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A Maine Agriculture Adapting to a Changing Maine¹

An Important Distinction

I am always delighted to visit about my favorite topic – agriculture, and especially Maine agriculture – and to do so in a conference focusing on change. Maine agriculture is changing in ways not totally obvious because it represents a steady movement towards a dual agricultural structure, a fork in the road if you will. Today, I want to visit with you about that fork in the road, how it got there, where it may take us, and what we may want to do about it, if anything.

Let me illustrate that dual agriculture by describing some farms taking the newer fork in the road; you may be familiar with some of them. About mid century, Jan Goranson's parents moved from Aroostook County to Dresden, carrying their potato growing skills with them. The Goranson's developed a fine potato farm between the banks of the Kennebec and Eastern Rivers. When Jan returned from college to help out at the farm when her father became ill, she intended it to be a short stay. While at the farm she started to grow a few crops other than potatoes, and sold them at farmers markets. At the time she also met Rob Johanson who was growing melons and mixed vegetables and producing maple in Whitefield. As Jan became increasingly attached to the farm – and the relationship with Rob grew into a family – Jan and Rob determined that the days of producing potatoes for wholesale prices at their scale in Dresden were doomed. They did not have enough land to produce the volume necessary to compete in the conventional market. Since Jan liked the farmers markets and Rob had the skills to manage a diversified farming system, they started to transition the farm from one producing commodity potatoes to one producing food for consumers. If you go to the Goranson

¹ Presentation of Stewart N. Smith, Professor of Sustainable Agriculture Policy, University of Maine, to the Changing Maine lecture series, University of Southern Maine Muskie School, Portland, January 21, 2004.

Farm today you will see a diversified farm producing a number of vegetables, small fruit and livestock— chickens and pigs – a maple syrup facility, greenhouses, and a farm store; a far cry from the potato farm that Jan and Rob took over nearly two decades ago.

While the numbers of farm families making this transition from producing commodities to producing food for local consumers is not yet large, the story can be repeated a number of times in Maine. For example, at Bars Mills, John and Ramona Snell transitioned the Snell's apple farm to a diversified mixed vegetable, fruit, maple and greenhouse farm selling at their farm store and at farmers markets. It is repeated at Nezinscot Farm in Turner, where Gregg and Gloria Varney transitioned the Varney dairy farm to an organic dairy farm with a retail store and café that sells their own organic vegetables, meat products, bakery products, fabrics, preserves, and a number of purchased whole food items.

Other farms were started as diversified, high value farms from the beginning. On King Hill Farm in Hancock County, Dennis King and Jo Barrett operate what started as an oversized home garden with livestock. Dave and Christy Colson operate New Leaf Farm in Durham as a biological system of crops and livestock, and growing a number of vegetables and greenhouse products that are sold directly to restaurants, stores and consumers.

These farms represent a relatively new direction in Maine agriculture, one that is growing in significance to Maine people but that represents only one component of Maine agriculture. To understand the totality of changes taken place, we need to view the totality of Maine agriculture today. We can start by extracting from the recent press.

We can read about farm and agricultural stories almost daily. The dairy industry that supplies much of the open space in central Maine is threatened, as new federal policies expose Maine farmers to a market place heavily influenced by the rapid development of large farms in the nation's northwest and southwest. Action by the Governor and

legislature provided support to help dairy farmers through last year, and they seem prepared to provide longer-term support this legislative session.

Potato farmers appear to be heading towards another difficult year, with abundant national supplies depressing market prices, and difficult growing and harvesting weather challenging more potato farm families. Three blueberry processors are financially threatened by a court decision rejecting the way they pay their grower-suppliers. Imports of apple juice concentrate from China and South America depress apple prices so severely that most Maine orchardists can no longer compete in U.S. markets.

Drought reduces crop yields through much of Maine, triggering a federal disaster declaration. Excessive wet weather during harvest triggers calls for another declaration. Traditional water supplies for irrigation are no longer readily available to many Maine farms, even as irrigation becomes increasingly critical to farm viability. These are the stories most of us read in the popular press, and they contribute to the definition of Maine agriculture, a definition that too often suggests pessimism and decline.

