Small Farms Quarterly

Good Living and Good Farming – Connecting People, Land, and Communities

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SUMMER 2025

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Cover photo: *Sea Matías is one of the farmers who has been deeply involved in the creation of the West Branch Commons. Photo courtesy of Farmland for a New Generation New York.*

SMALL FARMS QUARTERLY

Good Farming and Good Living
Connecting People, Land, and Communities

Small Farms Quarterly is for farmers and farm families – including spouses and children – who value the quality of life that smaller farms provide.

Our goals are to:

- Celebrate the Northeast region's smaller farms;
- Inspire and inform farm families and their supporters;
- Help farmers share expertise and opinions with each other;
- Increase awareness of the benefits that small farms contribute to society and the environment;
- Share important research, Extension, and other resources.

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The Small Farms Quarterly is compiled by the Cornell Small Farms Program, based at Cornell University in Ithaca, NY. The Cornell Small Farms Program fosters the sustainability of diverse, thriving small farms that contribute to food security, healthy rural communities, and the environment. We do this by encouraging small farms-focused research and extension programs.

Anyone is welcome to submit articles for consideration. See our guidelines at smallfarms.cornell.edu/quarterly/writers/ and contact Kacey Deamer with inquiries. Articles should be 1,000 - 1,600 words in length with at least three high-resolution image options.

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How Much is New York's 20% Farmer Investment Tax Credit Worth Today?

This fact sheet by PRO-DAIRY shared the implications for capital investment and tax management decisions.

By Mary Kate Mackenzie

In April 2022, New York State expanded the farmer investment tax credit (ITC) to be worth 20% of eligible capital investment. For property placed in service on or after Jan. 1, 2023, the ITC is fully refundable for taxpayers who earn more than two-thirds of their gross income from farm-ing. Many asset types are eligible for the ITC, so long as they have a useful life of four years or more and are used primarily in agricultural production. Investments in land, passenger vehicles, and buildings used for other purposes (e.g. farmworker housing) are ineligible at this time.

Expansion of the ITC has generated enthusiasm among producers who rightly view it as an incentive to reinvest in their farms. However, in some cases this enthusiasm may be inflated by cognitive biases known as the "scarcity effect" and the "money illusion." Studies in human psychology show that people place a higher subjective value on things that are perceived to be scarce or limited in availability. Based on this research, marketing firms use the scarcity effect to stimulate consumer demand and drive impulsive purchasing decisions by deliberately creating temporary conditions of scarcity. The short-lived price discounts applied to a wide range of products on Cyber Monday illustrate how online retailers use the scarcity effect to drive billions of dollars of consumer purchases in a single day.

The money illusion refers to the tendency to focus on the face value of money rather than its true purchasing power. For example, consider an employee who receives a 3% pay raise and is happy to deposit a larger paycheck into their account each week. If the rate of inflation is 5%, then that employee's purchasing power has declined, even as the dollar value of their paycheck increased.

In theory, the ITC could trigger these biases to influence capital investment decisions on farms. The ITC is

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Message from the Editor

Dear farmers and friends,

As we reflect on seasons past and plan ahead, how are we prepared to weather change?

If we've learned anything from recent history, our predictions can be wrong. Farmers weather change on a daily basis – anyone involved in farming, gardening, and agriculture knows that there's nothing certain and nothing predictable.

Resilience as a concept is showing up everywhere, but it's not new. I think of it as "how well do we bounce back" when we're stuck, broadsided, or otherwise thrown off course. As farmers, this may be the rule and not the exception. Unexpected things come up at any moment, and call upon our creativity, persistence, and community to solve. What are the assets and resources that support you and your farm's resilience to meet these surprises, bounce back, and continue toward your goals?

While our past practices have mostly gotten us through, part of being a resilient farmer is careful observation, back-up plans, and trying new things.

One successful farmer told me that every year they try three new things. And as a farm, as a family, and as a community, they look at those three new things to see if they help them be more resilient in the face of change.

Here are my three new things for this season:

- Write down weekly reflections on what went right and what went wrong since it is a blur by the end of the season.
- Use more mulches to conserve water as we have seen hotter and drier summers.
- Set my future self up for less stress at tax season by doing better with weekly recordkeeping.

The Cornell Small Farms Program is also trying new things. We're excited to share the launch of "Small Farms Radio," our new monthly podcast. While doing farm chores, we invite you to listen to our first five episodes. And when you take a moment to sit and rest, you can also watch a short film and read in more detail about the story of Tom and Sea and the West Branch Commons.

Be well; we're in this together.

Anu Rangarajan
Editor-in-Chief
Director of the Cornell Small Farms Program

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currently legislated to continue through 2027. If farm managers perceive the tax credit to be a time-limited resource, they may place a higher subjective value on it, feeling a sense of urgency to take advantage of the credit before it goes away. If managers focus on the face value of the 20% credit rather than its purchasing power, they will overestimate the credit's true worth. The following example demonstrates how farm managers can determine the real economic value of the ITC at the time an asset is purchased to support sound investment decisions.

Example

Assume that a New York dairy bought a new chopper for $800,000 in June 2024, knowing the investment would trigger a $160,000 refundable tax credit. If the farm operator claims to have purchased the $800,000 chopper for only $640,000, we can infer that he has been misled by the money illusion. To calculate the real cost of the copper at the time of purchase, the farm must account for future tax implications of the credit, and for the time value of money.

Most would agree that $100 today is worth more than $100 a year from now. The time value of money reflects the fact that $100 today can be invested for a financial return, and that $100 a year from now will have less purchasing power due to inflation. This concept applies to the ITC due to the lag between the time when a farm makes an investment and the time when it receives the credit. Using a net present value framework, the future value of the tax credit can be discounted to its value at the time of the investment, given some assumptions about the farm's annual discount rate and how long it will take for the credit to arrive.

Not only must farms wait to receive the ITC, but they must also pay tax on it. For example, the farm that purchased the $800,000 chopper in 2024 might receive their $160,000 credit in 2025, then pay federal income tax on the refundable portion of the credit in 2026. The amount of tax owed will depend on how much of the credit was refunded, and on the taxpayer's marginal tax rate.

Implications

Profitability

Farm managers should take away three important lessons from this example. First, be aware of the potential for cognitive biases to influence your own decision making. Remember that the 20% ITC is not worth the full 20% in today's dollars at the time of the investment. Ensure that all capital investments make sense from an operational and financial perspective, given the real economic value of the credit. Even with the credit, the farm still pays for the majority of an investment, and all business investments should generate an acceptable rate of return.

Cash Flow

Most farms are likely to receive some or all of the ITC as a refundable credit, which creates a future federal income tax liability. This tax bill may become a cash flow problem if the farm is unprepared. Discuss the future income tax implications of the ITC with your tax accountant. If there are concerns about generating sufficient cash flows from operations to make the tax payment, consider saving a portion of the ITC to ensure that the business has sufficient liquidity to cover the tax bill when it comes due.

TABLE 1. Net present value of the New York State investment tax credit as a percentage of the total investment.[1]

		After-tax discount rate[3]				
		0%	5%	10%	15%	20%
Marginal federal income tax rate[2]	0%	20.0%	19.0%	18.2%	17.4%	16.7%
	10%	18.0%	17.2%	16.5%	15.9%	15.3%
	12%	17.6%	16.9%	16.2%	15.6%	15.0%
	22%	15.6%	15.1%	14.5%	14.1%	13.6%
	24%	15.2%	14.7%	14.2%	13.8%	13.3%
	32%	13.6%	13.2%	12.9%	12.6%	12.2%
	35%	13.0%	12.7%	12.4%	12.1%	11.8%
	37%	12.6%	12.3%	12.1%	11.8%	11.5%

[1]Calculations assume a one-year lag between the time of investment and receipt of the credit, a two-year lag between the time of investment and the payment of federal income taxes on the credit, and that the entire credit is refundable.
[2]The marginal federal income tax rate depends on a taxpayer's adjusted gross income.
[3]A farm's after-tax discount rate can be approximated by its weighted average cost of capital, calculated as: (percent equity x opportunity cost of equity) + (percent debt x average interest rate on farm debt x (1 – total marginal income tax rate)).

The net present value of NYS investment tax credit as a percentage of the total investment for eight marginal federal income tax rates.

TABLE 2. Modeling impacts of the 20 percent investment tax credit on debt service. *This table compares the monthly principal and interest (P&I) payment amounts for a $6 million capital investment given two financing scenarios.*

	Scenario 1	Scenario 2
Long term principal borrowed	$6,000,000	$4,800,000
Interest rate on long term debt	8.0%	8.0%
Loan term in years	20	20
Monthly P&I payment on long term debt	$50,186	$40,149
Short term principal borrowed	$0	$1,200,000
Interest rate on short term debt	-	8.0%
Monthly interest payment on short term debt	$0	$8,000
Total monthly debt service	$50,186	$48,149

Comparison of the monthly debt service for two borrowing scenarios.

Debt Service

Some farms may look to the ITC to lower the cost of financing a large capital project. Consider a dairy seeking to finance a $6 million parlor investment. What happens if the farm needs the resulting ITC, valued at $1.2 million, to bring the debt service down to a manageable level? First, the farm must solve the problem of how to structure financing given the delay between the capital purchase and the ITC payment. For the sake of simplicity, assume the lender offers a short-term $1.2 million bridge loan at 8% interest, with interest-only payments. The interest payments would be $8,000 monthly, or $96,000 annually, until the farm receives its ITC and uses it to pay off the loan.

Table 2 shows the monthly debt service to finance the full $6 million over 20 years compared to financing $4.8 million over 20 years plus paying interest on a bridge loan. The difference between the two financing scenarios is relatively small, around 4%, until the ITC arrives. If the farm does not generate sufficient earnings to service the debt on a $6 million loan, it may struggle to make payments on a $4.8 million loan while paying interest on the bridge loan. Furthermore, the timing of the ITC payment is uncertain, and it could take more than a year to arrive if the farm's claim is audited.

