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REGIONAL SELF-SUFFICIENCY IN FOOD PRODUCTION— THE NEW ENGLAND STATES

Henry M. Bahn and Robert L. Christensen

New England's dependence upon other regions for much of its food supply has become a cause for concern for farmers, consumers, and public officials. As the debate on the region's need and ability to become more self-sufficient in food production continues, the need for an estimate of current levels of self-sufficiency becomes obvious.

This paper estimates New England's level of self-sufficiency for 1975 using secondary data for population, retail expenditures and farm marketing receipts. The region was found to be about 38 percent self-sufficient in overall food production. It produces a high of 176 percent of its seafood requirements and a low of 3 percent of its red meat. Maine and Vermont are surplus food producers.

INTRODUCTION

Regional self-sufficiency in food production for New England has been discussed frequently during the past several years.¹ As food prices continue to escalate and as concern over vulnerability to possible food shortages grows, food production self-sufficiency for the region becomes, in the eyes of some observers, an idea whose time has come.

A number of benefits are identified with self-sufficiency in food production. The regional agricultural industry would be revitalized, with all of the accompanying benefits of an expanding industry. Money currently flowing out of the region to other areas for the purchase of food would instead be retained and the region would be assured a stable source of food in the event of transportation stoppages or some other crisis of a short or long term nature.

In addition to economic benefits, it is argued that self-sufficiency would preserve open space and insure to the public the aesthetic value provided by farms. With the expansion of relatively small family farms, some feel that the agrarian values of freedom, independence and progress would be preserved [Gulley, 1974, p. iv]. Although these values are not the exclusive property of the family farm, there is little doubt that expanding food production would help to preserve the pastoral or rural setting common to New England.

Total food self-sufficiency for the region is highly doubtful. Climatic conditions, the land base, and soil fertility are constraints to sufficiently large scale production of some food crops and feed grains necessary to support a substantial livestock industry. Certain crops such as citrus fruits, subtropical vegetables and fresh winter produce are for practical purposes impossible to grow in New England.

In 1975 New England accounted for about six percent of the United States population while containing only two percent of the nation's land area. Much of the region is forest or woodland.

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¹Between 1976 and 1978 six articles in *FREE News*, an Extension newsletter from the University of Massachusetts Department of Food and Resource Economics, discussed various aspects of this issue.

This, coupled with high demand for land for nonagricultural purposes and the large population suggests that the region might have difficulty producing all its food needs.

New England's population continues to expand with the highest rates of growth in Connecticut and New Hampshire. The region as a whole grew in population by over thirty percent in the 25 year period from 1950 to 1975 (Table 1). Much of this growth has occurred in the nonmetropolitan areas. For example, the period of 1970-1976 witnessed an 8.4 percent growth rate in nonmetropolitan areas in the Northeast [U.S.D.A., 1978]. Although this growth represents the entire Northeast, it is indicative also of the situation in the six New England states.

Whether a sustained effort to maximize partial self-sufficiency should be made remains to be decided by farmers, consumers, public officials, and public interest groups. Decisions to increase support for agricultural development must be based on sound and reliable information. The purpose of this paper is to estimate, using secondary data, New England's level of food self-sufficiency in 1975. A knowledge of the region's current level of self-sufficiency is vital to future efforts to pursue increased regional food production as a goal.

Table 1
Trends in Population, New England

State	Census Year				% Change 1950-75
	1950	1960	1970	1975	
	(000)				
Connecticut	2,007	2,535	3,032	3,095	54.2
Maine	914	969	992	1,059	15.7
Massachusetts	4,691	5,150	5,689	5,818	24.0
New Hampshire	533	607	738	818	53.5
Rhode Island	792	859	947	927	17.0
Vermont	378	390	444	471	24.6
Region Total	9,315	10,510	11,842	12,188	30.8

Source: U.S. Department of Commerce, U.S. Bureau of the Census, *Current Population Reports, Population Estimates and Projections*, Series p-25, No. 709, September 1977.

