2019 Annual Report of Accomplishments and Results

Vermont
University of Vermont Extension
University of Vermont Agricultural Experiment Station

I. Report Overview

The NIFA reviewer will refer to the executive summary submitted in your Plan of Work. Use this space to provide updates to your state or institutions as needed.

1. Executive Summary (Optional)

Please refer to the Executive Summary submitted in our FY21 Plan of Work (alternatively, you may reference our FY20 Plan of Work). This will provide the most up to date overview of Vermont's critical issues and how we, the University of Vermont Agricultural Experiment Station (AES) and UVM Extension (EXT), work together to address them.

Please note that in FY19 we had not yet transitioned to the new Critical Issue areas outlined in our FY21 Plan of Work. The accomplishments described in this report are instead organized by the following Planned Program areas:

1. Global Food Security and Hunger
2. Community Development and the Personal and Intellectual Development of Youth and Adults
3. Climate Change
4. Sustainable Energy
5. Childhood Obesity
6. Food Safety

As demonstrated in past years, it is most practical to report the bulk of our efforts within the Global Food Security and Hunger program area. This area encompasses a wide variety of work conducted at UVM, ranging from water quality improvement, to food safety, to cost of health insurance and childcare, to future U.S. agricultural production, to the viability of dairy through hay crop harvest and silage management. We have chosen to report the majority of our efforts within Global Foods even if part of the work could be allocated to other NIFA priority areas.

FY19 UVM Agricultural Experiment Station and Extension Highlights:

- In the past fiscal year, **UVM Extension** offered more than 2,700 significant educational events (educational programming of six or more hours), serving more than 10,400 non-traditional students. Thousands more learn by participating in interactive, online webinars; visiting the UVM Extension website (www.uvm.edu/extension); or attending workshops and other educational/informational events. In addition, UVM Extension's 4-H and other youth programs provide educational opportunities with more than 13,700 youth contacts through experiential learning and community service.

- In FY 2019, **Vermont Agricultural Experiment Station** researchers conducted 131 projects funded by public and private sources. Station researchers are nationally and internationally recognized for their excellence.

- **Vermont Vegetable Farmers Cultivate a Practical Approach to Produce Safety Regulation:** Community Accreditation for Produce Safety (CAPS) is helping Vermont's growers adapt to new expectations of buyers and regulators. The program is effective because it was designed by vegetable farmers to make sense and because it provides multiple benefits, on the ground, every day. As the national produce safety landscape evolves, CAPS will evolve, too - changing as Vermont's growers, educators, and regulators collaboratively find ways to better "harmonize" with new market expectations and the twists and turns of FDA's Produce Safety Rule implementation. This voluntary, on-line program has helped over 130 vegetable farms grow cleaner, safer product more efficiently.

- **Grazing Management Pays Dividends**: "This is the cheapest milk I've ever made," says Hilda Fisk Haines, owner of an 80-Holstein dairy farm in Vermont. Farmers who adopt management-intensive grazing practices can better utilize their pasture resources and realize significant savings in stored feed costs. By 2018, six years after initial contact with a UVM Extension Grazing Specialist, the Fisk-Haines Farm's grazing system covered 60 acres and their season savings totaled $44,000. These savings were thanks to the 36,400 pounds of grain, corn silage and haylage their cows no longer needed each week. "It has changed our breakeven point," Hilda Fisk Haines notes. "If we hadn't done this, I don't think we could have withstood the price drop."

- **Examining the Economic Sustainability of Organic Dairy in Vermont:** UVM AES researchers analyzed the financial records of more than 30 of Vermont's 200 organic dairy farms and calculated their accrual net farm income and financial standing. Findings were shared with organic dairy farmers, organic dairy cooperatives and other organizations through the Northeast Organic Farming Association of Vermont (NOFA-VT). Organic dairy farms are an economic engine for much of rural Vermont, and these findings help improve farm profitability.

