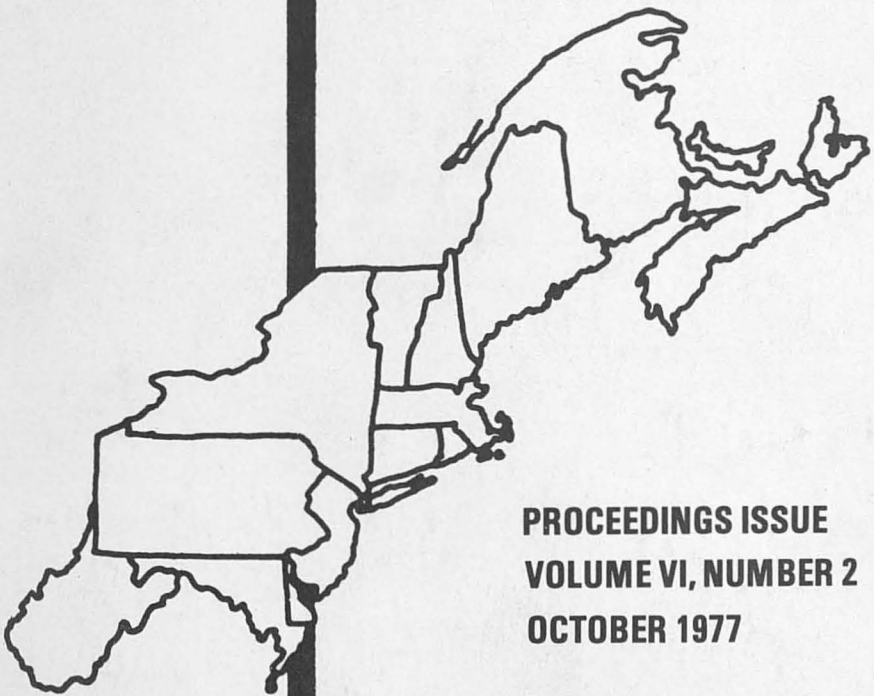
JOURNAL OF THE

Northeastern Agricultural Economics Council



PROCEEDINGS ISSUE
VOLUME VI, NUMBER 2
OCTOBER 1977

AGRICULTURAL PROJECTIONS TO 1985 FOR THE NORTHEAST AND COMPARISONS WITH THE UNITED STATES[1/]

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Introduction

This paper contains new but preliminary agricultural projections to 1985 for the Northeast and for the United States.[2/] The projections reflect our best judgement of the future agricultural production and resource use, but these are subject to additional review and revision before becoming official projections of the U. S. Department of Agriculture.

First, we want to explain briefly how the agricultural projections are made and then summarize the projected production and land use for the Northeast and for the United States.

The National-Interregional Agricultural Projections (NIRAP) System[3/]

The projections are made with the (NIRAP) system. It is a series of interconnected model components useful in simulating future agricultural production and related economic variables in the United States as shown in Figure 1 [5].

We start with estimates of the functional relationships of demand and supply. These functions are then shifted over time based on