This example illustrates that, although the ITC can help to bring down the total cost of financing a large capital investment over time, farms may still face short-term financing challenges due to the lag between making a capital purchase and receiving the tax credit. The income tax liability triggered by a large tax credit may also impact a farm's repayment capacity. Assuming a 24% marginal tax rate, the farm in this example could owe an additional $288,000 in federal income tax on the $1.2 million state tax credit.

Tax Management

Many farms are taking the ITC into account when making capital investment decisions. However, the choice of whether to claim the ITC is not finalized until income taxes are filed. This decision is complicated by the fact that a taxpayer may not use Section 179 to depreciate an investment on their federal tax return if they claim the ITC for that same investment on their New York State tax return, although bonus depreciation is permitted. Some farms and tax preparers may be tempted to maximize Section 179 depreciation to reduce their current year tax bill, or to avoid paying federal income tax on the ITC in the following year. However, in many cases, this strategy may be shortsighted.

If a tax planning goal is to minimize lifetime taxes paid, then we must consider how today's tax management decisions will impact not just the current year, but also future year tax liabilities. For example, if a farm uses Section 179 to depreciate their $800,000 chopper investment in one year, then not only do they give up the $160,000 credit, but also, they lose the opportunity to use some of that depreciation against future year tax liabilities. To compare the long-term impacts of two different tax management strategies, we can calculate the total net present value, after tax, of all future tax benefits. Table 3 provides an example.

TABLE 3. Total net present value after tax for $800,000 of capital investment under two tax management scenarios.

		Scenario 1[1]	Scenario 2[2]	Difference
A	Tax Management Strategy	NYS 20% ITC	Section 179	
B	Capital Investment Amount	$800,000	$800,000	$0
C	Year 1 Depreciation Expense	$416,000	$800,000	-$384,000
D	Year 1 Total Marginal Tax Rate[3]	40%	31%	9%
E	Year 1 Tax Savings from Depreciation	$177,277	$315,186	-$137,909
F	Investment Tax Credit Amount	$160,000	$0	$160,000
G	Year 1 Net Benefit (Tax Savings + ITC)	$337,277	$315,186	$22,091
H	Net Present Value After Tax[4]			
I	Year 1	$318,185	$294,842	$23,343
J	Year 2	$9,426	$0	$9,426
K	Year 3	$24,209	$0	$24,209
L	Year 4	$13,601	$0	$13,601
M	Year 5	$12,735	$0	$12,735
N	Year 6	$5,962	$0	$5,962
O	Total Net Present Value After Tax	$384,118	$294,842	$89,276

[1]Scenario 1 claims the 20 percent New York State investment tax credit (ITC) and uses MACRS with 40 percent bonus depreciation to depreciate the investment over six years.
[2]Scenario 2 uses Section 179 to depreciate the full value of the investment in one year.
[3]This example assumes a higher total marginal tax rate for Scenario 1 in the first year and a 32 percent total marginal tax rate for both scenarios in subsequent years.
[4]Net present value calculations use a 10 percent pre-tax discount rate and assume that the entire ITC is refunded to the taxpayer in Year 1 and taxed at 24 percent in Year 2.

Comparison of the next present value after tax of two tax management strategies for depreciating an $800,000 capital investment.

Scenario 1 in Table 3 claims the 20% ITC on an $800,000 investment and uses MACRS with 40% bonus depreciation to depreciate the investment over six years. Scenario 2 uses Section 179 to depreciate the full value of the $800,000 investment in one year. This example assumes a higher total marginal tax rate for Scenario 1 in the first year, a 32% total marginal tax rate for both scenarios in subsequent years, and a 10% pre-tax discount rate. It also assumes the entire ITC is refunded to the taxpayer and will

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Study Offers Insight into Balancing Climate Solutions & Crop Yields

Regenerative farming practices can potentially reduce yields according to new research.

By Krishna Ramanujan

People have assumed climate change solutions that sequester carbon from the air into soils will also benefit crop yields.

But a new study finds that most regenerative farming practices to build soil organic carbon – such as planting cover crops, leaving stems and leaves on the ground, and not tilling – actually reduce yields in many situations.

The computer model analysis showed that global adoption of such practices to improve soil health can benefit either greenhouse gas mitigation or crop yields but rarely both.

The predictions will help farmers, policymakers, and sustainability professionals mix and match optimal management plans based on location, as different practices will work better or worse depending on local conditions. For example, the model predicted that climate mitigation and improved yields had the best chance of occurring together when grains are planted, especially in soils with high clay content or that have limited nutrients.

"For the first time, we can have contextualized information about how farmers can choose the optimal mix of practices that meet their needs to maintain crop yields while also providing climate change mitigation," said Dominic Woolf, senior research associate in the School of Integrative Plant Science, Soil & Crop Sciences Section, in the College of Agriculture & Life Sciences at Cornell University.

Woolf is principal investigator of the project and senior author of the study published in May in Nature Climate Change. Shelby McClelland, a postdoctoral researcher at New York University's Department of Environmental Studies, formerly in Woolf's lab at Cornell, is the paper's first author.

For farmers, climate mitigation strategies include cover crops that are planted and left in place. Cover crops benefit farms by adding soil organic carbon (carbon from organic matter in soils), improving soil health, reducing soil erosion, cycling nutrients, and converting nitrogen to forms usable by plants (when legumes are planted). They also offer off-farm benefits of protecting surface water quality and mitigating climate change, by pulling carbon from the air for growing stems, leaves, and roots, and sequestering it from being released back into the atmosphere. Other practices, such as eliminating tillage, reduce erosion and limit soil carbon losses and disruption of soil structure.

The global computer model compared soil organic carbon changes, greenhouse gas release, and yield outcomes of cropland climate mitigation practices with conventional cropland management. The researchers simulated a set of scenarios through the end of the century, including various combinations of four common management practices: planting grass cover crops, planting legume cover crops, zero-tillage, and leaving crop residues in fields.

The analysis showed that grass cover crops combined with no tilling led to the highest potential for limiting greenhouse gases, but were the worst for crop yields. Legume cover crops with no tilling provided higher crop yields but close to 70% lower climate benefits. Reduced yields were found to be most likely in drier climates where cover crops compete for available water.

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be taxed at 24% in the following year.

By maximizing Section 179 depreciation, the farm pays $137,909 less in income and self-employment taxes in the first year under Scenario 2 (line E). However, after accounting for the value of the ITC, the taxpayer will be $22,091 better off in year one under Scenario 1 (line G). Adding the discounted future tax benefits of depreciation makes Scenario 1 look even better. In this example, accounting for the discounted value of all future tax benefits and costs, the farm will be $89,276 better off in today's dollars if they take the ITC (line O).

Conclusions

The investment tax credit is an excellent tool for New York farmers to reduce the cost of investment in livestock, machinery, equipment, and buildings used for farming. While the real economic value of the ITC is less than 20% at the time a capital purchase is made, that should not discourage producers from utilizing it. An awareness of the role cognitive biases play in decision making can help to improve management decisions, along with using a net present value framework to consider the total value of all future tax benefits and costs.

PRO-DAIRY is a nationally recognized Extension and applied research leader serving dairy farms for more than 30 years.

This article was originally featured in CALS News.

How Not to Graze

In the third installment of our series "Where's the Grass?", we share that there are many poor management practices seen in the grazing world. Here's how to ensure you do the right things for good results.

By Rich Taber

This is the third installment in our series "Where's the Grass?" in which we try to elaborate on the points of good grazing. Previous installments can be seen in the archives of the Small Farms Quarterly at smallfarms.cornell.edu.

As I write this article it is mid-May, and my cows have finally been put out to graze. It was an exceedingly wet spring, and the grass took a while to start photosynthesizing due to the lack of sunlight. It is easy to be a good grazer during the month of May, but when the summer slump begins in July and August, we need to put our skills as good graziers to the test.

As you may recall from some of my previous articles, I deplore seeing animals grazing on over-grazed, depleted pastures. I see this all the time driving around the countryside and see animals grazing on all but bare ground. Why do the animals do this? Because that is what they do. It never ceases to amaze me to see animals grazing on such pastures and they have beautiful hay waiting for them in a manger.

Sooner or later, they will avail themselves of the hay but persist in grazing almost bare ground because as I have alluded to, this is what animals do. They graze. So people look out upon those overgrazed pastures and see animals grazing and they think that all is well.

However, the animals are in a nutritional deficit as they are not taking in near enough dry matter to fuel growth, milk and meat production. The average animal needs to take in about 3 lbs. of forage dry matter for every 100 lbs. of bodyweight, so a 1,200-lb. cow would need about 36 lbs. of forage dry matter. This translates into well over 100 lbs. of wet grass that they need to take in. On depleted pastures, they don't take in a fraction of this needed dry matter.

How do we prevent this from happening? This is when we use all of our skills as improved rotational grazers to provide the animals with healthy, lush growing grass throughout the season. We have to learn how to keep the animals on a grazing paddock for a few days and then rotate them to a fresh paddock.

The author's cows out on deep, lush spring pasture in mid-May. The challenge in grazing is to keep pastures growing like this throughout the season.

Earlier in the season, we may be able to come back into the first paddock after as few as 21 or so days. As the season matures, we need to rest the paddocks for longer and longer intervals, depending on rain and sunshine. We may need to add some previously ungrazed paddocks that we took first cutting hay from earlier in the season. Typically, dairy cows are moved into fresh paddocks every 12 hours. All other classes of animals can be held in paddocks for up to about five days.

Overgrazed pastures provide little or no feed for the animals.

Rich Taber / CCE Chenango

Some other ways of not running a grazing program are as follows:

• Don't ever soil test for needed fertility elements such as NPK and lime. Hey, as long as the grass is green everything should be okay, right?

• Don't ever added needed inputs such as manure, fertilizer or lime. That stuff costs money.

• Make your animals walk inordinate distances to get water. I've seen some dairy cows walking over one mile to get water. The exercise is good for them, right?

• Have an inadequate watering system. An old garden hose running into a leaky tank should be fine. If the cows bash into it and don't get enough water, what's the harm?

• Have sloppy grounding situations on your electric fencing system. So what if you were told to have three ground rods, spaced every 10 feet. That old rusty single electric fence post should do as well, right? All of that fencing stuff down at the farm supply store costs money!

