Northern New York Dairy Industry: A Look at Production Potential

Mark Stephenson, Ph.D., Cornell Program on Dairy Markets & Policy

Introduction

In 2002, the "North Country" of New York state became concerned with the possible closing of one of the region's dairy processing plants. Plants in the region had argued that there wasn't a large enough milk supply to support plant expansion which would allow them to achieve the economies of scale required in the current competitive environment. Dairy farmers, on the other hand, voiced the opinion that they would produce more milk if a higher milk price was possible. Rather than debate the issue from two sides of a fence, milk producers, dairy processors, economic development and academic interests began to work together to explore the milk production potential of Northern New York, as described by Jefferson, Lewis, St. Lawrence, Franklin, Clinton and Essex counties.

This paper examines market impacts of plant closure, trends in milk production and farm structure, costs of production, opportunities for a higher milk price, the propensity to produce milk in the region and untapped agronomic resources.

Impact of Plant Closure

Spatial economics tells us that we should not expect a uniform price across broad regions for any product as long as transportation costs are greater than zero. Dairy farmers understand that the cost of shipping milk from their farm to the closest plant increases if that plant is no longer in business. However, the impacts of plant closure can be felt by many more farms than just those experiencing greater milk hauling costs. The remaining plants in the region will have the opportunity to purchase additional milk which they now value at somewhat less than their previous supplies—I.e., the marginal value of milk has diminished for remaining plants and their willingness to pay premiums above the regulated minimum prices has decreased.

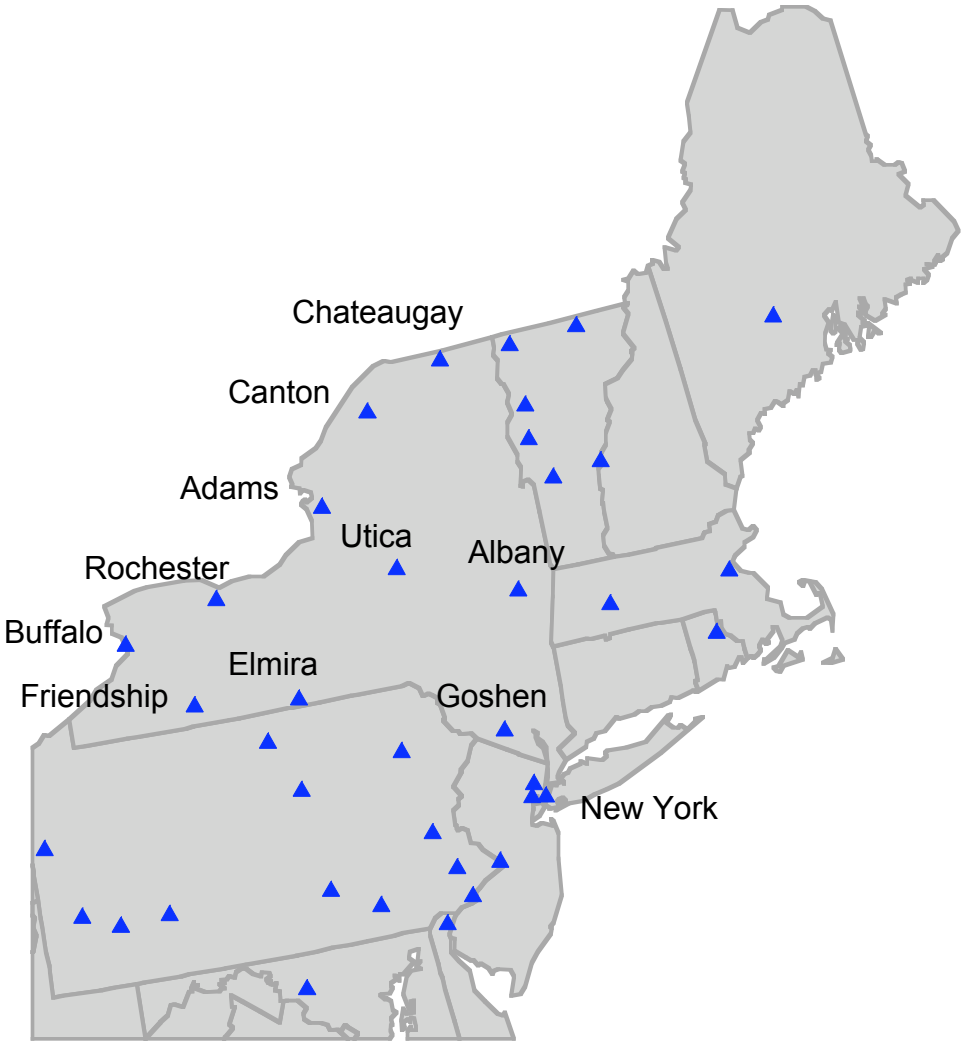
The U.S. Dairy Sector Simulator (USDSS)[1] was employed to address the question of market impacts of plant closure in the North Country. This spatial model of the U.S.

[1] Pratt, James E., Phillip M Bishop, Eric M. Erba, Andrew M. Novakovic, and Mark W. Stephenson, "A Description of the Methods and Data Employed in the U.S. Dairy Sector Simulator, Version 97.3", Cornell Program on Dairy Markets and Policy, R.b. 97-09.

dairy industry is highly disaggregated and takes milk supplies at a few hundred locations, processing plants at a few hundred locations and demand for dairy products at a few hundred locations and calculates the least-cost movements for milk from farms to plants and distribution of finished dairy products from plants to consumers.

Figure 1 shows the locations available for cheese processing in the Northeast. It should be noted that these are not all of the actual possible locations, but the points represent the approximate location of major cheese plants in the area.

Figure 1. Location of Cheese Plants in the USDSS Model



The market impacts are assessed by determining the marginal value of milk in the region.[2] Then, we can "close" a particular plant, or not allow processing at that location and re-run the model to compare the new marginal values of milk.

The Canton plant was chosen as the plant to close. Further restrictions on the model would only allow a maximum increase of 10 percent in volume for other plants in the region. This was done to reflect the reality that any individual plant does not have unlimited capacity to adsorb new milk supplies in the short-run. The closure of the Canton plant results in a redistribution of milk used for cheese making but also for soft product production in the Northeast. The model results show that plants as far away as Pennsylvania and Maryland are impacted by the closure of a single plant in Northern New York.

Figure 2 demonstrates the change in *plant milk values* in the Northeast as a result of plant closure in Canton, New York. This is somewhat different than the change in *farm milk values* shown in Figure 3. Figure 2 reflects the change in marginal value of an additional hundredweight of milk in remaining plants while Figure 3 shows the change in marginal value of farms to produce an additional hundredweight of milk on their farms.

The green areas throughout the map in Figure 2 indicate a decrease in milk value across a broad area. Darker greens indicate a bigger predicted decrease in value. Perhaps not surprisingly, the effect is largest in the immediate vicinity of Canton, where we see a decrease of over $0.50/cwt. There is a broad area of the North Country for which the location value decreases more than $0.10/cwt., and for much of the state, the milk value would be basically unchanged. The results partly reflect the new supply and demand balance and the increased costs of distribution to demand locations previously serviced by the Canton plant. These numbers reflect a decrease in the willingness of cheese plants to pay for milk, and thus indicate something about changes in the amount of premiums they would be willing to pay.

