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Changing Conditions and Emerging Issues for Agriculture Production in the Northeast

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Production agriculture in the Northeast represents a declining share of national agricultural production. Some of the characteristics of Northeast agriculture that affect its future are (1) an unfavorable resource base; (2) proximity to population centers; and (3) a diversity of enterprises. Major issues affecting the future include changing technology, changing structure, competitive advantage, regulation, and labor supply and demand. The role of specialty crops in Northeast agriculture was examined. Pesticide regulation and the labor requirement for specialty crops are serious constraints to widespread adoption.

Production agriculture in the Northeast is generally perceived to be in a gradual state of decline. Expressed in terms of market shares, that perception is correct. And yet, pockets of viability, and even success, are observable. About one-third of a million persons in the Northeast are employed in production agriculture on 170,000 farms which have total sales of about \$8.8 billion in 1982 (Northeast Regional Council, 1987b). As farm numbers shrink nationally, as well as in the Northeast, the viability of agriculture remains a vital issue for the region.

Various suggestions regarding increasing the viability of the Northeast have been made. Madden summarizes three general approaches: (1) restricting the conversion of farmland; (2) increasing the productivity, efficiency, and profit of farming; and (3) direct marketing. Madden notes that several strategies for keeping land in farming have been conspicuous failures. One such strategy, use value assessment, has provided tax relief to farmers, but success in achieving the objective of preserving agricultural or open space use of farmland is difficult to identify (Tremblay, et al.). State agencies and consumer groups often advocate direct marketing and/or farmers changing to alternative crops such as fresh fruits and vegetables of which the Northeast is a large net importer. Throughout this paper, attention will be directed toward the potential for the Northeast to increase its production of specialty crops such as fruits, vegetables, floriculture, and ornamentals.

Characteristics of Production Agriculture in the Northeast

Three major characteristics shape the future of agriculture in the Northeast. These are (1) a disadvantaged resource base; (2) proximity to population centers; and (3) diversity of enterprises. Each of these characteristics has implications for the future of agriculture, some having a positive influence, others having a negative influence.

Unfavorable Resource Base

While the quality of land is hard to express quantitatively, it is clear that the Northeast has relatively poor soils, despite some areas with excellent soil. Much of the land has production limitations such as steepness, wetness, acidity, or stoniness that restrict its use in crop production. Only 37% of the total land area is suitable for regular cultivation, compared with 45% of the nation's land and 64% in the North Central region (Schertz). Thus, it is not surprising that livestock and dairy enterprises, which utilize lower-valued forage crops, have dominated as a source of cash income. These limitations are compounded by a short growing season that restricts crop selection and reduces crop yields. Variable weather conditions also complicate harvest operations for a wide variety of crops, including forages and fruits and vegetables. The region receives adequate rainfall in an average season, but the variability causes moisture stress in some years. On the positive side, the unique climate also presents some special opportunities for crops such as tree fruit and cranberries. Moreover, there are

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pockets of productive land throughout the region, e.g. the Delmarva Region, Lancaster County Pennsylvania, Long Island, the Connecticut River Valley, the potato growing area in Aroostook County, Maine, and some of the river valleys and the Central Plain of New York. Overall, however, the region is adversely affected by its soils and climate.

Proximity to Population Centers

Increasingly in the Northeast, farming occurs in close proximity to urban and suburban populations. The Northeast, with just 6% of the land area of the United States and 3% of its farmland, has 26% of the nation's population. This fact poses a number of constraints, opportunities, and problems for the region's farm sector. It means that the region's producers are close to markets and have an advantage of lower transportation costs. This advantage is frequently overemphasized, as suggested in an analysis by Dunn, which showed that as energy prices increase, the cost of production in the Northeast rises almost as much as the cost of food transported from other regions. How noted that new methods of marketing and packaging, different means of transportation, and changes in consumer demand have more than offset the effect of rising energy prices so that nearness of market is not as important as it once was. Farmers also have more opportunities for direct sales to consumers. Nearness to market has always been a double-edged sword in the Northeast; it affords more marketing opportunities for producers, but it also makes it more difficult to forge disciplined cooperative marketing efforts that would maintain higher volume, more consistent supplies, and high quality of farm products. Such efforts are requisites for effective participation in today's marketing and distribution system.

Urban and suburban residents are often in an uneasy relationship with their farm neighbors. There are complementarities in that nonfarm residents value the open-space amenities that agricultural activities provide. However, farmers situated near population concentrations can encounter problems with vandalism, littering, traffic, and mixed views on the use of pesticides and disposal of animal waste. Proximity to urban areas has also intensified competition for land and labor. Increased land values stemming from development pressure have a positive effect on the farm balance sheet, but result in increasing opportunity costs. The Northeast economy, which is generally on an ascent, has offered increased nonfarm employment opportunities and reduced the supply of agricultural labor.

There are both negative and positive aspects to

the proximity to population centers; in my opinion the result on balance is negative, and one that will intensify in coming years. Schertz noted that during the 1970's population shifted toward open country and small towns, indicating that pressure is not confined to the perimeters of urban areas.