- **Resettled Refugee Farmers Adopt Cover Cropping**: After working with UVM Extension, two New American farmers adopted cover cropping on a total of two acres of land. This acreage represents close to a 100% increase in cover cropped land, bringing their ratio of

production land to cover cropped land to an impressive 1:1. This demonstrates that farmers, no matter where they come from, no matter what language they speak or what their prior experience has been, have the potential to adopt new ways of becoming better land stewards, balancing short term economic needs with longer term goals of protecting environmental and soil health.

- **Modernizing Tapping Guidelines for Sustainable High Yield Maple Syrup Production:** Vermont is the nation's leading producer of maple syrup and in 2017 produced nearly two million gallons of syrup. Due to recent changes in maple sap collection technologies and substantial gaining yield, maple producers do not fully comprehend all the consequences of various management approaches and decisions. In response, UVM AES researchers are defining and disseminating sustainable guidelines for tapping maple trees using modern, high-yield sap collection practices and equipment.

- **New Calculators Help Farmers Assess Nutrient Load and Value of Cover Crops**: Farmers are always looking for ways to adjust their operations to make them more successful. UVM Extension agronomic and soil specialist Heather Darby and her team developed the Whole Farm Mass Nutrient Balance and Cover Crop Economics Calculators. These analysis tools provide a modern way for farmers to assess total nutrient load of their farm and realize the financial benefit of using cover crops, even if it does not show up in their bottom line directly or immediately.

- **Supporting Prosperous Communities:** With PROSPER, Vermont youth learn to navigate peer pressure; caregivers practice effective communication and parenting skills; and communities build a parent network to reinforce that participants are not alone. Since 2013, PROSPER has reached over 1,200 5th, 6th, 7th graders and families in Vermont. This work builds and strengthens primary prevention, health and wellness programs in communities and schools.

- **Woodchips: An Innovative Solution in Grazing:** Woodchip heavy-use areas provide an excellent and innovative solution for small-scale livestock producers in northern New England wanting to protect pastures during sensitive times of the year, while also reducing environmental impact to water quality. Research shows they produce up to 50% less dirty water, are less expensive and offer increased animal comfort compared to concrete. There are now six systems in Vermont and New Hampshire with more on the way.

- **Increasing Crop Diversity to Hinder the Effects of Climate Change:** Recent advances in diversified farming within the Northeastern United States have highlighted the need to increase native crop diversity in order to foster ecosystem services, such as maintaining soil quality and increasing biomass/yield, in the face of climate change. UVM AES research suggests that cool season grasses (subfamily Pooideae), a fundamental component of Vermont flora, are strongly adapted to seasonal variation in temperature and aridity, making them an option for use in diversified farming.

- **Expanding the Markets for Renewable Energy Products:** The U.S. produces more than 70 million tons of organic waste each year, and though biodigesters can turn that waste (i.e. cow manure) into electricity and other energy products, markets are highly restrictive due to the lack of consumer willingness to pay for such products. UVM AES researchers are producing educational materials and developing policy recommendations to expand the markets for renewable energy products generated from cow manure and other organic waste.

- **Bridging the Health Care Gap:** The stability of the Vermont dairy industry depends on immigrants who work an average of 69 hours per week in a physically demanding job. The Bridges to Health program helps Vermont's immigrant farmworkers maintain physical, mental, and emotional health. For employers, avoiding costs of health-related absenteeism, turnover, lost productivity and expertise, and training/replacing new employees helps the bottom line. In 2018, the Bridges to Health program assisted 450 immigrant farmworkers/family members with accessing health care services to maintain their physical, mental, and emotional health.

II. Merit and Scientific Peer Review Processes

The NIFA reviewer will refer to your Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA's attention.

Process	Updates
1. The Merit Review Process	Please reference our FY21 POW (alternatively you may refer to FY20).
2. The Scientific Peer Review Process	See above.

III. Stakeholder Input

The NIFA reviewer will refer to your Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA's attention.