The red areas in Figure 3 show the change in the farm milk value net of hauling costs when cheese production is not allowed at the Canton plant. They demonstrate a decrease in milk location value across a broad area. The effect is largest in the immediate vicinity of Canton, where we see a decrease of just over $0.40/cwt. There is a broad area of the North Country for which the location value decreases more than $0.10/cwt., and for much of the state, the milk location value would decline by $0.05/cwt. So, the plant closure is predicted to have geographic impacts in a broad area, largely due to increases in hauling and distribution costs.

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[2] In an optimization model, these are often called "shadow prices".

Figure 2. Change in Plant Milk Value

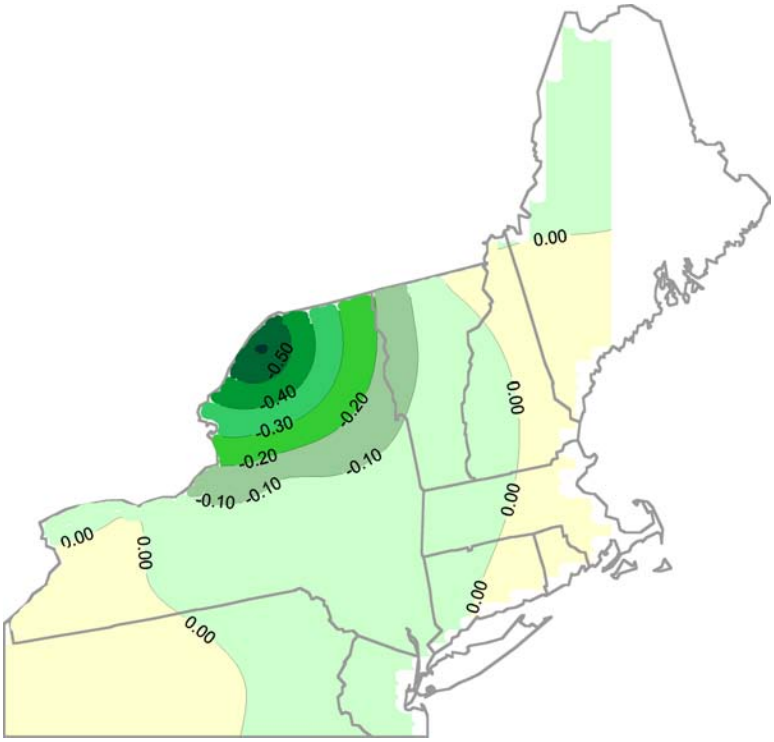
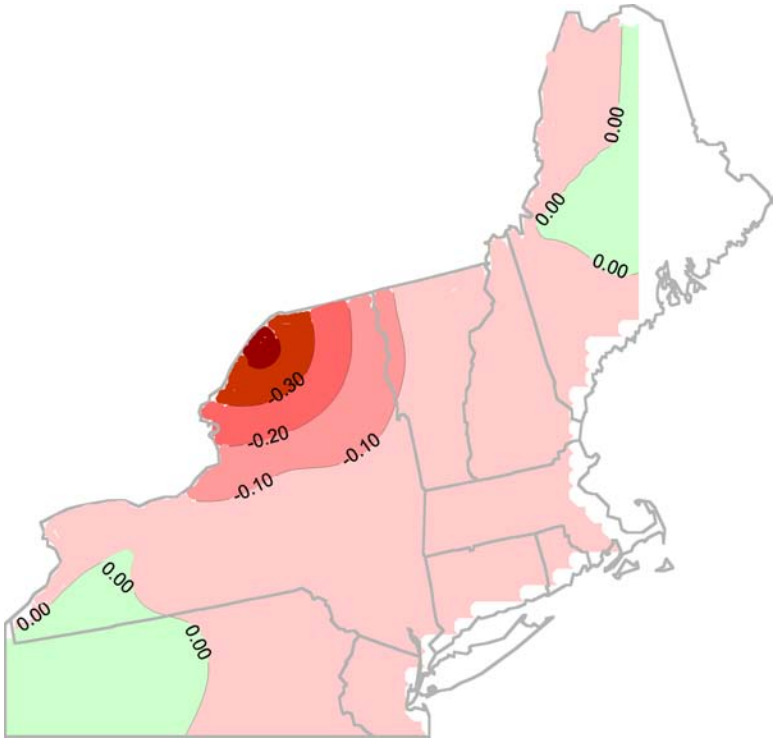


Figure 3. Change in Farm Milk Value



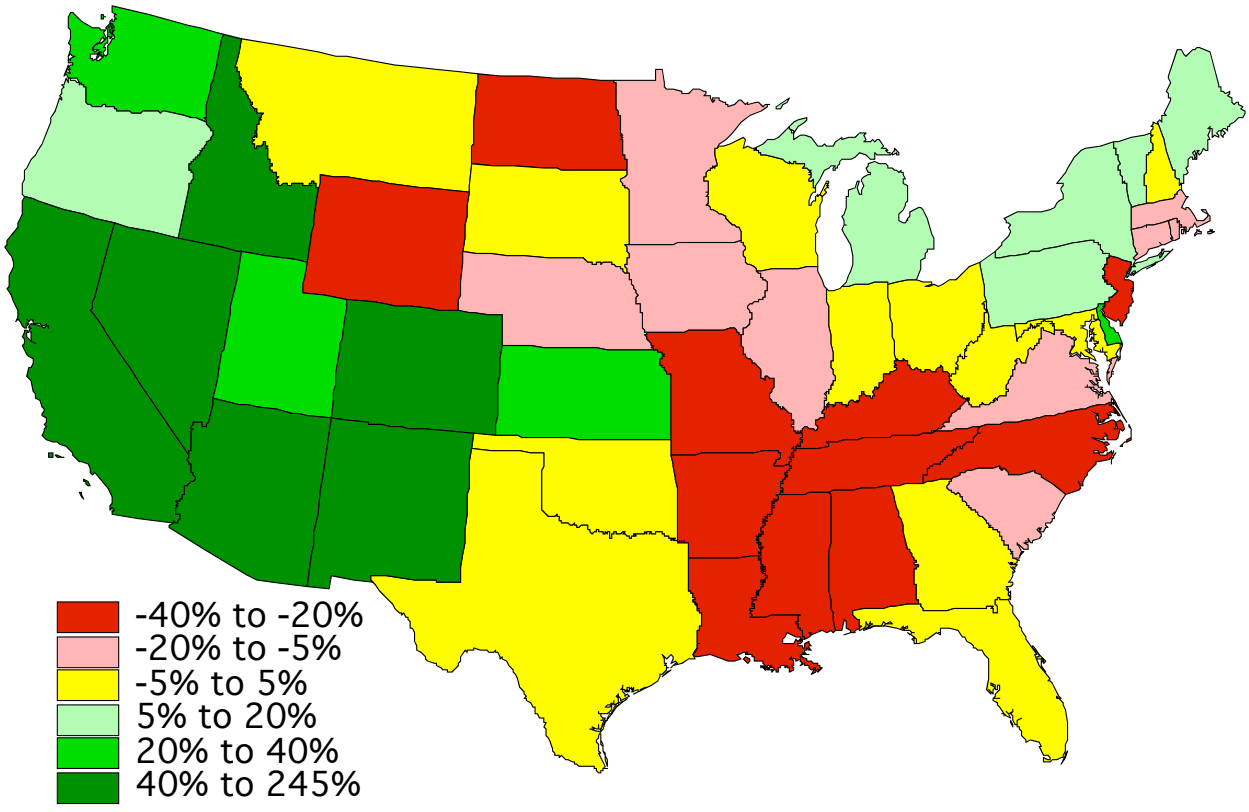
Trends in Milk Production and Farm Structure

United States Trends

An important part of the discussion of cheese plant closures in northern New York comes from influences outside of the region. U.S. cheese demand has been the major driving force in increased consumption of dairy products for more than 25 years. As manufacturing firms have contemplated new capacity, plant location is a critical part of the decision.