Diversity of Enterprises

The Northeast has a great diversity of enterprises, with important market shares in many commodities, such as dairy, poultry, greenhouse and nursery, potatoes, cranberries, blueberries, mushrooms, and apples. This diversity helped the Northeast to weather the agricultural crisis in the first half of the 1980's. At the same time, the value of the region's farmland did not rise in the 1970's as in the Corn Belt and was cushioned against falling values by the demand for land for nonagricultural uses. This diversity is a source of strength for the region's agriculture as it helps to even out cyclical economic activity from rising and falling commodity prices. Johnson noted that the Northeast, in the beginning of 1987, had a smaller than proportional share of farms in a vulnerable position (as defined by income/solvency) than did regions such as the Corn Belt, the Lake States, the Southern Plains, and the Delta. This fact was attributed to production in the region being oriented more heavily to livestock, fruit, vegetable, and nursery and greenhouse products which generally had a smaller than proportionate share of farms in a vulnerable position. The major crop and livestock commodities produced in the Northeast are shown in Table 1. In addition, nursery and greenhouse products accounted for \$834 million in cash receipts in 1984 (Northeast Regional Council, 1987b).

Issues Affecting the Future

I have identified five major areas, or issues, which I believe will have major implications for the future of production agriculture in the Northeast. These are as follows: new technology, changing structure of farming, comparative advantage of the Northeast, regulation, and labor supply and availability.

Changing Technology

Much of the current interest in changing technology centers around biotechnology. Tauer has noted the difficulty in predicting or forecasting economic impacts when so little production information is available on specific biotechnologies. Perhaps the best place to start is with the impacts of bovine So-

Table 1. Major Crop and Livestock Commodities Produced in the Northeast, 1984

Commodity	Production (million pounds or acres harvested)	Value of Production	Proportion of Total Value
	(million pounds)	(million \$)	(percent)
<i>Livestock</i>			
Broilers	2,507	903	8.9
Cattle	253	128	1.3
Eggs	1,364	709	7.0
Milk	27,959	3,886	38.2
Pork	448	218	2.1
Sheep/lambs	22	13	0.1
Turkeys	172	85	0.8
Total Livestock	41,783	5,943	58.4
	(thousand acres harvested)	(million \$)	(percent)
<i>Crops</i>			
Field crops	13,106	3,148	30.9
Tobacco	91	84	0.8
Potatoes	177	239	2.4
Fresh vegetables	115	225	2.1
Processing vegetables	151	82	0.9
Fruit (orchards, vineyards, berries)	348	456	4.5
Other crops	4,349	NA	NA
Total Crops	18,337	4,235	41.6

Source: Northeast Regional Council, *Toward 2005: Issues and Opportunities, Northeast Agriculture, Food, Forestry*, 1987b.

matotropin (BST) since more is known about its specific impacts than for other biotechnologies. Furthermore, milk accounts for over one-third of the Northeast's receipts from production agriculture, and is by far the most important commodity in the region. Numerous research efforts have been directed toward estimating the economic impact of BST.

The results of several studies (Magrath and Tauer, 1986; Kalter et al., Boehlje and Cole) were summarized by Tauer. The aggregate increase in milk output with market clearing prices is estimated to be about one-third as great as the average response per cow as farmers respond to lower milk prices. Tauer notes that the introduction of BST would not necessarily traumatize the dairy industry, assuming less than a 20% production per cow increase (an adoption rate estimated by Kalter et al.) and a government milk program that balances supply and demand by the time the hormone is first used. The government's policy response prior to the introduction of BST looms as a very important determinant of the ultimate impact. The impact is reduced at lower milk prices because the profitability of using BST is greatly diminished. Only farms with high producing herds may find it profitable to use at the margin if government policy balances supply and demand, thus reducing milk prices, prior to its

introduction. A free-market oriented approach could result, however, in the short-run in a price of milk so low (\$6.43 per hundredweight) according to subsequent research by Kaiser and Tauer, that the result is unlikely to be politically acceptable. Kaiser and Tauer note that the combination of lowered support prices and dairy termination programs appear to be a more attractive policy option in terms of government costs and farm profitability as BST is adopted.

Significant impacts may be expected on land use. Tauer notes that, in the short run, higher quality land may increase in value relative to other land since a premium will be placed on high quality forages produced from that land. Actually this would accentuate a trend that has been occurring in the Northeast, with milk production becoming intensified in areas of higher quality land. In general, the impacts of BST are size neutral except that high producing cows and better farm managers are generally believed to be associated with larger farms. In the Agrifax Dairy Farm Summary for New England, New York, and New Jersey (Dalrymple); the Business Summary for New York (Smith et al.); and the ELFAC Dairy Farm Business Analysis of farms in Connecticut, Maine, New Hampshire, Vermont, and West Virginia (Tremblay), dairy farms in the largest size groups had the highest levels of

pounds of milk sold per cow, giving support to the proposition that larger herds have higher average milk production. Thus, larger farms may be expected to benefit more from BST with increased milk production and lower milk prices and the smaller farms are more likely to be forced out. The result would be an increase in average herd size.