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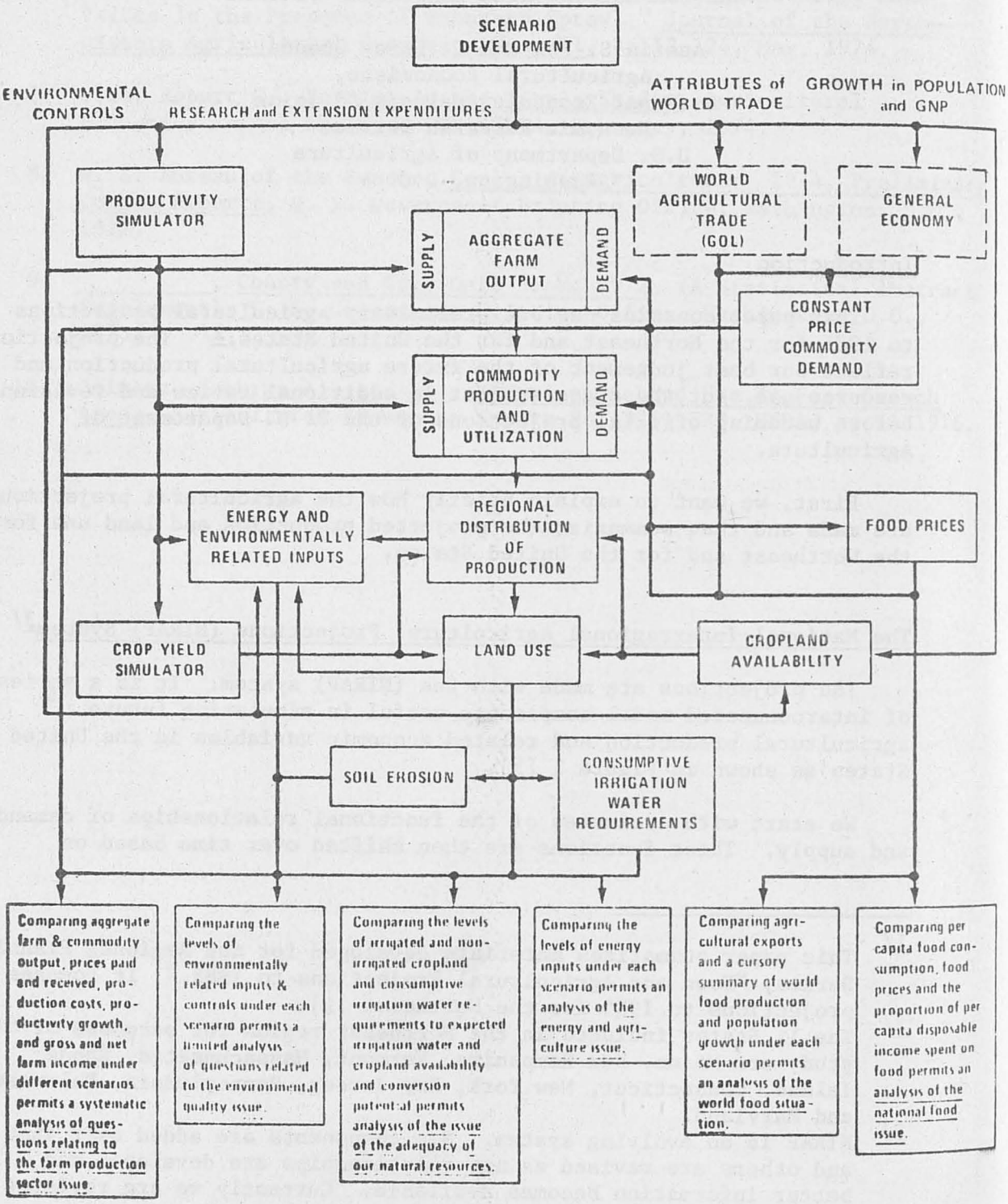
1/ This paper summarizes materials developed for the Regional Planning Series, "Food and Agricultural Projections to 1985." It focuses on projections to 1985 for the Northeast [1].

2/ The 11 States included in the Northeast region for purposes of this study are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, and Maryland.

3/ NIRAP is an evolving system. New components are added over time and others are revised as new relationships are developed and better information becomes available. Currently we are revising the methodology for improving the regional distribution of production and the use of selected inputs such as fertilizer, fuel, and pesticides.

Figure 1

GENERALIZED FLOW CHART OF NATIONAL-INTERREGIONAL AGRICULTURAL PROJECTIONS (NIRAP) SYSTEM



NOTE: Dots on flow lines indicate lines connect.
= = = means no formal endogenous model
——— means a formal endogenous model

assumptions or exogenous projections of supply and demand shift variables. Finally equilibrium solutions are calculated.

