INSIGHTS AND PERSPECTIVES 2018

FARM CREDIT EAST

ECONOMIC ANALYSIS & PAPERS ON AGRICULTURE, COMMERCIAL FISHING & THE FOREST PRODUCTS INDUSTRY

Dear Farm Credit East Customer:

As we look forward to 2018, there are both challenges and opportunities for Northeast agricultural, forest products and commercial fishing businesses.

In addition to many economic, political and regulatory uncertainties, there are also constants — especially our customers' resilience. In the face of headwinds in many sectors of agriculture and the other industries we serve, we are always encouraged by how Farm Credit East's customer-owners make adjustments and continue to succeed and grow.

Farm Credit East strives to be a steadfast partner in that success by providing the capital and the financial services to enhance your business success. In addition to products and services, Farm Credit East also seeks to provide the knowledge and expertise you need to inform your business decisions.

That's why we are pleased to share with you the 2018 edition of **Insights and Perspectives.** Our 2018 report provides outlooks and insights from both industry experts and Farm Credit East's knowledgeable staff. Our internal reports include a discussion on financial management from both our outgoing and incoming chief business officers, a summary outlook for the many industries Farm Credit East serves, an overview of the recently passed tax reform law, and a crop insurance overview.

We are also pleased to provide ten papers developed by external academic and industry experts covering a number of sectors and topics.

- Grain and Oilseed Outlook, Pat Westhoff, University of Missouri
- Dairy Outlook, Ben Laine, CoBank
- Greenhouse and Nursery Outlook, Charles Hall, Texas A&M
- Apple Outlook, Desmond O'Rourke, Belrose, Inc.
- Northeast Vegetable Crops Outlook, Brad Rickard, Cornell University
- Controlled Environment Agriculture, Jie Li and Miguel I. Gómez, Cornell University
- Northeast Forest Products Outlook, Eric Kingsley, INRS, Maine
- Northeast Fisheries, Hank Soule, Sustainable Harvest Sector Cooperative, Maine
- Consumer Behavior at Farmers' Markets, Chris Wayne, GrowNYC
- FSMA Produce Safety Rule Update, Gretchen Wall, Cornell University

In addition to this report, our Knowledge Exchange program provides content throughout the year, including the monthly Knowledge Exchange Partner (KEP) e-newsletter and webinars on economics topics, market outlooks and regulatory issues. In conjunction with credit and financial services experts, Farm Credit East business consultants can help farm, forestry and fishing businesses identify opportunities for improvement.

We understand that our success is a result of our customers' success, and hope that the information in this report will, as the title suggests, provide some insights and perspectives that assist your planning as you face the opportunities and challenges in the year ahead.

Sincerely,

William J. Lipinski

Chief Executive Officer

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COMMAND & CONTROL

Has your business kept up?

FARM CREDIT EAST CHIEF BUSINESS OFFICERS:

JAMES PUTNAM

MIKE REYNOLDS

This joint article written by Jim Putnam and Mike Reynolds is especially appropriate for our 2018 Insights and Perspectives. After more than four decades of contributions to Northeast agriculture and Farm Credit, Mr. Putnam will retire on March 31. As we look to the future, we are pleased that Mr. Reynolds takes over as Chief Business Officer.

Northeast farm, forest products and fishing businesses have invested fast and furious in technology and productive assets over the past decade. We've observed, and often had the opportunity to finance major investments in new and updated machinery, new buildings and structures, new technology, working capital, and additional productive land. All of this bodes well for the future of your businesses. It positions you to remain competitive and profitable, while attracting the next generation of management, and eventually ownership, to engage in your business.

Has your capability as a business management team kept pace with all of this new investment in productive assets? Or, are you feeling you have a tiger by the tail in terms of the added complexity, scale and demands of successfully leading your business?

Think back over the past decade or so, to this time in 2008:

- How much more output is your business producing, whether it is bushels, trays, cwt., barrels, cords, board feet, pounds, tons or other relevant unit of measure?
- How much more exacting are the quality standards required by your customers or buyers? The hurdle for marketable quality has been rising almost constantly in all the industries we serve, and shows no signs of slowing down.
- How about the materials handling and logistics of your operation — moving raw materials in and finished products and by-products out? Today, many of you are either operating or hiring substantial over-the-road trucking as a critical element of your business, for example.
- How about payroll and benefits? Has this gotten any simpler?
- Or gross dollars flowing out of your checkbook for purchase of inputs and services, and deposits back in as product is sold?
- What about regulatory requirements? Whether it's your income, payroll and sales tax liabilities, CAFO, FSMA or Fishery Management Council regulations, no one is going to contend that has gotten any easier! Our states and federal governments, no matter what the rhetoric, keep adding to the list while rarely taking anything away.
- How much more information is available to you about your business? And is it being used in a systematic and purposeful way, or is it "information overload?"

Most of this added complexity is on you and perhaps one or two other key senior people within your business. The size and margins of most natural resource-based businesses does not allow for a multi-disciplinary team of specialists who can stay on top of these issues. For example, you probably do not have a senior vice president of human resources or in-house corporate counsel. Some Northeast natural resource businesses have done well in upgrading their management systems to maintain balance with greatly increased complexity and scale. Unfortunately, many others are in catch-up mode.

Tell-tale Signs

Often when times are good and markets strong, these challenges are not particularly apparent. Good times can lull any of us into complacency — that's human nature! Inadequate management systems can quickly become painful, however, when profitability goes south. This has occurred in the dairy and cash crop industries over the past couple of years, and in the green and forest products industries in 2008-09. Common challenges are:

- Cash flow and profitability swing dramatically negative, but the business owners are slow to grasp the magnitude of this, or really know what to do about it. Necessary adjustments and perhaps bold actions are unfortunately delayed, and the proverbial dark hole gets even deeper.
- Accurate financial information is missing in action until many months after year-end. As a result, income tax management, filing of timely tax returns, benchmarking/budgeting, and credit renewals are delayed far too long.
- Critical strategic decisions get put off. There are too many other fires to fight, so important issues like family succession and/or updating wills are deferred.
- Stress on key family business leaders increases, sometimes leading to tension within the team. "I know I'm responsible for keeping the financial records up to date, but I am three months behind because of the terrible weather during crop season…"
- Employee hiring, turnover, productivity, attention to key details and other issues are allowed to fester because management is spread too thin and/or perhaps too stressed.

The Right **Command and Control** *Capability?*

Command and Control is a military term not commonly used in the business world. As a retired Marine Corps Major (Jim's son!) described it: ***"Command and control is the means by which a commander recognizes what needs to be done and sees to it that appropriate actions are taken."***

Substitute the word(s) "management team or president or general manager for "commander," and this definition fits remarkably well for most of the businesses with whom we work. As your businesses have grown in size and complexity, it is understandable how "command and control" would have lagged behind.

Command and Control ("C&C") Checklist

Certainly there is no "one size fits all" command and control system for farm and natural resource-based businesses.
We encourage you to think about:

- ***Timely, accurate financial information*** that enables the management team to:
  - » understand monthly/annual performance on an ongoing basis, *and*
  - » identify both opportunities and problems as they arise, *and*
  - » develop timely action plans in response, *and*
  - » track and assess the success of these action plans.
  - » Integral to actionable financial information is a laser focus on a few key financial metrics that are the true drivers of your business. Yes, you need full financial statements for other business reasons, but not for purposes of command and control.
- The capability to ***integrate business information*** from throughout your business operations – production, marketing, retail front-end, financial and the other information being generated by the technology in which you have invested. While this has long been an element of Farm Credit East's CenterPoint® Accounting software, Success Strategies Benchmarks and Profit Analyzer services, technology enabling this integration is developing by leaps and bounds.
- ***Clearly identified management accountability,*** tracking of key business results to those directly responsible, periodic measurement of accountability to actual results, and reinforcement through compensation (including perhaps bonus/gain sharing programs) are part of the foundation of effective C&C. This structured approach to human resource management is critical to success. If disappointing business outcomes result in finger pointing within your team or "not in my job description," then C&C is inadequate. If it is all on you as leader, then you are destined to have key performance issues get away from you, if not becoming personally "burned out" someday.
- ***Regular, structured communication*** within your management team focused on business results, responding to opportunities, and resolution of problems and action plans. A blessing and a curse of family and small businesses is that we sometimes know each other too well! We have to speak to each other frequently to get things done and we are frequently in each other's space. This is all necessary and wonderful, but success requires regular communication focused on business results and problem-solving in a complicated world!
- ***Risk management focus and capability.*** At first, risk management may seem out of place in our discussion of business C&C. Think back to our military analogy, however. The commander relies on "intel" from a variety of sources to anticipate and overcome adversity in order to accomplish their mission. In farming and natural resource-based businesses, we plan and hope for "normal." But, we are always aware that a wide range of natural, market and institutional forces may completely disrupt "normal" thereby impacting our business results. Risk management capability implies that we:
  - » understand the key risks to our business
  - » assess their potential impact
  - » whenever possible, have a contingency plan in place
  - » use risk mitigation tools (e.g., crop insurance, business interruption insurance, forward contracting, margin hedging, maintaining cash and credit reserves, etc.)

Ask Farm Credit East's Team to Help!

The Farm Credit East team can help you develop *Command and Control* capability for your business — please ask your Farm Credit East representative. For nearly 50 years we have been in the business of helping our customers become better business managers. Our goal, then and now, has always been to assist Northeast producers in being more profitable, better managing risk and transitioning their businesses to the next generation. Along the way, we hope there has been substantial value in our customers' peace of mind knowing that Farm Credit's experts are part of their team.

Our business consultants and other providers have lots to offer in helping you take command and control to a higher level:

- ***Red Wing CenterPoint®*** accounting software
- On-Farm and at-Farm Credit accounting services
- Success Strategies Benchmarking for dairy, ag retail, green industry and winery businesses
- Profit Analyzer service: Monthly profitability reports and consultant-facilitated profit meetings with your management team
- GenerationNext management development seminars and customer on-farm training
- And more!

We also have some great new things in the pipeline to be introduced this year.

HR Success Strategies

Assistance with employee handbooks, job descriptions and business organizational structure (think about better assigning and communicating employee accountability).

Financial Dashboards

Do your eyes glaze over when you see a page full of monthly general ledger reports? Dashboarding provides a more user-friendly way to focus on key business metrics. We are currently working to integrate this with our Dairy Profit Analyzer service. Roll-out is anticipated early this year.

Profit Groups

We are strong believers in "learning from your peers." In response to inquiries from a number of customers, we look forward to offering profit groups as a structured, high-energy learning experience. We will facilitate customer self-selected groups populated with 8 to 10 producers who would like to meet periodically with a skilled facilitator. That said, with the diversity of business types that we serve here in the Northeast, we think there is a great opportunity to learn and seek business improvement within a group consisting of diverse businesses rather than one all from the same industry.

All of us at Farm Credit East are incredibly proud of your business accomplishments. As you have grown in business management capability, you have enabled us to grow with you. Our team is eager to assist you in taking business management — command and control — to the next level in 2018.♦

THE NORTHEAST FARM ECONOMY

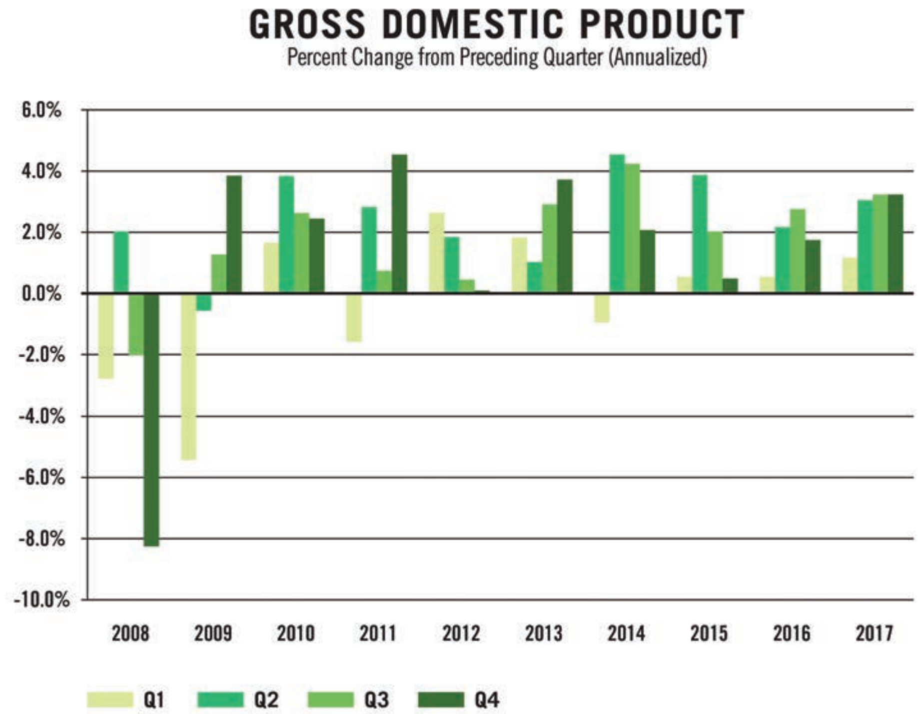
FARM CREDIT EAST
DIRECTOR OF
KNOWLEDGE EXCHANGE:
CHRIS LAUGHTON

THE NATIONAL ECONOMY

The United States economy continues to pick up steam. Growth in the U.S. gross domestic product (GDP) averaged 2.5 percent for the first three quarters of 2017, according to the Department of Commerce's most recent estimates. Depending on the fourth quarter results, economists predict that real GDP growth for the year will come in at 2.4 to 2.6 percent. If achieved, this would represent a significant acceleration of economic growth from 1.5 percent in 2016. GDP growth is projected to continue to strengthen through 2018.

America's expanding economy is having a number of impacts; one of the more significant is the tightening of the labor market. The official unemployment rate fell from 4.8 percent in January of 2017, to 4.1 percent in November. Job growth averaged a healthy 174,000 per month for the first 11 months of 2017, compared with an average of 187,000 in 2016. Many employers report having to look more aggressively for workers as the nation approaches full employment. Over the year, average hourly earnings rose by 2.5 percent.[1]

The improved economy was also reflected in consumer spending and sentiment. The Consumer Confidence Index was at a 17-year high as of November, at 129.5, compared to 109.4 in November of 2016.[2] That high level of consumer confidence has translated into increased consumer spending, a key component of the overall economy. Overall consumer spending increased by 5.7 percent in November, year-over-year.[3]



Source: U.S. Department of Commerce. Q4 2017 is a preliminary estimate.

Inflation has picked up somewhat, as might be expected with a more robust economy. Consumer price inflation, including food and energy, increased to 2.2 percent in November, slightly above the Federal Reserve's target of two percent. In response to this and a tightening job market, the Fed made three interest rate moves over the course of the year, bringing the Federal Funds rate to 1.50 percent resulting in a prime rate of 4.50 percent as of December 2017. Projections indicate that the Fed could make two or three more quarter-point rate moves in 2018.

The housing market remains relatively strong. While still well below peak levels, housing starts averaged 1.2 million for the year through November, in line with last year's average. The S&P/Case-Shiller 20-City Home Price Index rose by 6.7 percent from October 2016 to October 2017.

In welcome news for exporters, the U.S. dollar declined in value somewhat against foreign currencies in 2017. The dollar had a trade-weighted index value of 88.9 in December compared to 95.4 one year earlier, representing a decline of just under seven percent.[4] While this should help

[1]U.S. Bureau of Labor Statistics, [2]The Conference Board (Consumer Confidence Index, 1985=100), [3]U.S. Census Bureau, [4]Federal Reserve, Trade-Weighted Index: Major Currencies (March 1973=100)

support agricultural exports, improving economic conditions in the U.S. relative to other major trading partners will likely limit the dollar's drop in value.