Less work has been done on the potential impacts of biotechnology on crop production. Initial products and/or technologies could be the following: genetically engineered plants that are resistant to herbicides, have the ability to fix nitrogen, or are drought resistant. Plants that are resistant to herbicides are a mixed blessing, since resistance may be conveyed for herbicides that are particularly toxic and persistent. However, Tauer points out that resistance is also being conveyed for fairly safe and effective herbicides. The implications of this technology could be favorable for the Northeast vegetable industry since manual labor is in short supply relative to other regions. If resistance were conveyed to nontoxic, nonpersistent herbicides, the Northeast would likely benefit relative to other regions. The development of nitrogen fixation could also be beneficial to the region, since the demand for applied nitrogen is reduced. With environmental constraints facing production agriculture in the Northeast, relative to other regions, the viability of agriculture would be enhanced by these developments.

Competition from arid areas of the West, which depend heavily on irrigation, is very significant in high valued horticultural crops. The development of drought resistant plants would be especially significant. As mentioned before, variability of rainfall is a disadvantage of the Northeast relative to arid producing regions that have control over the water supply through irrigation. The regional impact of all of these potential developments in plant biotechnology are probably much smaller, however, than the potential benefits from BST in animal production. This is due to the importance of animal agriculture to the region, the slower development of commercial applications of plant biotechnology, and because most developments are likely to be in crops with large acreages such as feed grains and soybeans.

Changing Structure of Production Agriculture

Stanton (1982) pointed out to this audience that very substantial reductions in farm numbers have occurred for the smaller, part-time and residential farms, while the numbers of "commercial farms" has remained fairly stable over the last 30 years. This finding holds for national, as well as for north-

eastern, statistics. Since the early 1970's, however, the numbers of part-time residential and commercial part-time farms in the Northeast have been fairly stable.

The largest commercial full-time farms produce an ever-increasing proportion of agricultural output while part-time farms produce a shrinking share. About 24,000 farms in the Northeast have annual sales in excess of \$100,000, and the importance of these farms, in terms of proportion of output, continues to grow. At the same time, it is possible that farm numbers in the smaller sales category (under \$10,000) will actually increase in the Northeast for the remainder of this century, as noted by Stanton (1984). There are currently about 90,000 farms in this size class. This could develop due to strong off-farm employment possibilities in the Northeast and proximity to urban and suburban areas where jobs are prevalent. These trends have significant implications for land grant universities, a point that will be addressed later.

Competitive Position

It is useful to distinguish between comparative advantage and competitive advantage in explaining market shares for a region or country. The former refers to a relative advantage that a particular region has for some commodities even if it is a high-cost producer of all commodities. It is assumed that markets are perfectly competitive with no barriers to trade. Competitive advantage, on the other hand, takes into account the realities of trade barriers, imperfect markets, the existence of economies of scale that constitute barriers to entry for new competitors, learning curves in production or marketing, government subsidies, etc. (Runsten and Chalfant). Existing trade flows and market shares can best be explained by reference to competitive advantage.

The *Toward 2005 Report* projected market shares for the Northeast region. In addressing the competitive position of the Northeast region's producers to supply its own markets, the authors concluded that Northeast agriculture would experience a falling market share for many of its products at the regional level, and virtually all products at the national level. The report concluded:

"If no steps (actions) are taken to change the situation, the general prospect is for a relative decline in Northeast agriculture's competitive position in comparison to agriculture in the rest of the United States."

The report projected changes in regional market shares and prevailing consumption trends for 23 commodities, as shown in Table 2. An increase in

Table 2. Changes in the Northeast's Regional Market Share to the Year 2005

Change in Northeast Market Share	Change in Total Regional Consumption			
	Increase		Decrease	
	Increase	Chicken Cranberries Milk Onions	Cabbage Eggs Lamb	Peas Pork Veal
	No change	Turkey		
Decrease	Apples Beef Grapes Green beans Lettuce		Mushrooms Potatoes Strawberries Sweet Corn Tomatoes	Cherries Pears

Source: Northeast Regional Council, *Toward 2005: Issues and Opportunities for Northeast Agriculture, Food, Forestry*, Number 2, 1987a.

regional market share was projected for 10 of the 23 commodities considered, a decrease for 12, and no change for one commodity. The classification by the 2005 project can serve as a base for a discussion of some of the factors affecting competitive position and for comments about some of the products.

Table 1 shows the importance of dairy, with over 38% of the value of production in the region. Add to that the sale of cull dairy cattle, accounted for in cattle, and this sector accounts for about 40% of the region's production agriculture. Milk is one of the commodities expected to increase in regional market share and to approximately hold its national share at about 21% of national production. Holding its national share, however, is based on a key assumption—that the region's producers will not resist new technology, especially BST.