In 1993 the West had 85 cheese plants processing just less than 25 percent of the total U.S. cheese production. By 2004, there were 96 plants in the western states processing more than 40 percent of U.S. cheese volume. This significant growth in processing has been possible because of growth in milk supplies. Figure 4 shows a decade's worth of change in milk production on a state-by-state basis.

Figure 4. Percent Change in Milk Production, 1990–2000.



Three important trends can be seen from Figure 4—The West has experienced tremendous growth in milk production, the Southeast has experienced very large declines, and the Northeast has, as a region, experienced very modest growth.

Milk production is a function of the number of farms in a region, the number of cows per farm and the amount of milk produced per cow.

Figure 5. Indexed Percent Change in Dairy Farm Numbers.

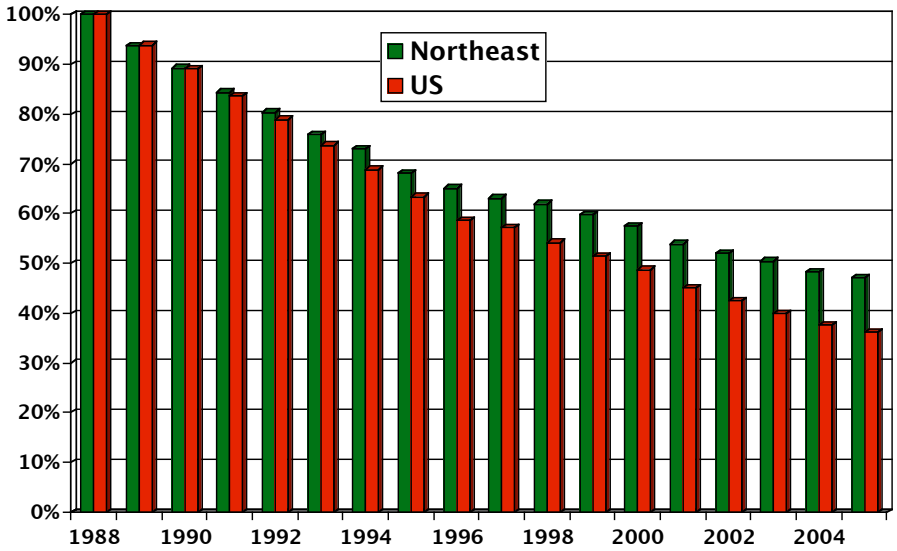


Figure 6. Average Number of Cows per Farm.

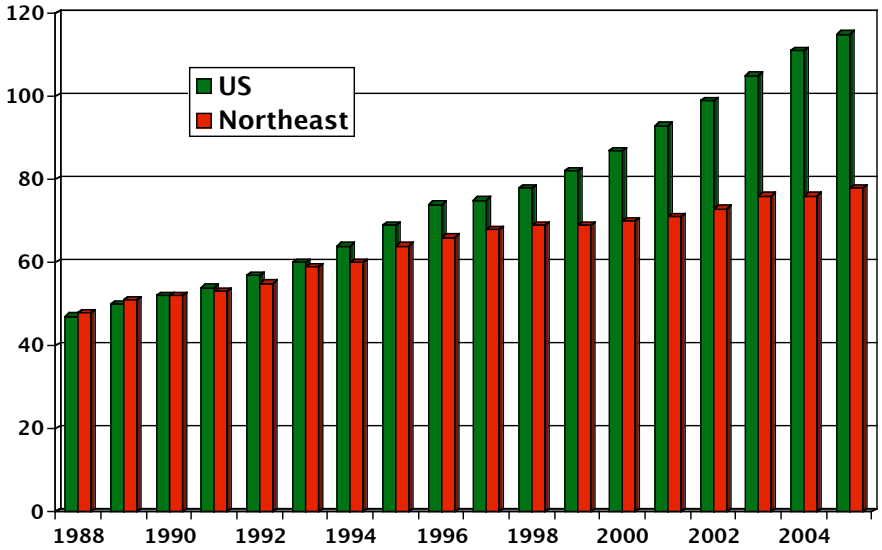
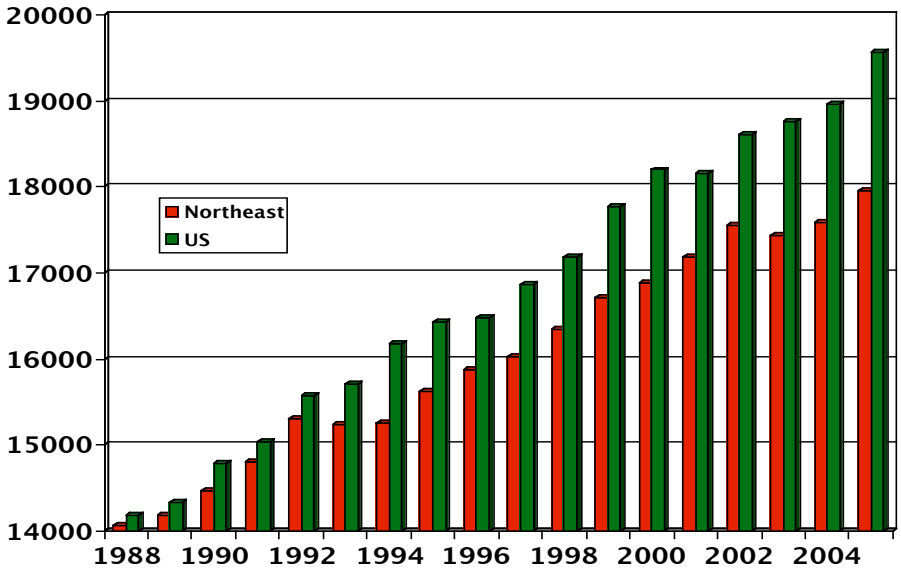


Figure 5 shows that the Northeast has lost dairy farms at a slower pace than the U.S. as a whole. The U.S. has only 36 percent of the dairy farms that they had in 1988 while the Northeast has retained 47 percent. This could be a positive indicator of additional milk in the region. However, Figure 6 demonstrates that consolidation in farm numbers has resulted in greater farm sizes. The slower growth in average herd size in the Northeast is partly a function of slower-than-average farm loss in the region.