But there is another Maine agricultural story, one that is often unrecognized, and until quite recently, probably under-reported. It is the story of what is being called “local agriculture”, built around local food systems where farmers produce food for consumers rather than commodities for market. In this story, farm numbers are increasing, farms are more connected to their local communities, and optimism reigns.

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These stories offer two very different concepts of Maine agriculture. The more common picture – the first presented above – is of an industry that produces agricultural commodities; we commonly refer to this as *commodity agriculture*². By this view, we see Maine agriculture as potatoes (about \$100 million sales per year), milk (~\$100 million), eggs (~\$60 million), blueberries (~\$30 million), nursery (~\$25 million),

² It should be noted that *commodity* as used here is quite different from its use by USDA where commodity refers to grains and other crops specified in certain Federal legislation. There, potatoes and blueberries, two of the largest crops of Maine commodity agriculture, are identified as specialty, rather than commodity, crops.

vegetables (~\$20 million), cattle (~\$15 million), apples (~\$10 million), and a number of commodities with lesser sales³. Most of that production is destined for regional, national, and international markets, often through commodity processors. Over half the Maine potato crop is processed into frozen fries and potato chips. Over half our milk is bottled in four processing plants in State; most of the rest is bottled out of State. Seven freezing plants process practically all of our blueberry production. Altogether, commodity sales at the farm level totaled \$419 million in 2001 (New England Agricultural Statistics Service). Thirty years ago, from this perspective, Maine agriculture would have been, in order of sales volume, potatoes, broilers, eggs, and milk, with apples, blueberries, cattle, and other commodities, all totaling nearly \$400 million. While the mix of commodities has changed somewhat, the nominal value is quite similar, reflecting a decline in real value of about 50% since the mid-1970s (Table 1).

In addition to farm sales, commodity agriculture includes the processing sector mentioned earlier that converts raw agriculture products grown in Maine into processed products for sale to consumers or for further processing, especially for milk, blueberries, and potatoes. This industry segment represents about \$500 million of sales, or about 50% of total food processing in the State, and is vital to the viability of commodity farming. Taken together, the agricultural commodity production and processing sector has an economic impact of nearly \$1.4 billion in the Maine economy.

An alternative perspective on Maine agriculture is of a State food and agricultural system, where agriculture is an industry that provides food and related products to human consumers. This perspective is usually referred to as *local agriculture*. In this way, we can view Maine agriculture as a system with direct economic activity of about \$3.3 billion. Agricultural production comprises about 13% of that system (~\$435 million); food processing, 30% (~\$1 billion); and food distribution and retailing, 57% (\$1.9 billion) (Gandee).

³ This does not include aquaculture sales that totaled \$64 million on 2001.

Food distribution and retailing is, by far, the largest component of the Maine food and agricultural system. As more Maine farms find global commodity markets less attractive, opportunities to provide marketing services within the Maine food and agricultural system become more attractive.

While the above perspectives are laid out as two distinct systems, it is very important to recognize that many Maine farms fall along a continuum between these two systems. Still, the distinction between Maine agriculture as a commodity producer/processor system, or as the Maine food and agricultural system, is a most useful and compelling one when considering the historical context, future direction, and policy implications of Maine agriculture.

Let me turn now to the question of how we got to where we are – the industrialization of agriculture

The Process of Agricultural Industrialization

Commodity agriculture is the product of agricultural industrialization, a process that has dominated U.S. agriculture for the past 150 years, and especially for the past 50. In the industrial process, farmers seeking more income adopt technologies that allow them to produce more. As their production increases they sell more commodities and increase their net income. Not surprisingly, other farmers see that happening and adopt similar technologies. Eventually, the commodity supply increases and prices decline, eliminating the increased income of the earlier adopter. To make up for the new loss of income, the early adopting farmer looks for other technologies that allow him to increase output and income again.