Field crops are the second largest category of crops produced in the Northeast at about 31% of the total value. For the most part, these crops support the dairy industry, with hay representing 12.5% of the region's total value of production. Thus, the fate of this sector is closely tied to the dairy industry in terms of the regional significance. Corn grain and soybeans are important cash crops in the southern part of the Northeast region, and these producers may have a difficult time holding their share of production. At the regional level, however, a move toward more corn grain in dairy rations will probably mean a larger share of corn grain, but a smaller increase in corn silage in total. Poorly drained soils in the middle and northern parts of the North-

east are a serious constraint to successfully expanding corn grain acreage. An expanding poultry industry will help expand demand for soybeans.

The poultry sector, comprised primarily of eggs, broilers, and turkeys, accounts for about 17% of the region's value of production. Although egg consumption is declining, the region's producers have a favorable competitive position and can expect to increase regional market share. The Northeast's competitive position in broilers is favorable, and along with turkeys, the region is expected to hold its market share. Overall, the region's competitive position appears favorable in an industry in which close proximity to major markets is a distinct advantage, and where barriers to entry, primarily through well-established brands in the broiler and turkey businesses, favor existing production/processing firms.

The greenhouse, nursery, and turf industries, which are not shown in Tables 1 and 2, represent the fourth largest sector of the Northeast's agriculture. The region is a deficit producing region, and imports of cut flowers, in particular, from the southern and western U.S. as well as South American countries have displaced many growers. The Northeast industry has responded by changing to bulkier living plants, primarily foliage plants, and by producing bedding plants which are used primarily by home owners and gardeners. This broad industry category of floriculture and ornamentals can be characterized by having (1) a relatively high percentage of direct sales; (2) advantage due to nearness to market; (3) growth that is closely tied

to the growth in personal disposable income as well as population growth, and (4) favorable opportunities for incorporating service into the firm's product mix. These factors, along with a strong income elasticity of demand, place this industry in a favorable position for growth in the Northeast. Turf and nursery producers are in a more favorable position than greenhouse producers.

Potatoes, fresh vegetables, processing vegetables, and fruit account for slightly over one billion dollars in value. These crops are for the most part expected to decrease in regional market shares. In fresh fruit and vegetables, the Northeast industry tends to be adversely affected by a relatively short harvesting season and a small volume of production. Availability of supply over only a few weeks of the season, contrasted with Western and Southern producing areas with a longer harvesting season, and low volume restricts access to profitable chain store sales. Crops that are stored, i.e. carrots, cabbage, potatoes, and apples, are not necessarily at a disadvantage in this respect.

While the Northeast is not as efficient in the production of apples as the Northwest, it continues to maintain a large niche in the market by being able to grow varieties of apples that cannot be grown elsewhere (McIntosh in New England and New York) or by establishing plantings of relatively new desirable varieties (Empire) that are gaining acceptance among consumers. A major problem for the Northeast's apple industry is the high proportion of older plantings of standard trees, which produce relatively poorer quality fruit and are inefficient in use of labor. New York (the largest producing state in the Northeast and second largest in the United States) in 1985 had over 25% of its tree stock in trees over 22 years of age (New York Agricultural Statistics Service). Most of these were standard trees. The Northeast's growers have not, in general, been on a replanting schedule that would permit them to maintain their market share. It is difficult to overcome this disadvantage because large replantings have negative consequences for cash flow for at least three to five years, so orchard renewal has to be done over time. A second problem is the possible cancellation by the Environmental Protection Agency of the growth regulator, daminozide. This chemical is used on apples to reduce the preharvest drop of apples, and is especially important for the McIntosh variety.

Potatoes are an important crop in the Northeast and provide an illustrative example of what can happen in regional competition. In 1940, 10 northeastern states produced 29% of the nation's production. By 1974, the Northeast's share was only 19%, as production expanded on irrigated land in

the Northwest (Stanton and Plimpton). The trend in harvested potato acreage for selected Northwest and Northeast states is shown in Figure 1. The loss in the Northeast's share is closely correlated with the rise in yields (see Figure 2) associated with the adoption of irrigation in Washington and Oregon in the late 1950's. By the early 1980's, the Northeast's production accounted for about 16% of the nation's production (White and Lazarus), and its share continues to fall. Another factor has been consumer preference for baking type potatoes (Russet Burbank) rather than the round white potatoes produced in the Northeast, which sell at substantially lower prices (How). Even though Idaho has similar yields as New York and Maine (Figure 2), acreage in Idaho has remained fairly constant due to the production of Russet potatoes in that state. So far, Russet-type potatoes cannot be grown successfully in the Northeast, and efforts to breed a Russet potato for the region have not been successful.

Other "minor" crops deserve consideration. The Northeast's position in cranberries remain strong due to two factors: (1) the unique climate required for production; and (2) a very strong processing cooperative which is committed to a particular commodity, and hence, growers of the region in which the product is grown. A similar point could be made with Concord grapes in Pennsylvania and New York. Comparative advantage cannot explain the continued high market share of Concord grapes grown in the Northeast. Rather performance in this sector traces to a strong cooperative with a commitment to maintain presence in the market for processed grape products. Both cooperatives have had strong marketing and product development programs. The situation with processed grapes and cranberries stands in contrast to numerous other closed processing fruit and vegetable plants formerly operated by large internationally or nationally controlled firms or small local privately-held companies. Wild blueberries are another example of a crop in which the Northeast (Maine) has a comparative advantage due to special climatic conditions. It is definitely a "niche" product, as U.S. per capita consumption is less than one-half pound per year (Putnam).