Globally, economic growth is expected to continue its momentum going into 2018. The overall world economy is projected to grow by 3.0 percent in 2018. Advanced economies are expected to show increased growth at 2.1 percent, while emerging markets are cooling off, and expected to grow by 3.8 percent, lower than in the past. China, long a leader in global economic growth, is projected to see growth slow from 4.2 percent in 2017 to 3.9 percent in 2018.[5]

Slowing growth in the developing world, along with rising agricultural productivity, has contributed to a global glut of commodities. While trends of population growth and a growing middle class in the developing world support a long-term bullish outlook for U.S. agriculture, in the near term, many commodities markets are expected to remain soft. USDA long-term projections indicate reduced farm income through at least the next crop year before global food and biofuel demand equalizes with supply, and farm incomes begin to slowly rise.

LEGISLATIVE AND REGULATORY ISSUES

Since its arrival in Washington, the Trump Administration has prioritized regulatory relief for businesses, and slowed the development of new regulations. However, there are plenty of existing laws and policies already on the books at the federal and state levels that affect agriculture. Farm Credit East continues to advocate for a favorable regulatory environment for agriculture, forest products and commercial fishing businesses.

Access to a reliable legal workforce continues to be a top concern of farmers. Given the current political climate, there is no apparent path forward for comprehensive immigration reforms, though there has been activity on the creation of an agricultural guest worker program. During 2017, House Judiciary Chairman Bob Goodlatte introduced the Agricultural Guestworker Act, which would create a new H-2C visa program. This bill passed the Judiciary program and, while it included some provisions opposed by agricultural employers, supporters will attempt to improve the bill as it moves through Congress, though its prospects in 2018 are very uncertain.

The Food Safety Modernization Act's Produce Safety Rule has started to take effect for some farms, with the first compliance deadlines occurring on January 1, 2018 and others coming over the next four years. The Trump Administration has delayed the implementation of the rules related to agricultural water for cleaning and irrigation, which are some of the most complex aspects of the regulations.

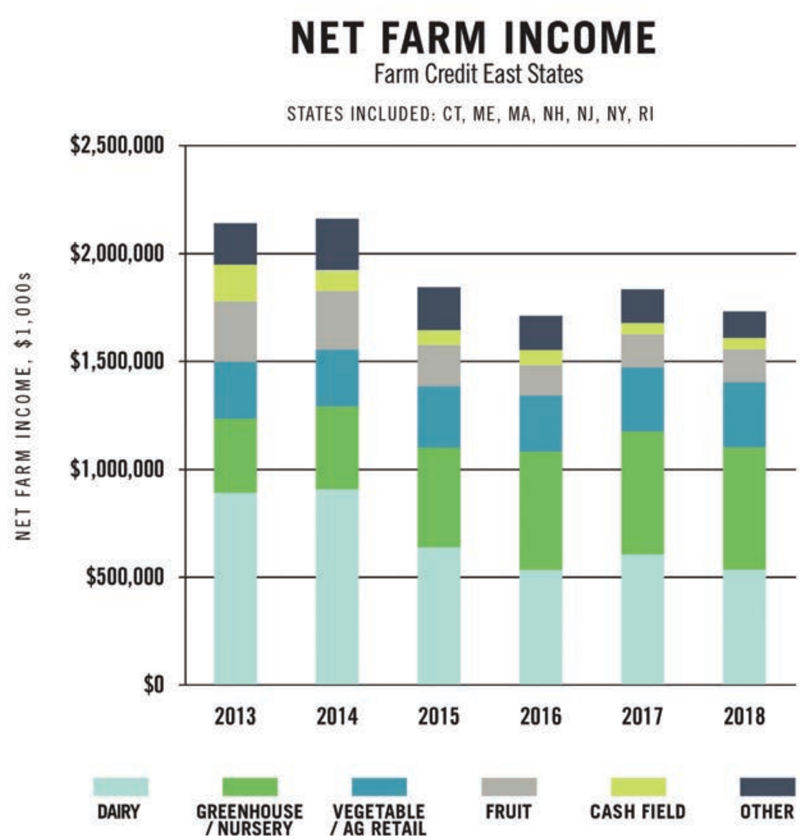
On the legislative front, Congressional work has begun on the Farm Bill, which will need to be acted upon in 2018. Major programs in the bill, like SNAP (Supplemental Nutrition Assistance Program) and crop insurance, could face changes driven by differing priorities and budgetary pressures. Farm Credit East will continue to push to maintain a strong and flexible crop insurance program so that Northeast producers maintain access to this important risk management tool.

Finally, Congress has passed the first major overhaul of the tax code in over 30 years. While Congress has completed its work (though there may need to be some technical corrections), there will be significant activity to implement the tax law changes and for producers to determine what the tax law means for them. An article later in this publication discusses some of the major provisions affecting producers.

THE FARM ECONOMY

DAIRY:

Northeast dairy farms continue to show a wide range of operating results, with many farms managing to remain profitable, while others struggle after several years of low prices. Most are expected to end 2017 slightly above break-even. An increase in milk prices has been beneficial to many farms, but in 2018, milk prices are expected to decline again.



[5]The Conference Board: Global Economic Outlook, November 2017

Source: Farm Credit East Knowledge Exchange Estimates

- 2017 farm gate milk prices averaged about $1.55/cwt above 2016. 2018 prices are forecast to average $1.67 below 2017, putting them slightly below 2016 levels.
- Despite relatively weak milk prices, national milk production continued to increase in 2017. Total milk production is estimated at 1.4 percent higher than 2016. This increase was due to a combination of both more cows and higher production per cow.
- Cow numbers increased nationally by 0.6 percent as of November. California showed a 0.8 percent decline, Idaho, Wisconsin and Pennsylvania were roughly flat, Michigan had a 1.1 percent increase, and New York increased by 0.8 percent to 625 thousand head.
- Exports continue to be a critical outlet for growing U.S. dairy production, and they ran well above prior-year levels from July 2016 through June 2017. However, since the midpoint of 2017, export sales have failed to keep up with 2016's record pace. On a total milk solids basis, 2017 exports represented 14.3 percent of all U.S. output.
- The outlook for 2018 is relatively bearish. The USDA has forecast a 1.7 percent production increase for next year, which means another 3.7 billion pounds of milk on the market. Meanwhile, competing exporters New Zealand, Europe, Argentina and Australia are all showing increased production as well, making export gains a challenge. However, China and other major importers seem to be increasing their purchases, which could help markets. The U.S. dollar has weakened somewhat year-over-year, which helps exports, but as noted earlier in the report, the strong U.S. economy could lead to a strengthening of the dollar compared to other currencies.
- Despite a relatively gloomy forecast for the first half of 2018, things could change significantly thereafter, and a number of factors are uncertain. If U.S. and foreign production increases fail to materialize, or if domestic and/or global demand picks up, U.S. milk prices could respond positively.

TIMBER AND FOREST PRODUCTS:

The forest products industry encompasses a variety of business types, and their economics sometimes do not track together. We are currently seeing a divergence in financial performance within the industry, driven heavily by the regional impact of a significant number of pulp and paper mill closings in Maine.

- Lumber
  - » U.S.-Canada softwood lumber dispute – The final ruling from the U.S. International Trade Commission came out at the end of 2017, and set countervailing and anti-dumping duties for most Canadian lumber shipments at 20.23 percent.
  - » Lumber prices have continued to move upward. Spruce/Fir hit a recent high of $540/mbf Boston, up from $410/mbf a year ago. Tight supplies around the country have kept order files long and price movement upward. Some of this may be tied to strong housing demand as well as rebuilding efforts from natural disasters in 2017.
  - » Eastern White Pine has benefitted as well from improving demand, and with constrained supply, prices have been at very favorable levels since early 2016. Hardwood prices are more variable and location dependent, driven by species and market mix.
  - » Sawmills continue to struggle with the limited markets and significant price reductions for residuals, but recent lumber price improvements have more than offset this shortfall.
  - » Biomass generation plants have struggled due to low natural gas and wholesale electricity prices, as well as the loss of Renewable Energy Credits from several Southern New England states. Consequently three biomass plants in Maine ceased power production in mid-2016.
  - » Low oil prices and a relatively mild 2016-17 winter resulted in an oversupply of wood pellets and the idling of several mills. Wholesale pellet prices remain low, but recent cold weather is helping to move excess inventory.
- Pulp and Paper
  - » Maine has seen four pulp and paper mills close in the last 18 months, and one idle half of its capacity. This has impacted both pulpwood prices and sawmill residuals negatively.
- Logging
  - » Loggers in Northern Maine have faced substantial challenges. Many contractors have been unable to harvest sufficient volumes of wood to generate positive cash flows, with some idling their operations. Contractors in Southern New England and New York have generally fared better.

CASH FIELD CROPS:

- For 2017, farmers harvested four percent fewer acres in corn (83.1 million acres) and seven percent more acres in soybeans (a record high of 89.5 million acres) than they did the prior year. It was a good growing year for much of the country, which means ample supplies. Cash field growers in general should be modestly above break-even for 2017, depending on their individual yields and marketing strategies.

- 2017 U.S. Soybean production is estimated at a record 4.43 billion bushels. Continued robust demand from China should support prices. Hurricane damage will impact supplies of peanuts and cottonseed, but will not materially affect soybean supply, and should have minimal price impact.
- Record corn yields of 175.4 bushels/acre resulted in a 14.58 billion bushel crop. This means large supplies, and possibly the lowest prices since the 2006 crop. Domestic and foreign demand remains strong, but robust production in both the U.S. and South America means limited upside potential.
- New York finished the crop year with 67 percent of corn and 73 percent of soybeans rated "good" or "excellent" by USDA. Corn yield averaged 147.0 bushels/acre, although there was a great deal of variation within the region. Some areas reported exceptional yields, others slightly below normal.
- USDA puts 2017/18 season averages at $2.85-3.55 for corn; $8.60-10.00 for soybeans.
- In 2018 look for soybean acreage to continue to increase and corn and wheat to continue to decline.

LIVESTOCK:

This is a very diverse sector ranging from beef or other protein producers, both full- and part-time, as well as equine, which itself can be broken down into racing/breeding, and boarding and training enterprises.

- USDA estimates 2017 average prices for Choice Steers at $121.42/cwt., slightly higher than 2016. 2018 prices are forecast at $113-122/cwt. However, many Northeast beef producers serve specialty markets and receive significantly higher prices than national averages.
- Dairy cull cows have averaged $60-65/cwt at auction.
- Most livestock product prices are expected to fall in 2018 due to larger supply. Eggs are an exception, which are expected to continue fetching relatively high prices, compared to year-earlier extreme lows due to an oversupply in the market last spring.

- Recreational equine markets are supported principally by local recreational demand and nonfarm income, and have been tracking upward along with the general economy.
- The New York horse racing industry has been doing well. Prices for New York thoroughbreds are at all-time highs, which is positive for breeding farms and the industry at large.

FRUIT:

- Apples
  - New York's 2017 apple production is estimated at 28 million bushels, or 1.20 billion pounds, better than last year, although the yield varied by region. Despite some severe weather during the growing season, New York's Hudson Valley and some other regions harvested a large crop.
  - The total U.S. apple crop is reported to be down by eight percent, partly due to sharp reductions in Michigan and Washington.[6] The fresh market for apples is becoming more bifurcated, with newer varieties commanding premiums, while older types have become commodities. Average prices received last year were above 2016 levels.
  - In the processing apple market, prices have improved slightly, but have not kept pace with rising costs of production.
- Juice Grapes
  - Favorable growing conditions led to an above average crop in the East for the second year in a row. New York produced 350 million pounds of juice grapes this year, two percent more than in 2016, and nearly 21 percent more than in 2015. While juice grape prices have been low for years, smaller harvests in Washington and Michigan could strengthen grower prices somewhat.
- Wine Grapes
  - Wineries in New York reported a somewhat slow spring for sales, but stronger performance over the summer. There are some concerns that the craft beverage market is starting to become saturated with an increasing number of wineries as well as farm distilleries and breweries entering the market. Many wineries report lower visitor counts, but higher average sales per customer. In many parts of the Northeast, it has been a good growing season for wine grapes.
- Small Fruits
  - Excellent prices have been reported for highbush blueberries in New Jersey due to freezes in other growing regions. Meanwhile, in Maine, the wild blueberry market is oversupplied with prices at a 10-year low. Highbush blueberries are generally sold on the fresh market, and lowbush, or "wild" blueberries are generally sold for processing, which explains the price disparity. A wet spring made for a difficult year for other berries.

- Cranberries
  - The cranberry market continues to struggle with oversupply, and low prices from independent handlers, below cost of production. The economics of cranberry producers are mainly influenced by how they market their product. USDA/NASS estimates 2017 U.S. Cranberry production at 9.05 million barrels, down six percent from the record 2016 crop of 963 million bbl. Still, that puts 2017's harvest nine percent above the 2011-2015 average. Continued ample production, and large beginning inventories will limit upward price movement.

[6] USDA/ERS, Fruit and Tree Nuts Outlook, September 29, 2017

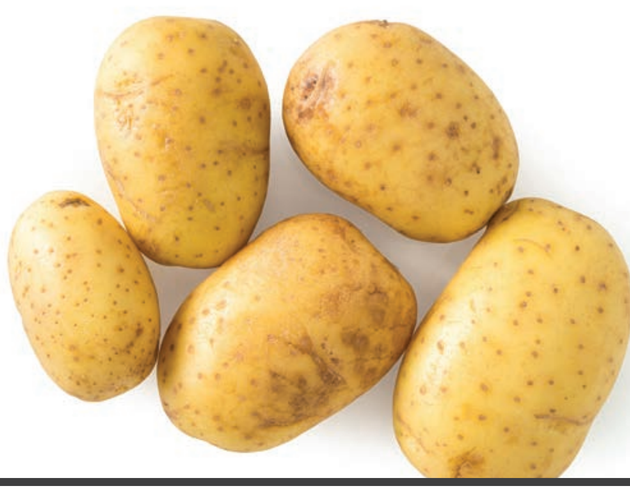
GREENHOUSE AND NURSERY:

- Greenhouse and Nursery growers throughout the Northeast generally reported an average-to-good 2017 season. Spring 2017 was cool and rainy, but most growers were able to recover the bulk of lost sales.

- Growers have reported that demand and pricing trended slightly higher this season, particularly in nursery crops. Landscapers have been very busy.
- Energy costs have remained moderate, helping keep greenhouse production costs in line.
- Big box chains continue to dominate the retail market. Growers who sell to them must be able to be very efficient and manage tight margins in order to survive. These major retailers are increasingly demanding more services from vendors, raising the cost to producers.
- For garden centers and retail growers, results have been more varied. The rainy spring and tough competition from chain stores made 2017 challenging.
- There is growing interest in new technologies in Controlled Environment Agriculture (CEA), primarily for vegetable production, such as roof top structures, vertical greenhouses, etc., particularly in metropolitan areas.
- Shortages of some plant materials, particularly caliper-sized trees, are being experienced, however this situation will largely resolve itself over the next couple of seasons as new plantings come up to size.
- As with other agricultural sectors, labor supply continues to be a major issue.

AQUATIC / FISHING:

- Lobster
  - » The Maine lobster industry is coming off several good years, with high catch levels and strong prices. However in 2017, a cold spring, high bait prices and a stormy summer have combined for a somewhat disappointing season. Dock prices along with catch levels were down for the first half of the season, and unless a strong finish materializes, total revenues are likely to be down in 2017. In 2016, Maine lobstermen harvested more than 130 million pounds of lobster for a record value of $533 million.
- Scallops
  - » Prices in 2017 are down slightly from last year, due to exceptional catch levels.
  - » The stock remains strong, is considered to be sustainable and we do not anticipate any major regulatory changes in the near future.
- Groundfish
  - » Although the stocks of many protected species of groundfish are rebuilt, regulations and quotas remain limiting for the industry.
  - » Permit trading continued to be limited in 2017 as regulations continued to ratchet down quotas and days-at-sea. The groundfish fleet in the Northeast is aging and with stringent regulations and an unclear future, reinvestment is difficult. That being said, there are some large multi-national corporations looking to buy existing groundfish boats in order to vertically integrate their business models. A significant groundfish fleet owner in Massachusetts has been convicted of serious violations of NOAA regulations. At this point it is unclear whether the owner's quota will be redistributed to the local fishing fleet or not.
  - » Prices have held steady, and the catch has been good on the species boats are allowed to land.