Shifts in demand over time are associated with expected non-price changes in exports and changes in domestic consumption. Constant price projections of exports for the major grains are from the Economic Research Service's Grain, Oilseed, and Livestock World Trade (GOL) model--a static equilibrium model that projects area production, food and feed use, and trade and prices for 11 commodities in 27 regions throughout the world [7]. Growth in domestic demand is related to changes in population and disposable income, the latter in turn depends upon projected Gross National Product (GNP). These shifts in demand are estimated for 22 crop and 8 livestock categories in the "constant price commodity demand" NIRAP component [8].

Shifts in supply over time are associated with changes in productivity, inflation, environmental controls, and weather. The principal relationship is simulated in the "productivity simulator" NIRAP component and relates changes in public expenditures for research and extension to expected future changes in technology induced productivity [2]. But it also includes variables associated with the level of education and the weather.

The projected equilibrium supply and demand for all commodities in the aggregate is calculated in the "aggregate farm output" component [9]. It is a system of simultaneous equations including Koyck type distributed lags in which both quantities demanded and quantities supplied are functions of both current and lagged prices. Among other things, this model provides the quantity of farm output and the overall indexes of prices paid and received by farmers. It relies heavily on estimated short run demand and supply elasticities, annual rates of shifts in demand and supply, lagged parameters in the demand and supply equations, and the assumed inflation rate. Projected equilibrium production, utilization, and prices for individual commodities are estimated in the "commodity production and utilization" component [4]. Both crop and livestock price elasticities and cross price elasticities of supply and demand are used to derive a market solution for relative commodity quantities and prices. The summation of the results from the individual demand and supply equations are constrained by results obtained in the aggregate farm output component. The projected equilibrium farm prices in combination with projected food consumption and marketing margins are used to calculate expected food prices.

Having decided what will be produced, it is now necessary to estimate where the production will be produced, and what inputs will be used in production. National production is distributed among States and regions based primarily on historical relationships but also on cropland availability, crop yields, expected land use patterns, and on professional judgement.

Scenarios

Our scenarios attempt to bracket food demand and supply shifts for expected changes in population, income growth, tastes and preferences, world trade, technology, inflation, and environmental conditions. These are shown in Table 1 and are from Quance, Smith and Powell [6].

One extreme scenario bound suggests scarcity and deals with high demand and low supplies. The high demand comes from 2.0 percent annual growth in exports, 3.5 percent growth in GNP, 2.8 percent growth in per capita disposable income, and a 0.9 percent growth in population. The low supplies are related to expenditures for research and extension at 1973-75 levels, poor weather with 1985 similar to the dust bowl conditions of 1934, a very small increase in productivity, high inflation, and stringent environmental controls.

Another extreme bound suggests abundance and deals with low demand and high supplies. The lower demand comes from a 1.9 percent annual growth in exports, 2.5 percent growth in GNP, 2.0 percent growth in per capita disposable income, 0.7 percent growth in population, and a change in tastes that includes more plant protein in the diet. The higher supplies are related to a doubling of expenditures for research and extension, long-run average weather, higher productivity, low inflation rate, and current trends in environmental controls.

Two supply-demand management scenarios lie between these extremes, and the boundary between these two scenarios is the "baseline." The changes in demand and supply for the baseline are generally between the toward scarcity bound and the toward abundance bound except for exports which are down. The upward shift in demand for the baseline comes from a 1.6 percent annual growth in exports, 3.0 percent growth in GNP, 2.2 percent growth in per capita disposable income, and 0.9 percent growth in population. The upward shift in supply is related to greater expenditures for research and extension, long-run average weather, higher productivity, 5 percent rate of inflation, and current trends in environmental controls.

