dairy products appear likely to continue generally available at or above restraint levels.

Production and Land Use

Among livestock products, the largest increases over the 1969-71 average production are projected for poultry (a little over 50 percent) and beef cattle (45 percent). Pork production may increase about in line with growth in the population. Egg output is likely to rise just a little less than the change in population. Milk output may remain near recent levels with declining use per person approximately offsetting population growth. The increase in output for all livestock products is a little over one-fourth, slightly more than the growth in population.

Crop output is projected to rise more than a third from the 1969-71 average. Soybeans would rise by a whopping 88 percent from 1969-71 to 1985, with feed grains rising by around 45 percent. The increase in wheat production would be quite modest, at 20 percent. Cotton production is projected to increase about a fifth, while rice would increase a third. Tobacco production would rise by nearly 15 percent; domestic use would account for the increased requirement since exports are projected to go down a little.

Continued advances in technology--including more improved varieties and more efficient cultural practices--as well as increased use of fertilizer and other purchased inputs are expected to further increase yields in the coming decade. We are aware that application of fertilizers and other chemicals may be regulated in the interest of protecting the environment. We come back to this possibility at a later point. In our baseline projection, the index (1967=100) of crop output per acre, rises from 107 in 1969-71 to 144 by 1985, an increase of 2 percent per year compared with a rate of 2.2 percent per year over the 2 previous decades.

The total increase in yields may about match projected growth in demand. This implies little net change in crop acres harvested, in contrast to the downtrend over the last 2 decades. Soybean acreage would increase to 62 million, while acreages of feed grains and wheat might edge downward.

We've recently had somewhere in the range of 50 to 60 million acres of cropland held out of production. These acres, around 15 percent of our cropland, have provided a substantial cushion of productive capacity.

The Rationale

In developing our projections, we used assumptions about the general economic setting, farm programs and the state of technology.

Population

For most of our recent projections work, and for this discussion, we assume a population growth rate of about 1.2 percent per year--the Series "D" projections of the Bureau of the Census. The "D" projections are in the middle range of the recent Census alternatives. This would mean an increase from 209 million people at the beginning of this year to around 246 million by 1985. In percentage terms the increase to 1985 is 18 percent from now or a bit over 20 percent from the 1969-71 base. Note, however, that recent demographic data, including a sharp decline in birth rates, suggest that a lower rate of population growth may be appropriate.

Economic Growth

The labor force and total employment can be expected to grow at around 1-1/2 percent per year for the next several years. This results from the high birth rates in the past 2 decades and the rising proportion of women in the labor force.

We project gross national product to rise at an annual rate of about 4 percent in "real" terms--that is, not including inflation. This implies an increase in output per man-hour of about 3 percent per year. If inflation slows a bit more in the next year or so and then averages 3 percent, current-dollar GNP would reach $3 trillion by 1985.

Farm Programs

Farm policy goals would continue to emphasize market expansion and the orderly adjustments of production to meet market needs. Specifically, for these projections this means some program of land restriction to adjust output for major crops and programs for tobacco, peanuts, and rice continued as presently operated.

Conditions for Agricultural Trade

Present trade policies of the principal importing and exporting countries are assumed to continue essentially unchanged except for England, Ireland, and Denmark which have joined the European Community and are scheduled to conform to the more protectionist EC orientation.

We've specified the medium level UN projection of world population growth; the world population would rise from about 3.6 billion in 1970 to 4.9 billion in 1985. Income growth would continue to allow increases in consumption levels in most countries. There would be no large-scale droughts or other major calamities. World per capita agricultural production would rise at a rate of 0.4 percent per year from 1970 to 1980 as suggested by recent FAO projections.

Technology

Further improvements in resource management, genetic developments, and use of nonfarm inputs will continue to spur output of crops and livestock. Crop yields are continuing to rise sharply, and we have projected crop output per acre to rise nearly as rapidly from 1969-71 to 1985 as over the past 2 decades. Average yields per acre rise to 130 bushels for corn, 39 bushels for wheat, and 35 bushels for soybeans.