VEGETABLES:

- In the New York processing market, vegetable acres appear at this point to remain stable in the coming year. Pricing, in general, has been stronger than 2016 for some crops, but a few varieties face gluts.
- In South Jersey, fresh market vegetables had strong early season pricing with above average yields. Processing vegetables and potatoes had good yields, but market may be soft for production above contracted levels.
- Throughout most of Farm Credit East's region, crops were slow to get going, due to a cool, damp spring. Prices have been average to good, depending on the specific variety and week. Yields were above-average, overall a good season for fresh market growers.
- Wholesale buyers and consumers increasingly seek out local product. "Buy local" has become a significant trend, especially in metro areas. However, this does not necessarily translate into a willingness to pay higher prices.
- It remains to be seen how the growing battle between Amazon/Whole Foods and Walmart in food retailing will play out and how it will affect producers and ag retail businesses.

- The availability of seasonal farm labor continues to be an issue for many vegetable growers.
- The 2017 Maine potato crop is looking better-than-expected, and pricing has been good except for non-contracted, or "open" chipstock. Most growers experienced average to above

average yields despite a prolonged dry spell during August. A few growers' yields were below average, primarily tablestock growers in Northern Aroostook. Open market prices for tablestock are $2-3 per cwt better than the previous year and quality appears excellent. Processing growers have been able to commit a sizeable portion of the contract overages to either McCain Foods, Pineland or Cavendish, who have all been in the market for excess potatoes. In general, chipstock yields were average, so most of the chipstock crop should move under contracts.

WHAT THE NEW TAX LAW MEANS FOR NORTHEAST AGRICULTURE

CONTRIBUTORS:

DARIO AREZZO, TAX CONSULTANT

JOSEPH BALDWIN, FINANCIAL SERVICES LEADER

PAUL VANDENBURGH, TAX SPECIALIST

CHRISTOPHER LAUGHTON, DIRECTOR OF KNOWLEDGE EXCHANGE

Overview

The largest overhaul of the U.S. tax code in 30 years provides overall positive benefits to many Northeast farmers. While a major promise of the tax reform movement was to "simplify the tax code," a great deal of complexity remains. Some of the provisions of the tax law that will affect producers in 2018 are discussed below.

Individual Tax Brackets

One of the key aspects of the new federal tax law was to change some of the individual tax rate brackets and adjust the bracket amounts. While the total number of brackets remains at seven, rather than the four initially proposed, the top rate will fall from 39.6 percent to 37 percent, and the amount of income covered by the lower brackets has been adjusted.

Individual Tax Rates, 2018-2025[1]

MARGINAL TAX RATE	INDIVIDUALS	MARRIED FILING JOINTLY
10%	Up to $9,525	Up to $19,050
12%	$9,526 to $38,700	$19,051 to $77,400
22%	$38,701 to $82,500	$77,401 to $165,000
24%	$82,501 to $157,500	$165,001 to $315,000
32%	$157,501 to $200,000	$315,001 to $400,000
35%	$200,001 to $500,000	$400,001 to $600,000
37%	Over $500,000	Over $600,000

Source: Tax Foundation, Final Tax Law, Published December 15, 2017

Standard Deduction:
The standard deduction for individuals increases to $12,000 for single filers and $24,000 for joint filers.

Alternative Minimum Tax (AMT):
The AMT remains (for individuals) but the exemption amounts are significantly increased, and will be indexed for inflation.

State and Local Tax Deductions (SALT):
The deduction for state and local property and income or sales taxes is limited to $10,000 annually.

Section 179

Beginning with the 2018 tax year, farmers will now be allowed to immediately write off capital purchases such as breeding livestock, farm equipment and single purpose structures (such as milking parlors) up to $1 million. The phase out on this expensing provision does not kick in until a farm reaches $2.5 million in purchases.

Bonus Depreciation

Farmers will now be able to write off 100 percent of qualified property purchased after September 27, 2017 through 2022 (at which point a phase down occurs). In the past, many farms used bonus depreciation on general purpose barns, to receive an additional deduction of 50 percent, that were built since they are classified as “20 year property” and are ineligible for section 179.

The new law expands bonus depreciation to include both new and used property that is purchased or constructed. Additionally, there are related party restrictions included that will limit this provision based on the technical definitions of “related parties” in the tax code.

The 100 percent deduction also applies to plants bearing fruits and nuts that are planted during the year.

Keep In Mind... It is important to note that many states do not conform exactly to the federal bonus and section 179 depreciation provisions. In most cases, depreciation taken at the state level is different than the federal level. For example, a farmer expensing 100 percent of a $3 million capital purchase with bonus depreciation may not receive that $3 million dollar deduction at the state level. Rather, the state deduction will incorporate depreciation on those assets over their normal recovery lives and methods.

Farm Equipment

Farm machinery and equipment (other than any grain bin, fence or other land improvement) will be able to be depreciated over five years as long as the original use of the asset begins with the taxpayer.

Like-Kind Exchanges

Like-kind exchanges are limited to real property. For example, farmers can still swap land for other land tax free but trade-ins of equipment will no longer be a tax-free event.

$25 Million Interest Deduction Limitation

Businesses, including farmers, will now be limited on deducting interest expense when their taxable income exceeds $25 million. Taxable income is computed without regard to certain adjustments, such as business interest expense and net operating losses. If applicable, the interest deduction cannot be more than the business interest income plus 30 percent of adjusted taxable income. There is an election farmers may consider in order to avoid the limitation.

The only catch, however, is that a slower depreciation method (ADS) will have to be used on farm property with a recovery period of 10 years or more (i.e. greenhouses, milking parlors, barns, etc.) Farmers will be permitted to carry interest forward indefinitely, subject to some pass-through limitations for partnerships.

Corporate Tax Rate

There is now a flat 21 percent corporate tax rate. While many farmers no longer operate in the corporate structure, the remaining ones that are structured as C-corps would typically fall within the 15 percent bracket.

For those farmers, they may want to consider converting to an S-corporation since there would be a tax increase of six percent.

Cash Method Accounting

Farmers with average gross receipts (more than three years) of under $25 million will be permitted to use the cash method of accounting. Additionally, these taxpayers are not required to account for inventories (however, cash basis taxpayers will not be able to deduct inventory until sold) under section 471. The uniform capitalization rules are also removed for taxpayers under the $25 million threshold.

Net Operating Losses (NOL)

- The law limits NOLs to 80 percent of taxable income.
- Farmers are permitted a two year NOL carryback.

Domestic Production Activities Deduction (DPAD)

The section 199 Domestic Production Activities Deduction has been repealed. As a result, many cooperatives have decided to accelerate that pass through deduction to patrons before the end of the year.

Estate Tax

The federal estate tax exemption rates will double to $11.2 million per individual ($22.4 million for married couples) in 2018. These enhanced amounts will sunset on January 1, 2026.

Cooperatives

Agricultural and horticultural cooperatives will have a new 20 percent deduction available to them to utilize until January 1, 2026. This deduction will be beneficial for reducing cooperative income. However, unlike the DPAD, this is not directly passed on to patrons but rather taken at the cooperative level.

[1] U.S. A chained CPI index will be used for future bracket adjustments

The new law includes a 20 percent deduction specific to cooperative members on the payments they receive from the cooperative. These provisions also sunset on January 1, 2026.

Non-Corporate Taxpayers

Like cooperatives, non-corporate taxpayers will also get a 20 percent deduction that may be used to offset ordinary income.

An issue of concern… Much like the DPAD that is being repealed, there are limitations associated with the non-corporate taxpayers' 20 percent deduction such as the amount of wages and unadjusted tax basis the businesses have. The cooperative members' deduction has limitations as well. These limitations are somewhat complicated and certain provisions remain unclear as to their mechanics. Additionally, the deduction only offsets income tax, not self-employment tax. One of the concerns with the deduction is that it may be of little use to dairy farmers who cull cows since any capital gain sales (i.e. raised cows) limit the impact of the deduction.

Breweries, Distilleries and Wineries

Alcohol manufacturers will enjoy a reduction in excise tax for the next two years. The new legislation also excludes the aging periods for beer, wine and spirits from the production period with regard to the UNICAP interest capitalization rules thereby allowing deductions over a quicker timeframe.

The credit against the wine excise tax was also expanded. Sparkling wine producers are included.

The Affordable Care Act (ACA)

Despite a great deal of press coverage, the Affordable Care Act has not, in fact, been repealed with the new tax provisions. While the individual health insurance mandate technically remains, the penalty has been reduced to $0, effectively rendering it moot. However, other aspects of the ACA, including the employer mandate, remain in place as before. ◆

CROP INSURANCE

JEREMY FORRETT, VICE PRESIDENT, CROP GROWERS, LLP

Farming can be a risky endeavor. There are many ways to prepare for and mitigate risks, and an important one for many producers is crop insurance. Northeast producers that have developed risk management plans that include a crop insurance policy have been better prepared for the recent weather and market volatility. A sound risk management plan allows producers to protect input costs, yields and market risks.

In 2017, Northeast producers purchased more than 21,000 crop insurance policies, protecting 2.6 million acres with $1.3 billion of protection in force. Many of these are the same Northeast[1] producers that during 2012-2016, received more than $500 million in claim payments due to weather and market-related crop losses. Crop insurance payments can help stabilize the income on farms and provide the confidence and certainty needed to reinvest.

Crop insurance has evolved significantly over the past 10 years. With the development of the Whole Farm Revenue Program and county program expansions, the USDA Risk Management Agency is committed to meeting the needs of all producers. Crop insurance has also been enhanced to provide benefits to beginning farmers and organic producers by establishing organic pricing that is more reflective of their industry.

[1]Region includes PA, NJ, NY and New England

Support for crop insurance in the upcoming Farm Bill is currently strong and everyone has a stake. Crop insurance is reliable, actuarially sound, affordable, assists producers in investing and obtaining capital, promotes good farming practices and continues to be expanded to meet the needs of all producers.

An important step in preparing for the coming year should be to develop or review your risk management plan with your local Crop Growers crop insurance agent. Utilize their expertise by reviewing your business goals, business risks and marketing plan. With their assistance, you can feel confident that the plan you have in place is achievable. We wish you a successful year, and you can count on us to be with you every step of the way.

Crop Insurance in the Northeast

Northeast producers can purchase crop-specific coverage on 34 crops in the nine state territory.

- In 2016, Northeast farmers purchased a total of 21,556 policies insuring ***2.6 million acres.***
- Northeast farmers received ***$140.8 million in payments*** on ***$44.7 million in premiums*** paid in 2016, and since 2005, ***$1.03 billion in payments*** from ***$480.8 million in premiums***.
- Almost $1.3 billion of protection was in force in 2016.

The significance of these payments goes well beyond the farm gate, covering input costs and replacing income that would have been lost due to crop losses. These funds encourage additional investment on the farm, while supporting the local agricultural infrastructure, economy and workforce.

Crop Insurance Participation, Northeast States

2016	TOTAL CONTRACTS	PROTECTION IN FORCE	ACRES INSURED	FARMER PAID PREMIUM*	LOSSES PAID
CONNECTICUT	282	$30,686,467	18,526	$1,812,688	$2,295,149
MAINE	742	$75,037,870	109,974	$3,270,002	$4,296,257
MASSACHUSETTS	523	$42,181,973	25,209	$1,167,126	$3,374,376
NEW HAMPSHIRE	78	$4,631,945	8,647	$171,944	$1,110,424
NEW JERSEY	1,517	$70,932,357	157,220	$1,573,146	$4,281,264
NEW YORK	6,229	$528,780,383	1,064,071	$16,153,200	$65,424,146
PENNSYLVANIA	11,685	$462,996,413	1,183,534	$19,418,351	$58,875,299
RHODE ISLAND	32	$1,202,089	1,188	$22,076	$226,952
VERMONT	468	$26,798,209	73,351	$1,083,661	$880,890
	21,556	**$1,243,247,706**	**2,641,720**	**$44,672,194**	**$140,764,757**

Source: Rain and Hail Insurance

Crop Insurance Participation, Northeast States

2005-2016	TOTAL CONTRACTS	PROTECTION IN FORCE	ACRES INSURED	FARMER PAID PREMIUM*	LOSSES PAID
CONNECTICUT	4,259	$746,772,157	272,245	$21,687,680	$55,516,125
MAINE	9,133	$904,679,398	1,397,059	$32,104,772	$60,433,473
MASSACHUSETTS	8,037	$592,120,148	322,893	$13,513,354	$43,791,210
NEW HAMPSHIRE	1,237	$80,571,317	104,709	$1,937,064	$4,920,485
NEW JERSEY	18,451	$1,106,249,049	1,933,460	$20,783,954	$37,108,319
NEW YORK	74,074	$5,076,247,544	11,038,585	$141,625,579	$425,575,402
PENNSYLVANIA	156,664	$5,141,450,550	13,811,884	$238,575,900	$372,463,936
RHODE ISLAND	494	$15,663,121	17,404	$306,205	$940,268
VERMONT	6,311	$329,545,433	882,003	$10,303,553	$32,730,063
	278,660	**$13,993,298,717**	**29,780,242**	**$480,838,061**	**$1,033,479,281**

**Note that in addition to farmer premiums, the federal government provides premium support to maintain the actuarial soundness of the program.*

DR. PATRICK WESTHOFF

FOOD AND AGRICULTURAL POLICY RESEARCH INSTITUTE AT THE UNIVERSITY OF MISSOURI

Grain & Oilseed Outlook

The big story in grain and oilseed markets is that large global supplies continue to weigh on prices. With stocks at or near record levels, it will take a significant reduction in production or an unexpected boost in demand to see a major price recovery.

World grain production in 2017 was down slightly from the record harvest of 2016, but stocks of four major crops are expected to remain quite large (Figure 1). When stocks are this large, there is little need for traders to bid up prices to obtain the supplies they need to satisfy demand for food, feed and fuel.

Demand for grains and oilseeds continues to grow. Rising populations and incomes mean people eat not just more bread and rice, but more meat and dairy products. That means more demand for corn and soybean meal to feed expanding livestock herds and poultry flocks. Biofuel production continues to expand, even if the pace is a lot slower than it was during the boom years.

The high crop prices of 2010-2013 encouraged farmers around the world to expand production, with acreage increasing in South America, the former Soviet Union and other countries. Recent lower prices have slowed area expansion,

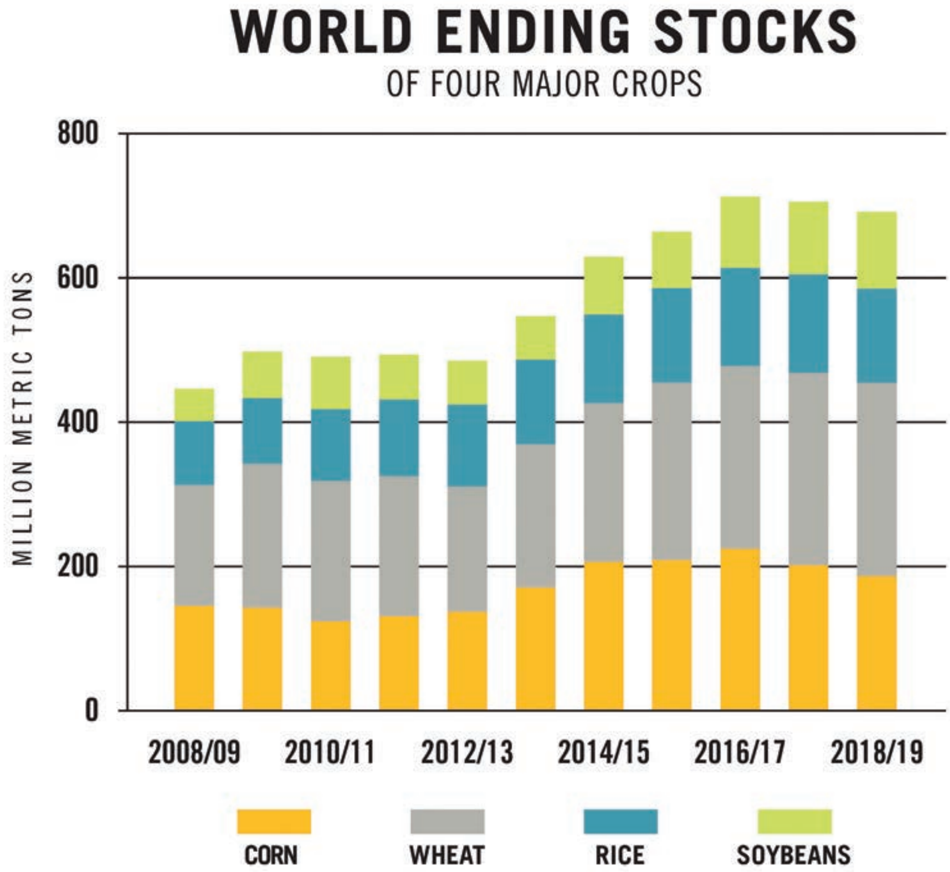


Figure 1. Sources: USDA estimates, November 2017 for 2008/09-2016/17; author projections for 2017/18 and 2018/19.

but have not reversed it. Meanwhile, yields have continued to increase, both because of investments the sector has made in technology and management techniques and because of a string of generally favorable weather after the severe drought of 2012.