• If you use barbed wire fencing for any of your pastures, make sure the wires remain loose, rusty, and are attached to old, broken fence posts. So what if the animals get out every once in a while?

• Why spend money on laneways? Animals can trudge through wet, swampy trails and roadways to and from the barn.

• Why bother checking your electric fences for proper charges? So what if a few branches come crashing down on your hot wire, causing shorts in the system? If

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Pay attention to the growth cycles of grasses throughout the season.

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Also, in some regions, these climate mitigation practices led to higher greenhouse gas emissions than conventional farming due to increased soil nitrous oxide, which is 273 times more potent as a greenhouse gas than CO2.

"We found a strong synergy in many locations between cover cropping and conducting no till," McClelland said. "If you do both those practices together, in many cases, that allows you to increase soil organic carbon much faster than individual practices alone, which offsets negative effects from things like nitrous oxide emissions," she said. Lowering nitrogen inputs into soil may also help address nitrous oxide emissions.

The authors found that in order to maintain crop yields to feed a growing global population, the maximum greenhouse gas mitigation through 2100 would be about 85% lower than if yields were not considered and farming practices centered around optimal climate mitigation strategies. "So tradeoffs have a massive impact in terms of what's achievable at the global scale," Woolf said.

Co-authors include researchers from the Nature Conservancy, the Environmental Defense Fund, Colorado State University, and the Woodwell Climate Research Center.

The research was funded by the National Institute of Food & Agriculture, a U.S. Forest Service contract through an interagency agreement with the U.S. EPA, the Nature Conservancy, the Environmental Defense Fund, the Bezos Earth Fund, King Philanthropies, Arcadia, a charitable fund, and the Cornell Atkinson Center for Sustainability.

Cereal rye, the most widely used cover crop in the U.S., in a field at the Cornell University Musgrave Research Farm in Aurora, NY.

Matthew Ryan / Image Provided

The article originally appeared in the Cornell Chronicle.

Krishna Ramanujan is a senior staff writer for Cornell Chronicle.

More Than Maple: Cornell Research Designs Sugarbush Agroforestry Systems

The Cornell Maple Program grows 18 species of perennial fruit- and nut-bearing plants within a maple sugarbush forest. They want to help maple producers be more resilient to economic challenges and extreme weather events and offer unique products.

By Krisy Gashler

Virtually all of the world's maple syrup is produced in Canada, the Northeast U.S. and some upper Midwestern U.S. states, where natural conditions for maple sugaring are perfect: wet summers, cold winters and springs with fluctuating temperatures above and below freezing. The same environmental conditions that support maple trees also produce a host of fruits, nuts, and berries, like pawpaws, juneberries, and hazelnuts.

The Cornell Maple Program seeks to combine these natural treasures. Aaron Wightman, co-director of the maple program, is leading a multi-year study on growing high-value fruit and nut species within the 350-acre maple sugarbush in Cornell's Arnot Forest. Such agroforestry systems – in which producers collect forest products and grow agricultural crops simultaneously – can increase farming efficiency and profitability, diversify crop offerings, and strengthen business resilience. To support producers, the maple program is also developing and testing distinctive products like maple-elderberry wine, maple-pawpaw ice cream, and maple hazelnut spreads.

"There's been a huge increase in demand for products that are locally grown, all natural, and made with ingredients that customers recognize," Wightman said. "We wanted to develop more products from a diversified set of crops that would stand out in the marketplace, bring people to these farms, and help New York maple businesses be profitable."

Maple syrup production in New York has flourished in recent years, driven by consumer demand and improved technology (sap once collected in buckets and boiled has been replaced by forest-wide plastic tubing and reverse osmosis machines). In 2024, the state's maple production reached 846,000 gallons, up almost 100,000 gallons from just the year before.

Over the past three years, the maple program has conducted performance trials with multiple varieties of 18 species of fruit- and nut-bearing perennial plants. They evaluated plant performance by assessing growth and vigor and documenting disease, stress, and damage. Researchers chose plant crops that are known to grow well in shade, that can grow with minimal input from farmers, and that would pair well with maple syrup in new products, said Ailis Clyne, maple technician.

Aaron Wightman, co-director of the Cornell Maple Program, at the agroforestry research plot within the maple sugarbush at Arnot Forest.

"We chose crops that should do well in these soil and climatic conditions in a Northeast forest and that are growing in popularity among more adventurous consumers," she said.

For example, Clyne wanted to develop a maple wine that incorporated a forest-grown fruit, so she chose to pair maple with elderberry, a native fruit that grows well in the shade. Maple adds sugar and elderberry adds acids, tannins, and flavor complexity – all components that consumers expect in a wine, she said. A maple-hazelnut spread developed by maple program food scientist Catherine Monserrate has been especially well re-

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you're going to be driving around country roads, you should expect to see a few farm animals running loose.

I could go on and on with my list of how not to correctly run a grazing system, but you get the point. Having a good grazing system is far more encompassing than just letting the animals out in a field in May and then collecting them again in November. Yes, grazing can be less expensive than feeding stored feed, but it does take some effort. It is not "free" – it takes a certain amount of time, money, attention, and effort to have a successful grazing system in which the animals flourish. Graze away!

Rich Taber is Agriculture Educator for CCE Chenango, and lives on a high elevation hill farm in nearby Madison County where he grazes a herd of cross-bred beef cattle. He can be reached at rbt44@cornell.edu.

Branching Out: Veterans Grow Their Fruit Tree Knowledge

A unique learning cohort for veterans in agriculture has helped dozens of veterans grow their confidence and farming skills.

By Rich Mattingly

Veterans across New York State are gaining hands-on skills in fruit tree production through a unique learning cohort developed by the Cornell Small Farms Program's Farm Ops project. Over the past two growing seasons, the program has helped dozens of veterans grow their confidence, technical abilities, and farming networks.

Farm Ops Project Lead Nina Saeli launched the Fruit Tree Production Cohort in early 2024 to deliver targeted training in orcharding. The program pairs peer group learning with the Cornell Small Farms Program's "Introduction to Tree Fruit Production" course, a six-week online class taught by Cooperative Extension regional specialists.

"Veterans often learn best when they're surrounded by other veterans who understand where they're coming from," Saeli said. "We built this cohort to foster those connections – between veterans, trusted instructors, and hands-on farm experiences that bring the online coursework to life. They're planting real fruit trees and putting down roots."

CCE Regional Specialist Mike Basedow and Janet van Zoeren led the technical instruction for the online course, drawing on deep knowledge in cultural orchard management, pest control, and production planning. Basedow also facilitated veteran-specific cohort sessions that offered live Q&A and personalized support as participants moved through the course.

"Working with veterans is different because they come with a strong sense of purpose and openly support each other," said Basedow, reflecting on the veteran cohort sessions. "Their openness to learning made it easier to tailor lessons to their goals. Janet and I noticed the group was more engaged than usual, not shy about asking questions, and very comfortable sharing with each other."

"Veterans sometimes generate unique ideas that other veterans understand due to a common history and experiences. They are able to speak a common language at times," noted Ken Brandt, a retired veteran who is hoping to get his first orchard planted in the coming season.

Farmer-veteran Ken Brandt prepares a rootstock during a Cornell Small Farms Program Farm Ops event. Farmer-veterans who were members of the Fruit Tree Production Cohort were invited to the grafting workshop earlier this year.

Farmer-veteran Jennifer Caci prepares a rootstock during a Farm Ops event at Cornell AgriTech. Farmer-veterans who were members of the Fruit Tree Production Cohort were invited to a grafting workshop.

Instructors covered critical concepts like site selection, rootstock choice, pruning, and pest management. Veterans learned that mistakes in site planning can lead to long-term disease and productivity issues. They also explored the role of rootstocks in controlling tree size, encouraging early fruiting, and resisting pests.

Wes Roberts, a veteran and owner of Sweet Acres Orchards in Leonardsville, NY, joined the Fruit Tree Production Cohort as a guest speaker. His U-pick apple operation has become a local favorite, blending hands-on farming with community engagement. Roberts shared insights from his experience managing a working orchard, offering practical advice on orchard layout, customer relations, and seasonal challenges. His participation helped cohort members connect classroom lessons with real-world orchard management and business operation.

Cohort members built on these lessons during a March 2024 field day at Red Jacket Orchards in Geneva, NY. Navy veteran, orchardist, and business owner Joe Nicholson led a group discussion on his orchard training systems, how Red Jacket manages the scale of their operations, and led veterans through a live demonstration of pruning trees in one of Red Jacket's nurseries.

"Seeing a working orchard up close helped me visualize how to set up my own. It made all the theory real and something I felt I could actually apply," reflected one participant.

Later that day, Anna Wallis, fruit IPM coordinator for the NYS IPM Program, and van Zoeren walked participants through basic integrated pest management strategies, including monitoring thresholds, orchard sanitation practices, and the timing of organic or conventional sprays. Each veteran left with two young fruit trees to plant at home, as well as printed resources and field tools to support continued learning.

"Those first trees made it real. I planted them right away, and they're doing great," said one participant.

Cohort programming in 2025 shifted focus to one of the most critical and challenging orchard skills: grafting.

"We have several veterans currently establishing their orchards and many more in the planning stages of orchard establishment," stated Saeli. "Having the skills to graft your own fruit trees can save on start-up costs when establishing an orchard business."

Saeli also suggested that an additional benefit of being able to graft your own fruit trees is the ability to establish a fruit tree nursery with your grafted trees.

"For an orchardist, a fruit tree nursery provides dual purpose benefits. First, you have a constant supply for fresh trees to replace any of your trees that die or are not producing as intended," explained Saeli. "Secondly, it provides an additional source of farm income should you wish to add nursery sales as one of your farm business enterprises."

Orchardist Roger Ort of Ort Family Farm supported the 2025 fruit production programming. Ort introduced veterans to the history of grafting and a variety different grafting techniques and the purpose and reasons for using each of these techniques. These techniques allow growers to propagate specific fruit varieties, top-work existing trees, and preserve heirloom genetics.