Broccoli produced in Maine is a prime example of a specialty crop that is replacing acreage of potatoes, traditionally the major enterprise in Aroostook County. Acreage expanded from about 300 acres in 1982 to over 3,000 acres in recent years. Cook and Amon note that prior experience in vegetable production and marketing enabled Maine to market a high quality pack from the outset. This experience in the cultural practices and marketing

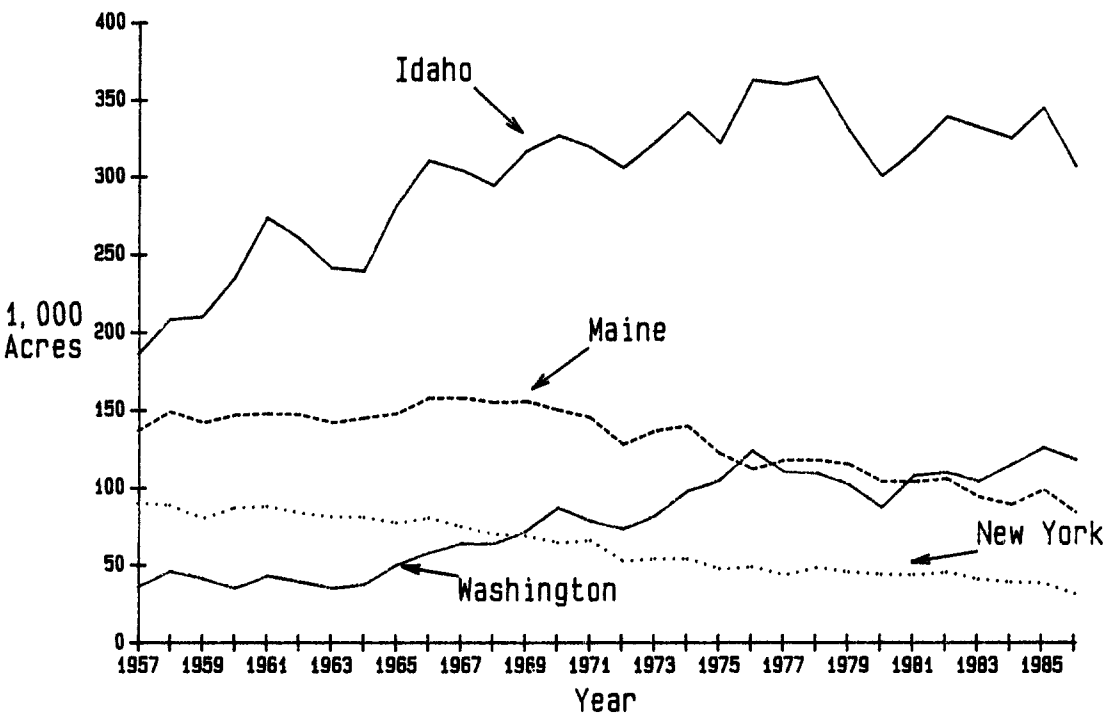


Figure 1. Potato Acres Harvested, Selected States, 1957–1986

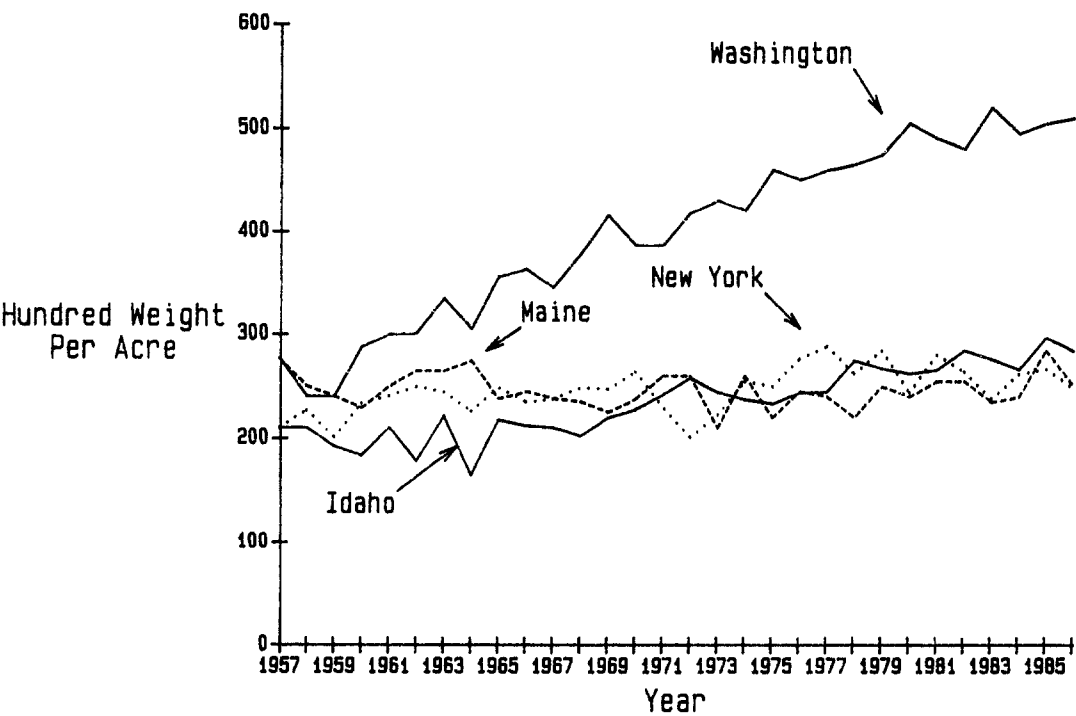


Figure 2. Potato Yield per Acre, Selected States, 1957–1986

of produce is a major impediment to the growth of specialty crops as an alternative to traditional livestock and field crop enterprises in the Northeast.

Some in the Northeast have identified so-called "high-valued" horticultural crops as the possible salvation of the Northeast's production agriculture industry. It is interesting that this possibility is often raised at the same time that the major competing state, California, is concerned about its ability to compete in this sector. California's comparative and competitive advantage in specialty crop production is being threatened by international competition, immigration reform laws, increased urban demand for water, and increasingly restrictive regulation and environmental controls (Runsten and Chalfant). This topic will be addressed subsequently, but in general, the Northeast does not have a comparative advantage in producing these crops, except in isolated examples. Among the better candidates for attention are specialized ornamental production (nursery and turf grass) which have relatively high transportation costs and a large service component attached to the product. Actually, the growth aspects of these businesses are very closely tied to the direct sales and the service aspects of the sector. The before-mentioned factors of soils and a short growing season are the primary impediments to expansion of fresh fruits and vegetable production. Other reasons for this conclusion are the effects of regulations and labor supply.

Regulations

Agricultural producers in the Northeast are concerned with regulation at both the national and the state level. In recent years, regulation at the state level in the Northeast has become more important as states try to strike a balance between agricultural interests and urban, environmental, and consumer interests. Two areas will be explored in this discussion—pesticides, which are an important problem currently, and animal rights which is a rapidly emerging issue in the Northeast.