The final piece of the total milk equation is milk production per cow. In 1988, the Northeast was very average with respect to herd size and milk yield. But, by 2005, productivity gains had lagged the rest of the U.S. by a substantial margin. In that year, the Northeast averaged more than 1,600 pounds per cow less than the U.S. as a whole. Taken together, Figures 5-7 paint a picture of an industry in the Northeast that is not progressing as rapidly as the rest of the country and in fact has slipped to well below average.

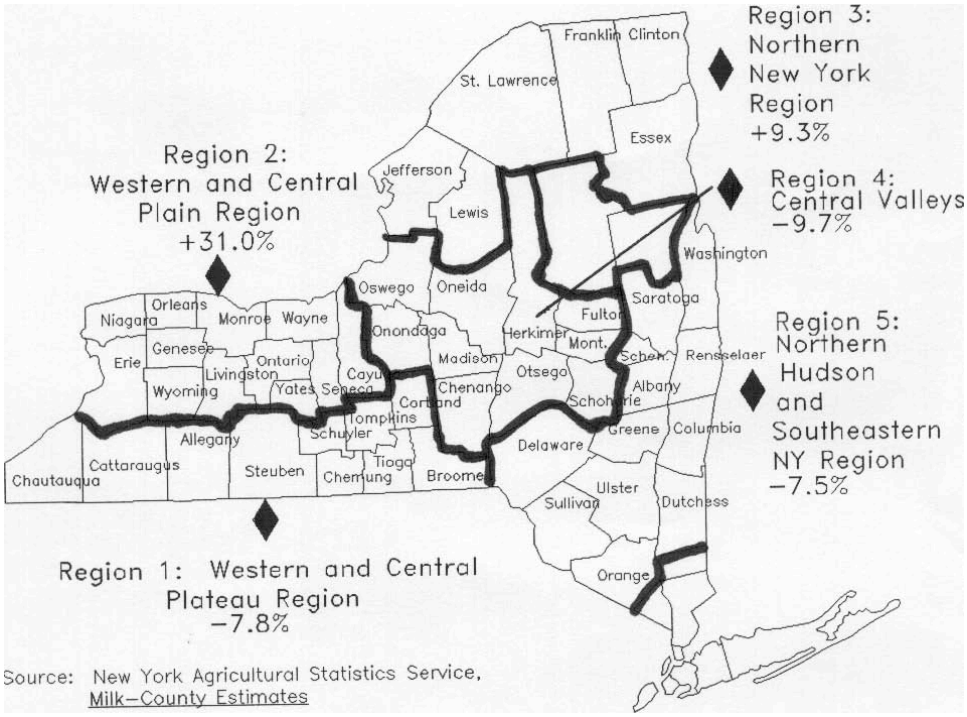
Figure 7. Average Pounds of Milk per Cow.



New York Trends

For much of the rest of this paper, I am going to focus on regions within New York state and in particular, Northern New York. Figure 8 displays five regions within the state that are geographically, culturally, economically and most importantly, agronomically distinct.

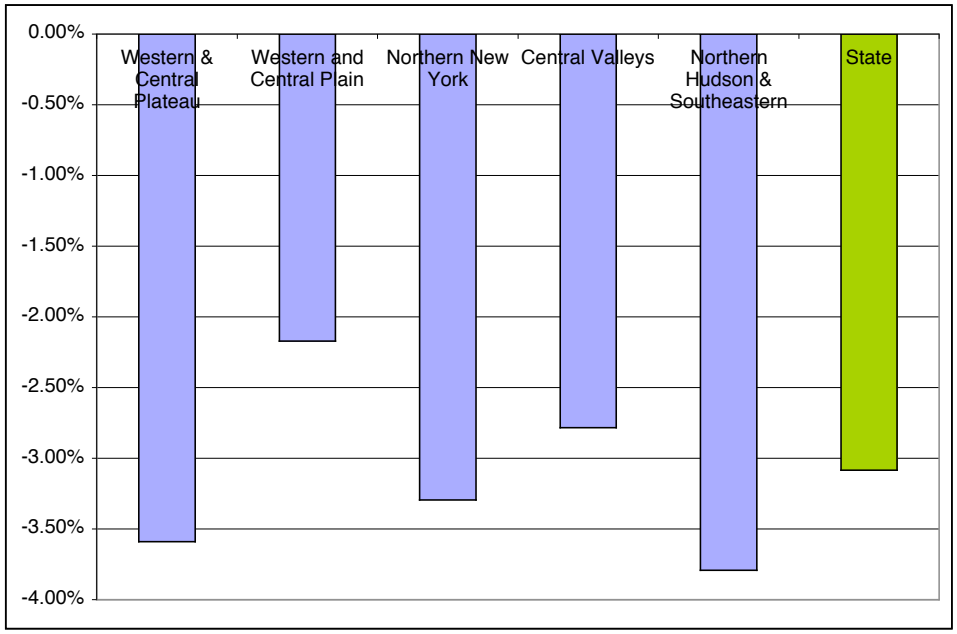
Figure 8. Regions of New York.



Source: New York Agricultural Statistics Service, Milk–County Estimates

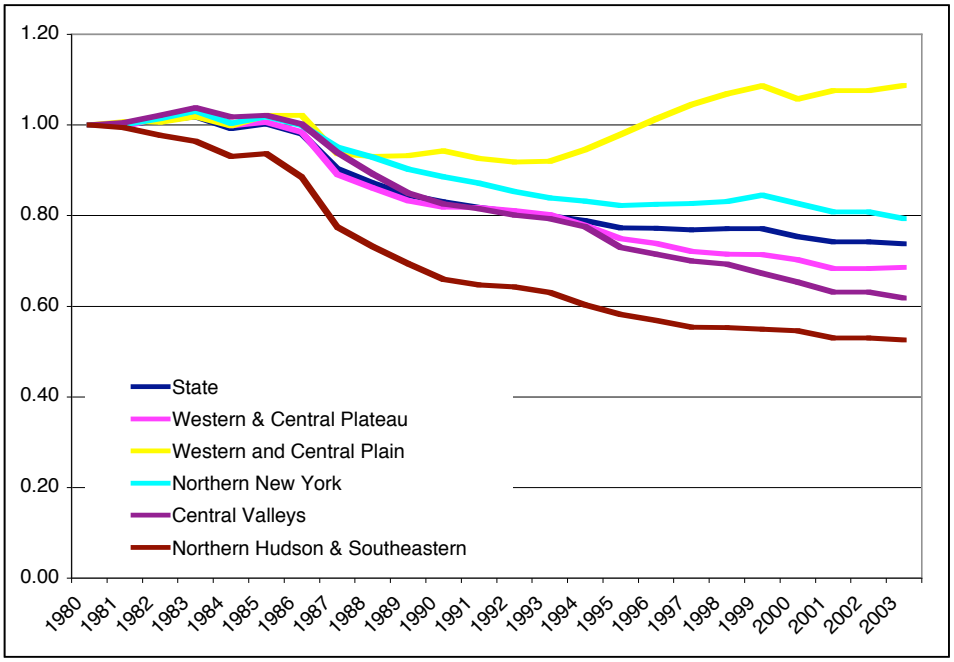
Northern New York has lost dairy farms at a somewhat faster pace than the state as a whole as seen in Figure 9. The Western and Central Plain region and the Central Valleys region have been the least in decline while the southern and eastern regions of the state have had the largest percentage loss.