That process has been coined the *technology treadmill* by Willard Cochrane, a well known agricultural economist and historian, and represents a constant search for new technologies that provide short term gains, and the subsequent and inevitable loss of that gain for the adopter. Since the early adopter had a period of increased income, he has the

financial resources to purchase the farm of the late adopter who has earned no similar financial cushion, but is faced with the same lower prices. This creates Cochrane's *farm cannibalism* that accompanies the technology treadmill.

An alternative, although not inconsistent, view of the industrialization process is offered by Goodman, Sorg and Wilkerson in their 1987 book *From Farming to Biotechnology*. Their work suggests that the industrialization process is driven by non-farm firms seeking to increase market share, rather than farmers seeking greater income gains. Non-farm firms develop products that are purchased and used by farmers, and displace farm labor and management. Goodman et al. refer to this process as *appropriationism*, and demonstrate that the result of this process is a shift of economic activities, and accompanying returns, from the farming sector of the food and agricultural system to the non-farm input sector, from farm labor and management to purchased inputs.

A similar process, coined *substitutionism*, is taking place at the other end of the farming process, where food manufacturers are continually searching for ways they can use less costly raw farm products by creating specific characteristics of the final product with further processing. The Goodman model explains the shift of economic activities and returns from the farming to the non-farming segments of the food and agricultural system that we see in the industrialization process.

Both models explain how the industrialization process simplifies farming operations by replacing farm management and labor with purchased products. Simplification, usually derived from specialization of production, allows farmers to operate larger farming units that capture economies of scale. By capturing economies of scale, larger farms can accumulate capital and expand by buying smaller farms.

The so-called mechanical revolution dominated agricultural industrialization from the late 19th century to about 1950. During that time, tractors driven by fossil fuels displaced horses as the power source on most Maine farms, releasing large amounts of acreage from growing feed for horses. The reduced acreage simplified farming operations, but

resulted in a larger share of farm income going for purchased inputs, especially equipment purchases, maintenance, and fuels.

The mechanical revolution was then followed by a chemical revolution, dating from about 1950 to the 1990s, in which pesticides, for example DDT, rid farmers of crop pests that had previously been managed by the rotation of crops. With no need to rotate crops, some farms could focus entirely on producing a cash crop, thereby increasing their output of cash crops substantially for their given land and management resource base. In both cases farm operations were simplified and output was increased; but economic activities per unit of production were shifted from the farm to the non-farm components of the food and agricultural system.

The process continues today, for example with biotechnology products. Recent work by one of my graduate students estimated the shifts in economic activities and returns from the adoption of rBST, recombinant bovine somatotropin, the artificial growth hormone introduced in dairy cattle to increase milk production. RBST has received recent attention from the lawsuit brought against Oakhurst Dairy of Portland by Monsanto, the firm that manufactures a brand of rBST. That study estimates that the use of rBST in dairy farming shifts about 9% of farming sector returns to the non-farm input sector, primarily to pharmaceuticals. Regardless of its other impacts, the general use of rBST will result in fewer farms, farming activities and farming returns, and more non-farm activities and returns.

At the national level, between 1910 and 1997, farming activities and returns constantly declined due to industrialization, while marketing and input activities and returns, those associated with the other components of the food and agricultural system, increased. As a proportion of the domestic food and agricultural system, farming returns declined about 65%, while the marketing share increased by 35% and the input share by 40% (Figure 1). The Maine picture is quite consistent in terms of these shifts, with the input sector claiming less than 50% of farm revenues in 1950, but 70% in 1997 (Smith 1999).

Let me now turn to the impact of all this on farming in Maine.

Agricultural industrialization and farm types

As well as shifting economic activities and returns from the farming sector to the non-farm sectors, agricultural industrialization promotes specialization of production and creates economies of scale. Farms can produce few commodities in large volumes, resulting in fewer, but larger farms. These trends could be seen in Maine and nationally in the first three quarters of the last century. In Maine, average farm size increased from 105 acres in 1910 to 221 acres in 1978. In constant dollars, the average sales per farm increased nearly 500% from 1910 to 1978 (Table 2).