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Farmer-veterans participating in a Cornell Small Farms Program Farm Ops veteran cohort event at Red Jacket Orchard last year look on as veteran and Red Jacket Orchard owner Joe Nicholson demonstrates proper pruning techniques in one of the orchard's apple tree nurseries.

Rich Mattingly / Cornell Small Farms Program

Practical Tips for Beginning Orchardists
(collected from the insights of Mike Basedow and Roger Ort):

- If you are new to orcharding, go work on an orchard for a year, a full season. Things are very cyclical with fruit trees. If you want an understanding of the rhythm of things, you need the hands-on experience.
- Use semi-dwarf rootstock and learn what rootstocks work best for your area by consulting local orchardists and CCE professionals. A dwarf rootstock, which is what you see sold at a lot of big box stores, will produce a tree that eventually falls over under its own weight.
- Don't start too big. Start with a couple of trees and keep it small. Better to make your mistakes on 5% to 10% of the area you want to plant instead of all of it.
- You have to embrace thinking years down the road if you want fruit or nut trees as part of your farm's production. Budget accordingly and don't get in over your head.
- Nurseries sell out on the hot rootstock quickly and will sometimes start selling lower-quality stock to compensate. If you try to buy all your rootstock in one year, you may not get the best rootstock.
- Consider possible sales of scion wood in your planning. Some trees are much more valuable producing scion wood than producing fruit.
- Have a pest management plan before you start. With these being perennial plants, don't plant them and wait for stuff to happen. Be proactive rather than reactive. Learn how to train your trees early and prune with a plan.

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ceived among producers and consumers at farmers markets and maple weekends, Clyne said.

The initial three-year project found that the best-performing plants grown in the maple sugarbush were pawpaw, hazelnut, Cornelian cherry, and Aronia berry. Some varieties of juneberry performed well too. Blueberries survived, but struggled with slow growth and defoliation. Raspberries and blackberries were not productive, were easily outcompeted by other species, and had mortality rates upwards of 70%.

The research was funded by Federal Capacity Funds managed by the Cornell University Agricultural Experiment Station (Cornell AES). Established as part of President Abraham Lincoln's land-grant university system, ag experiment stations in each state are devoted to research that improves local farming, environmental stewardship, and community development. The maple program has earned another three-year grant to continue studying their maple sugarbush agroforestry plantings and to study propagation methods for forest plants with culinary, ornamental, or other value, such as bladdernut, cohosh, and buckeye.

Agroforestry systems enable producers to grow more food with the same amount of land, and they help protect businesses against economically devastating crop failures by diversifying what's being grown, Clyne said. For example, this spring's maple harvest across New York's Southern Tier was down by 30% to 50% because of drought conditions last

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The sap from sugar and red maples flows abundantly at Arnot Forest on a sunny morning in March.

The finished maple syrup is flowing into a tank at the Arnot Forest maple lab.

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Veterans practiced cleft grafting during a hands-on lab at Cornell AgriTech in March. Under Ort's guidance, they grafted three apple varieties onto semi-dwarf rootstocks and took home their trees along with full grafting kits.

"The grafting workshop was a highlight," said one participant. "I didn't just watch someone do it – I got to make something myself and bring it back to my farm. Now I've got grafted trees growing that I made with my own hands. That's empowering."

The final event of the season took place in April with a tour of Ort Family Farm in Bradford, NY. The farm grows more than 600 trees, including heritage and specialty crops like pawpaws, quince, persimmons, medlars, and figs, in addition to three acres of unusual small fruiting plants. Veterans learned how niche fruits can open new market opportunities, especially when marketed directly to chefs or processed into value-added products like jams and syrups.

Offering this expert advice, Maria Ort talked through her production methods of over 100 flavors of jams, sold throughout New York State at farmers markets, wineries, and local shops.

"There are many farm business opportunities should you decide to grow fruit, and we hope to continue to offer veteran fruit production cohorts in an effort to inspire veterans to build small farm businesses that continue to support the growth of New York State agriculture," said Saeli.

Farm Ops staff say the cohort model works not only because of the technical content, but because of the relationships it builds between veterans, educators, and growers. The group dynamic creates space for questions, problem-solving, and confidence-building – things that are hard to achieve in a traditional classroom.

"Veterans come with a different mindset and level of engagement. Their mutual support and purpose drive their success in ways typical online learners don't always show," expounded Saeli.

The Fruit Tree Production Cohort is just one of several seasonal learning groups supported by Farm Ops, a program of the Cornell Small Farms Program and funded by the NYS Department of Ag & Markets. Farm Ops connects veterans to training, resources, and a peer network de-signed to support their transition to agriculture.

Learn more about Farm Ops, the veteran cohort model, and upcoming workshops at smallfarms.cornell.edu/projects/farm-ops.

With Sustainable Practices, New York Dairy Farms Lower Emissions

A new study is first to capture "whole farm" emissions from New York farms, which includes feed production, animal feeding, manure management, and energy use.

By Caitlin Hayes

A number of New York dairy farms achieve low greenhouse gas emissions due to sustainable management practices like growing a high proportion of their own feed and making the most of manure, according to new research. The findings establish the first regional baseline for dairy farm emissions using data from real farms.

In the study, published March 3 in the Journal of Dairy Science, researchers collected data from 36 medium to large dairy farms in New York State from calendar year 2022. They found that emission intensities were lower per gallon of milk than national estimates and among the lowest reported across continents. Those lower emissions were due mainly to farmers growing their own high-quality feed and using manure rather than outside fertilizers and manure treatment systems to reduce methane.

"The key finding was that New York dairy farms produce a lot of feed on the farm, and that's a huge advantage for them," said first author Olivia Godber, research associate with the Cornell Nutrient Management Spear Program in the College of Agriculture & Life Sciences (CALS). "They're doing a really good job of producing high quality crops with minimal inputs, and because those crops make good quality feeds, that is helping them get high milk yields which also lowers their emissions. This emphasis on good crop production is really helping in all the other aspects."

Senior author Quirine Ketterings, director of the Nutrient Management Spear Program and professor of nutrient management in agricultural systems (CALS), said the lower footprint – and the research to calculate it – is the result of the farmers' commitment to improving their emissions.

"What is pretty unique with this dataset is the fact that these farms are all willing to participate," Ketterings said. "There's a shared interest in learning, in knowing, an interest in figuring out the next steps."

Previous research about emissions from dairy farms was largely extrapolated from limited farm information or "representative" farms that may fail to capture important features of a farm, or diversity between farms. The study is the first to collect and analyze data that capture "whole farm" emissions from New York farms, which includes feed production, animal feeding, manure management, and energy use.

Similar to other studies, the researchers found that methane from the cow directly was the biggest contributor to emissions, accounting for 45%, with feed production at 25%. Manure management practices accounted for 20% and had the widest variability between farms. Fuel, energy, and transport made up the remaining 10%. Changes in manure management – incorporating strategies that capture methane, for example – offered the greatest opportunity for lowering emissions on some farms.

The participating farms ranged in size from around 300 to more than 6,000 cows, predominantly Holsteins; in 2022 the farms contributed 12% of the total milk produced in New York, which is the fifth largest milk-producing state. With data provided by farmers, researchers used the Cool Farm Tool, a global assessment tool developed by the Cool Farm Alliance, to calculate emissions. They then delivered individualized reports and analyses of emissions to the farmers.

The data could help farmers make decisions about the financial and environmental implications of incorporating practices that further reduce emissions. In addition to lowering the carbon footprint, sustainable practices can be associated with higher productivity and may give the farms greater access to incentives and new markets.

"If they take on a new practice on the farm, it's often not just to bring down their emissions – it's also going to increase crop yields, milk yields, reduce the amount of money they're spending on fertilizer," Godber said. "Many aim to be sustainable dairy farms, but they may also see a commercial advantage."

The reports also provided an estimate of emissions if farmers had not implemented regenerative or sustainable practices.

"Farms wanted to know their footprint. The co-ops and the supply chains were asking, but no one had the answer," Godber said. "So, we wanted to find out where farms are but also take a step back and look at where farms have come from, what their opportunities are in the future. Is it possible for dairy farms to reach

net zero? We need a starting point to understand that."

The research is part of a larger Extension effort, through the Nutrient Management Spear Program, that has been building relationships with New York farmers since 2000 and aims to help them identify, develop, and implement more sustainable and more productive management practices. Close collaboration with PRO-DAIRY, a Cornell Extension and applied research program to bolster New York State dairy farms, has further strengthened relationships.

"Under our mission, everything we do is in partnership with farmers and farm advisers," Ketterings said. "By setting up these networks, we have the unique ability to combine research with Extension – it's impossible to separate the two, because the farm supplies the data, we supply information back, we get their feedback which helps us improve and see other things in the data … It allows us to do better work, find more meaningful tools and to move forward."

Co-authors of the study include Karl Czymmek, associate director and dairy climate leadership specialist for PRO-DAIRY (CALS), and Michael E. van Amburgh, Ph.D., professor of dairy nutrition (CALS).

The study was supported with funding from Chobani, the New York State Department of Environmental Conservation, New York State Department of Ag & Markets, the Northern New York Agricultural Development Program, and USDA.

The article was originally featured in the Cornell Chronicle.

Caitlin Hayes is a staff writer for the Cornell Chronicle.

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summer and a too-warm early spring, Wightman said. Having additional crops to rely on can help producers weather bad harvests.

Growing in forests also makes crops more resilient to extreme weather and helps sequester carbon.

"In forests, extreme climate conditions are moderated for us. Droughts are moderated by leaf cover overhead and deep, rich soils that retain more moisture. Flooding is moderated because forests slow surface runoff and soil erosion," Wightman said. "At the same time, in agroforestry systems, we're growing perennial plants that can sequester carbon instead of releasing it, and we're producing very high-value nutrition."

Wightman's ambition in supporting New York maple growers comes from his desire to help rebuild communities and livelihoods in rural areas.

"Rural America is just decimated – a lot of the small farms around here have been trying to scratch out a living on these hillside farms with depleted soils, and that's a tough fight," he said. "But the resource base is there. We have all these highly productive forests, good markets close by, and consumers interested in buying locally. I think we have the possibility of an agricultural revival in New York State that will help our rural communities and contribute real food value."