Much of the analysis in this paper is limited to a discussion of the baseline projections, but information for the alternative scenario bounds is also summarized. For the national projections it was estimated that there was a 70 percent chance that the demand and supply attributes would grow within the supply-demand adjustment range specified in Table 1. Probabilities of specified changes related to the demand and supply attributes were estimated and then weighted in relation to their influence on quantities demanded and supplied to determine the likelihood that agricultural adjustments will remain within the supply-demand management scenario bounds--between the toward scarcity and toward abundance bounds.

Table 1
Values of Exogeneous Variables and Their Total Impact on Annual Shifts in Demand and Supply Under the Baseline, and at the Toward Scarcity and Toward Abundance Bounds, United States

Item	Unit	1973 to 1975	1985 Projections		
			Toward Scarcity	Base-line	Toward Abundance
Demand:					
Population	Mil.	212	234	234	228
Income					
GNP, 1972 dols.	Bil. dols.	1,210	1,672	1,593	1,517
Per capital disposable income, 1972 dols.	Dols.	4,020	5,008	4,760	4,635
Exports, agricultural	1967 = 100	159	184	176	183
Changes in tastes	---	---	a/	a/	b/
Annual shift in demand	Percent	---	2.40	2.01	1.76
Supply:					
Technology					
Public expenditures for agricultural research and extension, 1972 dols.	Mil. dols.	795	795	1,100	1,673
Weather	Index c/	105	69 d/	102	102
Productivity	1967 = 100	110	113	121	122
Inflation, annual	Percent	---	7.0	5.0	3.0
Environment	---	e/	f/	e/	e/
Annual shift in supply	Percent	---	-0.66	1.024	1.20

a/ Current trends in tastes--a domestic diet of less than 5 percent plant protein.
b/ A shift to more plant protein--a domestic diet made up of between 5 to 14 percent plant protein.
c/ The Stallings Weather Index. An index value of 100 is the long term average.
d/ Assumes a weather pattern (measured here by the Stallings Weather Index) beginning in 1978 similar to that beginning in 1927 so that the 1985 weather is similar to what it was in the drought year 1934.
e/ Current trends in environmental controls.
f/ Stringent environmental controls.

General Economic and Agricultural Growth

For the baseline, total personal income projections in the Northeast for 1985 show more growth than for the United States (Table 2). During this period, the region's population growth is only slightly less than for the Nation. However, slower projected increases in agricultural productivity, total cropland, and cropland harvested in the Northeast than for the Nation cause slower growth in farm output. Even so, there will continue to be increases in farm output and higher productivity in the region. Total cropland remains about the same in the Northeast and increases slightly in the United States. But cropland harvested continues to decline in both the region and Nation.

Farm output is projected to grow somewhat slower than population in the Northeast and thus the region will become a larger net importer of farm commodities. The region's farm output relative to personal income is projected to be only two-thirds as high in 1985 as it was in 1973-75.

Population pressure in the Northeast will continue to prevail. Even though population growth in the region will be slightly lower than for the Nation, the ratio of population to total cropland continues to increase on the baseline.

Commodity Production

The Northeast is still important in food and agriculture, particularly in view of the small share of cropland available for production. The region has less than 4 percent of the cropland and cropland harvested in the Nation but produces a higher percentage of the oats, hay, noncitrus fruits, Irish potatoes and vegetables (Table 3). In addition, the region imports livestock feed used to produce from 15 to 20 percent of the Nation's chickens, eggs, and milk.

Production increases are projected for 1985 in the Northeast for nearly all crops and for cattle and calves, chickens, and milk on the baseline. The production of hogs and eggs is expected to decline. Broiler production will increase but there will be fewer layers and less egg production. Lower hay production is associated with feeding more silage and other forages.

The Northeast is projected to continue to be competitive in producing many agricultural products. The region will increase production faster than the U. S. to meet the projected demand in 1985 for milk, cattle and calves, Irish potatoes, vegetables, dry beans, noncitrus fruit, tobacco and oats (Table 3).