Stakeholder Input Aspects	Updates
1. Actions taken to seek stakeholder input that encouraged their participation with a brief explanation	Please reference our FY21 POW (alternatively you may refer to FY20).
2. Methods to identify individuals and groups and brief explanation.	See above.
3. Methods for collecting stakeholder input and brief explanation.	See above.
4. A Statement of how the input will be considered and brief explanation of what you learned from your stakeholders.	See above. UVM Extension stakeholders told us how important it would be to recognize the stacked benefits from well-managed farmland and how it would improve their financial viability to be compensated for those benefits.

IV. Planned Program Table of Contents

V. Planned Program Activities and Accomplishments

Please provide information for activities that represent the best work of your institution(s). See Section V of the Guidance for information on what to include in the qualitative outcomes or impact statements. Add additional rows to convey additional accomplishments. You may expand each row as needed.

No.	Title or Activity Description	Outcome/Impact Statement	Planned Program Name/No.
1.	**Vermont Vegetable Farmers Cultivate a Practical Approach to Produce Safety Regulation**	Relevance: Regulations aim for safe food, good working conditions, and clean water. Despite good intentions, regulations don't make sense in every situation, and they cost farmers their time and money, which seems to threaten what we all want: a vibrant agriculture. This is the story of how Vermont's vegetable farmers ignored their headaches, weeded out the bad stuff, and cultivated a positive, practical approach to food safety regulation. Response: In 2014, responding to the pending Produce Safety Rule being developed by the U.S. Food and Drug Administration (FDA), the Vermont Vegetable and Berry Growers Association (VVBGA) teamed up with University of Vermont Extension and the Vermont Agency of Agriculture, Food and Markets (VAAFM) to get out in front of this regulation. Our goal was to create a user-friendly program to help farms of all sizes maintain market credibility and reduce produce safety risks, while reaping the benefits of becoming "more organized." Out of this collaboration the Community Accreditation for Produce Safety (CAPS) program was born. CAPS is a voluntary, on-line program that has helped over 130 vegetable farms grow cleaner, safer product more efficiently. CAPS guides its participants to write practical produce safety plans and then document their implementation. It grants certificates to those farms that adopt all of the required practices--identified by Vermont growers as necessary and	Global Food Security & Hunger; Food Safety

		useful. These include things like testing the water used to wash crops, training employees on sanitation, and developing standard procedures for cleaning harvest and storage equipment. CAPS is not a regulatory program, though it can help farms comply with regulations. Results: Participation in CAPS has increased every year, from 60 farms in 2016, to 113 farms in 2018. Most CAPS farms are in Vermont, but some are in New Hampshire, New York and Quebec. A few farms use the CAPS platform but choose not to get accredited. Over 90% of CAPS farms renew from year to year. In total, CAPS farms currently have 1,600 acres in production and sell about $23 million of produce annually. Twenty of these farms are also enrolled in CAPS-Plus. Earning a CAPS-Plus certificate is optional for farms that want to market their produce to larger buyers, some of whom, like Hannaford Supermarket, accept it in place of a USDA Good Agricultural Practices (GAPS) audit. CAPS-Plus has increased the number of Vermont farms selling to Hannaford by over 50%, with 30 certificates granted since 2016. CAPS is helping Vermont's growers adapt to new expectations of buyers and regulators. The program is effective because it was designed by vegetable farmers to make sense and because it provides multiple benefits, on the ground, every day. As the national produce safety landscape evolves, CAPS will evolve, too - changing as Vermont's growers, educators, and regulators collaboratively find ways to better "harmonize" with new market expectations and the twists and turns of FDA's Produce Safety Rule implementation.	