This article originally appeared in CALS News.

Krisy Gashler is a freelance writer for the Cornell University Agricultural Experiment Station.

The agroforestry project is just one of many in the maple program:

Modern processing technologies – Reverse osmosis systems like the one at the Cornell maple lab are now commonly used by producers. The maple program is also testing new sap filtration technology to improve process efficiency, research that's especially important in a warming climate because sap becomes clouded with microbes and biomatter when it's too warm. To further help preserve sap quality and extend the life of plastic tubing, Wightman tests sap tubing sanitation methods.

Resources for producers & novel maple products – The Cornell Maple Program is creating food safety training materials for producers, hosting courses for beginning maple producers, and developing other unique products, such as a maple-marshmallow spread, maple kombucha, and maple skin care and bath products.

Tours & teaching – The maple program does trainings and tours of the maple plantings as part of its outreach mission. Last year the program undertook 77 presentations to about 1,600 maple producers. They host student groups, such as the Akwe:kon North American Indigenous residential hall community. Native people tapped maple trees for sap for generations before teaching the practice to European colonists.

Collecting climate & production data – Adam Wild, co-director of the maple program, is collaborating with partners across the U.S. and Canada to gather climate data to better understand how climate change is impacting sap production. The sensors monitor atmospheric pressure, temperature, relative humidity, soil moisture, internal tree pressure, individual tree sap flow, systemwide average sap flow per tap, and sap sugar content.

Bringing the Farm of the Future to Life

CAST offers researchers and companies a place to test and demonstrate novel agricultural technologies in real-world farm settings.

By Jackie Swift

Research and development of new agricultural technology takes time. Prototypes of devices such as biosensors for tracking livestock health and soil moisture sensors for crop fields require multiple iterations of testing, validation, and redesign before they are ready for commercial use. But researchers and companies need to test and demonstrate these novel technologies in real-world settings. That is when they turn to the Cornell Agricultural Systems Testbed & Demonstration Site (CAST) for the Farm of the Future.

Graduate student Haowen Hu tests a newly installed Cynomys environmental sensor in the dairy barn at CURC.

Jackie Swift / Cornell CALS

CAST collaborator Prof. Quirine Ketterings (L) and Postdoctoral Associate Subhashree Shrinivasagan ready an agricultural drone for flight at CURC.

Photo by Agency 29 / Hill + Valley Creative

"The mission of a testbed is to provide a place where technology can be tested without major repercussions if a prototype or an immature technology should fail or prove to be less effective than hoped," explained Dr. Julio Giordano, professor of dairy cattle biology and management and director of CAST. "To have an agricultural testbed like CAST at a land grand institution like Cornell is especially beneficial because we can provide unique infrastructure and expertise you can't get anywhere else."

CAST is made up of three real-world, commercial-scale farms in New York State: the Cornell University Ruminant Center (CURC) in Harford; the Musgrave Research Farm in Aurora; and the Cornell Teaching Dairy Barn in Ithaca. Together, the farms encompass two crop production units with approximately 2,550 acres available and two dairy herds of approximately 825 adult cows and 500 youngstock.

In 2023, Giordano received a four-year, $4.3 million grant from USDA's National Institute of Food & Agriculture (NIFA) to establish CAST at Cornell as part of the federal Farm of the Future program. Since then, he and his colleagues have created the infrastructure necessary for CAST to function as both a testbed and a demonstration site for novel, data-driven products and management practices for crops and livestock.

"When we started CAST two years ago, we had a limited number of different technologies working at our farms," Giordano said. "Now we have around 20. But it's not just about how many digital tools and devices we have; it's about the number and wide variety of data streams they generate and how these data are used. These data streams help us better understand and successfully manage the complex biological systems involved in field crops and dairy production."

CAST has approximately 40 data streams these days. Giordano and his colleagues are working on methodologies to combine the streams in various ways to facilitate farm decision-making. For instance, combining data from soil moisture monitors, robotic nitrogen application, and yield monitors can help ag producers make informed decisions about what, when, and where to plant.

"By combining all these devices and the data they generate, we have increased tremendously our capacity to understand our cows, our soils, and our crops," Giordano said. "We used to monitor and understand a small portion of what was happening. Now we can monitor and under-stand a lot more."

Ultimately, CAST seeks to develop a prototype ecosystem of networked technologies and techniques. An ecosystem such as that can generate integrated data, which producers can use to understand everything that is happening on their farms, Giordano explained. Then they can make informed decisions that will help them increase production, sustainability, and animal welfare.

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New York Hybrid Grapes: Cheers & Challenges

After delving into the opportunities and challenges of hybrid grapes with Finger Lakes winemakers, one researcher is leveraging their insights to advance global research on hybrid grapes.

By Catherine Dadmum

All wine needs a story, and hybrids tell a great one.

Some wines narrate tales of the land, whispering of rocky soils and steep cliffs. Others speak of heritage and tradition, showcasing techniques honed over centuries, proud family lineages, and ancient cellars. Some wines exude prestige, gracing glamorous dinners and commanding high prices at auctions. Each wine has its own story, yet the narrative can shift with the storyteller.

To me, hybrid wines tell a story of underdogs, of perseverance, and of creativity.

As a Ph.D. student at the Cornell Craft Beverage Institute (CCBI), I investigated the world of "interspecific hybrid" grapes and wines – so named because they result from crossing two or more grape species. Together with Molly Japp, a technician at CCBI, I interviewed area winemakers and uncovered intriguing insights and perceptions.

Current hybrid development focuses on cultivars that produce high-quality wine while addressing climate change, disease pressure, and reducing pesticide and fungicide use. By observing traditionally-bred crosses and monitoring genetic markers, breeders aim to create cultivars with desirable fruit qualities of *Vitis vinifera* and resistance from other *Vitis* species against fungi, pests, and diseases.

Hybrid grape cultivation dates back to the 1800s, initially using non-*vinifera* species for disease resistance, crucial for the wine industry's expansion and combating the European phylloxera epidemic. Early hybrids had a negative stigma due to low-quality parents and undesirable aromas. Today, however, hybrid development prioritizes high-quality wine attributes, though they often remain "outsiders" compared to *V. vinifera*.

Increased interest in hybrids due to environmental pressures and their complex history necessitates evaluating their current status in the wine industry to uncover future potential. Collaborating with Dan McCole from Michigan State University, we initiated a project to explore perceptions of hybrid grapes and wines. In academic and industry settings, "hybrid" can be a taboo term or an exciting concept, depending on the storyteller.

To understand hybrids' future role in the wine industry, we needed to assess their narrative. We suspect that while the industry has a complex view of hybrid grapes, consumers mainly care about the wine's quality, not its grape ancestry. The story itself can influence consumer perception. To explore this potential disconnect, we interviewed five professional winemakers in the Finger Lakes region.

One of my takeaways is that it is immediately obvious that the importance of hybrids to the local wine industry can't be ignored.

"If I didn't have hybrid grapes, some years would have been tougher than others," said Chris Stamp, co-owner at Lakewood Vineyards. "There were certain years where the Riesling crop was so absolutely minuscule that we would have had to lay people off."

Winemakers highlighted the consistency that hybrids provide.

"Oh, non-*vinifera*'s keeping the lights on, 100%," said Phil Plummer, winemaker at Montezuma Winery.

Others shared the economic benefits of having wines based on hybrid varieties on their store shelves.

"Our Vignoles wine outsells our Riesling at the same price point, and Marquette outsells our Petite Syrah three-to-one," said Dan Budmen, owner of Scout Vineyards. "From a quality standpoint, I would argue that in many years the quality of hybrids is better than that of *vinifera*. They don't rot as easily and they ripen more consistently."

The quality of hybrids these days is an important sticking point for winemakers.

"I think that these are really good wines where we can compete price-wise; we can make really excellent, high-end reserve wines with them if we want to, but we can also make everyday wines that are accessible. So for us, there's never going to be a reason to step away from hy-brids," said Plummer.

All the winemakers that were interviewed highlighted that hybrids, with their versatility, lack of preconceived expectations, and lower financial barriers are ideal for experimentation and innovation. This flexibility allows them to create novel wines that consumers love and that sell out annually, making it easier to develop a diverse product portfolio.

One winemaker noted that hundreds of years of experience with Riesling have established clear expectations for the wine, whereas Cayuga White, with only four or five decades of history, is still defining its identity. This lack of preconceived expectations gives room for

A researcher holds a hybrid grape bunch.

Images provided

experimentation with interesting styles, and new ways to showcase local grapes – something that a new generation of consumers seems to value immensely.

"I think people are embracing the chaotic nature of wine. Maybe we just need to be a little bit looser with things and see what happens. I think this is reflected in our product and it's made it better," said Plummer. "The more people are willing to kind of step outside of the rigid recipe to make a 90-plus-point wine, the more cool stuff we're gonna come up with, and I think customers want to see you take that chance. At least the younger ones do."

This was not the only instance that a "younger generation" of consumers was mentioned. All winemakers remarked on the notable shift in consumer mindset and priorities. Some interviewees described consumers as seeming more adventurous, curious, and open-minded. Winemakers with a few decades of experience particularly commented on the shifts they have witnessed regarding hybrid perception.

"A lot has changed in the last 20 years," said Craig Hosbach, winemaker at Fox Run Vineyards. "They don't come in asking for Chardonnay or Merlot, like maybe

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To reach this goal, CAST also engages in partnerships with leading crop and animal technology providers. Currently CAST has over 15 partnerships, with more companies joining all the time. The industry partners range from companies seeking to test or demonstrate a new iteration of a commercial technology to startups working on novel innovations not yet on the market.

One of CAST's earliest industry partners is Labby Inc., an agritech startup located in Rochester, NY, that is currently pioneering real-time on-farm milk testing for the modern dairy supply chain. All three of Labby's product lines underwent iterative testing at CAST.

"The operational expertise of the CAST team out at CURC gave us a true proving ground to pressure-test our products in a real commercial farming environment," said Julia Somerdin, Labby co-founder and CEO. "The collaboration helps us shorten our product development cycle and bring market-ready solutions to the dairy industry much faster.