The Northeast is projected to remain competitive in producing broilers and barley. Projected regional increases in percentage terms

Table 2
Agricultural Supply-Demand Management Scenario Baseline Projections to 1985 for the Northeast and the United States, and Comparisons with 1973-75 Averages. a/

Adjustment Indicator	Unit	1973-75 Averages		1985 Projections		1985 Projections as a Percent of 1973-75 Averages b/	
		North-east	United States	North-east	United States	North-east	United States
Population	Million	54	211	59	234	110	111
Personal income c/	Mil. 1967 $	225	813	370	1273	164	158
Farm output	1967 = 100	98	110	105	124	107	113
Total cropland	Mil. acres	17	464	17	474	99	102
Cropland harvested	Mil. acres	13	324	12	312	85	96
Agricultural productivity	1967 = 100	108	110	114	121	106	110
Farm output relative to population	Ratio	---	---	---	---	97	102
Farm output relative to personal income	Ratio	---	---	---	---	64	71
Population relative to total cropland	Ratio	---	---	---	---	110	107
Cropland harvested as a percent of total cropland	Percent	75	70	70	66	94	94

a/ The 11 states included in the Northeast region are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, and Maryland.

b/ Percentages calculated from unrounded data.

c/ Source: 1972 OBERS Projections, Regional Economic Activity in the U.S., Series E population, Volume 4, States. U.S. Water Resources Council, Washington, D.C., April, 1974. These personal income projections are not entirely consistent with the GNP projections used in our aggregate demand analysis. These personal income projections were derived from GNP growing at 3.35 percent per year compared with a 3.0 percent GNP growth rate in our baseline projections.

Table 3
Projected Agricultural Commodity Production in the Northeast, for 1985 Under the Supply-Demand Management Scenario, and Comparisons with 1973-75 Averages, and 1985 Projected United States Aggregates[a/]

Commodity	Unit	1973-75 Averages			1985 Projections							1985 Baseline Production as a Percent of 1973-75 Averages[b/]	
					Northeast			United States					
		Northeast	United States	Northeast as a % of U.S.[b/]	Toward Scarcity Bound	Baseline	Toward Abundance Bound	Toward Scarcity Bound	Baseline	Toward Abundance Bound	Northeast Baseline as a % of U.S.[b/]	Northeast	United States
		----Million----		-Percent-	----------Million----------						-------Percent-------		
Food grains													
Wheat[c/]	Bu.	25	1,878	1	25	25	26	2,088	2,106	2,146	1	100	112
Feed grains & hay													
Corn	Bu.	188	5,359	4	181	190	193	5,814	6,127	6,207	3	101	114
Oats	Bu.	42	646	7	44	50	50	616	694	694	7	117	107
Barley	Bu.	14	370	4	18	18	18	459	473	468	4	126	128
Hay	Tons	12	132	9	11	12	12	121	133	130	9	97	101
Oil crops													
Soybeans	Bu.	17	1,428	1	17	18	19	1,621	1,742	1,787	1	107	122
Other field crops													
Tobacco	Lbs.	60	1,972	3	70	69	71	2,160	2,122	2,188	3	113	108
Fruits & Vegetables													
Noncitrus fruit[d/]	Tons	1	11	11	2	2	2	13	13	14	12	123	118
Irish potatoes[d/]	Cwt.	56	319	18	69	65	65	375	354	352	18	117	111
Dry beans[e/]	Cwt.	1	18	3	1	1	1	18	20	21	4	140	112
Vegetables and melons[d/]	Tons	2	24	8	3	2	2	30	28	28	9	120	118
Livestock & poultry													
Cattle & calves[f/]	Lbs.	1,092	41,477	3	1,187	1,278	1,276	44,137	47,544	47,465	3	117	115
Hogs[f/]	Lbs.	324	18,971	2	210	224	222	21,258	22,610	22,485	1	69	119
Chickens[f/]	Lbs.	2,088	12,324	17	2,490	2,425	2,412	14,679	14,291	14,218	17	116	116
Eggs	Dozen	844	5,472	15	723	782	802	5,429	5,866	6,017	13	93	107
Milk[d/]	Cwt.	231	1,555	20	247	263	269	1,141	1,216	1,241	22	114	105

a/ States included in the Northeast region are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware and Maryland.
b/ Percentages derived from unrounded data and then rounded.
c/ Grain equivalent.
d/ Fresh equivalent.
e/ Cleaned basis.
f/ Liveweight.