2.	**Grazing Management Pays Dividends**	Relevance: Hilda Fisk Haines and Steve Haines operate Fisk-Haines Farm in Danby, Vermont. They milk 80 Holsteins, ship milk through Dairy Farmers of America, and manage approximately 250 acres. Six years ago they were experimenting with rotational grazing on 20 acres and turned to UVM Extension Grazing Specialist Cheryl Cesario for guidance. Looking back, Hilda says, “I did not understand the logistics. I was doing it on a wing and a prayer.” Response: Hilda began meeting annually with Cheryl. Before the 2018 grazing season began, Hilda participated in UVM Extension's four-part grazing class where farmers learned in-depth grazing principles and developed their own plans. This program was part of a two-year Sustainable Agriculture and Research Education grant that combines classroom education with on-site consulting visits. "In the pasture class I picked up stuff that made a difference this year," says Hilda. Results: By 2018, their grazing system covered 60 acres and their season savings totaled $44,000. These savings were thanks to the 36,400 pounds of grain, corn silage and haylage their cows no longer needed each week. Instead, cows ate approximately 63% of their daily dry matter needs in the pasture over a 24-week period. Milk production remained steady, averaging 70 pounds per cow per day. Hilda's daily attention to plants and animals has been critical to success, allowing increased recovery time for pastures to grow back and increase dry matter yields. The annual vet bill was reduced by 66%, too. "Our animals are healthier. They breed back better, their feet are stronger. Improvements to their system, like adding polywire fencing and a water system, are done regularly and without cost-	Global Food Security & Hunger

		share money. Their motivation? "It's simple," Hilda says. "Money. This is the cheapest milk I've ever made."	
3.	**Examining the Economic Sustainability of Organic Dairy in Vermont**	Relevance: Vermont organic dairy farms are an economic engine for much of rural Vermont. These farms provide eco-friendly local food sources for Vermont and the Northeastern United States, yet their financial future can be altered by climate change, food safety, and food security. Response: The financial records of more than 30 of Vermont's 200 organic dairy farms were analyzed and the accrual net farm income and financial standing were calculated. Results: The findings are helpful for improving farm profitability and have been provided to organic dairy farmers, organic dairy cooperatives and other organizations through NOFA-VT. Return on Assets (ROA) is often favored as an indicator of profitability because it is a relative measure that allows researchers to compare farms of diverse size, number of operators, and financing (Gloy 2002). Because farm assets are accounted for, variations in ROA make it possible to analyze changes in farm profitability as a difference in percent return on investment.	Global Food Security and Hunger
4.	**Resettled Refugee Farmers Adopt Cover Cropping**	Relevance: Cover cropping can improve long term environmental and business sustainability. But due to a lack of long-term access to land, resettled refugee farmers living in Burlington, Vermont face barriers to implementing the practice. Still, farmers have the potential and desire to adopt new ways of becoming better land stewards. Ben Waterman has seen this first-hand as UVM Extension's Beginning Farmer, Land Access and New American Farmer Program Coordinator.	Global Food Security & Hunger

		Response: During fall 2018, in partnership with the Association of Africans Living in Vermont, Waterman taught six New American farmer business owners in the Burlington area how to add cover crops to their fields. With Waterman's technical assistance, Janine Ndagijimana's African Eggplant Farm and the Burundian Farmers Group quickly adopted the practice on two acres (a large portion of which exists in environmentally sensitive floodplains). Results: This acreage represents close to a 100% increase in cover cropped land, bringing their ratio of production land to cover cropped land to an impressive 1:1. Setting aside this much land for cover cropping demonstrates an investment in and commitment to the soil they farm. It's especially notable due to the challenges New American farmers face gaining long-term access to fertile and productive land. A year later, the two businesses have maintained that 1:1 ratio and continue to balance their short-term economic needs with longer term goals of protecting environmental and soil health.	
5.	**Modernizing Tapping Guidelines for Sustainable High Yield Maple Syrup Production**	Relevance: Vermont is the nation's leading producer of maple syrup and in 2017 produced nearly two million gallons of syrup. Due to recent changes in maple sap collection technologies and substantial gaining yield, maple producers do not fully comprehend all the consequences of various management approaches and decisions. Response: A project was initiated to define and disseminate sustainable guidelines for tapping maple trees using modern, high-yield sap collection practices and equipment.	Global Food Security and Hunger