Specialization can also be seen in Maine from the shifting of commodities to specific areas of the state, leaving commodity production unevenly spread across the Maine landscape. Most Maine potatoes are produced in Aroostook County; most of the milk is produced in a seven county dairy belt centered around Kennebec County; and most blueberries are produced in Washington and Hancock Counties. These areas are particularly vulnerable to price and yield fluctuations of, or other unforeseen impacts on, their particular commodities.

The regional specialization is the result not just of nature, but of industrialization. In 1910, Aroostook was the largest dairy-producing county in the state. Potatoes contributed 50% of total farm revenues then, but increased to 83% in 1997, after the dairy industry concentrated in Central Maine. Dairy, the largest individual commodity produced in Kennebec County now, contributed just 15% of county farm revenues in 1910, and 45% in 1997 (Smith). Consolidation, concentration, and regional specialization based on agricultural industrialization shaped the structure of Maine agriculture throughout the past century.

In recent years, however, the U.S. story and the Maine story have diverged, as a result of that fork in the road I noted earlier. Since 1978, average Maine farm size has leveled off

to 209 acres in 1997, down about 5%, and per farm sales in constant dollars have declined nearly 20% since then. The leveling off of farm sizes and farm numbers in Maine since the mid 1970s is not the result of changes in the trends of commodity agriculture. Rather, it is the result of the entry of new, smaller, more diversified farms that are usually participating in local agriculture. Unlike most states, Maine farm numbers remain quite stable and average farm size declines, even as commodity farms continue to get larger and fewer.

The increase in smaller, more diversified farms since the 1970s, generally under the rubric of sustainable agriculture, suggests a growing and potentially sustainable farming sector for Maine. This agriculture appears in at least two forms. One is the relatively small but quite diversified farm that sells its output to the final consumer, who usually is a local resident or visitor, or to a local institution. These farms are likely to be near population areas, and are substantially integrated into their local community.

Another farm type seems to be proving viable at the mid-size range by alleviating some of the dependence on economies of scale. This farm is moving away from the strict commodity model on the production side, but not completely away on the marketing side. It maintains its commodity marketing while accesses some higher value markets with new production. Costs are reduced with more complex production systems, including integrating crops and livestock enterprises. Dairy farms adding high value vegetable enterprises represent one type of this new farm.

While both these farm types generally produce less than a specialized commodity farm in total farm output, on a per unit basis they can leave more net income for the farm, generate more value added for the total farming sector, and often integrate more actively into their local community. They often sell their output to local consumers who may visit the farm as part of the purchasing process. In the case of community supported agriculture farms, or CSAs, consumers participate to some extent in the farming process itself.

A recent survey of Maine farms that I am now analyzing demonstrates some interesting differences between local agriculture farms and commodity farms. The survey represented a cross section of Maine agriculture except for blueberries and large egg producers. Respondents were almost evenly split between commodity farms and local agriculture farms. Slightly more than half, 52%, indicated their farm better fit the commodity profile; 48% indicated they better fit local agriculture. Not surprising, local agriculture farms had significantly more enterprises and used significantly more practices than commodity farms; they are more complex and are operated as holistic systems. They are also twice as likely as commodity farmers to provide the public access to their farms, with much of that access involving the sale of products. Local agricultural farms are relatively small. Commodity farms were fifteen times larger in sales and twelve times larger in crop acres.

While commodity farms sold 69% of their output to wholesale markets, local agriculture farms sold 66% of their output directly to consumers. About 40% of commodity farms relied on farming to meet their families' financial needs, compared to less than one-fifth of local agriculture farmers. However, farming was an important contributor of family livelihood, although not necessarily the sole income source, to nearly 60% of local agriculture farms and over 80% of commodity farms. Off-farm work was a more integral part of local agriculture farms, where nearly three quarters had at least one member working off farm, compared to about half for commodity farms.