for these commodities are about the same as for the Nation. But, the projections suggest that the region is not competitive in producing some crops and livestock. Projected rates of increase in production are lower for the Northeast than for the Nation for hogs, eggs, corn, and soybeans.

Crop Acreage and Yield Projections

Under the baseline the Northeast is projected to harvest about 3.8 percent of the cropland harvested in the Nation in 1985. Cropland harvested in both the region and the Nation is projected to decline but the rate of decline is almost twice as great for the Northeast as for the United States. Cropland harvested in the region is projected to decline from 12.9 million acres in 1973-75 to 12.0 million in 1985 (Table 4).

Baseline projections indicate that in the Northeast, there will be 100,000 acres less wheat harvested in 1985, 200,000 acres less corn and 20,000 acres less potatoes. But more acres will be used in producing oats, barley, and tobacco--10,000 20,000 and 20,000 acres respectively. Soybean acreage will stay about the same.

Projected crop acres would be higher if it were not for increases in crop yields. For example, the Northeast could produce about the same quantities of wheat in 1985 as in 1973-75 on 100,000 fewer acres because the projected yield increases from 35.0 bushels to 41.8 bushels per acre. Yield increases are projected for all crops. The highest projected yield increase is 25 percent for potatoes. Wheat, oats, barley and vegetable yield increases are between 15 and 20 percent. Corn and hay yields are projected to increase between 7 and 9 percent. Soybean yields increase about 4 percent and tobacco yields 2 percent.

Impact of Alternative Scenarios

Analysis of the high demand-low supply conditions indicates that as we move to the toward scarcity scenario bound, crop yields are considerably lower than under the baseline. Lower yields are primarily caused by poor weather but also by lower productivity growth, stringent environmental controls, and the need for more acres. The Nation is more adversely impacted than the Northeast by these low supply conditions. Even though 15 percent more crop acres are projected to be harvested in the United States, yields are down sharply and farm output is down 4 percent. In the Northeast, only 3 percent more acres are harvested and yields are not down as much. For example, nationally, the corn yield is nearly 25 bushels less than under the baseline but in the Northeast, the corn yield is down only about 15 bushels. Similarly for wheat, the United States yield is down nearly 9 bushels but only about 6 bushels in the region. Between 15 and 20 percent more corn and wheat acres are harvested in the region as we move

Table 4
Crop Acreage and Yields in the Northeast, and United States in 1973-75 and Projected for 1985 Under the Supply-Demand Management Scenario[a/]