		Results: Several presentations to maple producer groups were conducted in Minnesota, Michigan, New York, Vermont, and Connecticut. These educational presentations included portions of the results found to date, though several years of work are necessary to incorporate natural season-to-season variation to formulate the final tapping guidelines.	
6.	**New Calculators Help Farmers Assess Nutrient Load and Value of Cover Crops**	Relevance: The Required Agricultural Practices require farmers create nutrient management plans (NMPs) and keep records of their manure and fertilizer applications to assess potential pollution risk. UVM Extension agronomic and soil specialist Heather Darby originally developed the "goCrop" software in 2012 to help dairy and other livestock farmers develop, implement and maintain their NMPs. Farmers are interested in additional tools to increase on-farm nutrient use efficiency and decrease nutrient imports, thus maximizing cost savings and environmental benefits. Response: With new funding, Darby and her team developed two new analysis tools for goCrop: the "Whole Farm Mass Nutrient Balance Calculator" and the "Cover Crop Economics Calculator." Unlike the NMP, the Whole Farm Mass Nutrient Balance Calculator (based on Cornell University's model) looks at how nutrients move onto and off the entire farm. It tracks nutrients in the forms of imported or exported feed, fertilizer applied, bought or sold animals, and amount of milk sold. In Vermont, this tool can be used to assess if a farm is a net importer or exporter of phosphorus. Cover crops can increase organic matter, increase nutrient availability to crops, and reduce erosion. As a result of soil health improvements, cover crops can protect water quality and increase cash	Global Food Security & Hunger

		crop yield. Of course, there are also costs due to planting, maintenance, and termination. The Cover Crops Economics Calculator takes these into account during the length of a field's rotation to assess if cover crops have a net monetary gain or loss. Results: Livestock farmers in the northern Lake Champlain Basin have piloted the new features to ensure their effectiveness. Tim Magnant of Bridgeman View Farm was highly engaged in the process. A final report from the Whole Farm Mass Nutrient Balance Calculator showed him the tons of nitrogen, phosphorus, and potassium by exports of milk, animals, and crops and by imports of feed, fertilizer, animals, and miscellaneous items like bedding. Tim was surprised to see that the majority of phosphorus actually came onto his farm as feed, not fertilizer. "It taught me things I wanted to know about how things work. I never thought about grain and phosphorus in milk. I thought it was all about the fertilizer." This sentiment was also shared by Geoff Sweeney of Sweeney Farm who said, "I had not thought of grain as an importer of phosphorus… after using this tool, I talked to the feed guy about over mineralization of the animals. They just don't need all of it." Recognizing that feed is a main source of bringing phosphorus onto the farm and that dairy animals often get more phosphorus than they need, can encourage farmers to source lower phosphorus feed options. The Cover Crops Economics Calculator also provided Tim Magnant with useful data and confirmed what he was seeing on the ground: his soils are healthier to the point where he may not apply starter fertilizer to his corn next year. The benefits of cover crops and the new tool were echoed by Mike Ferris of Ferris Farm, "the Cover Crops Economics Calculator helped me realize the monetary value and savings of planting cover crops." Mike is looking forward to using the tool at next	

		year's NMP update class to run scenarios to pinpoint the most cost effect cover crop system for his 2020 cover cropping plan.	
7.	**The Food Safety Resource Clearinghouse**	Relevance: Resources for Produce Safety and Preventive Controls for Human Food are rapidly being developed by stakeholders across the nation. Given the breadth of material being developed, it is impossible to know what materials are created and where they can be found. The scattered nature of these materials makes it very difficult for anyone to fully understand what educational and technical support information exists, resulting in duplication of efforts. Additionally, knowledge that can be passed along to producers and processors isn't, since an educator might not know that a factsheet existed addressing the question at hand. There was a significant need to create an online location where all these resource should be consolidated into an easy searchable format. Response: The Northeast Center to Advance Food Safety (NECAFS) created The Food Safety Resource Clearinghouse, an online curated source for resources related to the Produce Safety Rule and the Preventive Controls for Human Food rule. This tool was developed in 2017 and launched in early 2018. This Clearinghouse is intended to collect and curate these materials in one single site. Using a search function, the user can find specific material and then follow links directly to the source of that information. The goal of this site is to provide direct links to food safety people, projects, and publications that have been gathered using a review process so that regulators, educators, technical service providers, growers and processors can feel confident knowing that the information they find within the Clearinghouse is a trusted source of food safety related information.	Global Food Security & Hunger; Food Safety