We specified relatively low environmental constraints with only limited regulation of pesticide use and restrictions on drainage and odors for livestock operations. Among pesticides, persistent chemicals would be severely limited in type and amount. Toxic but nonpersistent chemicals would carry a larger burden in pest control. No restrictions are assumed on the use of fertilizers, but fertilizer prices are expected to trend upward in contrast to the downtrend of previous years.

Other Possibilities

Obviously a lot of other conditions could be considered. Let's glimpse briefly at the impact of two other possibilities.

Slower Population Growth

What if population growth slows down? Remember that for the results discussed so far we have used the Series "D" population projection. But we've recently decided to shift for our baseline projection to a slower assumed rate of growth (Census projection Series "E"). This shift is in line with the sharp decline in birth rates of the last few years. Indications are that in 1972 the fertility rate fell for the first time in U.S. history below the long-term replacement rate figure of 2.1 children per woman. The previous lowest birth was during the Depression of the 1930's when the average fertility rate was around 2.2.

The shift to a slower projected growth rate would drop the 1985 total population from 246 million to 236 million. This is a growth rate of a little less than 1 percent in comparison with the 1.2 percent that we've been using.

The slowdown in population growth would have some impact on per capita consumption by raising disposable incomes per person and changing the age distribution of the population. For example, the per capita consumption of meats and cheese would rise. Nevertheless, the lower population would not be fully offset by higher per capita consumption and the total demand for agricultural products would be reduced.

Livestock and crop production would be reduced by about 2-1/2 percent, a little less than the change in the population variable. The likely impact on harvested cropland would be around 5 to 8 million acres.

Restraints on Inputs and Yields

A major concern is the possible implementation of environmental restraints. If severe restrictions were applied to production inputs and farm production practices, they could have a substantial impact on crop yields. To get some idea of the magnitude of this kind of question, we've looked briefly at the impact of slower yield increases on cropland.

We assume for simplicity a reduction of one-half in the rate of increase in projected crop yields. For example, the corn yield in 1985 would be at 110.5 rather than our current projection of 130 bushels per acre. This is a rather severe restriction but it could conceivably occur with stringent restrictions on fertilizers and other chemical inputs and on tillage practices.

The initial result, assuming other things constant, would be to increase cropland harvested by about 40 million acres in order to achieve the same production levels as before. This is less than the amount being held out of production in recent years under Government programs. However, it would substantially lower the amount of excess capacity, thereby raising prices and bringing some adjustment in consumption.

While this example is rather crude, it offers some inkling of the magnitude of impact that environmental constraints could have on agricultural production. In addition, it affords an example of our dependence on modern production technology.

In Conclusion

Based on our analyses, U.S. production capacity appears to be fully ample to meet domestic and export demand at least through 1985. With population continuing to rise about like it has over the past decade and with other factors along the lines we specified, farm output in 1985 would be up by a third from the 1969-71 level. Output would rise somewhat more rapidly for crops than for livestock, due in part to the strong demand gains projected for exports of feed crops. The need for cropland would run about the same as in recent years or perhaps a little higher. Farm prices would trend up, but probably at a lower rate than the general price level; and farmers' net incomes likely would trend upward. However, if the rate of population growth slows to 1 percent or less, as now seems reasonable, demand growth would be slow enough that cropland use could decline a little from recent levels. This would keep downward pressure on farm prices and reduce the likelihood of appreciable farm income gains.

While a variety of potential constraints could affect the rates of change discussed here, our analyses to this point have suggested no insurmountable problems. Rather, our work suggests strong growth in the demand for farm products and reasonable prospects for an upward trend in farm income. However, this should not lead to complacency about the future as needs and technologies change around us.

Table 1.--U.S. per capita civilian consumption of specified foods, selected averages and projections for 1985