Pesticides are a necessity for modern agricultural production, but protection of groundwater, worker safety, and contamination of the food supply are also immediate and legitimate concerns. The Northeast, with its high population density and large urban centers, is a natural focal point for contention between agricultural and environmental interests. The current theme among some proponents of stricter laws to regulate pesticides in agriculture is "sustainability". This argument is based on the premise that farming without pesticides, or at greatly reduced levels of pesticides, is in the long-term interests of the Northeast's agriculture. Most ag-

ricultural producers have not been convinced, however, and fear that stricter regulation affects them adversely in competition with other regions and countries with less regulation.

In New York, the current battle is over the drafting of regulations for notification, or requiring farmers who apply pesticides to give advance notification to persons living within the farm boundaries about when the material is to be applied, what material, etc. In the future, the regulations may include notification of persons on adjoining properties as well. On many fruit and vegetable farms, applications are made several days a week for two or three months of the growing season, making compliance with such notification rules a formidable task.

The contamination of groundwater supplies has also been a problem in the Northeast. Perhaps the best known example was the discovery of aldicarb in wells on Long Island in 1979 (Holden). Aldicarb had been used on virtually all of the 22,000 acres of potatoes grown on Long Island to control the Colorado potato beetle. Since aldicarb was banned, Long Island growers have not really found an acceptable control alternative, although progress has been made through crop rotation, monitoring for pests, and other integrated pest management tactics (White and Lazarus). The Long Island situation very clearly points out the nature of some of the trade offs between agriculture and the environment. In more recent years, aldicarb has been discovered in wells in Upstate New York as well as in California, Florida, and Wisconsin (Holden). The United States Environmental Protection Agency lists an additional 12 states in which aldicarb has been found in groundwater. Aldicarb use was withdrawn in Upstate New York in 1986, and some of the difficulties in controlling the Colorado potato beetle, although not as intense as on Long Island, have begun to appear there as well.

Notification and groundwater protection are legitimate concerns of state government but the implementation of programs to address these issues will continue to increase cost of production in the Northeast relative to other producing states and nations. These high costs are a reason that horticultural commodities are not likely to become alternatives to crop and livestock enterprises in the Northeast. Table 3 indicates the substantial differences in intensity of pesticide use on both a per acre and a per farm basis between dairy and horticultural farms. Fruit and vegetable farms are likely to use five to ten times more pesticides per crop acre than dairy farms.