		Results: In the 12 months from May 14, 2018 – May 13, 2019, the Food Safety Resource Clearinghouse had 2,593 unique users visit for a total of 5,305 sessions averaging 3.3 minutes per session. These visitors from across the nation viewed and downloaded some of the 304 resources added by 62 contributors in the first full year of the Clearinghouse's life. The time visitors have spent using the Clearinghouse amounts to 291 contact hours which only required crowd-sourced contributions of existing resources, web development, and some training and guidance as sustaining effort. This averages out to about 1 contact hour per day between users and resources in a convenient, self-serve, one-stop-shop manner that requires very little administrative burden.	
8.	**Vermont Clean Water Initiative Program**	Relevance: Water quality protection and compliance with the Vermont Required Agricultural Practices is a challenge for Vermont farmers. Outreach education and technical assistance provided directly to farmers has been the most effective method to assist them with implementing new conservation practices to address issues with water quality and soil health while balancing farm economic viability. Response: With financial support from Vermont's Clean Water Initiative Program (CWIP), the UVM Extension Crop, Soil and Pasture Team accomplished the following education and outreach efforts: published three newsletters with relevant educational material to more than 1,300 contacts; coordinated and delivered 41 educational programs (348 total hours of instruction) to 3,067 farmers and an additional 1,942 non-farmer participants; and provided direct technical assistance to 81 farmers.	Global Food Security & Hunger

		Results: As a direct result of the technical assistance provided to 81 farmers this past year, the UVM Extension Crop, Soil and Pasture Team increased on-farm implementation of conservation practices on 9,179 acres (average 1.6 practices per farm). Implemented practices included the following: nutrient management plans, innovative manure application, conservation tillage (primarily no-till planting), cover crops, improved pasture/grazing management systems, and more.	
9.	**Maple and Forests Benchmarks Project**	Relevance: Both maple sap/syrup and timber harvesting represent viable working lands business opportunities in a state that is roughly 76% forested. But in early 2017, softwood and secondary hardwood markets were experiencing challenges that concerned business owners. Also in 2017, the maple industry was continuing to grow, but anticipated reductions in bulk syrup market prices were beginning to impact producers. These challenges highlighted the need for development of and access to public resources to inform policy, programs and increase capital. Resources were also needed to inform decision-making for current business owners and promote strong research and feasibility for prospective businesses. Response: The UVM Extension Maple and Forests Benchmarks project focused on the importance of financial analysis and informed business planning on an ongoing basis. The project provided business development assistance to maple businesses and timber harvest companies in Vermont. Team members served 479 maple syrup producers and primary wood processors with a total of 681 hours of technical assistance. This outreach included mentoring and business coaching; financial record keeping,	Global Food Security & Hunger