PROCEDURE AND ANALYSIS

Using data assembled from various government sources, levels of food production self-sufficiency were developed for the region and for each of the six New England states. The calculations were made for 1975 since that is the most current year for which the necessary data were available.

Consumer retail food expenditures based on per capita consumption and census population figures were estimated. Farm receipts for the region were adjusted to retail value. Comparing receipts and expenditures gave an indication of the degree of self-sufficiency for selected food groups for 1975 and allowed an estimate of overall food production self-sufficiency to be derived.

RETAIL FOOD EXPENDITURES

To determine retail consumer food expenditures it was assumed that New England per capita food consumption of the major foods was the same as national consumption. Although this ignores regional consumption differences, the overall effect is probably not serious. U.S. per capita expenditures for major food groups were developed using total U.S. retail food spending and census estimates of the 1975 national population (Table 2).

New England retail expenditures were estimated by multiplying the per capita figures by the regional population for each food group. This produced a regional estimate of retail food expenditures for 1975.

Since all major food groups are not currently produced in New England, it was necessary to restrict the preliminary self-sufficiency estimates to those groups for which regional production is relevant. The groups include meat products, dairy products, poultry and eggs, fruits and vegetables, and seafood products. Not all commodities in each group are regionally produced, of course, but an overall measure of self-sufficiency was derived for each group.

The data presented in Table 3 were developed by multiplying per capita expenditures by population for the six states. Disaggregating expenditures by state allowed a comparison of each state's relative level of self-sufficiency to be made in addition to a regional estimate.

Food Production in New England

The U.S. Department of Agriculture releases cash receipts for farm marketings for major commodity groups. The figures presented in Table 4 represent only those groups producing food for consumption. Not included were greenhouse and nursery products. The farm receipts in Table 4 represent most of the region's agricultural production, ranging from a low of 72 percent in Rhode Island to 97 percent in Maine.

In order to make a realistic comparison between regional production and consumption, the cash receipts from farm marketings must be converted to retail values. The U.S.D.A. gives both retail and farm costs for its market basket in the *National Food Situation* [U.S.D.A., 1977]. Comparing retail and farm costs allows an adjustment ratio of retail value to farm value to be computed for the major food groupings (Table 5).

Table 2
Estimated Consumer Retail Value of Food Purchases—U.S. and New England, 1975

Commodity Expenditures	All Food Products	Meat Products	Dairy Products	Poultry and Egg Products	Fruit and Vegetable Products	Seafood Products	Grain Mill Products ¹	Bakery Products ²	Miscellaneous Food Products ³
Total U.S. Million \$	158,975	43,459	22,712	11,562	33,298	4,362	5,796	17,186	23,669
Per Cap- ita ⁴ \$	752	206	107	55	158	21	27	81	97
New Eng- land ⁵ Million \$	9,165	2,512	1,304	670	1,924	256	329	987	1,183

¹ Includes cereals, bran, rice.

² Includes flour and baked goods.

³ Includes fats and oils, coffee, tea, chocolate, spices, condiments, sugars, nonalcoholic beverages, and some processed foods.

⁴ Based on 1975 U.S. population of 211.4 million.

⁵ Based on 1975 New England population of 12.188 million.

Source: *Food Consumption, Prices, Expenditures*, Supplement to 1975 Agricultural Economic Report #138, U.S.D.A., E.R.S., January 1977, Tables 111 and 118.

Fisheries of the United States, 1975, Current Fishery Statistics No. 6900, March 1976, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, p. 69.

Table 3
Estimated Consumer Retail Value of Food Expenditures
in New England for Major Food Groups for Which
Domestic Production is Relevant, 1975

State	Meat Products	Dairy Products	Poultry and Eggs	Fruits and Vegetables	Seafood Products
(million dollars)					
Connecticut	\$ 638	\$ 331	\$170	\$ 489	\$ 65
Maine	218	113	58	167	22
Massachusetts	1,199	623	320	919	122
New Hampshire	169	88	45	129	17
Rhode Island	191	99	51	146	19
Vermont	97	50	26	74	10
New England Total	\$2,512	\$1,304	\$670	\$1,924	\$255

Note: Per capita expenditures used were those computed from national data (see Table 2) and population by states was obtained from 1975 estimates. Source indicated in Table 1.