Figure 9. Annual Percent Loss of Dairy Farms in New York.



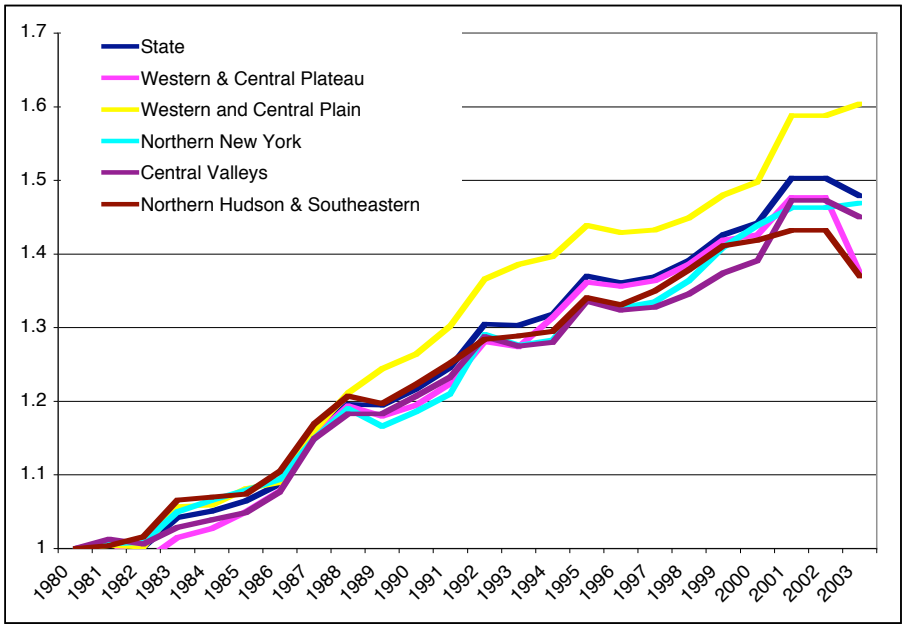
Using an index which shows the relative changes over time, ranking of cow numbers in the state look somewhat different for the regions. As productivity per cow has increased, the dairy industry needs fewer cows to produce adequate volumes of milk. In general, the trend is for fewer cows all across the country. In New York, the Western and Central Plain region has bucked that trend and actually increased cow numbers, particularly through the 1990s. Northern New York has lost cows but at a slower rate than the rest of the state.

Figure 10. Index of Cow Numbers in New York.



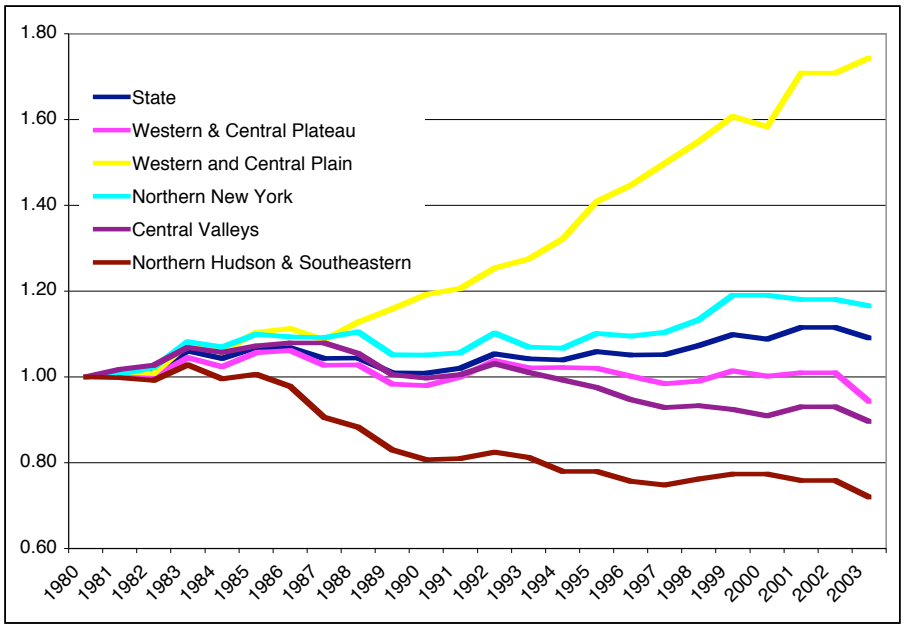
In terms of productivity, Northern New York has has performed at about the state average with milk production per cow as seen in Figure 11. The state's Western and Central Plains region is the only area with any real distinction and they have had much better performance in that regard.

Figure 11. Index of Milk Yield per Cow



Combining the effects of cow numbers and production per cow, we can see in Figure 12 the real differences in total milk production in the various regions of the state. Again, the Western and Central Plain region is the obvious standout with much greater milk production gains than any other region of the state. The Northern Hudson and Southeastern region of the state also stands out for it's loss of milk over the past two decades. Northern New York has increased milk production slightly over this time period and has outperformed the state increases in production.

Figure 12. Index of Total Milk Production in New York



Costs of Production

In 1996 and 1999 the U.S. Top Dairies workshop was held to assess the costs and returns on "best practice" dairy farms from around the country. Approximately 100 farms participated by invitation only and these farms were fairly evenly distributed between eastern and western style operations. Very similar values were found in both years.

Table 1 shows that on average the western farms were much larger than the eastern operations. It also reveals that the milk sold per cow was very similar while the milk sold per worker and the crop acres per cow were very different—reflecting different production practices.

Table 1. Descriptive Statistics of Western and Eastern Best Practice Farms.

Values for 1999	Western	Eastern
Cows	1112	193
Heifers	737	156
Percent custom raised	21%	2%
Milk sold per dairy	23,417,461	4,001,775
Milk sold per cow	20,674	19,388
Milk sold per worker	2,601,591	691,705
Cows per worker	118	35
Total crop acres per cow	0.40	2.20

Table 1. Receipts per Hundredweight Milk.

Values for 1999	Western	Eastern
Milk	$14.86	$14.84
Dairy cattle	$0.58	$1.05
Dairy calves	$0.09	$0.12
Other livestock	$0.03	$0.08
Crops	$0.14	$0.41
Custom machine work	$0.02	$0.06
Government receipts	$0.09	$0.65
Other receipts	$0.30	$0.29
Total receipts	$16.14	$17.53

Surprising to many folks, the milk price received was not much different between regions. However, sales of dairy cattle, crop sales and government receipts were much higher on the eastern farms providing more than an additional dollar per hundredweight in total receipts for the eastern producers.

Table 3 shows that net feed and crop expenses were considerably less for eastern producers where a major portion of forage was being grown on the dairy farms. In fact, total operating costs were nearly two dollars per hundredweight lower for the eastern farms than those of the west and, combined with a higher receipts per hundredweight, the net return over cash operating costs was nearly double for eastern producers. This is an indication that when comparing best practice farms, eastern operations can compete with larger firms in the west.