Crop	Unit	1973-75 Averages[b/]				1985 Projections[b/]											
		Northeast		United States		Northeast						United States					
						Toward Scarcity Bound		Baseline		Toward Abundance Bound		Toward Scarcity Bound		Baseline		Toward Abundance Bound	
		Acres	Yields	Acres	Yields	Acres	Yields	Acres	Yields	Acres	Yields	Acres	Yields	Acres	Yields	Acres	Yields
		Mil.		Mil.		Mil.		Mil.		Mil.		Mil.		Mil.		Mil.	
Food grains																	
Wheat [c/]	Bu.	.7	35	63.0	30	.7	36	.6	42	.6	42	79.9	26	60.9	35	61.8	35
Feed grains & hay																	
Corn	Bu.	2.3	82	64.7	83	2.5	74	2.1	89	2.2	82	70.9	82	57.5	107	58.3	106
Oats	Bu.	.8	53	13.6	47	.8	53	.8	62	.8	62	12.7	48	12.1	57	12.1	57
Barley	Bu.	.3	47	9.1	41	.4	47	.3	55	.3	55	11.2	41	9.6	49	9.5	49
Hay	Tons	5.6	2.2	61.5	2.1	4.6	2	5.1	2.4	4.9	2.4	53.2	2.3	56.8	2.3	55.1	2.3
Oil crops																	
Soybeans	Bu.	.6	28	64.7	27	.6	27	.6	29	.6	29	62.9	26	56.7	31	58.2	31
Other field crops																	
Tobacco	Pounds	.04	1408	1.0	2014	.05	1429	.05	1443	.05	1445	1.0	2073	1.0	2116	1.0	2122
Fruits & Vegetables																	
Noncitrus [d/]	Tons	-	-	1.7	6.9	.2	7.3	.2	8.5	.2	8.5	2.0	6.5	1.8	7.6	1.8	7.6
Irish potatoes [d/]	Cwt.	.2	229	1.3	242	.2	286	.2	288	.2	286	1.4	266	1.3	268	1.3	267
Dry beans [e/]	Cwt.	.04	11	1.5	12	.05	12	.05	12	.06	12	1.4	13	1.5	13	1.6	13
Vegetables and melons [d/]	Tons	.4	5.0	3.4	7.1	.5	5.2	.4	6.0	.4	6.0	4.6	6.5	3.7	7.7	3.6	7.7
Subtotal		11.1		285.5		10.7		10.5		10.4		301.4		262.9		264.4	
Other crops				43.5		1.8		1.7		1.7		62.1		54.2		54.7	
Total crops harvested				329.0		12.5		12.2		12.1		363.5		317.1		319.1	
Double cropping				4.7		.2		.2		.2		5.2		4.7		4.7	
Cropland harvested		12.9		324.3		12.3		12.0		11.9		358.3		312.4		314.3	
Cropland failure		.1		5.3		.2		.2		.2		19.7		8.9		9.0	
Pasture and idle		4.2		103.8		4.6		5.0		5.1		73.9		119.8		117.9	
Summer fallow		-		30.3		-		-		-		46.8		35.4		35.7	
Total cropland		17.2		463.8		17.1		17.1		17.2		474.4		474.4		474.7	

a/ States included in the Northeast, (see table 2). Yields are in units per harvested acre.
b/ Due to rounding totals may not add and production in table 3 may not equal these acreages times yields.
c/ Grain equivalent.
d/ Fresh equivalent.
e/ Cleaned basis.

to the toward scarcity bound. And there are substantically greater acreages of barley and vegetables. But only slightly larger acreages of oats and fruit are harvested, and fewer acres of hay.

The possible move to the toward abundance scenario bound indicates production only marginally higher than under the baseline. Generally depressed farm prices stimulate producers to shift the input mix away from fertilizers and toward land. This conclusion is supported by the fact that even though inflation is less and productivity higher, in comparison to the baseline, yields are the same or only slightly higher and cropland harvested is up.

Summary and Implications

The Northeast will continue to play an important role in food and agricultural production through 1985. Projections indicate continued increases in total farm production and for some commodities greater increases in the Northeast than for the Nation. The production of milk, cattle and calves, fruits, vegetables, potatoes, oats, tobacco and dry beans are projected to increase faster for the region than for the United States. But even with increases in total farm output, projected decreases in the production of eggs and hogs along with continuing increases in population and total personal income will make the region a larger net importer of farm commodities. Population pressure on land resources in the Northeast will continue to increase even though growth in population will be lower than for the United States.

Our projections show slower growth in farm output and in agricultural productivity for the Northeast than for the United States. Much of this is attributed to lower marginal rates of return to expenditures for agricultural research and extension [3]. Some may also be associated with greater environmental concerns in the Northeast due to population density and agricultural terrain. It suggests a need to find cost effective ways to improve agricultural productivity and the importance of relating environmental concerns and actions to the adoption of new technology and in turn to the impact on agricultural productivity.

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