A third aspect of pesticide regulation is food safety. The Environmental Protection Agency (EPA)

Table 3. Pesticide Costs per Farm on Various Types of Farms in the Northeast, 1986

Type of Farm	Location	Average Area Cropped (Owned & Rented)	Total Pesticide Costs	Pesticide Cost Per Crop Acre
Fruit	New York	186	\$23,724	\$128
Potato	Maine	203	16,722	82
Dairy	New York	288	3,040 ¹	11 ¹
Dairy/cash crop	New York	397	5,662 ¹	14 ¹

¹Includes "other crop expense" as well as pesticides; thus the costs overstates pesticide use.

Sources: DeMarree; Hall; Smith et al.; Knoblauch and Putnam.

establishes tolerances for pesticide residues on raw farm commodities. Pesticide residues that concentrate in processed food above the level authorized in the raw commodities are also regulated by EPA; however, while raw commodities are regulated considering both risks and benefits, processed products are regulated according to the Delaney Clause standard (National Research Council). If any portion of a crop to which a tumor-causing pesticide has been applied is processed in a way that will concentrate residue, the EPA's policy is to deny tolerance for residues on the raw commodity as well as the processed. This has implications for major crops in the Northeast such as apples, potatoes, and grapes in which significant quantities of the crops are processed. To date, the EPA has generally applied the Delaney Clause to the granting of tolerance for pesticides registered since 1978. In the future, these criteria may be applied to compounds registered prior to 1978. This extension of the Delaney Clause would most seriously affect fungicides, which are used extensively on high value fruit and vegetable crops and are especially critical in the Northeast's humid environment. Even though fungicides account for only 7% of agricultural pesticide sales, they account for about 60% of all estimated oncogenic risk (National Research Council).

Another dimension of this issue is the concern that consumers have about pesticide residues. Casual observation would suggest that there is a growing market for fruits and vegetables produced without the use of pesticides. One of the difficulties for consumers who desire pesticide-free foods is that there is really no way to determine whether a crop has been grown without pesticides. This suggests a potential role for cooperatives or state agencies to administer a certification program to ensure standards regarding non-use of pesticides and perhaps inorganic fertilizers as well. As Stanton (1984) noted, producing fresh fruits and vegetables for sale at a farmers' market is an example of an enterprise that fits well with part-time farming. It is my contention

that niche markets do exist for produce grown without pesticides, and that this market has the potential for rapid growth in the next few years. Currently, at least four states (California, Texas, Massachusetts, and Florida) have certification programs for organically grown produce.

Massachusetts is at the forefront of attention to animal welfare protection. Massachusetts voters will vote in November on a petition that, if enacted, would establish a Scientific Advisory Board within the Department of Food and Agriculture. This board would develop and implement humane standards of animal care in farm animal production systems, and in the transportation and slaughter of farm animals. The board is to be comprised of the director of the division of animal health or a person designated by the director and four members appointed by the governor. The proposed petition specifies that these appointees shall have been nominated by at least two nonprofit humane organizations. It is also specified that, beginning in 1989, the board may allocate "a sum not to exceed 10 cents per citizen of the commonwealth . . . for the purpose of assisting farmers in the adoption of methods which are consistent with the petition". A provision would require the commissioner of the Department of Food and Agriculture to develop regulations that "ensure that the scientific advisory board has an opportunity to review and comment on plans for new or substantially altered farm animal housing prior to construction of such facilities . . .". The latter provision would pertain to the construction of such facilities where the housing is estimated to cost in excess of \$10,000, a requirement that would make essentially all specialized commercial agriculture livestock structures subject to bureaucratic review. This provision is certain to attract strong opposition among agriculture interests.

Notification requirements on pesticides and the provision for review on specialized livestock structures, if enacted, are examples of well-intentioned regulations that can turn into bureaucratic night-

Table 4. Labor Expense for Various Types of Farms in the Northeast, 1986

Type of Farm	State	Total Labor Costs	\$ Labor Cost /\$ Receipts
Fruit	New York	\$91,971	0.37
Potato	Maine	67,540	0.21
Dairy	New York	36,493	0.16
Dairy/cash crop	New York	36,003	0.17

Sources: DeMarree; Hall; Smith et al.; Knoblauch and Putnam.

mares when implemented. Producers will incur costs in time, frustration, and delay in performing certain actions in a business in which timing is often critical.

Labor Supply

One who meets frequently with managers of production agricultural firms is struck by the frequent reference to the difficulty in finding and keeping good agricultural labor. Anecdotal evidence is overwhelming that, in New York State, labor availability is a prime constraint to agricultural production. Labor also appears to be equally constraining in parts of New England. This tight labor market is hard to document except in a very general way. However, about one-half of the participants of a recent personnel management seminar series in New York indicated that they had experienced difficulty in "finding and keeping good help" (Maloney). The difficulty is perhaps related to the unfavorable image that farm labor has among potential employees. Also, managers cannot, or believe that they are unable, to pay competitive wages.