Commodity	Averages		Projected
	1949-51	1969-71	1985
	Pounds		
Beef and veal 1/	71.2	117.9	140
Pork 1/	70.6	68.1	70
Lamb and mutton 1/	3.8	3.3	2
Chicken 2/	20.8	40.6	52
Turkey 2/	4.0	8.3	10
Eggs	49.8	41.8	40
Dairy 3/	729.0	563.0	500
All animal products 4/	92.7	102.5	106
Wheat (grain equivalent)	191.7	152.7	143
Rice (milled) 5/	5.4	7.6	10
Corn (grain only)	49.8	61.2	67
Oats	6.7	7.0	6
Peanuts (farmer's stock basis)	6.2	7.8	9
Food fats and oils (fat content)			
Animal	22.1	14.1	10
Vegetable	21.4	38.2	50
Fruit 6/			
Citrus	n.a.	93.4	106
Noncitrus	n.a.	101.1	98
Vegetables 6/			
Fresh	114.4	99.0	87
Canned and frozen	83.4	114.4	132
Potatoes 6/	110.1	118.1	127
Sugar, cane and beet 7/	97.0	101.7	102
Tobacco 8/	14.1	11.6	11.5
All crop products 4/	97.2	102.6	106
All foods 4/ 9/	94.3	102.6	106

1/ Carcass weight. 2/ Ready-to-cook basis. 3/ Milk equivalent, fat solids basis. 4/ Constant retail-price weighted index, 1967=100. 5/ Territories excluded in historical data, included in projections; this accounts for part of the increase in projected consumption rates. 6/ Fresh equivalent. 7/ Refined. 8/ Per capita consumption for persons 18 years and older, including Armed Forces overseas. 9/ Excludes tobacco. n.a. Not available.

Table 2.--Product[illegible] of specified commodities

Table 2.--Production of specified commodities, selected averages and projected 1985 with percentage change 1985/1959-61 1/

Commodity	Million units	Averages		Projected 1985	Percentage change: 1969-71 to 1985
		1949-51	1969-71		
					Percent
Cattle and calves 2/	Lb.	10,478	22,185	32,250	+45
Hogs 2/	do.	10,827	13,728	16,900	+23
Chicken 3/ 4/	do.	3,199	8,478	13,020	+54
Turkey 4/	do.	629	1,727	2,620	+51
Eggs	Doz.	5,291	5,863	6,870	+17
Milk 5/	Cwt.	1,165	1,174	1,210	+3
Total Livestock Production	Index 1967=100	75	105	134	+28
Wheat	Bu.	1,035	1,490	1,800	+20
Rice, rough	Cwt.	42.0	86.3	116	+34
Feed grains	Ton	109.9	181.7	261	+44
Soybeans	Bu.	272	1,143	2,150	+88
Peanuts 6/	Lb.	1,853	2,829	4,700	+66
Cotton lint	Bale	13.6	10.1	12	+19
Fruit 7/					
Citrus	Ton	n.a.	10.6	14.3	+35
Noncitrus	do.	n.a.	9.0	10.4	+16
Vegetables and melons 7/	do.	17.9	23.6	29	+23
Potatoes 7/	Cwt.	231.9	319.2	368	+15
Sugar, cane and beet	Ton	2.2	5.7	7.5	+31
Tobacco	Lb.	2,110	1,811	2,065	+14
Total Crop Production	Index 1967=100	77	105	143	+36
Farm Output	Index 1967=100	74	105	139	+32

1/ Livestock items are on a calendar year basis; crops are on a crop year basis. 2/ Carcass weight. 3/ Farm chickens and commercial broilers. 4/ Ready-to-cook basis. 5/ Milk equivalent, fat solids basis. 6/ Farmer's stock basis. 7/ Fresh equivalent. n.a. Not available.

Table 3.--Crop acres harvested and yields per harvested acre for specified crops, selected averages and projections for 1985

Crop	Averages		Projected
	1949-51	1969-71	1985
Acres harvested (million)			
Wheat, all	66.5	47.1	46
Rice	1.8	1.9	2.0
Feed grains	129.7	100.4	94
Soybeans	12.6	42.1	62
Peanuts	2.2	1.5	1.4
Cotton	24.1	11.2	11
Hay, all	74.3	60.9	56
Other crops	38.5	35.2	34
Total acres of crops harvested	349.7	300.3	306
Yield per harvested acre			
Wheat, all (bu.)	15.7	31.8	39
Rice (lb.)	2,291	4,551	5,675
Feed grains (tons)	.85	1.8	2.8
Soybeans (bu.)	21.6	27.2	35
Peanuts (lb.)	848	1,946	3,070
Cotton lint (lb.)	273	437	535
Hay (tons)	1.39	2.1	2.6
Index of crop production per acre (1967=100)	69	107	144