Table 3. Expenses per Hundredweight Milk.

Values for 1999	Western	Eastern
Net Feed & Crop	$5.98	$3.65
Total labor	$2.47	$3.32
Net machinery expense	$0.73	$1.60
Net cattle purchases	$0.35	($0.59)
Milk marketing & livestock expens	$2.46	$2.08
Real estate repair, taxes & rent	$0.54	$1.04
Depreciation machinery & real est	$0.87	$1.21
Total interest	$1.52	$2.13
Net misc. expense	$0.24	$0.57
Operating Cost	$12.52	$10.64
Total Cost	$15.20	$15.04
Net Return over Operating	$2.34	$4.20

The New York Dairy Farm Business Summary lets us look at the same receipts and expenses categories for New York farms. In making those comparisons and summarizing the costs by regions, we can see that Northern New York has very low operating costs of production and has consistently had them over the years. In fact, as seen in Figure 13, Northern New York has significantly lower costs of production than any other region of the state and over the fourteen years of data shown has averaged nearly 70 cents per hundredweight lower than the state average.

Northern New York does not fare as well when looking at net returns over operating costs. Figure 14 illustrates that while usually somewhat better than state average, the region does not stand out as it does with costs of production. The only reason that this would not be the case is that the price received for milk is relatively lower.

Figure 13. Operating Costs per Hundredweight in New York.

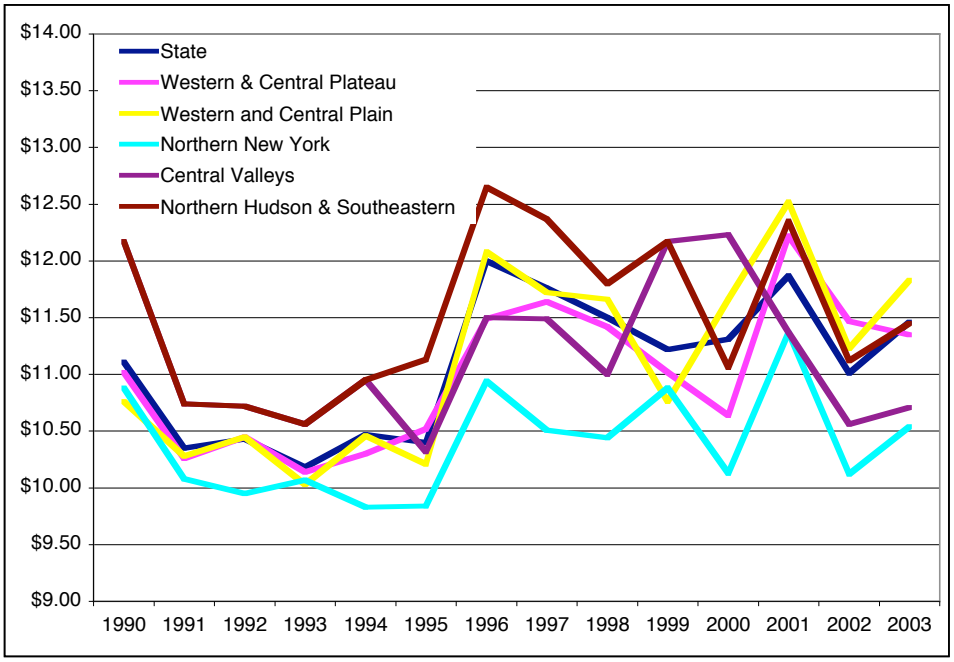
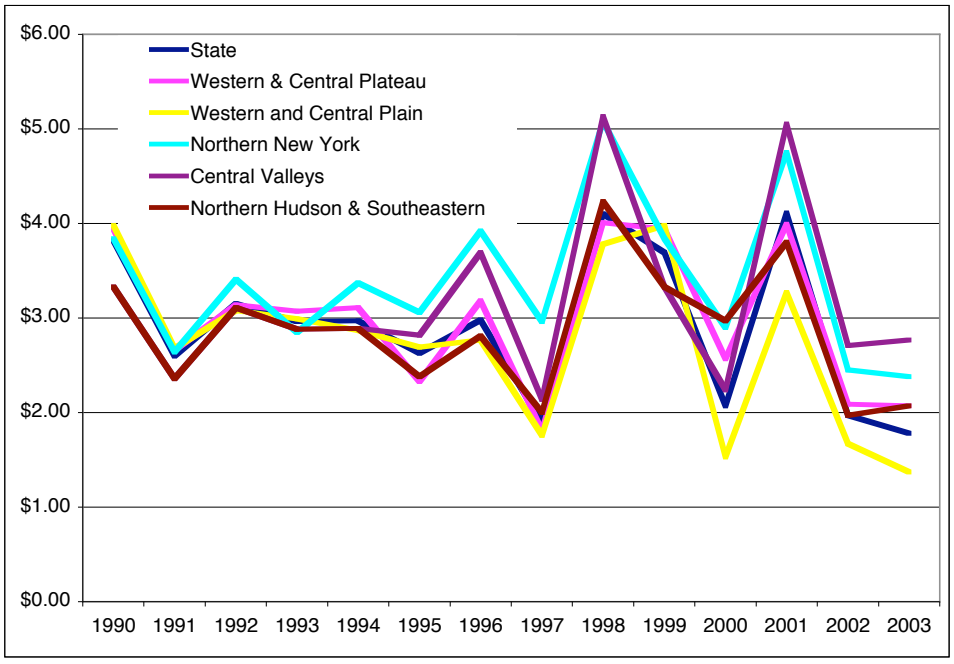


Figure 14. Net Return over Operating Costs in New York.



Opportunities for a Higher Milk Price

The Cornell Program on Dairy Markets & Policy has been conducting an annual milk check study since the year 2000. This project collects copies of milk checks from dairy producers around the state for the same month (typically August) and provides a customized report of the farm's production of components, negotiation of premiums and major deductions from the milk check. This data set provides an opportunity to see if milk prices in Northern New York are actually lower than surrounding regions and if so, why.

Figure 15. Regional Milk Check Values for New York State, August 2003.