"Through CAST, Labby validated the accuracy and reliable of its inline milk analyzer and flow meter," she continued. "The real-world setting also helped us introduce new innovations – including a camera-based cow identification system."

Martin Perez (rear), CAST manager, shows Labby tech to CAST collaborator Adedeji Adetunji at CURC. Adetunji is visiting from the University of Arkansas at Pine Bluff where he is an assistant professor of animal science.

Jackie Swift / Cornell CALS

Rowbot Systems, a Minnesota company developing a multi-use robotic platform for row crops, is another CAST partner. Last summer, Rowbot brought its robotic platform to CAST for testing in the field at Musgrave Research Farm.

"Working with CAST researchers to test our platform's cover crop seeding ability helped improve our understanding of what questions researchers find most pressing and how their work can impact farmers," said Kent Cavender-Bares, Rowbot co-founder and CEO. "It's always good to be involved in path-breaking activities like CAST because it can help provide exposure to researchers and farmers."

Somerdin, too, is excited about the new doors CAST can open for Labby. "The collaboration has been transformative," she said. "With our newly refined products, we are preparing to expand our installations across more farms. Additionally, CAST not only helped us improve product per-formance but also open doors to strategic networks across the agritech and dairy ecosystem."

This article was originally printed in CALS News.

Jackie Swift is the communications specialist for the Cornell CALS Department of Animal Science.

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their parents did before them."

The selling points that hybrids create a more sustainable future for our industry, as well as that they are cultivars unique to our region which thrive locally, help create a particularly appealing narrative as well.

"The older generation wants what everybody around them has, as a status symbol, and the younger crowd is looking for a status symbol with totally different parameters," said Plummer. "They want something that nobody else has seen before, because that's the key to cool for them. It's not mirroring what their peers are doing. It's bringing something totally new to the table, and we can nail that with hybrids all the time."

A scrappy story of underdogs, hybrids offer an engaging and unique narrative that resonates with an evolving consumer base. However, several potential pitfalls threaten the burgeoning hybrid renaissance.

First, the price point. Historically, hybrid wines in the Finger Lakes have been priced lower than *V. vinifera*, which seems to cause some perception-related issues. Yet, it's a challenging issue to address, as even a modest increase of a dollar in retail price (or 50 cents in distribution price) can lead to a significant drop in sales.

"We're telling people they're cheaper. We're telling people their quality isn't as good by doing that," said Hosbach. "So we're apologizing and we don't realize we're doing it. If we're charging $20 for a bottle of Riesling, we should be charging $20 for a bottle of Traminette."

Researchers test hybrid grape juice for quality.

The key factor here, of course, is the wine quality. Some winemakers remarked on the success they've witnessed when hybrids are priced the same as *V. vinifera* – and they sell, because the quality is there.

"Where is the ceiling?" Plummer wondered. "It's proving to everybody that it can be done. It's just a matter of committing to it."

The second concern was the risk of accidental bias due to confusion from the term "hybrid." Although these unique cultivars have a great story behind them, many consumers confuse the term "hybrid" with "GMO," which can incite undue bias. If the hybrid term is used, an explanation often needs to accompany it.

A potential future hybrid grape cultivar in a Cornell research vineyard.

"Why even mention it? It's a locally grown grape, you know? I think it's that easy. Pinot Gris is actually a mutation of Pinot noir, but we don't explain that. So why are we talking about 'the hybrid'?" mused Hosbach.

Considering this insight, the question is whether there is a future where the narrative no longer separates *V. vinifera* from non-*vinifera*, if wine quality is present … which leads to the third concern.

While many hybrids produce consistent, high-quality wines, this isn't true for all. Three interviewees shared cautionary tales of grapes planted in the Finger Lakes decades ago because they grew well, before the wine industry caught up. Early plantings of inferior varieties overshadow the potential of newer, higher-quality hybrids. Some believe the region should focus on high-quality cultivars that make good wine, not just what grows well, which would also aid name recognition. Achieving this would require time, money, and organization.

The fourth and perhaps greatest challenge is the barrier hybrid-based wines face in wine magazines, liquor stores, and restaurants. Winemakers unanimously felt that consumer perception of hybrids is positive, and that consumers either don't know or don't care about the parentage and species of the grape as long as wine quality delivers. But as soon as the conversation arises with industry tastemakers, hybrids are met with bias, leading winemakers to avoid submitting their hybrid wines for scoring altogether.

None of these challenges can be resolved overnight, just as wine culture itself didn't emerge overnight. The narrative we craft around hybrids will significantly influence their development in the coming decades. As the global conversation on hybrid grapes and wine grows amidst a rapidly changing climate, what story will we tell? How do we balance tradition and innovation in the evolving wine industry?

As Ben Riccardi, owner of Osmote Winery, eloquently put it, "[It's] not hybrids versus *vinifera*. Hybrids with *vinifera*. A unified path forward to increased acreage and better vineyard sustainability."

This article was originally featured in CALS News.

Catherin Dadmun completed her Ph.D. in food science and technology at Cornell University. She is now a postdoctoral associate at the University of Burgundy Europe in Dijon, France.

Cover Crop Challenge Lets Students Compete & Grow

Cornell AES manages farms and greenhouses that support research but are also unique teaching resources. This is the sixth story in a series about on-farm teaching; in Cover Crops in Agroecosystems, students explore the uses of cover crops and assess their benefits.

By Krisy Gashler

How better to learn with classmates than to soil your undies together? Students in the Cover Crops in Agroecosystems (PLSCI 4125) course learn about the importance of soil nutrient cycling by, among other things, burying a new pair of cotton underwear at the beginning of the semester, then pulling it out at the end to see how much it's decomposed.

"If you pull the undies out and they're filled with holes, what you're seeing is the benefit of our beautiful microorganisms in the soil performing nutrient cycling and all the other ecosystem services that these little guys provide," said Nazir Adam Sharifi '24. Sharifi took PLSCI 4125 in autumn 2023 and is now a graduate student in the lab of Matthew Ryan, associate professor in the School of Integrative Plant Science, Soil & Crop Sciences Section.

Ryan teaches Cover Crops in Agroecosystems, in which students learn about the benefits and logistics of planting cover crops, like legumes and grasses, in between cash crop plantings. The practice sequesters carbon dioxide, improves long-term soil fertility, and reduces soil erosion – especially important as the changing climate increases the frequency and intensity of extreme rainfall events.

"Cover crops are one of the primary ways that farmers can increase the sustainability of their cropping systems," Ryan said. "This conservation practice offers ecological benefits, like supporting beneficial insects and reducing water pollution, and it often results in higher yields over time for farmers because of improved soil health."

The class is one of over 40 that enrich student learning by hosting experiential activities at the research farms and greenhouses managed by the Cornell University Agricultural Experiment Station (Cornell AES).

One of Ryan's most impactful activities is the "Cover Crop Challenge." Students get to choose from among 12 different species, such as crimson clover, annual ryegrass, mustard, and oats, to create their own cover crop mixtures. They then plant their mixtures indoors, in one of the Cornell AES greenhouse facilities, and outdoors, in the Crops Garden at Campus Area Farms. Eight weeks later, students take a host of measurements to assess the effectiveness of their cover crops – insect and floral diversity, total biomass, weed suppression, and more – and they calculate the economic efficiency of their mixtures.

Ryan developed the Cover Crop Challenge as a teaching activity in 2013 for his class Sustainable Agriculture: Food, Farming, & the Future (PLSCI 1900), which will be offered again in autumn 2025. Between 2021 and 2023, Ryan worked with colleagues at universities across the country to teach a multi-institutional course Cover Crops in Agroecosystems (PLSCI 4125/6125), which included the Cover Crop Challenge. Students from Cornell, Clemson University, Michigan State University, University of Nebraska-Lincoln, University of New Hampshire, and University of Kentucky competed against each other to grow cover crops that were the biggest and most economical. A December 2024 journal article about the Cover Crop Challenge, co-authored by Ryan and 10 colleagues, explores the benefits of the learning activity and offers a guide for others interested in using it.

Students assessing beneficial insect activity in their cover crop mixtures at Campus Area Farms. (R - L) Margaux Hein, Martin Ganev, and classmates in PLSCI 4125.

Students in Matt Ryan's class are sampling biomass from their cover crop mixtures in a Cornell AES greenhouse facility on campus.

Students in Matt Ryan's class are busy collecting samples from the cover crop mixtures they designed and planted for the Cover Crop Challenge

Matt Ryan / Cornell CALS

Natasha Djuric, a graduate student in Ryan's lab, took PLSCI 4125 in autumn 2022 and co-authored the new article.

"The most impactful thing for me was learning what different people choose to prioritize," Djuric said. Some students were most concerned with carbon sequestration or preventing soil erosion, while Djuric's top priority was growing the most flowers to feed pollinators. Students from farming families often prioritized oats, because they knew they were cheap to plant and would grow quickly, she said.

"What we prioritize is a really big factor in deciding which cover crops to use, or whether to use cover crops at all," she said. "In trying to promote cover crop adoption, it's really important to see other people's perspectives."

For Sharifi, the course brought together complementary elements of key challenges he wants to help address: climate change and agricultural sustainability.

"I came into Cornell focused on the environment and sustainability, but I fell in love with ag, in part because I realized how important ag is for sustainability," he said. "We have a growing population of 8 billion people, and we need to address problems like climate change and herbicide resistance – modern ag is facing an onslaught of these problems. We haven't seen a revolution in agriculture since the Green Revolution, and we're due for another one. I want to be part of that."

This article was originally published in CALS News.

Krisy Gashler is a freelance writer for the Cornell University Agricultural Experiment Station.

Jake Perno, a student in PLSCI 4125, holds a tillage radish from his cover crop mixture in the Crops Garden at Campus Area Farms.

Carrying Capacity

How many sheep can you raise per acre?

By Ulf Kintzel

The question about how many sheep per acre one can raise is almost guaranteed to be asked when people inquire about my White Dorper breeding stock, especially when they are beginners. It also is the question that is the hardest to answer because it depends on so many different factors.