		accounting, and industry benchmarking; financial cash flow management, projections, and feasibility; financial access to capital; and marketing. Results: By engaging with current and prospective business owners through a variety of outreach techniques, this project team was able to develop core standardized business analysis methods and disseminate industry benchmarks to guide management decisions. 79% of survey respondents indicated that this project helped owners make a decision for their business. Outcomes also included: five owner-operator timber harvest jobs were retained (forest businesses retain jobs); 85,100 maple taps and 1,547 new acres added in Vermont, resulting in an estimated $730,158 in new annual syrup sales (commercial businesses expand utilization of working lands); and $2,971,132 in new investments (actual or pending loan applications) was verified through this project (businesses increase access to capital).	
10.	**Vermont Tourism Summit**	Relevance: Recreation and tourism in Vermont have a long history of contributing to the economy, influencing the culture of local communities, and impacting the natural environment. Although many communities and businesses are quick to embrace tourism for its perceived economic benefits, tourism development can result in negative social and environmental impacts and inequitable distribution of economic benefits. Information and training is needed about best practices for running successful businesses that promote sustainable tourism. Response: The Vermont Tourism Summit (VTS, formerly named the Vermont Travel Industry Conference) began in 1983 as a small, half-day conference organized by University of Vermont Extension with the goal of	Global Food Security & Hunger

		sharing university research about tourism. The conference was a success and VTS became a non-profit seven years later with the mission of hosting an annual conference. In 2019, VTS attracted 242 participants and offered two days of keynote speakers, workshops, and networking opportunities. Results: Long-term (conditional) outcomes are difficult to measure and directly attribute to a particular program, however annual conferences with repeat participants provide an opportunity to assess long-term outcomes. The Vermont Tourism Summit serves as an example of an annual conference with a high percentage of attendees who have participated in past conferences. This continuity provides an opportunity to ask attendees of past conferences about long-term outcomes. In 2019, 69% of participants had attended the conference previously. The evaluation included a question asking whether past conferences had helped attendees make improvements in a variety of areas. Of the 65 respondents to the survey, 61 (94%) answered positively about expected outcomes from this year's conference. When asked about outcomes from past years, 39 conference participants reported that past conferences had resulted in improvements in the following areas: business profitability (31%, 12 responses), customer satisfaction (38%, 15), sales/marketing (77%, 30), networking (85%, 33), and use of resources (36%, 14). Of note, 100% of sponsors (14/14) reported that they had made new contacts through the conference, and 86% of sponsors attending previous conferences (10/12 sponsors) reported that they had made additional sales as a direct result of sponsoring at VTS.	
11.	**Supporting Prosperous Communities**	Relevance: New England states have been hard-hit by the opioid epidemic, with rates of drug overdose deaths at or above the national average. The	Community Development and the Personal and

		effects of this crisis are felt in every sector from business to education to social services and vulnerable populations, like youth, are at especially high risk. Response: To build and strengthen primary prevention, health and wellness programs in communities and schools, UVM Extension has deployed PROSPER (PROmoting School-community-university Partnerships to Enhance Resilience). PROSPER is a delivery model for substance abuse prevention programs which relies on strong collaboration among school, community and university. Since 2013, PROSPER has reached over 1,200 5th, 6th, 7th graders and families in three Vermont communities. Family and in-school programs build protective factors in children (like communication, problem-solving and decision making skills) that help prevent or delay engagement in risky behaviors. Results: In each delivery of PROSPER's family program, 100% of parents and children have reported positive behavior change. Parents report being more prepared to talk to children about resisting peer pressure and are better able to see things from their child's point of view. And children report knowing at least one step they can take to reach a goal, an important resiliency-building skill. With PROSPER, Vermont youth learn to navigate peer pressure; caregivers practice effective communication and parenting skills; and communities build a parent network to reinforce that participants are not alone. Financial support is provided by UVM Extension, NIFA-USDA Children Youth and Family at Risk (CYFAR), and the Children's Trust Fund.	Intellectual Development of Youth and Adults