The two farm types are also different in experience and education of the farm family. Commodity farmers indicated they had been farming, on average, 28 years, while local agriculture farmers indicated 17 years. While all farms have more formal education than the state average, with 65% of farmers and spouses having college degrees, local agriculture farmers have more formal education than commodity farmers. Eighty percent of local agriculture farmers and spouses have schooling beyond high school, with over one quarter having schooling beyond college. This compares to 60% of commodity farmers and spouses with education beyond high school and 12% beyond college.

These profiles of the two types of farming in Maine help to paint the picture of Maine agriculture. While commodity agriculture remains dominant in terms of cropland used and value of sales per farm, local agriculture farms are becoming nearly as numerous. Local agriculture farms are more complex, and are operated as integrated biological and community systems. Local agriculture farmers are younger with more formal education, and rely less on farm income to sustain the family; but the farm is an important component of their family livelihood.

This profile of Maine agriculture suggests policy directions if we wish to maintain farm numbers. As long as commodity agriculture efficiencies are driven by economies of scale, commodity farms, if they are to remain competitive, must continue to get larger and fewer even as production is maintained or increased. With Maine's limited land base, the number of commodity farms must decline if size is to increase. Without a fundamental change in agricultural technology development, century long trends suggest that within two generations we will be counting dairy and potato commodity farms in the dozens rather than the hundreds, just as two generations ago we counted them in the thousands.

On the other hand, we can see growth in the numbers of small and moderate sized farms that become part of the local food system. While my crystal ball is blurred by the lack of historical data on these farms, I would not be surprised to see substantial growth in local agriculture farming in the next generation, especially if it receives adequate public support. Because local agriculture farming is a substantively different farming system, built around biological and community systems rather than efficient production of commodities, transitioning farming resources from commodity to local systems will be a daunting challenge to many farmers. For many farmers and communities, the success of that transition will depend largely on the preference that local consumers express for maintaining a local agriculture and on sound, supportive public policy.

Maine today, then, appears to be moving towards a viable, dual agricultural structure that has important implications for State agricultural policy. Let me turn to this question now.

I was pleased to hear Governor Baldacci in the State of the State address announce that he was directing the Department of Agriculture to develop a program to support local agriculture. Let me offer some suggestions.

First, it would be wise to determine the extent of the potential for local agriculture. I don't think any of us know exactly how large it might be, but we do know some parameters. According to our economic development models, of the \$3.3 billion spent for food by Maine consumers and institutions, only about \$120 million, or 4%, goes to Maine farmers, and a third of that is dairy. Surely that can be increased substantially.

I don't know the potential for direct sales by farmers to consumers, but I believe past sales have been greater than those reported by the Agricultural Census. According to the Census data, Maine farmers sold somewhat over \$5 million of food products directly to consumers in 1992 and over \$8 million in 1997. While I don't know what the 2002 Census that should be available in about two months will show, my own data generated from farm surveys suggest those numbers are too low, and that direct food sales to consumers in 2002 were close to \$50 million.

Second, farmers need both technical assistance and financial assistance in transitioning to these systems, which are complex and require very different management skills than commodity farms. I know a number of farmers contemplating the transition but finding it very difficult to keep the commodity component financially viable while building the local agriculture component. I suspect it will require some sort of partnership relations for many. A local agriculture development program will need to offer both the technical assistance and a combination of loan and grant funding support. Support needs to be targeted to appropriate, viable systems. The Potato Market Improvement Fund and the Farms for the Future programs are likely good models for such a program. The first is

targeted toward specific technologies and provides for industry input in judging appropriateness of proposals. The latter focuses on business planning as a first step in farm system development.

Third, the technical component will require support from the research community. Most agricultural research in the past has focused on industrial agriculture. The University of Maine has made a good start in redirecting research capacity. It's important that it continue that effort.

The resources required for supporting agricultural change discussed above do not only support an economic sector that must change to survive and thrive. An adequate development program will provide substantial public benefits in the form of open space, fresh foods, and vital communities.