Applying the adjustment ratios to the state and regional totals in Table 4 allowed retail values for New England produced food to be estimated. Since the adjustment ratios are based on national data, they may not be totally accurate for the region since transportation costs, volume of production and processing costs may cause regional deviations. However, the authors feel that the values are sufficiently realistic despite regional variations (Table 6).

Levels of Self-Sufficiency

The data from Tables 3 and 6 were compared, surplus or deficit food production was calculated and an indicated degree of food self-sufficiency was determined for each state and the region for five food groups (Table 7). The results of these calculations indicate large variations between states and food groups. Two states produce sizable overall surpluses. Maine produces large surplus quantities of seafood, dairy products, poultry and eggs, and fruits and vegetables. These are the result of that state's relatively small population and specialization in

poultry and vegetable production. Much of the fruit and vegetable surplus is a result of Maine's large potato industry.

Vermont produces a surplus of dairy products. Once again this is the result of a strong dairy industry coupled with New England's smallest population.

Seafood products is the only food group in which the region displays total self-sufficiency. Although not the largest food group produced in New England (dairy, poultry and eggs and fruit and vegetables all surpass seafood in dollar values), the industry provided a \$194 million surplus in 1975, and is thus an important contributor to regional food supplies.

No New England state is self-sufficient in meat production. Levels of self-sufficiency range from 27 percent in Vermont to 1.3 percent in Rhode Island.

The figures for meat products are probably an overestimate since much of New England's meat production is cull dairy animals. The overall level of self-sufficiency for high quality beef is probably less than one percent. A similar situation exists for pork.

Connecticut and New Hampshire do not produce surpluses in any of the five food groups. Their deficits are filled by imports from elsewhere in the region and from other parts of the U.S.

In order to arrive at overall figures of food self-sufficiency, two final adjustments were required. First, the data in Table 7 were aggregated to provide an estimate for the region for the combined major food groups produced in New England. These data are summarized in Table 8. They indicate that the region is

about 38 percent self-sufficient in meat, dairy, poultry and egg, fruit and vegetable, and seafood production.

The discussion thus far has not considered several food groups. Total food expenditures per capita in 1975 were estimated to be \$752 (Table 2). Expenditures per capita for meat products, dairy products, poultry and eggs, fruits and vegetables, and seafood was estimated to be \$547. Those five food groups thus constitute about 73 percent of total food expenditures.

The food groups not previously considered were grain mill products, bakery products, and miscellaneous. These groups include cereals, grains, flour and baked goods, fats and oils, sugar and sweets, nonalcoholic beverages and a variety of processed foods. While some of the ingredients in these foods could be provided by domestic production, the error involved in assuming that all such products must be imported is not great. If this assumption is applied, an aggregate estimate of overall food self-sufficiency may be developed (Table 9).

Overall, New England was found to be about 28 percent self-sufficient in food production. Conversely, nearly three-quarters of the region's food must be imported from elsewhere in the U.S. Maine and Vermont, because of their large surpluses in dairy, poultry, and fruit and vegetables, surpass 100 percent self-sufficiency and make sizable contributions to the region's overall food production. Connecticut and Massachusetts, states with large populations relative to available agricultural land, were the least self-sufficient.

Table 4
Cash Receipts From Farm Marketings by Major Food Group, New England, 1975

State	Meat Animals	Dairy Products	Poultry and Eggs	Fruits and Vegetables	Seafood Products
Connecticut	\$ 6.53	\$ 60.75	\$ 52.00	\$ 19.52	\$ 2.64
Maine	6.46	61.14	179.73	105.44	48.49
Massachusetts	13.63	59.88	32.21	45.89	78.47
New Hampshire	4.89	31.99	16.69	11.01	1.31
Rhode Island	1.44	5.91	4.33	8.31	18.79
Vermont	15.57	185.11	6.67	6.35	—
New England Total	48.52	404.78	291.63	196.52	149.70

Source: *State Farm Income Statistics*, Supplement to Statistical Bulletin No. 576, September 1977, Economic Research Service, U.S. Department of Agriculture.