Based on information available in November 2017, it appears likely that U.S. average corn prices will remain between $3.00 and $3.70 per bushel for the fourth straight year in the 2017/18 marketing year (Figure 2). Record U.S. corn yields and more competition from Brazil and other countries have kept domestic corn supplies large and made it hard to maintain the export pace of 2016/17.

In the case of wheat, a much smaller U.S. wheat crop in 2017 has contributed to some recovery in domestic wheat prices, but large global supplies limit wheat export prospects, and U.S. carryout stocks remain large by historical standards.

Soybean prices have been unusually high relative to corn for the past couple of years, and one might have expected that planting 90 million acres of soybeans in 2017 would result in lower prices. However, continued strong soybean demand growth in China has provided support.

Looking ahead to the crops that farmers will plant in 2018, the most likely prospect is more of the same. No major U.S. acreage shifts are expected at this time. If crop yields here and around the world are near the long-term trend, it appears likely that global supplies will remain large, with little change in global grain and oilseed stocks. This middle-of-the-road outlook suggests just a slight uptick in corn, wheat and soybean prices for the 2018/19 marketing year.

As always, any projection of prices for a crop that has yet to be planted is uncertain. Consider a crude measure of price uncertainty: the average change (increase or reduction) in national marketing-year average prices from one year to the next (Figure 3). Over the last six years, the average annual change in prices was about $1.50 per bushel for soybeans, about $1.00 per bushel for wheat, and about $0.85 per bushel for corn. Splitting that period in half

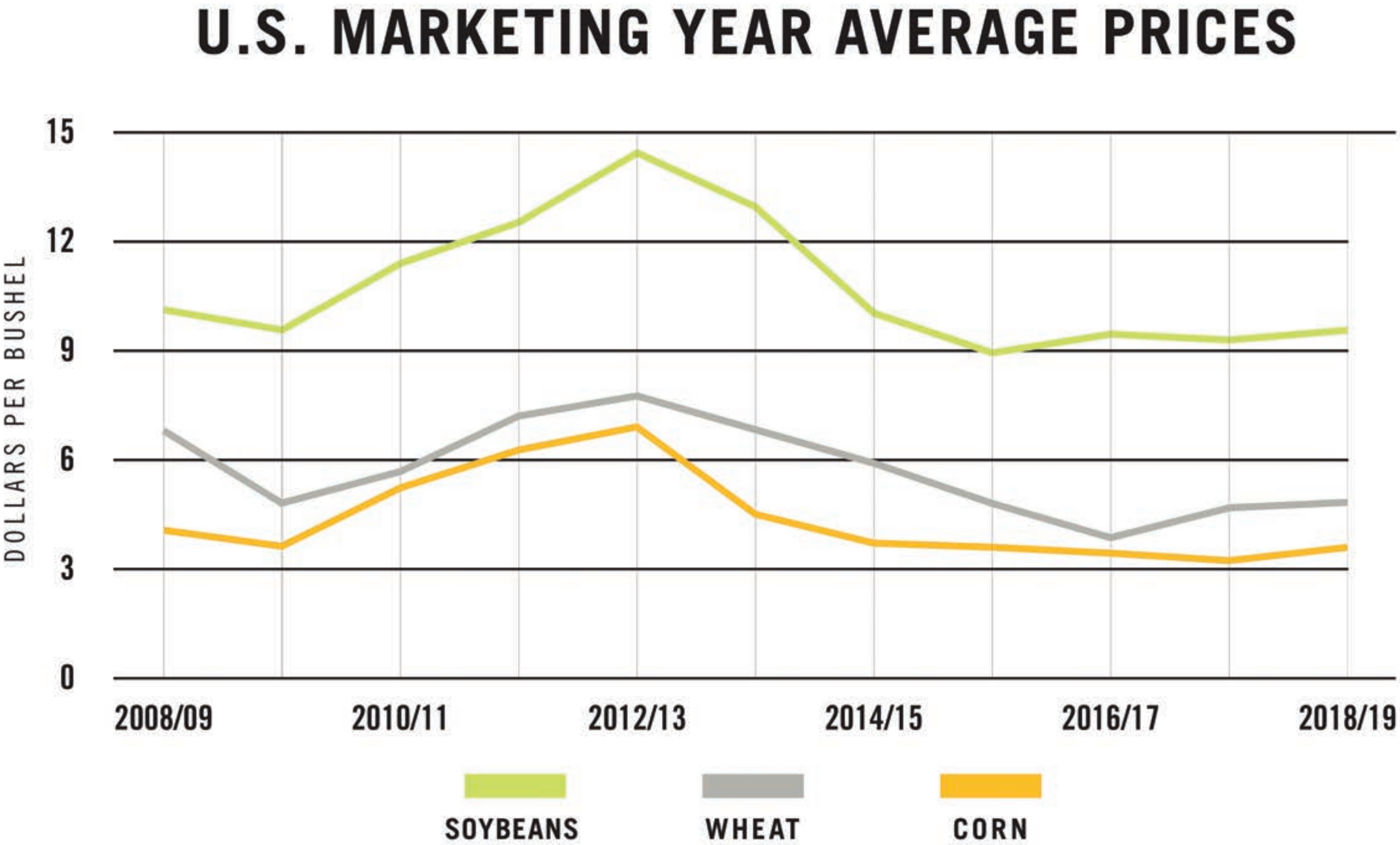


Figure 2. Sources: USDA estimates, November 2017 for 2008/09-2016/17; author projections for 2017/18 and 2018/19.

suggested little change in the year-to-year volatility of wheat and soybean prices, but reduced volatility for corn in recent years.

As producers make production decisions and marketing plans, it is important to remember that the world remains an uncertain place. Large global stocks may make a major price recovery difficult, but it is easy to imagine scenarios that result in higher or lower prices than futures markets or market analysts suggest.

The weather is probably the most important reason for price volatility in any given year. However, lots of other factors can also play a role. Consider all of the uncertainty that China causes in global agricultural markets. When that country changes its support policies, builds or reduces government-held stocks, or decides to promote biofuel production, it can have a huge impact on global markets.

U.S. farm programs, of course, are designed to offset a portion of the risk faced by producers. Debate on the next farm bill has begun, but the final outcome is unclear. Budget constraints mean it is likely that the next farm bill will not provide more support than the current bill. ◆

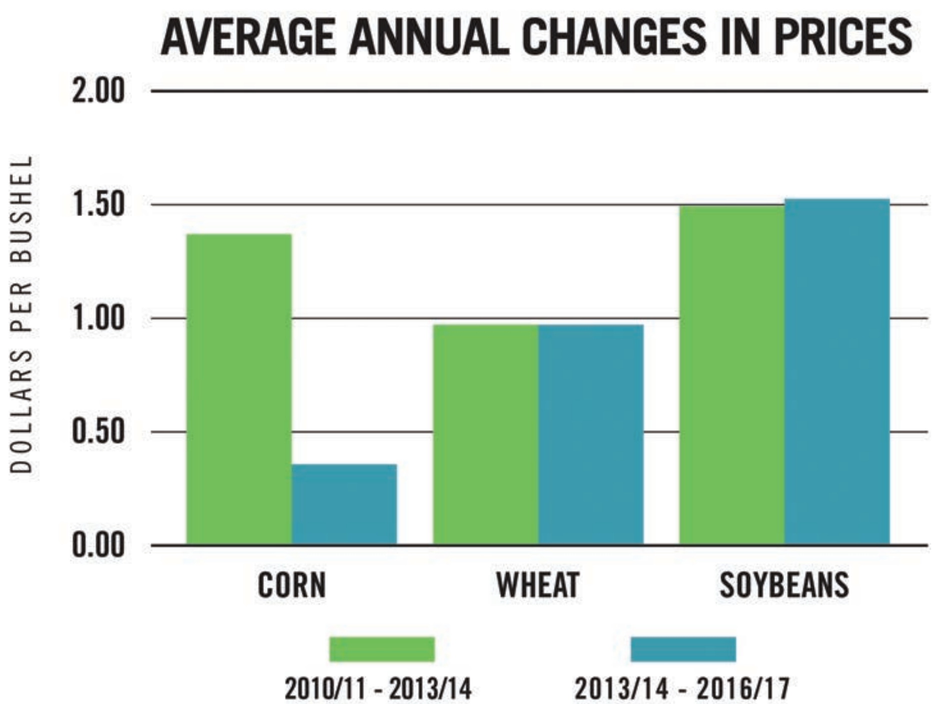


Figure 3. Source: Author estimates, based on November 2017 USDA data. Reported are average absolute changes (increases or reductions) from one year to the next.

Strong Demand for Milk Fat and the Global Surplus of Skim

BEN LAINE

SENIOR ECONOMIST, COBANK

In recent years, the volatility in milk prices has been driven by the push and pull of domestic demand and exports, and the related battle between the fat and skim components of milk. Between 2009 and 2014, the all-milk price ranged from a low of $11.30 in the summer of 2009 to a high of $25.70 in September of 2014 — a span of $14.40 per hundredweight of milk. The three years since then have been lackluster in comparison. Milk prices are expected to be slightly lower in 2018 than they were in 2017, though a drop of any significant magnitude will likely be prevented by strong domestic demand.

There are a number of reasons to expect some downward pressure on prices next year. The primary reason is the enormous amount of milk being produced not just in the Northeast or in the U.S., but around the world. The good news is that there is strong demand for that milk, and there are reasons to expect continued growth in demand over the long-run. The challenge is that the demand, for now, is mostly for the fat portion. The surplus skim that is left over after that high-value fat is taken out is keeping a lid on milk prices. As long as the oversupply of skim remains a global phenomenon, export opportunities will be a challenge.

Consumers' tastes change over time. Health trends come and go, and perceptions of different products shift. Over the past few years, consumers have generally looked more favorably upon natural wholesome fats like butter compared to more highly processed oils. Other higher-fat content dairy products have also benefited from a boost in demand, including whole milk, which has seen per capita increases in consumption despite the broader category of fluid milk continuing its downward trend.

Producers and processors do their best to respond to these changing dynamics, but milk production is a biological process and there is no practical way of altering milk composition with the necessary speed or scale to respond to the constantly changing marketplace. Since we can't independently slow down the supply of individual components, the problem of surplus skim is here to stay until demand for skim returns in a meaningful way.

The solution in the past has been to export the vast majority of those skim solids. Currently, about three quarters of U.S. nonfat dry milk and skim milk powder is exported. But we're not the only game in town. Following the removal of the EU quota system, production in the region surged and resulted in hefty government stockpiles of skim milk powder. Canada was an outlet for some of the U.S. skim in the Northeast and Upper Midwest in the form of ultra-filtered milk, until the Canadian government decided to put a stop to that in early 2017 in response to a surplus situation of their own.

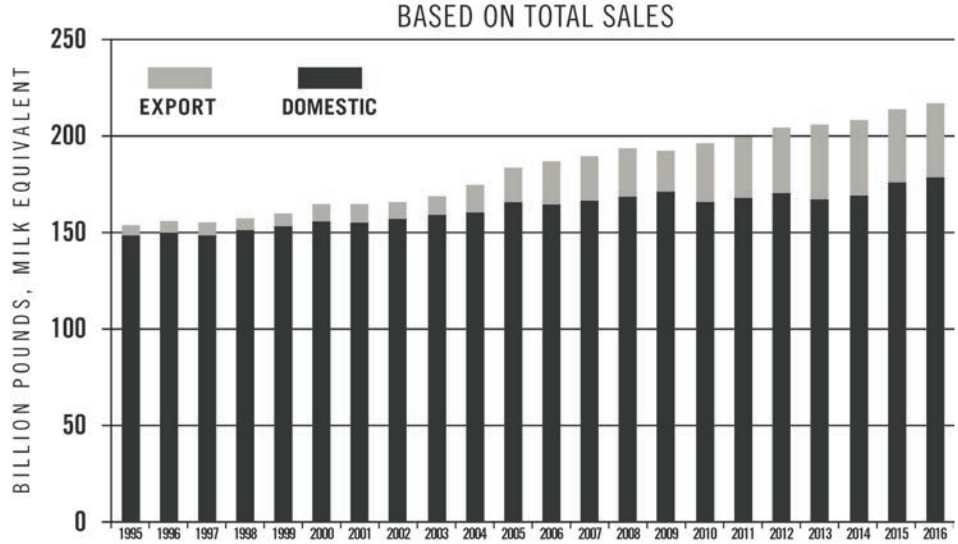
Despite these setbacks, exports will continue to be critical to long-run growth in the U.S. dairy industry, but they can't be taken for granted. A large consumer base with strong domestic demand for dairy has been a blessing and a curse for the U.S. dairy industry. Milk producers have been able to rely on the domestic consumer for rising demand of value-added products like cheese and butter.

At the same time, this robust domestic demand has diminished the need to invest in marketing our products abroad. Meanwhile, areas like the EU and New Zealand have been spending years developing global brands and gaining experience looking beyond their borders for growth opportunities. As the importance of exports to U.S. milk producers grows, the industry will face significant competition from the EU and New Zealand for global market share.

With no signs of the worldwide skim surplus going away in the immediate future, milk price upside will be limited and exports will be a challenge. Meanwhile, domestic demand should remain strong enough to support prices in a similar range to what we have seen in recent years. Although the near term outlook remains dim, the long run outlook is positive. Situations of oversupply or shortage come and go, consumers preferences rotate between fat and protein, but the long-term demand trend for milk and dairy products continues to climb. ♦

TOTAL DEMAND FOR U.S. MILK

BASED ON TOTAL SALES



Source: USDA - ERS, CoBank

NURSERY & GREENHOUSE

Outlook for 2018

DR. CHARLES A. HALL
TEXAS A&M UNIVERSITY

For the first time in three years, the U.S. economy has sustained three percent growth for two consecutive quarters. This economic momentum should continue into the fourth quarter, with 2.7 percent growth, providing strong momentum going into 2018. There are a few more red flags economically-speaking than last year, but nothing that deters my optimism for the green industry next year. In fact, most economic modelers are not expecting a slowdown for at least another 18 months, holding all other things constant, of course.

Although slowing, one of the continuing bright spots in the green industry outlook this coming year is the housing market, a prime influencer of derived demand for green industry products and services. Extra spending to repair damage from the hurricanes will continue to boost the economy. However, last year's back-to-back hurricanes did put some additional pressure on prices for lumber and other building materials and have worsened the already tight labor market for construction laborers.

While hurricanes often lead to a spike in building activity, I suspect that physical constraints, including a lack of buildable lots, shortages of skilled construction workers, rising material prices and tighter underwriting standards, will keep a relatively low ceiling on housing starts. Efforts are being made to break the log jam, with several municipalities looking to streamline the permitting process, and investment in worker training and lumber mills is increasing. Such efforts, however, will still take time to produce meaningful results.

Still, early signs suggest solid growth in 2018. Put it all together and we may see an acceleration toward the mid-two percent range for underlying trend economic growth. Less government interference frees up entrepreneurship and productivity growth powered by new technology. Yes, the Fed is starting to normalize policy, but fiscal and monetary policy together are still pointing toward a good environment for growth.

> "Most garden centers that I interact with across the country report increases in profitability over the last two years..."