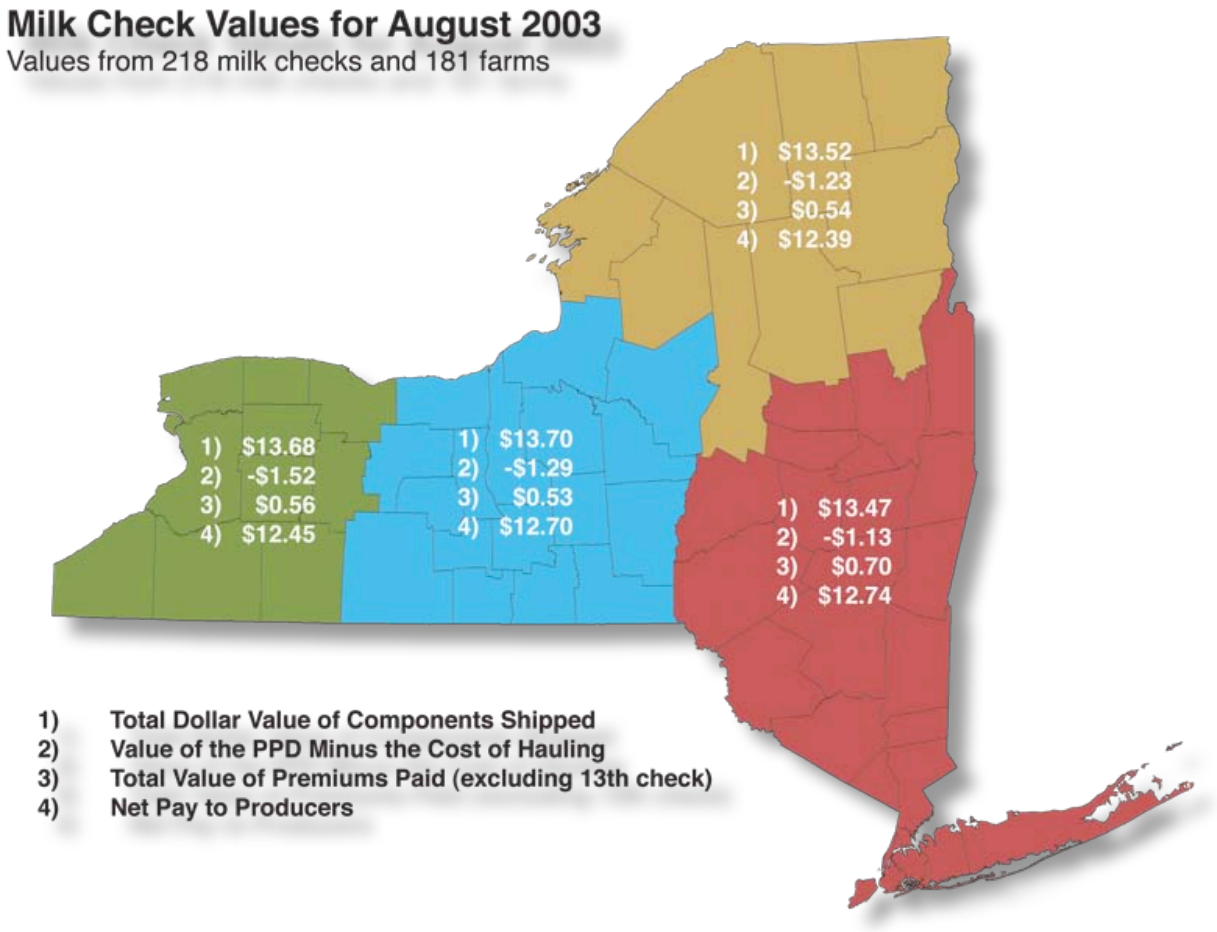


Figure 15 shows regions of the state that approximate the regions previously discussed. The fourth value for each region is the net pay to producers which includes the value of components produced, all premiums paid minus hauling and other relevant deductions from the milk check. This data affirms the results from the Dairy Farm Business Summary regarding lower milk prices in Northern New York. It also provides detail regarding the source of the lower pay prices. The total value of premiums paid to Northern producers is right in line with producers in other regions of the state (except the southeastern region near the major population centers). The difference in net pay appears to be in the value of components shipped.

Farms participating in the milk check study are very evenly distributed across the state but it is possible that this is the result of a small sample (somewhat more than 200 farms). However, using data from the Market Administrator's (MA) office for component production on every farm in the Northeast Federal Milk Marketing Order for twelve consecutive months shows exactly the same pattern of components shipped. Whether the reason is management or agronomic, it is clear that dairy producers in Northern New York do not produce the same component levels as the rest of the region.

Further examination of the MA component data reveals that butterfat percentages are somewhat lower than the rest of the state. Other solids, which is primarily lactose, is modestly lower than state average. But the most economically significant difference is that the true protein values in Northern New York are lower than other regions of New York. Moreover, the counties of Jefferson, Lewis and St. Lawrence are the ones who are especially lower while Franklin, Clinton and Essex are about at state average. Bringing the North Country's component levels up to state averages would return an additional $0.20 per hundredweight to producers (about $5 million annually to the region).

The Propensity to Produce Milk

A number of years ago, the Economic Research Service, a branch of the U.S. Department of Agriculture, published a document entitled "The U.S. Dairy Industry".[3] In this document they calculated a value that they called the "propensity to produce" for each of the 48 contiguous states. This calculation was basically a notion of how responsive producers had been to changes in the milk price. For example, if a state had a significant increase in milk production with little increase in milk price, they would have a high propensity to produce. If output changed little with changes in milk price then a state's propensity to produce would be low. In 1992, New York state ranked 16th in propensity to produce relative to other states.

This same calculation can be done for counties or regions within a state. Figure 16 shows the five regions of New York for the years 1995, 2000 and 2003. It can be seen that the Western and Central Plain region stands out as having a much higher propensity to produce than other regions of the state and this propensity has been growing over time. However, Northern New York has the second highest propensity to produce and they have demonstrated modest growth in this tendency.

An interpretation of the propensity to produce might be where do you get the "biggest bang for your buck". In other words, if additional money was made available to produces via higher component sales or greater premiums paid, Northern New York and the Western and Central Plain regions would respond with greater milk output than say the Central Valleys region.

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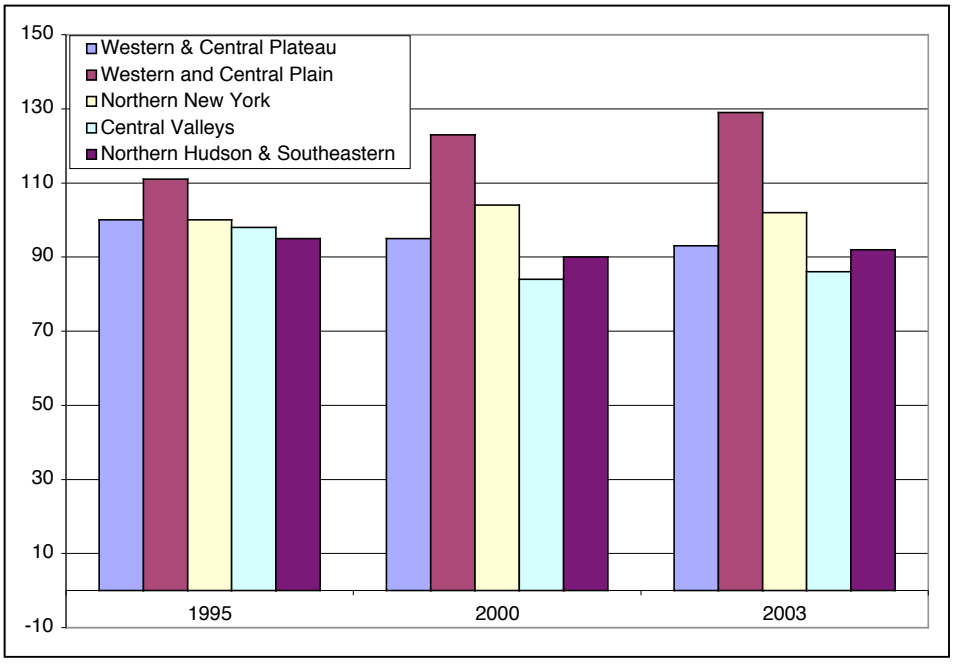
[3] Richard Stillman, Don Blayney, James Miller and Terry Crawford. *THE U.S. DAIRY INDUSTRY.* http://pdic.tamu.edu/black/stillman.pdf

Figure 16. Propensity to Produce Milk in New York.