Let's first define the term: Carrying capacity means how many sheep can be raised annually on an acre. "Sheep per acre" always addresses the ewes but also includes their lambs without specifically mentioning them.

Let's calculate an example with an average lambing percentage of 150% (1.5 lambs/ewe) annually: Two sheep per acre means two ewes and three lambs per acre.

The carrying capacity can vary widely, depending on many different factors. Here are some examples:

Soils – The fertility and condition of the soil types on your farm matter. First, the potential the soil has for production, its ability to drain, and its water-holding ability have to be assessed according to its composition. Soil maps and descriptions will do that for you. Then one would have to evaluate how well-maintained the soils are. What is the percentage of organic matter? What is the pH level? Both have an influence on the availability of nutrients. Soils can also be eroded or depleted if improper farming was practiced.

Climate – The climate will influence your growing season. A long winter, especially with heavy snows, followed by a relatively short growing season affects your carrying capacity negatively. Areas that have little to no snow with a very long growing season where you can possibly graze year-round have a higher carrying capacity since there is little need for making hay.

Weather – The weather in any given year can vary greatly. Droughts can seriously curb the carrying capacity. Too much rain has also a negative impact. Heat will lead to a summer slump in growth.

Winter Feed – If you buy all winter feed, your carrying capacity will be higher than when you plan on making hay or baleage on your own farm. If you also intend to feed grain, you will likely increase your carrying capacity even more since you will bring in additional nutrients.

Fertilizer – How much fertilizer do you intend to spread, if any? Whether you use manure or commercial fertilizer, fertilizing will increase your carrying capacity.

Pasture shift: A daily pasture rotation increases the carrying capacity significantly.
Ulf Kintzel / White Clover Sheep Farm

Grazing Management – Rotational grazing will allow for a higher carrying capacity than set-stock grazing (no pasture rotation). The more frequent the pasture rotation (ideally once a day), the more sheep can be grazed per acre. Set-stock grazing systems have by far the lowest carrying capacity.

Pasture Management – Observing proper pasture rest, leaving residual of about four inches after grazing, and bushhogging seed stems and undesirable weeds before seeding will all increase carrying capacity.

Stockpiling Pasture – Pasture can be set aside to grow in late summer and early autumn. That is called stockpiling. It will then be grazed during late autumn and early winter, in favorable climate even until the growing season starts again in spring. Stockpiling pasture will significantly reduce your cost, but it will also reduce your carrying capacity.

Profit Margin – With a substantial increase in the number of sheep per acre, your input per unit (meaning per sheep) will rise. For example, at a certain number, the number of days you graze per season will decrease, and more money will be spent on stored feed. While your profit may still go up, your profit margin per lamb will shrink.

Other inputs like fertilizer and grain feeding will also

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Growth Across Fields: Scientific Collaboration Tackles Farming Challenges

A new study shows how agriculture's toughest challenges require coordinated breakthroughs in biology, chemistry, engineering, and data science.

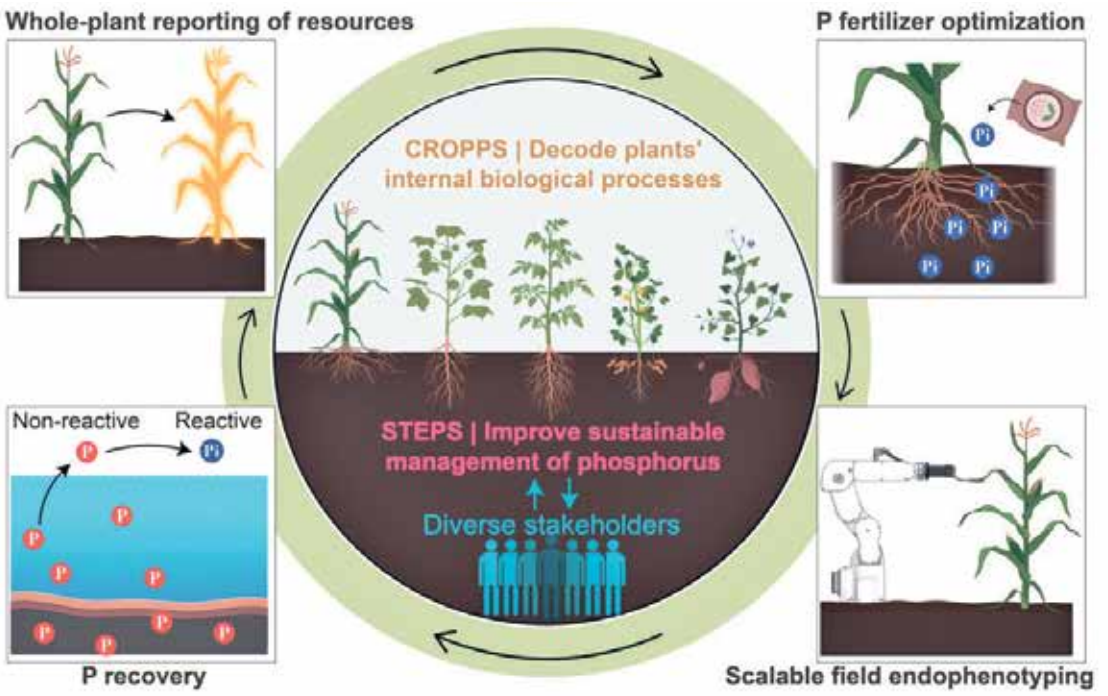
By Matt Hayes

From soft robots crawling through crops to bio-based fertilizers that protect waterways, the future of farming lies at the intersection of scientific disciplines, according to a new study describing how agriculture's toughest challenges require coordinated breakthroughs in biology, chemistry, engineering, and data science.

The study, published in Global Change Biology, presents five case studies that demonstrate how this kind of deep collaboration can transform crop monitoring, fertilizer use, and water management. It was completed by 25 researchers from two Science & Technology Centers (STCs) of the National Science Foundation (NSF): the Center for Research on Programmable Plant Systems (CROPPS), led by Cornell, and the Science & Technologies for Phosphorus Sustainability (STEPS) Center based at North Carolina State University (NCSU).

"Working across disciplines doesn't just expand our toolkit – it reshapes the questions we ask," said Vesna Bacheva, a mechanical engineer in the Smith School of Chemical & Biomolecular Engineering and Plant Biology Section of the School of Integrative Plant Science, who co-authored the research with Imani Madison, a postdoctoral researcher in the Department of Plant & Microbial Biology at NCSU.

Feeding a growing global population while managing limited natural resources presents ongoing challenges for scientists, engineers, farmers, and policymakers, the researchers said.



The monitoring system framework of the Center for Research on Programmable Plant Systems.
CROPPS / Cornell University

One case study features nanosensors and soft robotics developed through CROPPS to help monitor plant water status in the field. Another, based at STEPS Center, explores fertilizer innovations and phosphorus recovery systems that may support more efficient nutrient use.

"These kinds of integrated solutions are possible because researchers in our centers are working creatively across disciplinary boundaries to achieve common goals," said Abe Stroock, the Gordon L. Dibble Professor in the Smith School of Chemical & Biomolecular Engineering and adjunct professor in the School of Integrative Plant Science, director of CROPPS, and a senior author of the study.

The study also examines how talking to agricultural stakeholders – including farmers, engineers, and university collaborators – can inform research direction and help guide the development of practical technologies. Social science researchers involved in the project conducted interviews and surveys to understand adoption considerations for technologies related to phosphorus recovery and nutrient use.

The authors emphasize the value of institutional support for collaboration and training across disciplines. They also note that the approaches presented in the paper may be adapted to address other topics in agricultural innovation.

"This work is an example of how different kinds of scientific expertise can be brought together to develop new approaches to agricultural production and resource management," said Margaret Frank, associate professor in School of Integrative Plant Science at Cornell and one of the corresponding authors of the study.

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A researcher flies a drone over the CROPPS experimental fields in Arizona.
Davis De Dios Media / Provided

Capacity ***from 15***

increase your cost per unit and reduce your profit margin. How much would you like to profit per lamb once you paid your expenses? The lower the profit, the more it becomes a question if a higher stock density is worth the operator's time. That is entirely an individual decision. You will be the judge of it.

I have thus far not given you any hard numbers. That is because each factor I listed is different for anyone reading this. You will have to do the thinking and calculating yourself. I can tell you how to approach an actual number, though: start at the low end of a possible number of sheep per acre. That would be two sheep per acre, perhaps a little less but definitely not more. After a year, you can assess if your number was too low and you can increase your flock size by retaining more ewe lambs than needed to replace the ewes you culled or by buying more breeding stock.

Going from too low of a number and going to a higher number is workable. The other way around is problematic and potentially costly. If you start with too many sheep per acre, you will run short on pasture. You will then either sacrifice pasture management and start a vicious downward cycle, or you'll need to buy expensive stored feed. Perhaps you will even need to de-stock at a time when prices are not favorable.

Whatever you do, don't plan according to ideal circumstances. Leave a little breathing room. Farming will always throw a wrench into your planning. The weather especially has a long track record of doing exactly that.

Ulf Kintzel owns and operates White Clover Sheep Farm and breeds and raises grass-fed White Dorper sheep and offers breeding stock suitable for grazing. He is a native of Germany and has lived in the U.S. since 1995. He farms in the Finger Lakes region. His website is www.whitecloversheepfarm.com. He can be reached by email at ulf@whitecloversheepfarm.com or by phone during the "calling hour" indicated on the answering machine at 585.554.3313.

Tom and Sea: Bringing a New Generation into Farming

One farmer's wish to see his land stay in farming, with no family to leave it to, led to the creation of a community trust land access project that supports beginning farmers starting their own operations.

By Jamie Johnson, Kacey Deamer, and Olivia Young

Farming can bring people together in many ways, from meeting neighbors at a market to sharing a meal at a table. The connections between people, and the land they share, is special. One such connection is the story of Tom and Sea, and the founding of the West Branch Commons, which we have featured in a short film and two podcast episodes share on the Cornell Small Farms Program website (smallfarms.cornell.edu).