Data published in the American Trucking Association (ATA) forecast (released July 2017) paints a positive picture for the next few years. For the remainder of this year, ATA predicts freight volumes to grow 2.8 percent. Beginning in 2018, volumes are expected to grow 3.4 percent annually until 2023. Also, according to ATA, the trucking industry is currently short around 48,000 drivers with that number expected to surge by several hundred thousand by 2025. The actual extent of the driver shortage is still unknown with a lot of it having to do with upcoming regulations. Because of this, growers will continue to face difficulty in finding enough drivers to ship their plants in 2018.

Most garden centers that I interact with across the country report increases in profitability over the last two years, mainly stemming from increased dollars sold per transaction, while customer count (and thus transaction customer count) is down. This trend must be corrected over time, mainly through the increase in prices and customers coming through the door, but 2018 should prove to be a good season provided the weather cooperates.

Landscape service firms have had a good run in recent years since housing has been growing steadily. Merger and acquisition activity in the landscape industry has been strong in recent years, another signal of a sector achieving above-average returns. As Boomers continue to age, they will switch from do-it-yourself lawn and landscape

sales to more do-it-for-me sales, another positive sign for landscape service providers and the growers that supply them.

Other key lawn and garden consumers are aging but still value the role of plants in their lives. However, the value proposition for up-and-coming consumers (Gen Xers and Millennials) must focus on the unique ways in which quality of life is improved for its customer base. The green industry cannot overemphasize the importance of this quality of life message, particularly in focusing its differentiation strategies in the future.

Regardless of which generation one is a member of, quality of life is a "higher order" need that is important to them. Research shows that there's no better way to do this than through the daily use and/or enjoyment of flowers, plants and trees.

In other words, plants enhance the quality of our lives through numerous health and well-being benefits, environmental ecosystems services benefits, and economic benefits. The green industry must convince consumers of this in a manner that they view their products and services as necessities instead of luxuries. This will, of course, make the industry even more recession-resistant in the future.

APPLE INDUSTRY OUTLOOK *2018 and Beyond*

DESMOND O'ROURKE
PRESIDENT, BELROSE, INC.
WORLD FRUIT MARKET ANALYSTS

Changing External Environment

The changing external environment for international trade most directly affects Washington, the major U.S. exporter of fresh apples, but indirectly affects other apple producing states, as apples not exported by Washington depress prices on the domestic market.

Deterioration in the external environment for international trade has persisted since 2014 and has taken its toll on U.S. apple exports. For decades, the United States placed its hope for further liberalization of agricultural trade on the World Trade Organization (WTO). But the WTO has struggled to even maintain current levels of liberalization. No longer fearing WTO sanctions, major importing countries, such as China and Indonesia, have erected barriers to imports of fresh apples. The most egregious barrier has been the 2014 Russian ban on imports of produce from the European Union, Australia, Canada, the United States and Norway, now in its fourth year. Competing exporters, like Chile and New Zealand, have increasingly bypassed the WTO process and sought advantages for their apple exporters through regional or bilateral trade deals.

More ominously for future trade prospects, China seeks to set up a managed trade system to replace the WTO model, and has been using various carrots and sticks to woo additional countries to its approach. In addition, President Trump has weakened traditional U.S. support for the WTO by his open skepticism about multilateral trade agreements and his strong criticism of NAFTA.

Changing Industry Environment

Since 2000, the U.S. apple industry has been in a state of continual change. Many less favored operators, orchards and districts have withdrawn from the industry. Large, integrated grower-packer-marketers have attained a dominant position. The overall apple industry has prospered.

Table 1 compares changes in some key industry metrics by major apple producing states for the three-year periods, 2000-02, 2007-09 and 2014-16. Bearing acres declined rapidly for all U.S. states between 2000-02 and 2007-09, and more slowly between 2007-09 and 2014-16. Only Washington managed a small gain in bearing acres in the most recent period. However, the average productivity of the remaining acreage has increased by more than 42 percent since 2000-02 due to more intensive production methods.

TABLE 1. CHANGES IN KEY METRICS FOR MAJOR U.S. APPLE PRODUCING STATES
(Percent Change, 2000-02 to 2007-09 and 2007-09 to 2014-16)

	BEARING ACRES		YIELD PER ACRE		DEFLATED VALUE/ACRE	
	(%) 2000-02 to 2007-09	(%) 2007-09 to 2014-16	(%) 2000-02 to 2007-09	(%) 2007-09 to 2014-16	(%) 2000-02 to 2007-09	(%) 2007-09 to 2014-16
CALIFORNIA	- 42.7	- 30.5	- 27.2	+ 2.7	- 1.3	- 19.8
MICHIGAN	- 28.2	- 10.8	+ 16.5	+ 42.7	+ 63.7	+ 89.2
NEW YORK	- 16.0	- 4.8	+ 41.4	+ 1.0	+ 87.2	+ 4.2
PENNSYLVANIA	- 9.0	- 4.5	+ 13.5	+ 10.2	+ 14.2	+ 19.5
VIRGINIA	- 26.9	- 13.7	- 2.2	- 2.0	- 1.0	+ 14.4
WASHINGTON	- 10.7	+ 2.2	+ 2.1	+ 27.4	+ 67.1	+ 35.2
OTHER STATES	- 38.6	- 26.1	+ 8.2	+ 17.6	+ 56.1	+ 31.6
UNITED STATES	- 22.7	- 8.1	+ 12.0	+ 26.8	+ 65.7	+ 37.5

Note that changes in yield per acre reflect new varieties and cultivation practices, but also reflect crop conditions in the chosen reference years.

Source: USDA, NASS. Noncitrus Fruits and Nuts, annual summaries. (miscellaneous issues).

Yields in Michigan and New York grew even faster than the national average. Average grower prices rose in real terms over the entire period by almost 60 percent. The average real value of production per acre more than doubled between 2000-02 and 2014-16, with California the only laggard. However, the rate of growth slowed markedly in the most recent period.

Various factors contributed to the increase in real grower prices, shown in Figure 1. These included the increasing share of the apple crop sold fresh, the growing popularity in the domestic market of newer varieties such as the higher-priced Honeycrisp, increased sales of organic apples, reduced apple crop due to weather in 2012, and the halting expansion of exports. The success of the U.S. apple industry has not gone unnoticed. Domestic pension funds and foundations, and foreign corporations, such as Baywa (Germany), Greenyard (Holland), Univeg (Belgium) and Total Produce (Ireland), have made, or are exploring, major investments in the industry.

Anxiety about the Future

However, many industry leaders worry that recent favorable conditions cannot be assumed to continue indefinitely. Productivity increases are needed to remain competitive, but require large amounts of capital, that can lead to swelling production and depressed prices. Other challenges include rising competition in export markets, diminishing domestic demand for many existing varieties and the danger of over-production of organic apples.

The larger integrated grower-packer-marketers believe that the key to riding out the industry ups and downs will be to have a stable of varieties that can generate above-average returns. They continue to bid aggressively for the rights to produce, pack and market the most promising "club" varieties. These are varieties where the growers and production levels are restricted to prevent oversupply. Breeders all over the world now compete to develop appealing club varieties. And, numerous interstate and international consortia have been formed to market the contending varieties. Fearing they will be left behind, smaller growers have pressured state universities into developing new varieties that would be available exclusively in their states, such as SnapDragon in New York and Cosmic Crisp in Washington.

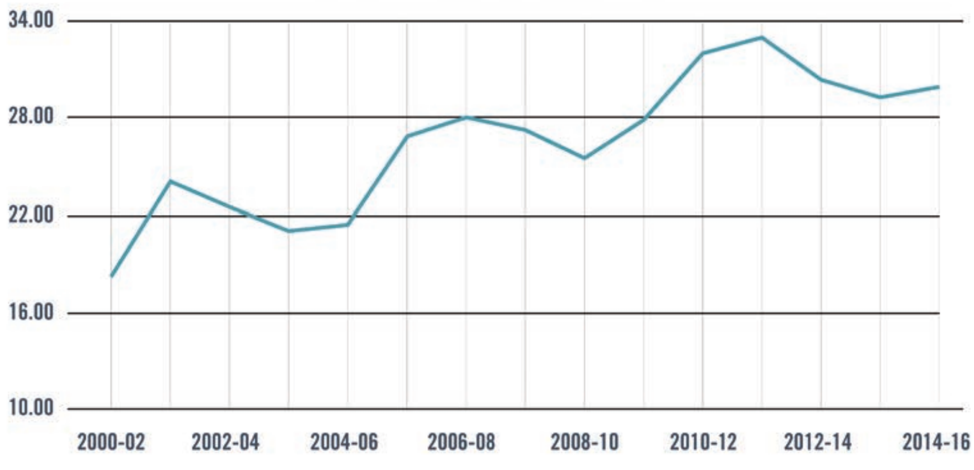
Undoubtedly, the supply of managed varieties will expand dramatically in the next five years, leaving many questions still unanswered. Which new managed varieties, and how many, will major U.S. retailers continue to welcome? How many premium varieties will U.S. consumers continue to buy? Less popular varieties are already being dislodged from produce shelves. Will current, mainstream varieties, like Gala, be vulnerable? Will foreign markets still demand lower-priced varieties that are less profitable to produce? Above all, will new varieties continue to justify the high cost of establishment, promotion and marketing?

Conclusion

The U.S. apple industry is moving towards a system dominated by large, integrated operations that have rising needs for capital in production, packing and marketing. Relative risk is likely to increase and to lead to further consolidation of the industry.

Marketers will hold the key to future success as they attempt to build portfolios of varieties that can maintain profitability. But, to execute their strategies effectively, they will need innovative technology and skilled personnel among their grower and packer partners and affiliates. Smaller growers may face challenges competing in this environment. ◆

FIGURE 1. **DEFLATED AVERAGE U.S. GROWER PRICES OF FRESH APPLES**
(Cents per lb, for three-year periods from 2000-02 to 2014-16)



Source: USDA, NASS. Noncitrus Fruits and Nuts, annual summaries. (miscellaneous issues).

2018 NORTHEAST Vegetable CROPS OUTLOOK

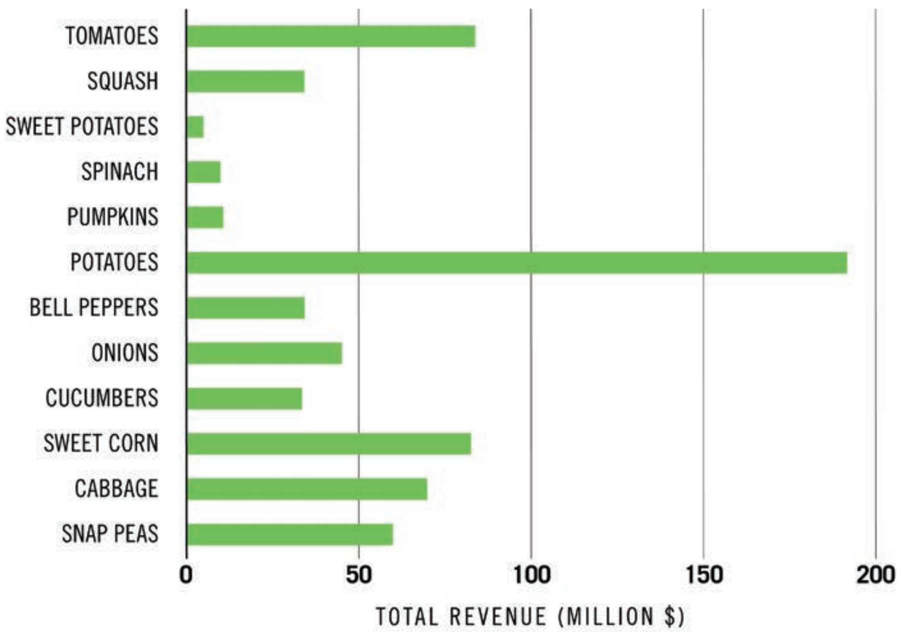
DR. BRADLEY RICKARD
DYSON SCHOOL OF APPLIED ECONOMICS & MANAGEMENT, CORNELL UNIVERSITY

Vegetable crops are an important component of the agricultural economy in the Northeast[1]. In the Northeast region, vegetable crops (not including potatoes) have been planted on approximately 90,000 acres with an annual total farm value of between $450 and $500 million. This translates to an average revenue of approximately $5,200 per acre across the states, with the highest per acre revenues of nearly $6,900 in New Jersey. Potatoes were grown on an additional 72,000 acres in the Northeast with a total value of nearly $200 million. We continue to see a wide range of vegetables produced in the region and marketed to consumers through various channels.

Figure 1 summarizes the highest revenue vegetable crops in the Northeast; each of these crops has exceeded $5 million in revenues in recent years.

As shown in Figure 2 (on following page), in recent years we have seen a slight decrease in vegetable crop acreage in the Northeast, which has been partially offset by an increase in per acre revenue. These trends suggest that there has been an adjustment towards higher-valued vegetables grown in the region.

FIGURE 1. **VEGETABLE CROP VALUES IN THE NORTHEAST (2015)**



Policies Impacting Vegetable Production in 2018

In 2018 there will be three key policy issues that Northeast vegetable growers will want to follow. First are the ongoing negotiations about free trade agreements, most notably about the future of NAFTA (North American Free Trade Agreement). There is widespread recognition that NAFTA has increased producer returns for most vegetable crops in the United States, and overall, across all vegetable crops, it has provided net economic benefits to the U.S. vegetable industry. It has also been noted that the NAFTA has been correlated with a 14 percent increase in per capita vegetable consumption in the United States since 1993. Vegetable producers in the Northeast could benefit from adjustments to the NAFTA that harmonize regulations and protect intellectual property, but are unlikely to benefit from increases in tariffs with Canada and Mexico.

The second issue is the availability of farm workers and potential changes in the cost of farm labor. In late 2017 we saw the introduction of the Agricultural Guestworker Act that seeks to replace the H2-A program with a new H2-C program with a greater number of visas. That would allow farmers to hire workers for year-round employment.

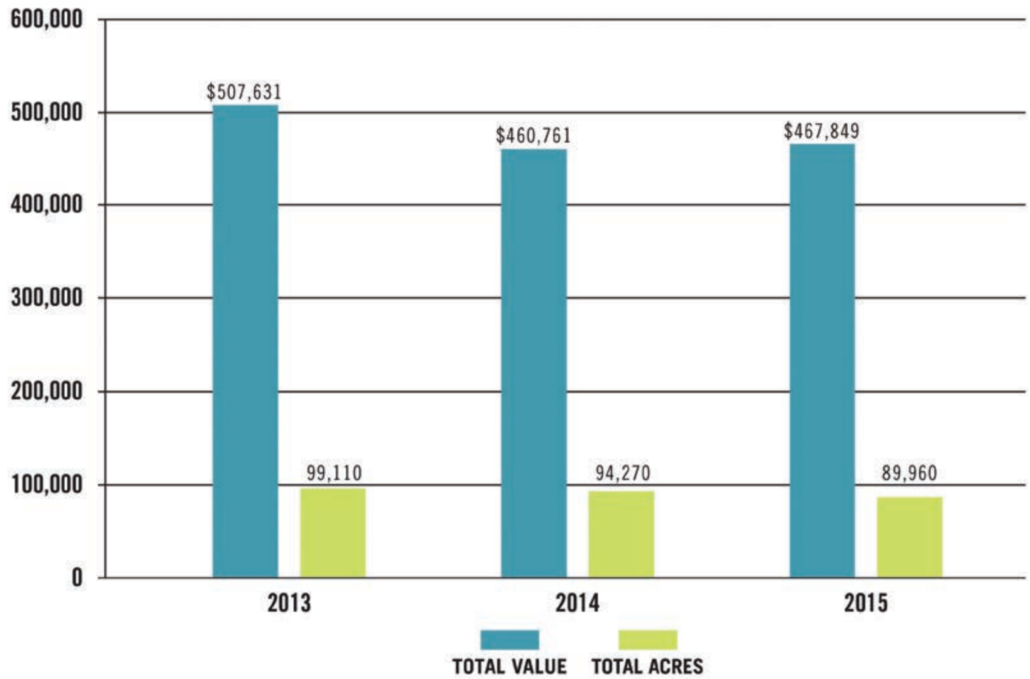
The third issue centers on discussions about the next Farm Bill and the level of attention that will be given to vegetable crops. Two big topics will be the role the government takes in providing subsidized crop insurance for vegetable crops and the level of funding for scientific research devoted to vegetable crops. Figure 3 shows that vegetable producers use relatively little crop insurance compared to producers of field crops and fruit crops, and for many producers the availability of crop insurance is a critical factor in the planning horizon when deciding what crops to grow.