Finally, let me say a word about the availability of farmland, the most important agricultural resource base. A viable agriculture depends on an adequately productive land base. In 1997, Maine had 1.2 million acres in farmland, a decline of more than 50% since 1964. Of that, 534,000 were in cropland compared to 894,000 in 1964. In 1997 one-third of Maine's cropland was in Aroostook County while five counties, Androscoggin, Cumberland, Oxford, Waldo, and York each had between 3.5% and 5.5% of Maine's cropland, much of it in areas under heavy development pressure (U.S. Department of Agriculture).

Between 1992 and 1997, according to the State Planning Office, Maine converted 33,500 rural acres *per year* to development, a rate four times that of the previous decade, and greater than the cropland in nine Maine counties. It has resulted in the loss of a substantial volume of land used by the livestock industry to pasture animals and produce feed crops.

Development pressure is not localized in any one area, but extends the length and breadth of Maine, boosting market values above those generated by agricultural production. In

the northern areas, the demand is for individual house lots and seasonal homes, rather than commercial development; but the impact on fragmenting the agricultural landscape and increasing farming costs is similar.

Besides increasing the incentive for farmers to sell their land for development, especially when they leave farming, development pressures also increase production costs from increases in the valuation of farmland for property tax assessment. The Farmland and Open Space Tax Law is designed to relieve this cost pressure by providing for the valuation of classified farmland based on its current use as farmland or open space, rather than its potential value for more intensive uses. However, owners of farmland must work with their town's assessor to enroll in the program. While the penalty for withdrawing from the program was reduced by the 119th Legislature so farmers only pay five years of tax savings plus interest, the program is still misunderstood and underused, resulting in sporadic requests for automatic assessment of all farmland at current use values or other similar initiatives to reduce the property tax burden on Maine farms. Taxation of farmland remains an important and unresolved cost issue for many Maine farmers.

To address the problem of farmland loss, the Maine Department of Agriculture, Food and Rural Resources (2003) recently published *Saving Maine's Farmland: A Collaborative Action Plan*, the result of a two-year planning process that offers a number of farmland protection program options. Donation or purchase of development rights in exchange for agricultural conservation easements is the primary technique currently used in Maine to permanently protect farmland. The Land for Maine's Future Program (LMF), with the mandate to spend up to 10% on farmland protection efforts, is the primary state financing mechanism. It is complimented by the USDA Farm and Ranch Lands Protection Program (FRPP) which provides a cash match of up to 50% of the appraised value of the development rights. While support from the LMFP and FRPP have helped the Department of Agriculture gain some notable success with protecting specific farmlands in southern and central Maine, more resources are needed to develop and implement a comprehensive farmland protection program that can assure the future land base for a viable agricultural industry throughout Maine.

I was pleased that Governor Baldacci committed to a \$100 million bond issue to continue the good work of the Lands for Maine's Future program. We must be sure that an appropriate proportion of that is for agricultural land protection, and that it gets utilized in ways that maximize the impact on maintaining a viable and sustainable farmland base for Maine agriculture.

As Maine agriculture faces a new century, it is challenged to change with the times. The commodity system that has offered most of the farming opportunities in the past fifty years will continue to dominate the Maine landscape and commodity farmers will have to continue to expand farm size to remain competitive in national markets. But opportunities for new farmers in commodity production will continue to decline. On the other hand, local agriculture will offer opportunities for new farmers as long as Maine consumers value local farms and State policy is supportive. In exchange for that support, Maine residents gain access to fresh, local foods, maintenance of open space, and more vital local communities.