Tom Hutson is a third-generation dairy farmer nearing retirement, and Sea Matías is a beginning farmer from the Bronx. Tom's greatest wish is to see his 257 acres stay in farming, as his life's work has been tending the land. Without family to take over the farm stewardship after him, Tom worked with American Farmland Trust (AFT) for more than a decade to create a transition plan. Neighboring farmers and organizations joined the conversation and together began imagining what equitable land access might look like for the next generation of farmers.

The West Branch Commons (catskillsagrarianalliance.org/wbc) was born out of those conversations, and this new organization will be taking over the farm and offering 99-year affordable leases to historically excluded beginning farmers to start their own operations.

One of the greatest challenges facing a new farmer is the search for land. It is difficult and costly to find quality acreage with the infrastructure needed to support a budding agricultural operation. However, there are many organizations trying to change this. The second episode of our "Small Farms Radio" podcast explores the founding of the West Branch Commons, a land access project that is working to bring land, logistical support, community, and sustainability to beginning farmers in Delaware County, NY.

Sea and Tom quickly forged a connection, and the timing was right for Tom to make his land available to farm.

Tom dreamed of farming on his family's land for the rest of his life after graduating college, but pressure from large industrial dairy farms drove him into debt. Tom was forced to sell his cows and lease parts of his property, but he refused to let go of his land for good. He wanted to sell his family property to someone like him who would honor land and respect the role of agriculture in the community.

That's when Tom heard of Tianna Kennedy, who was looking to start a nonprofit land access project that would prioritize regenerative agriculture and food security for the surrounding community. He decided to partner with her to realize her project.

"Why did I pick what I did with the farm last year and this group of kids? Because they want the same thing [as me]," Tom said.

The project born out of the partnership between Tom and Tianna was West Branch Commons, a community trust land access project that supports beginning farmers. In partnership with the Catskills Agrarian Alliance, the nonprofit that owns Tom's former farm offers 99-year, affordable farmland leases. Additionally, they offer logistical support to market and distribute farmers' products upstate and into New York City through the 607 CSA (the607csa.com), a community-supported agriculture program. In the future, they plan to construct housing that will build a tight-knit community of farmers at West Branch.

Programs like West Branch allow beginning farmers to find a foothold in agriculture.

Sea Matías is one of the farmers who has been deeply involved in the creation of

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Tom and Sea *from 17*

the West Branch Commons. When Sea's grandmother passed away, they wanted to connect with her again through plants and the outdoors. They decided to join Farm School NYC, where they learned how to farm in an urban setting. Sea became an apprentice at Morning Glory Community Garden in the Bronx, but soon grew bigger ambitions and wanted to scale up to a farm of their own.

Sea quickly learned that finding one's own land is not as easy as it sounds. Land was expensive and hard to find, and they lacked family support or other means to fund a lease. They decided to attend a meeting of AFT, where they learned about the West Branch Commons and met Tom.

"It's very competitive to get financial support and it's also really hard to find land," Sea said. "This opportunity with Tom and with American Farmland Trust and the West Branch Commons is like a needle in a haystack opportunity, a once in a lifetime chance to get equitable land tenure."

Sea signed a lease on the Commons land and began Serra Vida Farm (serravidafarm.com) in 2024. Their farm became one of the anchor lessees on Tom's land, managing over an acre of vegetables, flowers, and herbs, grown for their community in the Bronx and the local community around Delancey.

Sea also helps Tom with his herd of beef cattle on the land and emphasizes the importance of receiving generational wisdom and the ability to "see the land through Tom's eyes" as its lifelong steward.

People like Rhiannon Wright, a program coordinator at the Center for Agricultural Development & Entrepreneurship (CADE, at cadefarms.org), believe that stories like Sea's and programs like West Branch Commons could be the future of small and regenerative farming.

"Land access is the number one issue that beginning farmers are facing, and the cost of land is the number one reason why," Rhiannon said. "Beginning farmers are being really clear that we need new models of land tenure … the income that is possible from running any type of regenerative farm enterprise just really isn't aligned with the cost of land."

Rhiannon highlighted the participatory nature of West Branch and the many supports that it offers as a source of potential for the land access model.

"One of the guiding pieces has been that the majority of the most active project team members have been farmers," Rhiannon said. "The project has started with individual farmers saying that they have a need or have a resource … The key piece is that this project has been designed to serve as many farmers as it can."

With the help of organizations like the Pace University Law Clinic and the Watershed Agricultural Council, West Branch provides an innovative tenure model to support beginning farmers throughout the farming process, allowing farmers to focus on sustainable, fulfilling, and community-oriented production.

When asked what it feels like to be a beneficiary of the services of the nonprofit, Sea described it as "a hug."

"I feel very supported … I have developed a community and family here," they said. "For someone to understand what I'm trying to do, and what the farmers of this Commons want to do, and what they're looking for, and believing in, that is just incredible."

Tom decided to sell his farm to American Farmland Trust in exchange for cash and a charitable gift annuity that will provide him with income for the rest of his life as he transitions out of farming.

Learn more about Tom and Sea's story by watching their short film on the Cornell Small Farms' YouTube channel at youtube.com/user/cornellsmallfarms. Hear more about the founding of West Branch Commons on episodes two and three of the "Small Farms Radio" podcast.

The farmers of the West Branch Commons are currently leasing the land from AFT while raising funds to purchase the property for permanent, secure access for the farmers within the commons.

Courtesy of Farmland for a New Generation New York

Jamie Johnson is the multimedia producer for the Cornell Small Farms Program. Kacey Deamer is the program's communications manager. Olivia Young is an intern with the program. AFT's Farmland for a New Generation New York team also contributed to this article.

Upcycled Grape Pomace in Chicken Feed May Improve Gut Health

Cornell researchers investigate utilizing grape waste for poultry feed.

By Laura Reiley

New York State's grape industry produces 30,000 tons of grape pomace waste each year. Nationally, that number is roughly 1 million tons.

The grape skins, seeds, and stalks left over from the wine and grape juice industries may provide new opportunities to improve the health of chickens and other animals.

In a paper titled "Concord Grape Pomace Extract Impacts Dextran Sulfate Sodium-Induced Inflammation in Ovo," published April 28 in the Journal of Functional Foods, three Cornell researchers explored how to optimize spent grape pomace as a sustainable dietary ingredient with health and nutritional benefits for broiler chickens.

The corresponding author is Elad Tako, associate professor in the Department of Food Science in the College of Agriculture & Life Sciences. Co-authors are Melissa Huang, doctoral student in the field of food science, and Eliot Dugan, who did an honors thesis in Tako's lab.

The objective of this study was to evaluate the potential anti-inflammatory effects of grape pomace in the intestines of fetal chicks.

While the research is relevant to humans and other species, in the broiler chicken industry, where an animal goes from birth to harvest in just 42 days, an extract made of grape pomace was shown to reduce inflammation and thus decrease risk of other diseases.

With rapid growth a crucial goal, "low-grade inflammation is the baseline in the broiler industry," Tako said. "What we propose here, for the first time, is to show that grape pomace extract could potentially decrease the susceptibility to these other diseases and negative aspects that inflammation would lead to. Inflammation weakens the immune system and opens the birds to other pathogens such as avian flu."

Some grape pomace is reincorporated into animal feed or repurposed as fertilizer, but a majority ends up in landfills, making it a significant environmental and economic burden. Huang, who led the study, aimed to determine whether grape pomace, which has varied phenolic com-pounds strongly associated with anti-inflammatory effects, is indeed anti-inflammatory.

To find out, they administered one injection in the amniotic fluid in chicken eggs to induce inflammation, and then a second one of a grape pomace extract to intervene.

It was shown to improve symptoms of gut inflammation and improve intestinal health, Huang said, which suggests a need for further investigation to optimize grape pomace's anti-inflammatory effects.

"Studies show that fiber and polyphenols, on their own, can affect inflammation," Huang said. "We need to differentiate which specific compounds in grape pomace are making this difference."

Tako and Huang's previous work explored how to optimize spent brewers' grain as a sustainable dietary ingredient with gut health and nutritional benefits for broiler chickens. With a valuation of $350 billion globally, the broiler feed industry seeks nutritionally beneficial ingredients that also happen to be more affordable because they come from waste streams.

Dugan, who will return to Cornell this autumn as a doctoral student and who recently was the recipient of the 2025 SUNY Chancellor's Award for Student Excellence, is also exploring the effects of grape pomace extract on skeletal muscle in poultry.

"We're looking to see if the polyphenols in grape pomace indirectly benefit muscle, research that could have implications for humans and other animals," Dugan said.

For the poultry industry, where nearly three-quarters of production costs are bound up in what the birds eat, finding an inexpensive way of maximizing flock health and minimizing landfill-bound waste could be something to crow about.

This article originally appeared in the Cornell Chronicle.

Laura Reiley is a staff writer for the Cornell Chronicle.

Collaboration ***from 16***

The research was supported by the NSF through awards to CROPPS and the STEPS Center, with additional support from the Schmidt Science Fellows program and the Kavli Institute at Cornell for Nanoscale Science.

Additional CROPPS authors include Mathew Baldwin, April Gu, Mehmet Ilman, Jen Liu, Sijin Li, Anand Mishra, Gloire Rubambiza, Robert Shepherd, and Hakim Weatherspoon from Cornell and Mark Beilstein and Jesse Woodson from the University of Arizona.

This article originally appeared in the Cornell Chronicle.

Matt Hayes is the external relations and communications manager for grant-funded projects at Cornell University's School of Integrative Plant Science.

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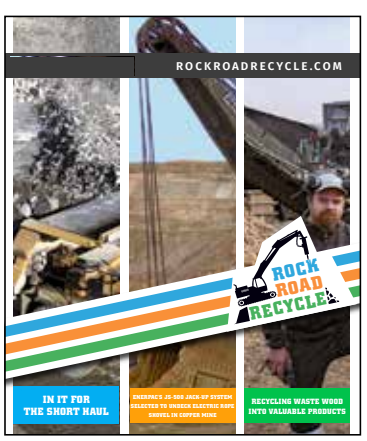

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