[1]Northeast includes NY, NJ and New England

Market Trends and Vegetable Consumption in 2018

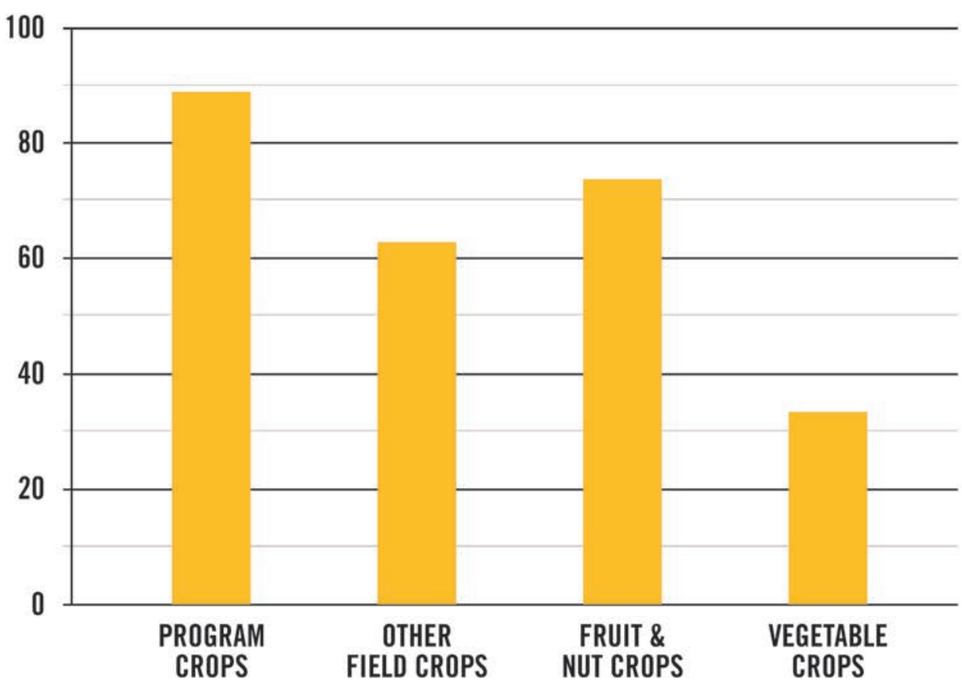
Consumer demand for fresh vegetables has shown modest but steady growth in recent years, and experts predict that U.S. per capita demand for fresh vegetables will continue to grow by between one and two percent per year over the next decade. As part of this increase in demand for fresh vegetables, we are witnessing a number of trends that will likely determine the magnitude of these changes in demand for vegetables in the Northeast. First, and perhaps most importantly, is the shift that is occurring towards on-line grocery shopping. Data shows that consumers make healthier purchases when buying on-line, and this will help boost sales of fresh vegetables. Recent research suggests that 20 percent of groceries will be purchased on-line by 2025 and this will represent approximately $100 billion in food and beverage sales. The recent purchase of Whole Foods by Amazon in June 2017 for $13.7 billion provides some indication that on-line shopping for groceries could be a paramount change for the food industry.

FIGURE 2. **VEGETABLE CROP VALUE AND ACREAGE IN THE NORTHEAST**



In addition, there were several important changes in the food retail landscape in 2017 and more are expected in early 2018. The three most notable food retail trends all involve a greater share of food sales happening at discount food stores. In 2017 there were 1000 new stores opened by Dollar General and another 650 stores opened by Dollar Tree, and both chains sell food, including fresh produce. There was also a significant redesign in many U.S. Aldi stores, and Aldi is planning to open 900 new stores in the United States by 2022 which would make it the third largest food retailer in the country. Lastly, another German discount food store, Lidl, has begun to open stores in the United States, and they plan to have 100 stores in the Eastern and Southern United States by mid-2018. Perhaps somewhat surprisingly, in these discount food retailers—and especially in Aldi's newer stores and in Lidl—is a renewed focus on fresh produce, including organic vegetables.

FIGURE 3. **U.S. CROP INSURANCE PARTICIPATION LEVELS (%)**



Among other trends, consumer demand for local vegetables and for vegetables purchased through a CSA is expected to remain relatively constant in the Northeast during the period 2018 to 2020. However, there is an expanding interest in more plant-based diets among some socio-economic groups, and this may prove to be the most important driver of growth in per-capita demand for fresh vegetables in some of the key urban populations in the Northeast. ♦

CONTROLLED ENVIRONMENT AGRICULTURE (CEA)

An emerging system to grow fresh produce in the Northeastern U.S.

DR. JIE LI
DR. MIGUEL I. GÓMEZ

DYSON SCHOOL OF APPLIED ECONOMICS AND MANAGEMENT, CORNELL UNIVERSITY

The sales of local fresh produce in the Northeast has increased substantially in the last 15 years, and demand will continue growing in the future. Meanwhile, the Northeast has a short growing season (about five months) which, according to mainstream views, limits the ability of the region to meet consumer demand for year-round locally grown produce. However, the rapid emergence of Controlled Environment Agriculture (CEA) enterprises is challenging this view.

CEA enterprises are able to provide year-round production through strict environmental controls combined with the use of hydroponic/soilless production systems. Thus, CEA systems allow growers to control all production factors (e.g. temperature, light, carbon dioxide, humidity) to achieve optimal plant health and growth. Moreover, CEA systems are about twenty times more efficient in water usage relative to field production by minimizing evaporation and waste. A CEA system also exhibits lower pest, weed and disease pressures, which results in less application of agrichemicals. Additionally, CEA systems are very flexible in terms of location as they could operate within or close to urban centers. In sum, CEA systems have a great potential to provide year-round fresh, pesticide-free, low carbon footprint, high-quality produce to Northeast consumers.

CEA enterprises are rapidly taking advantage of business opportunities throughout the United States. The number of greenhouse operations (including hydroponic operations) producing food crops in the U.S. increased modestly from 1,015 in 1998 to 1,476 in 2009. However, according to the most recent USDA *Census of Horticultural Specialties*, there were 2,521 CEA enterprises in 2014, an impressive 75 percent increase between 2009 and 2014.

Annual CEA sales were $797 million in 2014, a threefold increase from 1998. Total greenhouse vegetable production amounted to 260,966 tons in 2014, with hydroponic production accounting for one third of the total. Fresh tomatoes were the number one crop, accounting for 37 percent of production by volume and 50 percent of sales value. Cucumbers ranked second, accounting for 14 percent of total production volume and 10 percent of sales value, followed by herbs and lettuces.

Although the U.S. CEA industry has experienced rapid growth in recent years, its size is substantially smaller compared to Canada and Mexico. For example, the area planted in greenhouse vegetables in Canada and Mexico is three and six times greater than in the United States, respectively.[1]

New York is a good example of the growth of CEA enterprises in the Northeastern United States. New York ranked second nationwide in terms of greenhouse vegetable production in 2014. The number of CEA operations in the state tripled between 1998 and 2014, and CEA produce sales have increased tenfold during the same period. Yet, New York still imports over 90 percent of its produce on an annual basis, including lettuce, tomatoes, spinach and strawberries, which travel, on average, 2,500 miles from other states or foreign countries to New York.[2] With appropriate business models targeting consumers with strong preferences for local products, CEA businesses in New York have tremendous potential for growth.

Recent economic research provides evidence of strong consumer support for local CEA-grown produce. Experimental data suggests that, on average, New York consumers are willing to pay as much as 30 percent and 18 percent price premiums for New York-grown tomatoes and lettuces, respectively, independent of the production system (field- versus CEA-grown).

Meanwhile, produce buyers across various market channels express a strong willingness to buy local produce. Similar to consumers, these buyers place high value on such attributes as 'local' and 'fresh', regardless of whether products are gown in the field or in CEA production systems. Therefore, wholesale produce buyers may be willing to pay price premiums for the year-round, local products that CEA systems are able to deliver.[3]

Looking to the future, produce buyers expect increases in supplies of beefsteak tomatoes and mixed greens produced in CEAs. They are also interested in new locally grown varieties of lettuces and tomatoes produced under controlled environments. Additionally, locally grown herbs, leafy greens (i.e., chard, spinach, kale and cabbage), peppers, radishes, eggplant and celery grown in CEA units are increasingly attractive to produce buyers and consumers.

In conclusion, CEA production systems have some clear advantages in the marketplace and they have great potential in the market. However, the industry still faces important challenges, including intensive capital requirements, lack of production and management labor, inadequate post-harvest processing and marketing infrastructure, and relatively high energy costs. These are the primary issues that investors and entrepreneurs need to address for continued growth in the Northeast CEA industry. ◆

[1] Source: Presentations by Neil Mattson, Miguel Gómez, and Julie Stafford at the Controlled Environment Agriculture (CEA) Entrepreneur Conference, November 1, 2017 at Cornell University, Ithaca, New York., [2] Source: Presentations by Neil Mattson, Miguel Gómez, and Julie Stafford at the Controlled Environment Agriculture (CEA) Entrepreneur Conference, November 1, 2017 at Cornell University, Ithaca, New York. [3] Source: Presentations by Neil Mattson, Miguel Gómez, and Julie Stafford at the Controlled Environment Agriculture (CEA) Entrepreneur Conference, November 1, 2017 at Cornell University, Ithaca, New York.

ERIC KINGSLEY,
INNOVATIVE NATURAL RESOURCE SOLUTIONS LLC

FOREST INDUSTRY IN THE NORTHEAST

After a few years of market turmoil, the Northeast's forest industry is showing signs of stability and some real opportunities for growth. We're not out of the dark days yet — and in all likelihood we'll lose some mills that use low-grade wood in the next year — but the markets are providing returns for landowners and real efforts are underway to find the next generation of uses for our forest resource.

The forest industry is, of course, comprised of dozens of individual markets, each with their own influences and dynamics. However, when you step back, products fall into three categories – sawlogs (used to make lumber), pulpwood (used for paper production) and biomass (used in energy production).

Each harvest will have a different ratio of products based upon location, forest type, harvest prescription and past harvesting practices. Figure 1 shows data – both volume and value to the landowner – from all harvests in New Hampshire for the most recent tax year. Maine, New York or other parts of New England would show slight regional differences, but the differences would be small.

Let's start with sawlogs. By volume, this is the smallest category, representing just over a fifth of the total harvest. However, the stumpage landowners received from sawlogs amounted to 80 percent, or four-fifths, of the total income for landowners. That's important.

Sawlogs get turned into lumber. For spruce-fir, that's structural lumber, used in construction as structural lumber. For white pine and hardwoods, a range of uses include flooring, furniture and siding. Of course, there are applications that have nothing to do with construction – pallets, reels and boxes, for example – but much of the lumber industry grows and shrinks with construction. To understand how construction is doing, the easiest thing to do is look at housing starts, and those have seen a steady increase since the rapid crash that came in 2008. In the past year, we've seen over 14 million housing starts – more than double the same period in 2008-2009.

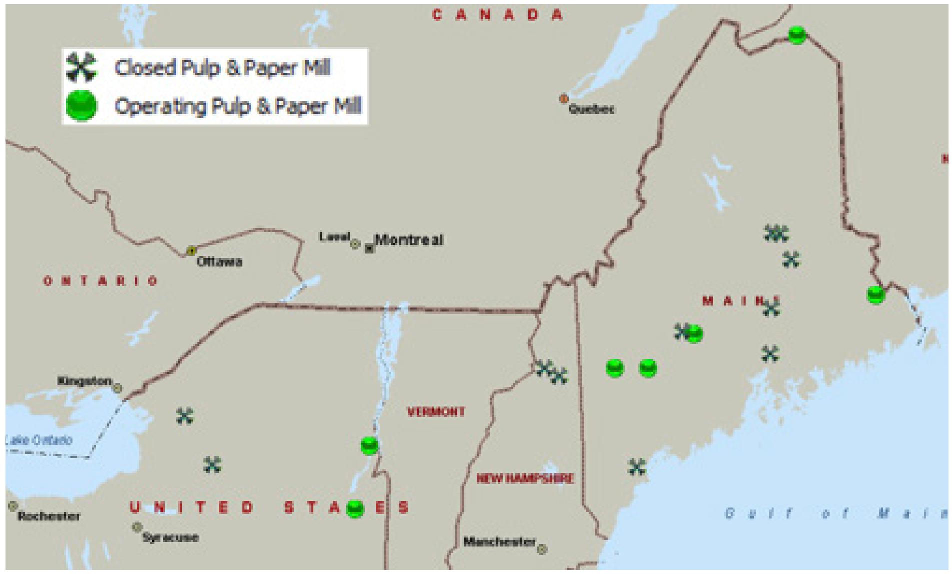
What that has meant for landowners and mills in the Northeast is steadily growing demand. Data from Maine, New York and regionally all show that sawlogs harvests are rebounding from the post-recession crash, and that sawmills in the region are increasing production. That's great for landowners, loggers and manufacturers.

Of course, sawmills aren't without challenges. We are seeing increased pressure from exports – including significant new demand from China for a range of species and products. While this can provide short-term benefits (in the form of more money) for landowners and some loggers, foreign competition can strain local mills, and make these anchors of the rural economy in the region less economically viable.

Some sawmills, particularly those producing softwood, are starting to have a hard time moving their residuals – which is necessary for continued operation. When a facility buys cylinders (logs) and sells rectangles (boards), lots of by-product is produced. The chips, sawdust and bark need to go somewhere, and loss of pulp mill markets – particularly in Maine – is starting to be a real concern for softwood sawmills as they make plans for continued production increases.

That brings us to pulpwood. In New Hampshire, it represents a third of the volume harvested and 13 percent of the stumpage to landowners. In Maine it might be a little more, in parts of Southern New England less, but the constant is that pulpwood is larger in volume and lower in value than sawlogs. Pulp mills have faced challenges, and since 2014 Maine has lost markets for about three million tons of pulpwood and chips annually; most of the market loss has been in softwoods. For landowners and loggers, this has represented a loss of critical markets for low-grade wood. While the market losses have been concentrated in Maine, the impacts are regional. Landowners and loggers in parts of Vermont, New Hampshire and Southern New England that only a few years ago were at the edge of a Maine mill's procurement zone, now find themselves too far away to economically sell wood to these markets.