Fisheries of the United States, 1975, Current Fishery Statistics No. 6900, March, 1976, National Marine Fisheries Service, NOAA, U.S. Department of Commerce.

Table 5
Adjustment of Farm Value to Retail Value for
Selected Food Groups, 1975

Food Group	Farm Value	Retail Value	Ratio of Retail Value to Farm Value
Meats	\$348	\$583	1.68
Dairy	150	303	2.02
Poultry	44	75	1.70
Eggs	36	55	1.53
Fruits and Vegetables	102	376	3.69
Seafood	1	3	3.00

Source: "National Food Situation," NFS-161, Economic Research Service, U.S.D.A., September 1977. Computed from farm value-retail costs in market basket for farm foods, page 14.

Fisheries of the United States, 1975, Current Fishery Statistics #6900, March 1976, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, pp. 13, 69.

Table 6
Retail Values of Farm Food Products Produced
in New England, 1975

State	Food Product Group				
	Meat	Dairy	Poultry and Eggs	Fruits and Vegetables	Seafood Products
(million dollars)					
Connecticut	\$10.97	\$122.72	\$ 88.40	\$ 72.03	\$ 7.92
Maine	10.85	123.50	290.58	389.07	145.47
Massachusetts	22.90	120.96	49.83	169.33	235.41
New Hampshire	8.22	64.62	25.72	40.63	3.93
Rhode Island	2.42	11.94	6.69	30.66	56.37
Vermont	26.16	373.92	10.26	23.43	—
New England Total	81.52	817.66	471.48	725.15	449.13

Note: Computed on basis of cash receipts from farm marketings (Table 4) multiplied by factors developed in Table 5 to obtain retail values.

Table 7
Indicated Degree of Food Self-Sufficiency—Selected Food Groups, 1975

State	Food Group				
	Meat Products	Dairy Products (million dollars)	Poultry and Eggs	Fruits and Vegetables	Seafood Products
Connecticut					
Estimated Consumer Expenditures	\$638	\$331	\$170	\$492	\$65
Estimated Retail Value of In-State Production	11.0	122.7	88.4	72.0	7.9
Surplus (Deficit)	(627.0)	(208.3)	(81.6)	(420.0)	(57.1)
Percent Self-Sufficiency	1.72%	37.07%	52.0%	14.6%	12.2%
Maine					
Estimated Consumer Expenditures	\$218	\$113	\$58	\$168	\$22
Estimated Retail Value of In-State Production	10.9	123.5	290.6	389.1	145.5
Surplus (Deficit)	(207.1)	10.5	232.6	221.1	123.5
Percent Self-Sufficiency	5.00%	109.29%	501.03%	231.6%	661.4%
Massachusetts					
Estimated Consumer Expenditures	\$1,199	\$623	\$320	\$925	\$122
Estimated Retail Value of In-State Production	22.9	121.0	49.8	169.3	235.4
Surplus (Deficit)	(1,176.1)	(502)	(270.2)	(755.7)	113.4
Percent Self-Sufficiency	1.90%	19.42%	15.66%	18.3%	193.0%
New Hampshire					
Estimated Consumer Expenditures	\$169	\$88	\$45	\$130	\$17
Estimated Retail Value of In-State Production	8.2	64.6	25.7	40.6	3.9
Surplus (Deficit)	(160.8)	(23.4)	(19.3)	(89.4)	(13.1)
Percent Self-Sufficiency	4.85%	73.41%	57.11%	31.2%	22.9%
Rhode Island					
Estimated Consumer Expenditures	\$191	\$99	\$51	\$147	\$19
Estimated Retail Value of In-State Production	2.4	11.9	6.7	30.7	56.4
Surplus (Deficit)	(188.6)	(87.1)	(44.3)	(116.3)	37.4
Percent Self-Sufficiency	1.25%	12.02%	13.14%	20.9%	296.8%
Vermont					
Estimated Consumer Expenditures	\$97	\$50	\$26	\$75	\$10
Estimated Retail Value of In-State Production	26.2	373.9	10.3	23.4	0
Surplus (Deficit)	(70.8)	323.9	(15.7)	(51.6)	(10)
Percent Self-Sufficiency	27.01%	747.80%	39.62%	31.2%	0%
New England					
Estimated Consumer Expenditures	\$2,512	\$1,304	\$670	\$1,937	\$255
Estimated Retail Value of In-State Production	81.5	817.7	471.5	725.2	449.1
Surplus (Deficit)	(2,430.5)	(486.3)	(198.5)	(1,211.8)	194.1
Percent Self-Sufficiency	3.24%	62.71%	70.37%	37.44%	176.1%