Untapped Agronomic Resources

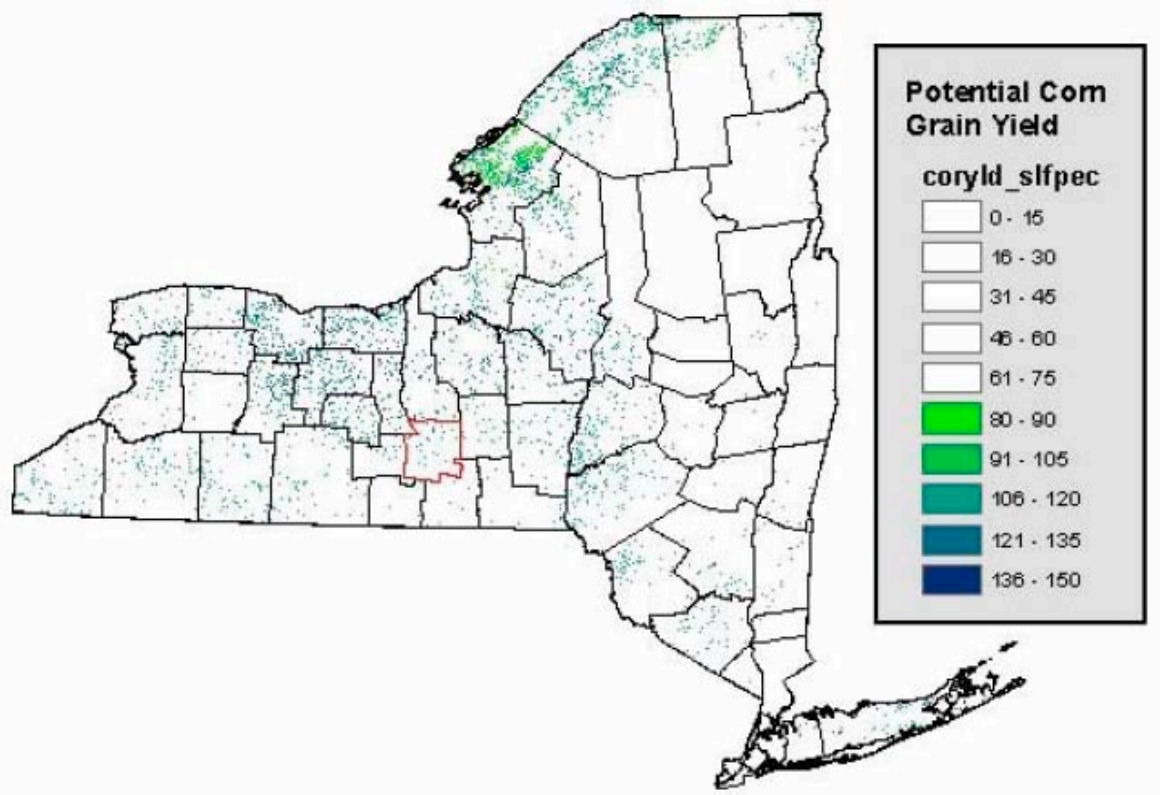
An underlying assumption regarding increased milk production in a region is that current production practices can be replicated. The eastern style dairy farms in the Top Dairies project were generally producing milk with 1-2 acres of crop land per cow. This has given them the opportunity to produce most of their forage needs, often some of their concentrates and a ready means of disposing of manure. This structure has generated relatively high margins for this style of production. Many of the eastern states already have such significant animal agriculture that large tracts of land are simply not available to duplicate these successful production practices.

As a part of a Biomass Energy Project, Peter Woodbury with Cornell's Crop and Soil Science Department, has looked at land use in New York. Approximately 60 percent of land in the state is currently forested, 10 percent is water and wetlands, and 20 percent is currently in crop and hay production. About 6 percent of the remainder is currently in pasture, old field and miscellaneous use (not including developed property). A portion of this 6 percent might be available for crop production.

Some of the potential crop land is not compatible for production—the land may have too steep a slope or have poor drainage. But of the remaining land, crop potential can be assessed. Corn yield is calculated by soil type and calculated yields below 80 bushels per acre are further removed from possible production as being economically non-viable. The final assessment of unused land in the state that would support at least 80 bushels of corn per acre can be seen in Figure 17. We can see from this map that the

that the greatest concentration of unused potential land is in Northern New York and specifically Jefferson County.

Figure 17. Potential Corn Yield on Unused, Compatible Crop Land in New York.



It is possible to go further and ask whether we are using the crop potential of all cropland as intensively as we might. Every acre of land in the state of New York is mapped by soil type and, every soil type in each county has a potential to yield a certain amount of total digestible nutrients (TDN). Moreover, we can estimate the TDN requirements of the milk produced in each county and build an estimate of the ratio of potential TDN production to TND used to produce milk.

By this calculation, Wyoming County uses an impressive 85 percent of all possible TDN to produce milk. Cayuga County is the second most intensive county using nearly 80 percent. In contrast, Northern New York uses a much lower percentage of potential TDN production to make milk, implying that not only is there land that is not currently producing crops that might be employed, but also that there may be a greater productivity of the crops currently grown and used to make milk in the region.

Summary

Northern New York, and particularly the counties of Jefferson, Lewis and St. Lawrence, have more potential to increase milk production than most any other region of the state. There are more untapped land resources that are available and compatible with milk production and the land resources that are being farmed appear to be underutilized.

Milk production in the Northeast is lagging the rest of the country primarily as a result of yield efficiencies. Our current milk per cow is more than 1,600 pounds below the U.S. average and Northern New York is somewhat below the state average. Moreover, the percentage of milk components in the milk produced in Northern New York lags the rest of the state by a significant margin. These two factors, milk yield and component levels, suggest that dairy producers in Northern New York can generate additional revenues on existing operations without herd expansion.

Dairy plants in the region are facing stiff competition from manufacturers in the western states. Plant closures will have a negative effect on milk prices as remaining plants purchase the extra milk and have to ship finished dairy products farther to markets. Plant closures will also impact dairy producers directly with higher hauling costs in the vicinity of the lost plant.

Northern New York dairy producers are to be commended for cost control. As a group, they are the lowest cost producers in the state. However, taken with the other observations of lower milk and crop yields and component production, it appears as though producers in this region are a bit too cautious or conservative in their management practices. It is likely that spending a bit more to focus on yield efficiencies would return more to the bottom line of their operations. Further, the extra milk and product yield from higher component levels would help keep manufacturing plants in the region.

Producers in Northern New York do respond to higher milk prices. Second only to the Western and Central Plains region of the state, their propensity to produce milk is fairly high. It appears as though it is within the capabilities of producers in the region to generate those higher prices and increase milk production in the region.