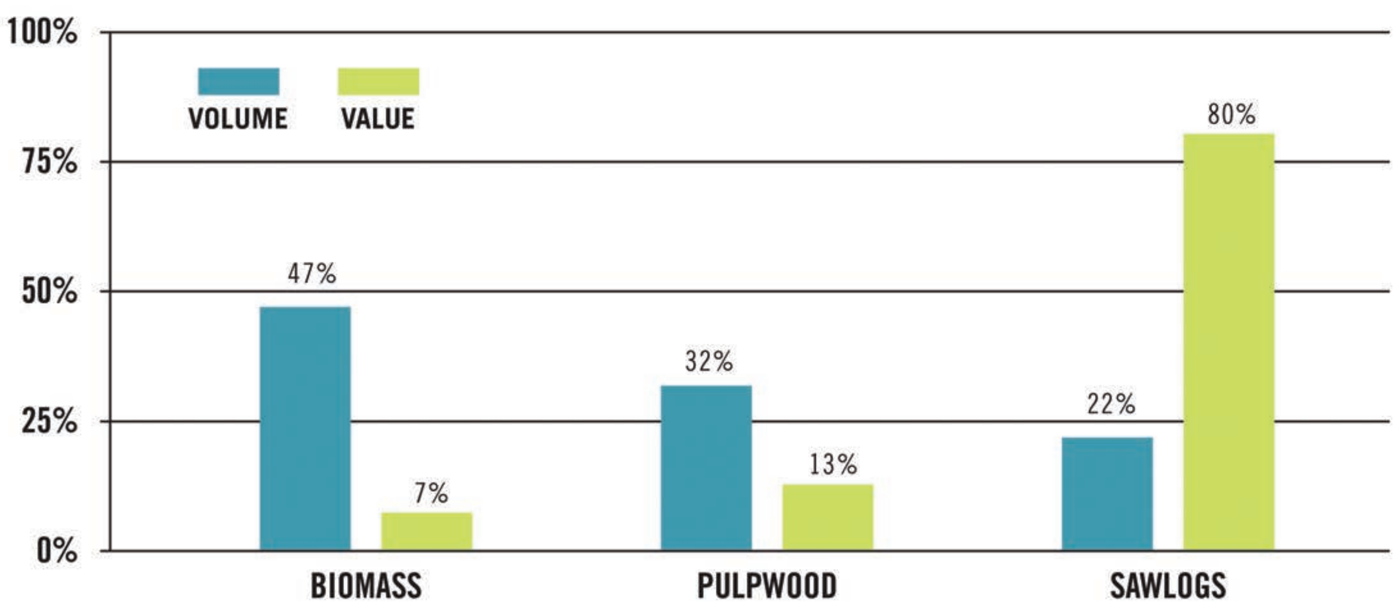
PULP & PAPER MILLS IN THE NORTHEAST, SINCE 1999



Biomass, used for the production of electricity, is important by volume, but in reality provides little economic return to the landowner. In New Hampshire, it was almost half of the harvested volume, but less than a tenth of the stumpage revenue to landowners. That doesn't mean it's not important – in fact the importance may be increasing in some regions as markets for pulpwood shrink.

Biomass faces some real economic challenges. Wholesale electricity prices – the prices that matter for power generators – have been in steady decline for the past several years. A combination

FIGURE 1. VOLUME AND VALUE FROM TIMBER HARVEST BY PRODUCT



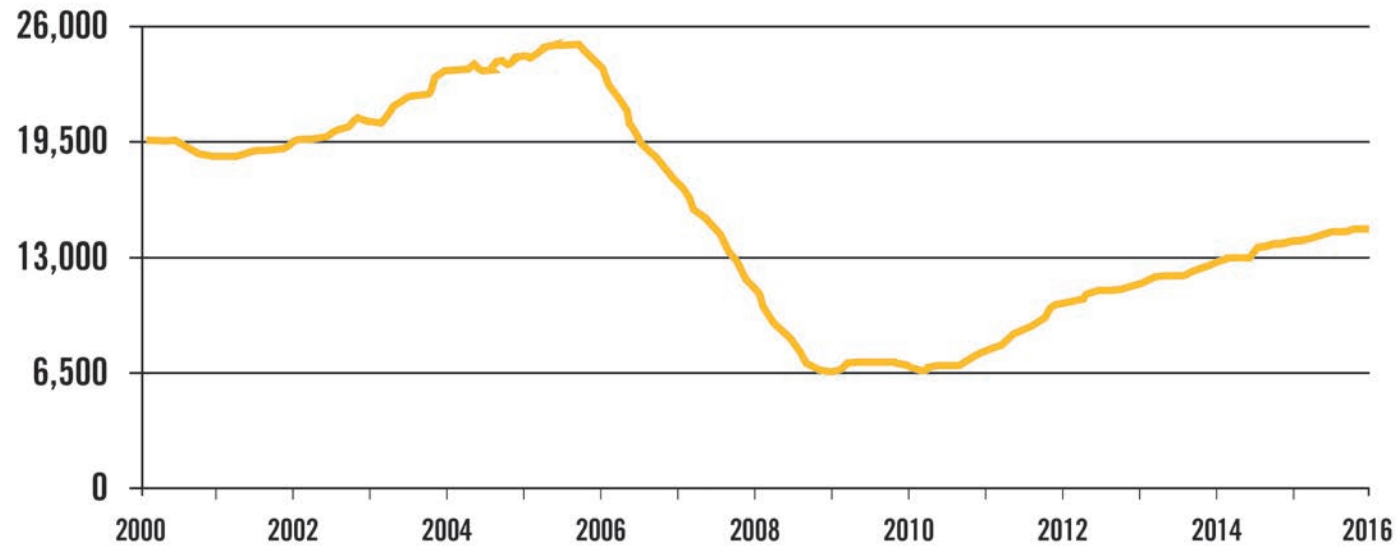
of inexpensive natural gas and lack of demand growth have pushed prices lower, and there is no reason to think that will change any time soon. Some states are taking steps to support their biomass facilities – Maine is in the middle of two years of above-market payments to four biomass plants, and earlier this year New Hampshire modified their Renewable Portfolio Standard to bolster biomass until 2020. These measures are temporary, and will end. When they do, the economic viability of biomass plants – and thus the market for millions of tons of low-grade wood annually – will be in question.

While much of this sounds bleak, all is not lost. Across the region, actions are underway to secure new markets for low-grade wood – replacing some of what has been or will be lost in pulpwood and biomass. A new facility producing bio-oil, a liquid fuel derived from wood, has been proposed in upstate New York. Maine industry leaders are working together to support existing markets and bring in new markets – biofuels, biochemical and biochar companies have all been in the state evaluating the significant forest resource, the robust logging infrastructure and the opportunities that lost markets have created.

The forest industry – growing, harvesting and processing wood – is undergoing profound change across the Northeast. Mills have closed, and many (if not most) will never re-open. While this can be disconcerting, the forest – upon which the entire industry relies – remains strong, adding volume. The forest – and the people that build their livelihoods from it – serve as the strong foundation for a changing industry. ◆

FIGURE 2. **U.S. HOUSING STARTS**

PREVIOUS 12 MONTHS TOTAL



Northeast Commercial
FISHERIES OUTLOOK

HANK SOULE

MANAGER,
SUSTAINABLE HARVEST SECTOR

New England fishermen landed $1.3 billion of seafood last year, continuing a recent steady annual increase of about four percent in value. Three iconic species — lobster, scallop, and in a distant third place, groundfish — comprised 75 percent of the value of the catch. As populations of fish wax and wane over time, so go prospects for fishermen. Prospects are up for scallop and groundfish — but with a big question mark for lobster.

The scallop and groundfish fisheries are managed under quota systems, meaning regulators set an upper limit on the amount of each species that they'd like to be caught. For scallops, the total projected catch is permitted to increase from 47 million to 52-60 million pounds in 2018. Five resource surveys pointed to increased abundance and a healthy range of size and age, suggesting good fishing prospects for the next few years at least. Further out, scientists have some concern over an apparent lack of new scallops being born, but those figures are very preliminary.

Groundfish include a basket of several stocks such as haddock, cod and several types of flounder. There are a lot of moving parts in the groundfishery, but overall prospects seem to be improving after well over a decade of quota limits that cut the fleet from more than 1,000 vessels years ago to well under 300 today. Figure 1 shows the consolidated changes in groundfish quotas for next year. The winners outnumber the losers in both number and magnitude, for an overall increase of 17 percent. As importantly, a few of the losses have no material effect. For example, the haddock quota is currently so large that the remaining fleet can harvest perhaps 15 percent of its total allowable catch. A four percent reduction next year won't change those prospects one bit.

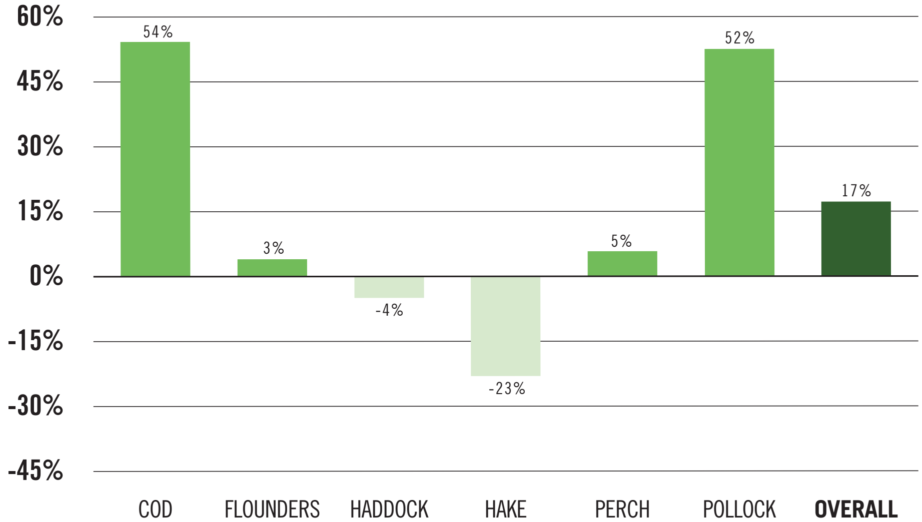
Prospects are murkier for lobster. There is no genuine quota in this fishery – regulators attempt to control harvest largely by limiting the number of lobster traps fishermen may haul. New England's lobstermen, particularly in Maine, have prospered under a three decade-long run of record-breaking revenues (Figure 2). They've risen six-fold, rivalling the rise in the Dow Jones Industrial Average over the same timeframe. But early reports are that Maine's landings appear to have fallen off smartly this year, and like other asset bubbles, some in the business speculate this one is due for a correction.

In days gone by, fishermen adapted to the ebb and flow of abundance by shifting their target stocks – perhaps emphasizing lobster in some years, or riding a relative bounty of groundfish in others. Increasing regulation of, and entry limits to, our many fisheries has had the unintended consequence of curtailing that flexibility. Today's fishermen are largely balkanized into a few specific fisheries, where bad fortunes in one can often no longer be offset by pursuing another.

It's not all about abundance. Innovation and capturing missed opportunity drives revenue as well. Just 40 percent of New England's groundfish quotas are harvested each year, and doubling that rate would solve most of the industry's financial woes. A small-scale fishery for pollock (one of the groundfish stocks) is developing in New England, using hooks – a fishing gear that faded from use several years ago, but which holds promise for this specific stock. The haddock resource is most efficiently, and increasingly, harvested with nets newly designed to target it almost exclusively.

At the dock, an increased focus on sustainability is driving electronic traceability technologies such as quick response ("QR") coding. Maine's lobster industry is experimenting with fishermen-owned unloading stations, expanded overseas marketing endeavors and ongoing development of value-added products such as prepackaged lobster tails. It's a tall hill to climb – lobster meat is already one of the most expensive proteins in the marketplace – but expenses keep climbing too, so the industry pushes ahead.

FIGURE 1. **PERCENTAGE CHANGE IN GROUNDFISH QUOTAS FOR 2018**

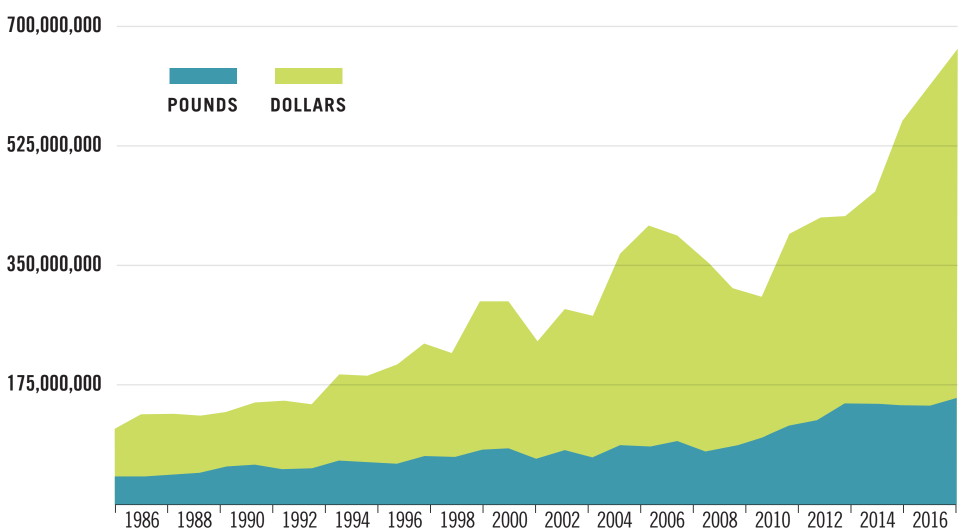


Huge advances in full utilization of catch are making their way to New England from overseas. Traditionally, more than half of a groundfish – the skin, the bones and so on – were discarded in the process of transforming a whole fish to a plate-ready fillet. Eventually, much of that waste was recycled into low-value products like fish meal, or as an additive to pet food.

To our east, across the Atlantic to Iceland and in Europe, entrepreneurs are creating high-value products from what was once viewed as waste. Decorative handbags made from fish skin, with a durability that can last decades. Enzyme is extracted from fish intestines, then processed and packaged as a natural skin cream (and proven effective as well). And 3D food printers can now transform a fish fillet into unique shapes such as the stars and the moon. That has to go over better than fish sticks with the kids!

In the end, abundance is key and Mother Nature bats last. Some stocks wax today while others wane tomorrow. But overall, the near-term outlook for our fisheries is healthier, and with much room to expand. ◆

FIGURE 2. **NEW ENGLAND LOBSTER HARVEST**
1986 to 2016



WHY THEY BUY

UNDERSTANDING CUSTOMER BEHAVIOR AT FARMERS' MARKETS

CHRISTOPHER WAYNE
FARMROOTS,
GROWNYC

There's no question that farmers' markets are more competitive now than ever before. With well over 8,000 markets across the country and food e-commerce a booming industry, farmers are feeling pressure to take more strategic approaches to their marketing. If not, they risk plateauing or, in some cases, declining sales.

In response to this growing concern, FARMroots, Greenmarket's business technical assistance team, has spent the last four years looking to an unlikely source for competitive new strategies: grocery stores.

You may not know it, but your grocery store is an artfully crafted social science masterpiece that taps deep into your subconscious to subtly unlock your wallet and make you feel good about doing it.

From the sparkling mist on the cilantro to the waft of rotisserie chicken to the 2-for-1 chocolate bars at check out, it's all designed to get you to stay longer and to buy more.

Using heat sensors, eye-movement-tracking glasses and teams of clipboard-wielding researchers, the grocery store industry has gathered troves of customer data that show exactly why and how we like to shop for food.

As farmers, it's unlikely you can cough up the money to hire a multi-disciplinary team of sociologists, anthropologists and psychologists to help you create an unforgettable experience for the shoppers under your easy-up tent.

You can, however, take a few pages from the retail science book and apply them to the farmers' market.

As grocery stores have shown us, it starts with data collection. It can be simple, but it's the basis of good decision making. FARMroots defined four easily measurable data points that are critical, consecutive stages of interaction each shopper has at a farmers' market stand: exposures, impressions, considerations and purchases.

Using a one-page data sheet, a tally counter and one hour's worth of time, farmers can generate data that shows how well their farm stand moves customers from one stage to the next. Using the data to identify weaknesses in the customer experience, farmers and market operators can then hone in on specific strategies to improve.

> "You may not know it, but your grocery store is an artfully crafted social science masterpiece"

A few of the most high-impact strategies for FARMroots over the past few years include:

Vertical signage: The human eye has more muscles to scan horizontally than vertically. Therefore, a customer's eye is drawn to vertical strips of text that break up a natural tendency to scan horizontally. Consider using your tent poles to post bright, vertical signage.

Dimension and color blocking: Shoppers are attracted to multi-dimensional displays. Try tilting your display crates forward using wood blocks, or make custom "stair displays" to take advantage of your space. Like a compelling piece of art, blocks of color create contrast that catches the eye. The human eye can see yellow from furthest way, so put those bright summer squashes on the most visible corner of your market tables!

Bounty: Customers hate buying the last of anything; it gives the impression that the product has been picked over and rejected by those before them. Make sure you consolidate product throughout the day to make things look bountiful. Think overflowing cornucopias from an 18th century still life painting.

Signage: Without clear pricing signs, sales drop because customers are embarrassed to ask for pricing information. An effective sign is simple, readable, durable and informative. Make it easy for your customers!

Increase sensory appeal: Virtually all unplanned purchases start with a customer being able to touch, smell or taste a product. When the salivary glands are activated, shoppers are much less disciplined. As much as possible, have samples out during key times of the day.