Table 8
Estimates of Aggregate Self-Sufficiency by State and Region for Food Groups Considered, 1975

State	Estimated Retail Value of Food Groups Considered	Estimated Retail Value of In-State Production	Surplus (Deficit) Based on Retail Value	Percent of Total Retail Value Supplied by Domestic Production
	(million dollars)			
Connecticut	\$1,696	\$ 302.0	\$(1,394.0)	17.8
Maine	579	959.6	380.6	165.7
Massachusetts	3,189	598.4	(2,590.6)	18.8
New Hampshire	449	143.0	(306)	31.8
Rhode Island	507	108.1	(398.9)	23.3
Vermont	258	433.8	175.8	168.1
Region	6,678	2,544.9	(4,187.1)	38.0

Table 9
Estimates of Overall Self-Sufficiency by State for Food Production—New England, 1975

State	Total Food Expenditures (All Foods)	Retail Value of In-State Food Production	Percent Food Self-Sufficiency
	(million dollars)	(million dollars)	(percent)
Connecticut	\$2,327	\$ 302.0	13.0
Maine	796	959.6	120.6
Massachusetts	4,375	598.4	13.7
New Hampshire	615	143.0	23.2
Rhode Island	697	108.1	15.5
Vermont	354	433.8	122.5
Total	9,165	2,544.9	27.8

Implications and Conclusions

Limitations of this type of aggregate analysis are obvious. Some self-sufficiency indicators are based on the production of a few specific commodities. Fruit and vegetables, for example, are primarily apples from central and northern New England and potatoes from Maine. As previously discussed, meat production estimates may be underestimated because of cull dairy animals. Heavy dependence upon key food groups can distort calculations of the overall level of self-sufficiency. If seafood production is disregarded, for example, Massachusetts and Rhode Island estimates drop from 13.7 percent and 15.5 percent to only 8.3 percent and 7.5 percent, respectively. Data availability is a problem in developing estimates of self-sufficiency on a less aggregated basis.

New England is highly dependent upon other regions for the majority of its food supplies. The region surpasses self-sufficiency in seafood production and comes near in poultry and eggs (70 percent) and dairy products (63 percent, primarily fluid milk). About one-third of New England's fruit and vegetable needs are produced domestically, while only 3 percent of the region's meat products are locally produced.

The relative levels of self-sufficiency are to be expected. Fluid milk, for example, is usually produced close to population

centers because of its bulk and the cost of transporting it, while higher value commodities like red meat products are usually produced closer to sources of inputs such as grain. Higher value items can absorb transportation costs with less difficulty than high bulk, low value commodities. Between these extremes are products such as poultry and eggs which in several areas of the country are produced on the periphery of large population centers.

The implications of this study are clear. New England has a long way to go to attain a high degree of self-sufficiency in food production. A full discussion of the pros and cons of pursuing a greater degree of self-sufficiency is beyond the scope of this paper. However, by identifying the region's strong points (seafood, dairy, poultry and some vegetable production) and weak ones (red meat products and some products which cannot be produced at all) and by estimating the present level of self-sufficiency, this study presents a basis for interested parties to assess the potential for food self-sufficiency for New England.

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