Specialty crop enterprises, such as fresh fruit, vegetable, and floriculture and ornamental enterprises, are labor intensive. As seen in Table 4, fruit farms in New York (including family and unpaid labor, which has an imputed value applied to it), hire or employ about two and one-half times as much labor on a dollar basis as dairy and dairy/cash crop farms. Potatoes are less labor intensive than other vegetable enterprises due to mechanical harvesting. While similar figures are not available for fresh vegetable, floriculture, and ornamental firms, they are also very labor intensive. Labor availability and management ability are considered to be the major constraints to a transition away from traditional potato farms on Long Island into fruit and fresh vegetable production (Warner and White). With tight supplies of local labor, expansion of production agriculture into specialty crops would require reliance on migrant labor. While fruit farmers, and to a more limited extent, fresh vegetable farmers and ornamental producers in the

Northeast are used to operating with migrant labor, it is difficult to envision much of an increase in the use of migrants in states of the Northeast. Housing and regulatory issues with local and state governments, and reluctance on the part of managers of production agriculture firms would, in my opinion, serve as insurmountable barriers to increased employment of migrant workers in the region.

Implications for Research, Teaching, Extension

The issues examined in this paper—changing technology, changing structure, competitive position, regulation, and labor availability together imply a Northeast production agriculture that continues to shrink in market share. Maintaining a critical mass of inputs, services, and educational programs that would enhance the viability of production agriculture becomes an ever more difficult challenge.

Demographic trends and trends in farm numbers suggest that the traditional land grant clientele (students and agricultural producers) will become fewer and fewer. The land grant system must confront the major problem of maintaining quality programs in the face of declining enrollments and smaller extension audiences. At the same time, more emphasis is being placed on competitive grants and fewer research dollars (in real terms, if not in absolute dollars) are allocated to formula funds (Northeast Regional Council, 1987a). The Toward 2005 Report noted that "maintenance research," or that research that adopts new technology to specific commodities in specific regional environments, becomes increasingly difficult.

These factors point to the need for more targeting of extension and teaching programs, and more regional cooperation. All Northeast states cannot maintain teaching, research, and extension programs in all, or most, commodity and program areas. It becomes imperative for administrators to keep a critical mass of faculty and extension agents and specialists to adequately serve important and

viable segments of the production agricultural industry.

In extension, these factors suggest several shortcomings of traditional programs delivered by agricultural economists. First, extension is no longer at the forefront of technology and business management. By aiming programs toward the mass extension audience of agricultural producers, extension economists have lost their edge in delivery to the largest producers, those 24,000 producers with sales in excess of \$100,000, which increasingly account for a larger share of the region's agricultural production. Secondly, as production opportunities in traditional commodities either stagnate or decline, more and more farm families are looking for alternative opportunities for their land, labor, capital, and management. Finding "niches" becomes the watchword. The opportunities being explored are by necessity unique, and often outside the experience of agricultural economists. These alternatives tend to be more entrepreneurial and more reliant upon marketing expertise. Often the skills of an M.B.A. are more relevant than an M.S. or Ph.D. in Agricultural Economics to serve this clientele. This implies the need for different qualifications at least among some faculty positions than the traditionally-trained agricultural economist has. Extension programs, such as the Farming Alternatives Project in New York (Grudens Schuck et al.), help to meet the needs of these clientele. At the other end of the scale are the part-time farmers toward which some institutions may want to direct educational efforts.

In research, the major challenge will be to direct formula funding toward critical areas within the colleges of agriculture and the departments of agricultural economics. This is essential if our competitive advantage in certain commodities and regions within the Northeast is to be enhanced through "maintenance research". It also becomes imperative for at least some agricultural economists in each department that chooses to have a strong program directed toward commercial agriculture to be involved in interdisciplinary research with other production agriculture researchers. One could also say that seeking and successfully delivering on competitive grants is important—but it may be unnecessary to say so, because the environment in most departments and the reward system reinforces this notion among agricultural economists and other agricultural scientists.

Finally, I believe that agricultural economists in the region need to be more effective in the policy area in general, but specifically in resource economics and labor and employment policy. The Northeast has a strong tradition of resource eco-

nomics and working with governmental agencies at all levels in problem solving in such areas as zoning, local property taxation, use value assessment, agricultural districts, land use, etc. The emphasis should be on a *more effective* role in assisting in public policy development. Such research and extension work would involve closer cooperation with state and federal legislators and their staffs. Regulation of pesticides, chemicals, and labor will be even greater issues in the future.

Summary and Conclusions

The resource base of the Northeast, competition for land and labor, and pesticide and other regulations will probably mean a continuing decline in Northeast agriculture relative to other regions. Specialty crops will provide an opportunity for a fairly small percentage of growers who are located in areas with favorable soil and climate, or who are favorably situated for retail sales. It is my contention that a major change to specialty crops would result in a downsizing of Northeast agriculture in terms of farm numbers and land in farms.

With changes in the structure of agriculture, the role of the land grant university becomes even more difficult. The issue becomes one of how to (1) serve an audience that becomes increasingly polarized into larger commercial units and small part-time operations; (2) conduct balanced research on issues of intense public debate and interest; (3) maintain quality in this diverse setting; and (4) accomplish these things on shrinking budgets. These realities may finally force a significant degree of regional programming and specialization of efforts among the land grant universities of the region.

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