Flow: Directional angst decreases sales. Create a natural flow to your market stand, with shopping bags at the beginning and check out at the end. Try a grab-and-go section near check-out with pre-packaged products to appeal to impulse buyers.

Space: Just as we tend to fill a large plate with food, shoppers tend to want to fill their shopping containers. Shopping carts in grocery stores have tripled in size since their inception in the 1930's. Try bringing shopping baskets to your market stand to appeal to customer desire to fill it up!

For farmers who have taken advantage of our marketing programming, adopting a mixture of these tactics has proven highly valuable. On average, program participants have shown a 17 percent increase in sales after collecting baseline data and implementing targeted strategies.

For some, embracing these same practices used by grocery stores may give the impression that retail market farmers will forever be grasping the coattails of grocery stores and their well-funded data collection machine. Farmers' markets, though, have one massive advantage that can never be appropriated — the ability for a customer to purchase — and interact — with the farmer who grew their food!

LATEST UPDATES ON THE FSMA PRODUCE SAFETY RULE

GRETCHEN L. WALL
CORNELL UNIVERSITY

& PRACTICAL ADVICE FOR GROWERS

What is on your farm's to-do list today? With a laundry list of tasks to be completed, food safety is likely just one critical priority among many for fruit and vegetable growers in the Northeast and across the United States. That priority list may change for some growers in the next few months, with the initial compliance dates having arrived for the first ever federal food safety regulation that will affect the growing, harvesting, packing and holding of fruits and vegetables.

Although some growers may be exempt from this new regulation, the U.S. Food and Drug Administration's (FDA) Food Safety Modernization Act (FSMA) Produce Safety Rule (PSR) is likely to change the playing field for all growers when it comes to buyer requirements (e.g., third party audits for food safety) and the standardization of practices for the safe production of fruits and vegetables. This article provides key updates from the FDA regarding compliance with the FSMA PSR as well as tips that all growers can use to reduce food safety risks, prepare for future market demands and get organized for the upcoming regulation, if applicable.

When does my farm need to comply?

For those not familiar with the FSMA PSR, published in the Federal Register on November 27, 2015, the FDA has produced a fact sheet that provides an overview of the regulation's requirements and potential exemptions and exclusions that growers may fall under.

The first compliance dates (See Table 1) have arrived for the largest farm category and FDA has proposed an extended timeline for certain provisions, specifically the agricultural water requirements within Subpart E. These proposed changes to compliance dates within the rule follow an earlier announcement made in March 2017 where FDA acknowledged that they had received feedback that the agricultural water standards may be too complex for growers to understand and implement on the farm. In response to these concerns, FDA has been considering how they might simplify these requirements and have proposed extended compliance dates for the agricultural water standards which would allow four additional years from the effective date of the rule for each business size category.

How is the FDA addressing concerns about the FSMA Produce Safety Rule and what updates do I need to know about?

It is clear that growers, educators and the produce industry have been vocal about their concerns in implementing this new regulation, and likewise, FDA has been listening. In the initial draft and revision of the regulation, FDA fielded over 13,000 comments during the first open comment period alone. The following year, in 2014, FDA released a supplemental document to the proposed rule to revise the standards to make them more flexible and less burdensome in a few areas. This is a step in the right direction to assist growers in compliance, while fostering a better opportunity to protect public health.

In addition to proposing extended compliance dates for the agricultural water provisions, the FDA, with the help of the Center for Produce Safety and agricultural water experts from around the country, convened a colloquium in April 2017 on this topic. The result: FDA has made the agricultural water testing requirements a bit more practical for growers by providing more information on test methods that the agency considers to be "scientifically valid" and "at least equivalent to the method of analysis in § 112.151(a) in accuracy, precision and sensitivity". Previously, the FSMA PSR only listed one test for generic E. coli, Method 1603, for use in testing agricultural water. This particular method presents significant limitations for some growers, as the test is not widely available at labs across the country. In September 2017, the FDA released a fact sheet that recognized eight additional equivalent test methods for generic E. coli (Table 2), the required microbial indicator for monitoring agricultural water quality.

Table 1: Compliance Dates for the FSMA Produce Safety Rule, by Business Size

BUSINESS SIZE	COMPLIANCE DATES FOR MOST PRODUCE	COMPLIANCE DATES FOR SPROUTS	WATER RELATED COMPLIANCE [a]	COMPLIANCE DATE FOR QUALIFIED EXEMPTION LABELING REQUIREMENT [b]	COMPLIANCE DATE FOR RETENTION OF RECORDS SUPPORTING A QUALIFIED EXEMPTION
All other businesses (>$500K)	1/26/2018	1/26/2017	1/26/2022	1/1/2020	1/26/2016
Small businesses (>$250K-500K) [c]	1/28/2019	1/26/2018	1/26/2023		
Very small businesses (>$25K-250K) [d]	1/27/2020	1/28/2019	1/26/2024		

Table Credit: Southern Center for Training, Education, Extension, Outreach, and Technical Assistance to Enhance Food Safety & The Produce Safety Alliance

(a) According to the Proposed Rule issued on 9/13/17, Compliance dates for Subpart E - Agricultural Water, allow an additional four years. (b) A farm eligible for a qualified exemption must notify consumers as to the complete business address of the farm where the food is grown, harvested, packed, and held. (c) A farm is a small business if, on a rolling basis, the average annual monetary value of produce sold during the previous 3-year period is no more than $500,000. (d) A farm is a very small business if, on a rolling basis, the average annual monetary value of produce sold during the previous 3-year period is no more than $250,000.

This list of test methods expands growers' options for monitoring their water quality while also achieving compliance with the FSMA PSR Subpart E requirements for testing. When contacting the lab, be sure to confirm that they can provide one of the test methods below for generic E. coli.

Table 2: Equivalent Testing Methodology for Agricultural Water

EQUIVALENT METHODS TO EPA METHOD 1603
Membrane filtration methods (colony forming units, or CFU)
mTEC agar (EPA 2010, APHA 2012, ASTM 2000)
mColiBlue ampules (Hach method 10029)
mEndo followed by NA-MUG agar (APHA 1997)
MI agar (EPA 2012)
Most Probable Number (MPN) Methods
Colilert (using Quantitray 2000 tray)
Colilert 18 (using Quantitray 2000 tray)

Around the same time that the announcement about additional test methods and the proposed extension of compliance dates for Subpart E was made, FDA Commissioner, Dr. Scott Gottlieb, addressed state agricultural commissioners in a speech at the annual conference of the National Association of State Departments of Agriculture (NASDA) in New Orleans. During Dr. Gottlieb's speech, he announced that inspections for the non-water requirements within the Produce Safety Rule for produce (other than sprouts) would not begin until 2019, despite the first compliance dates for the largest farms beginning in January 2018. This delay will give FDA and its state partners more time to provide education and training opportunities to growers, state officials, cooperative extension agents and other FDA produce safety experts on the new requirements. Take advantage of this extra time by attending a training, getting familiarized with the FSMA PSR requirements, writing a food safety plan (not required by the FSMA PSR, but required by many buyers), or by scouting out labs and test method availability for the agricultural water requirements.

What should I be doing now?

If the information and updates provided above leave you scratching your head, you are not alone. There have been quite a few announcements from FDA since the FSMA PSR was published in the Federal Register in 2015, and likely more adjustments to the agricultural water standards going forward. Keep in mind that although FDA has announced that they will not begin inspections until 2019, growers will still need to comply by the appropriate date based on the farm's business size category (See Table 1), with the exception of the Subpart E requirements for agricultural water because of the proposed extension of compliance dates.

Guidance is also a critical piece of the puzzle missing for growers and educators. In September 2017, FDA published a guidance document for small entities to aid in compliance with the FSMA PSR, but its' functionality and utility are debated among the produce community after initial review. While many in the produce community wait for the primary guidance to be released for the FSMA PSR, you can start by reviewing these five key steps to prepare for produce safety market demands and compliance with the regulation, if applicable to your farm.

5 Steps to Prepare for Produce Safety

1. **Be aware that produce safety will impact your farm.**

- Whether the regulation applies to your farm or not, it is likely that produce safety will impact your business either through buyer requirements or through increased public awareness of the new regulation. Even some of the smaller scale markets (e.g., local farmers' markets, Farm-to-School programs) are beginning to ask for documentation of produce safety practices. Many third party audits are also now incorporating FSMA Produce Safety Rule requirements into the audit metrics. Additionally, foodborne illnesses that have been linked to produce commodities diminish consumer confidence and can even impact consumption trends and market prices, not to mention the significant impact to business viability and overall health of local communities.

2. **Stay up to date.**

- It is probably evident by now that there are a lot of moving pieces and parts related to regulatory compliance dates and revision of certain provisions within the regulation. The best thing you can do to prepare your farm is to stay in the loop. Consider joining the PSA's general listserve or the Northeast Center to Advance Food Safety (NECAFS) newsletter distribution which provides relevant updates to the FSMA PSR and other produce related educational opportunities and resources, both nationally and regionally.
- FDA also offers a subscription to e-mail updates related to FSMA on their Subscription Management Center.

3. **Consider attending a training or an On-Farm Readiness Review (Coming Soon!).**

- Now more than ever, opportunities to learn about produce safety abound. Some growers may already be familiar with produce safety practices through Good Agricultural Practices (GAPs) training or from participation in a third party GAPs audit. Although there is quite a bit of cross-over between basic GAPs and the requirements within the FSMA PSR, the regulation is new to everyone and there are certain nuances to which you should be aware. Additionally, third party audits (e.g., buyer requirements) and inspections (e.g., FSMA PSR) are not the same thing. It is best to become familiar with both, since your farm may be subject to both.
- A list of Produce Safety Alliance Grower Trainings, both domestic and international, are available on the PSA website and the course is one way to satisfy the FSMA PSR requirement outlined in § 112.22(c) that requires 'At least one supervisor or responsible party for your farm must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the Food and Drug Administration.'
- Lastly, attending an On-Farm Readiness Review (OFFR) will help prepare your farm for the FSMA PSR requirements. On-Farm Readiness Review (OFRR) is a plan and tool-kit designed to be used by regulators and educators to prepare farmers for compliance with the FSMA Produce Safety Rule. Currently, the OFFR has been piloted in six states in conjunction with the FDA and NASDA and is due to launch in 2018. Either of the listserves mentioned earlier in this article will announce when those opportunities are available.

4. **Don't bite off more than you can chew.**

- It is easy to get overwhelmed very quickly after attending a training or reading up on the regulation. Don't stress. Start with the following:
  - » ***Prioritize*** – biggest risks first, the ones that will give you the "most bang for your buck".
  - » ***Organize*** – begin by writing a food safety plan if you do not have one already, or consider developing or revising new Standard Operating Procedures (SOPs) and checklists. There are plenty of resources out there to get you started with writing a food safety plan and keeping records, so do not reinvent the wheel.
  - » ***Make an action plan*** – choose 2-3 things to get done this winter, when it is too cold and miserable outside to work in the field. Pick tasks that you know you can achieve, not that you hope you can achieve!

5. **Ask questions when you need help!**

- Especially before making any big changes, such as changing a water test method or renovating a packinghouse! With FSMA funding available for states and Regional Centers to help growers understand and implement the new regulations, there are plenty of individuals to assist in answering your questions.
- A good place to start is by contacting any of the Produce Safety Alliance Staff: https://producesafetyalliance.cornell.edu/contact-us/psa-staff
- The Northeast Center to Advance Food safety (NECAFS) also services and collaborates with 12 states (CT, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VT, WV) and the District of Columbia to make up the Northeast region which aims to jointly advance understanding and practice of improved food safety among the region's small and medium sized produce growers and processors.
  - » Website: https://www.uvm.edu/extension/necafs
  - » Contact: necafs@uvm.edu, 802-447-7582 x254

Resources for writing a food safety plan and keeping records

Farm Food Safety Plan Writing Resources. Produce Safety Alliance. Available from: https://producesafetyalliance.cornell.edu/resources/farm-food-safety-plan-writing-resources.

Records Required by the FSMA Produce Safety Rule. Available from: https://producesafetyalliance.cornell.edu/sites/producesafetyalliance.cornell.edu/files/shared/documents/Records-Required-by-the-FSMA-PSR.pdf

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FDA Considering Simplifying Agricultural Water Standards. Available from: https://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm546089.htm

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Equivalent Testing Methodology for Agricultural Water. Available from: https://www.fda.gov/Food/FoodScienceResearch/LaboratoryMethods/ucm575251.htm

FDA Commissioner Addresses State Agriculture Commissioners; Announces New Steps to Enhance Collaboration with States and Ensure Farmers Are Prepared for FSMA. Available from: https://www.fda.gov/Food/NewsEvents/ConstituentUpdates/ucm575532.htm

Guidance for Industry: Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption: What You Need to Know About the FDA Regulation - Small Entity Compliance Guide. Available from: https://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ucm574281.htm

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On the Farm, in the Office or on the Internet, Our Entire Farm Credit East Team is Ready to Help Your Business be More Profitable

AUBURN, ME
Matt Senter, Manager
615 Minot Avenue
Auburn, ME 04210-4052
800.831.4230 / 207.784.0193

BATAVIA, NY
Ed Urbanik, Manager
4363 Federal Drive
Batavia, NY 14020-4105
800.929.1350 / 585.815.1900

BEDFORD, NH
David Bishop, Manager
2 Constitution Drive
Bedford, NH 03110-6010
800.825.3252 / 603.472.3554

BRIDGETON, NJ
Scott Andersen, Manager
29 Landis Avenue
Bridgeton, NJ 08302-4396
800.219.9179 / 856.451.0933

BURRVILLE, NY
Kathryn Canzonier, Manager
25417 NY Route 12
Watertown, NY 13601-5730
800.626.3276 / 315.782.6050

CLAVERACK, NY
Tim Slavin, Manager
190 State Route 9H
Hudson, NY 12534-3819
800.362.4404 / 518.851.3313

COOPERSTOWN, NY
Rob Yurkewecz, Manager
7397 State Highway 80
Cooperstown, NY 13326
800.762.3276 / 607.282.3002

CORTLAND, NY
Jan Bitter, Manager
One Technology Place, Suite 2
Homer, NY 13077-1526
800.392.3276 / 607.749.7177

COUNTRY LIVING
Dave Pugh, Director
7397 State Highway 80
Cooperstown, NY 13326
800.762.3276 / 607.282.3002

DAYVILLE, CT
Lynn Weaver, Manager
785 Hartford Pike
Dayville, CT 06241-1739
800.327.6785 / 860.774.0717

ENFIELD, CT
Keith Stechschulte, Manager
240 South Road
Enfield, CT 06082-4451
800.562.2235 / 860.741.4380

FLEMINGTON, NJ
Steve Makarevich, Manager
9 County Road 618
Lebanon, NJ 08833-3028
800.787.3276 / 908.782.5215

GENEVA, NY
Stephen Tudhope, Manager
1450 Route 14
Phelps, NY 14532-9542
800.929.7102 / 315.781.7100

GREENWICH, NY
Chris Truso, Manager
394 State Route 29
Greenwich, NY 12834-2650
800.234.0269 / 518.692.0269

HORNELL, NY
David Van Lieshout, Manager
1155 Airport Road
Hornell, NY 14843-9144
800.929.2025 / 607.324.2020

MAYVILLE, NY
Jenny Montalbano, Manager
28 E. Chautauqua Street
Mayville, NY 14757-0163
800.929.2144 / 716.753.2144

MIDDLEBORO, MA
Cynthia Stiglitz, Manager
67 Bedford Street
Middleboro, MA 02346-0720
800.946.0506 / 508.946.4455

MIDDLETOWN, NY
Blane Allen, Manager
669 East Main Street
Middletown, NY 10940-2640
888.792.3276 / 845.343.1802

POTSDAM, NY
Mike Haycook, Manager
One Pioneer Drive
Potsdam, NY 13676-3273
800.295.8431 / 315.265.8452

PRESQUE ISLE, ME
Peter Hallowell, Manager
26 Rice Street
Presque Isle, ME 04769-2265
800.831.4640 / 207.764.6431

RIVERHEAD, NY
Steve Weir, Manager
1281 Route 58
Riverhead, NY 11901-2097
800.890.3028 / 631.727.2188

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FarmCreditEast.com