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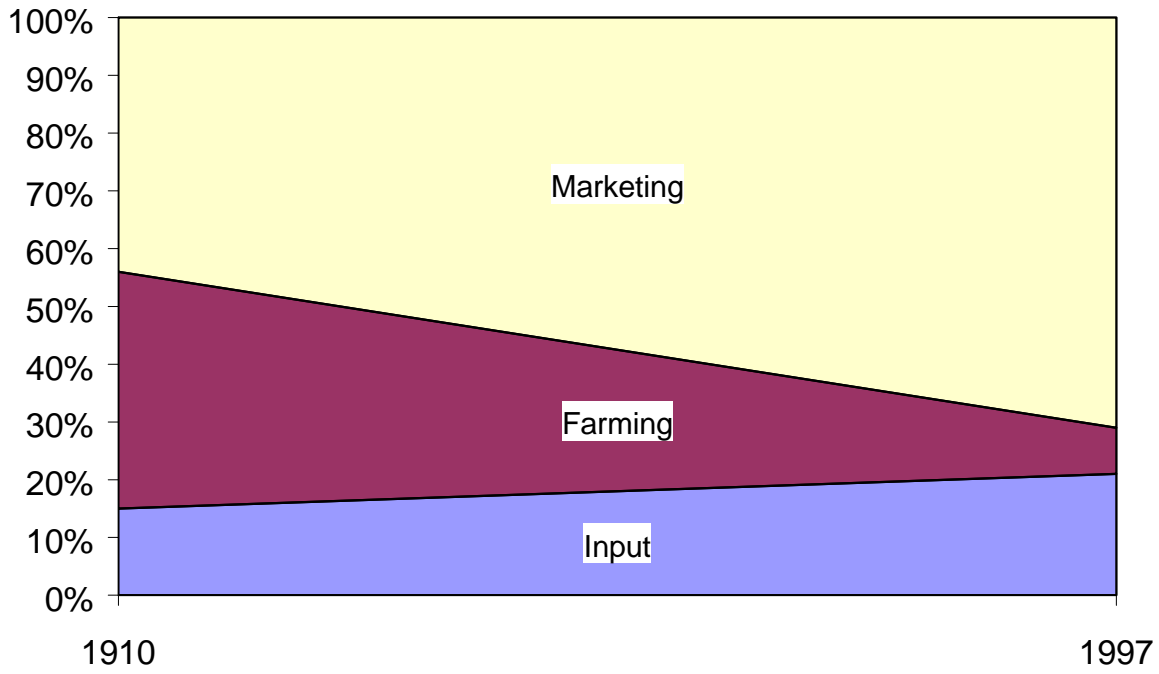
Table 1: Maine Cash Farm Receipts without Aquaculture

(Selected years in nominal dollars, millions)

	1970	1973	1975	1980	1985	1990	1995	2000	2001	Composite (1973-2001)
Potatoes	67.5	141.8	88.1	96.0	79.9	139.5	97.1	114.8	101.8	107.4
Milk	42.2	50.8	61.1	91.6	91.1	91.9	88.3	93.2	105.8	84.2
Eggs	50.3	79.2	90.1	104.6	79.4	90.0	73.8	56.4	56.6	78.8
Other Poultry	54.7	86.8	91.1	85.7	35.0	4.6	3.9	3.6	3.0	39.2
Blueberries	1.9	5.9	3.2	8.1	11.4	27.7	21.0	44.3	23.0	18.1
Cattle	7.8	9.7	6.3	14.5	20.3	19.7	16.4	17.4	17.0	15.2
Green/Nursery	2.2	3.0	3.5	6.6	8.9	18.8	28.6	23.9	24.4	14.7
Vegetables	4.3	4.2	3.4	4.3	4.3	13.6	18.4	27.0	24.4	12.5
Apples	5.0	13.9	7.5	12.5	13.0	15.3	10.2	9.9	9.2	11.4
Other	5.3	3.3	12.7	11.0	30.5	28.7	47.5	51.1	54.0	29.9
Total	241.2	398.6	367.0	434.9	373.8	449.8	405.2	441.6	419.2	411.3

Source: Economic Research Service

U.S. Domestic Agro-Food System Shares as Linear Trends 1910-1997



Source: Smith

Table 2: Size Consolidation of Maine Farms
(Selected Years, 1880-1997)

	1880	1910	1978	1997
# of Farms	64,309	60,016	6,775	5,810
Acres/Farm	102	105	221	209
Sales/Farm (\$1992)		17,026	97,226	71,110

Sources: Ahn et al.; Smith