12.	**4-H Provides Building "Blox" for Success**	Relevance: Youth benefit from positive role models and safe, supportive environments when building key life and job skills. Andrew Dutil has been passionate about "Roblox," an online community where users create and collectively play games, since age eight. Now a senior studying computer science and programming at Burlington Technical Center (BTC), Andrew turned that passion into a unique learning opportunity. Response: Through partnership between BTC, UVM Extension's 4-H Program and his sending school, Andrew developed an after-school Roblox class. With team mentoring and guidance, he created four 90-minute lessons to teach younger students how to code, design and build robots in the system. The course received high marks from its participants: "If this were at my school, it would be the best class I ever took!" Results: Andrew lives his life navigating the complexities of autism, and has had difficulty sharing what he loves and excels at with others. With the support of his schools and the opportunity 4-H provided, Andrew found success in this program and discovered a talent for teaching others. "It was a big responsibility to commit to 4-H to run an after-school program," Andrew notes. The experience taught him how to manage long-term projects, design lessons, and work with younger students. "Andrew learned to be a leader, to overcome his fears, to realize the joy of sharing his knowledge, as well as how to make new friends," adds his mom, Ann. This collaborative approach to creating learning experiences is what 4-H is all about. By tapping into a young person's passion, connecting them with positive role models, and using existing structures and resources, 4-H creates safe, supportive and developmentally appropriate environments	Community Development and the Personal and Intellectual Development of Youth and Adults

		where all youth can succeed in building key life and job skills. As Andrew put it: "the whole team, together we made it happen."	
13.	**Vermont's Urban & Community Forestry Program – Engaging Communities in their Town Forests**	Relevance: Town forests are as integral to Vermont's urban forest as the trees along streets and in town parks. There are over 68,000 acres of forestland owned by 168 municipalities, all open to the public to enjoy. The values of town forests are diverse, from watershed protection, wildlife habitat, and forests products to public recreation and tourist destinations, outdoor classrooms and community gathering places. Growing pressure on town forests for recreation, coupled with a lack of capacity at the municipal level to make an informed decision around balancing the growing recreation interests and the health of the forest, has led to a need for local recreation planning assistance. Response: To empower communities to move forward with confidence on recreation projects in their town forest, Vermont's Urban & Community Forestry Program partnered with a consulting firm that specializes in community planning. Together they engaged 10 Vermont communities in a robust year-long planning process to develop action-based town forest recreation plans. Results: Throughout the year-long process, project partners and local steering committee members attended over 50 public meetings, walked over 60 miles of town forest trails, welcomed over 650 community members to town forest recreation planning presentations and public meetings, and engaged over 1,200 Vermonters in public visioning and planning for the future of their town forest. This work will continue, beyond the 10 communities, through an interactive town forest recreation	Community Development and the Personal and Intellectual Development of Youth and Adults

		planning toolkit to help support all Vermont communities in sustainable, forest-based recreation planning in town forests.	
14.	**Annual Energy and Climate Action Conference for Vermont Communities**	Relevance: Vermont cities and towns are being challenged to find ways to address climate change in their communities. For some, this means improving the energy efficiency of town buildings (e.g. town halls, libraries, schools, etc.) and in some cased this work translates into educating community members on how to reduce their carbon footprint and/or how to save money on energy in their personal lives. Response: For 11 years, UVM Extension has partnered with the Vermont Energy and Climate Action Network to offer a yearly one-day conference for citizens interested in reducing energy consumption and/or addressing the impacts of climate change. The event attracts between 225 and 300 individuals from around the state and a handful from surrounding states. Speakers come from the communities themselves and from various NGOs around the state. UVM Extension and VNRC do the bulk of the coordination of the event managing the logistics, registration, recruiting sponsors and managing evaluations. Results: We now have over 100 communities in Vermont with Energy Committees. These committees have conducted energy audits on their town buildings, written grants of varying sized to support infrastructure ranging from solar arrays to electric vehicle charging stations to recycling initiatives and rural transportation projects. They also conduct town meetings and public education events to help community members better understand both the complex challenges and opportunities the state faces in this time of changing climate.	Community Development and the Personal and Intellectual Development of Youth and Adults; Climate Change

		In addition, these committees are developing the leadership skills to sustain their committees over time and to more fully integrate them into the local government structures of their towns/regions. Almost half of the conference attendees have attended five or more conferences. We count this as evidence that they value the conference and the information provided.	
15.	**Woodchips: An Innovative Solution in Grazing**	Relevance: Winter feeding of grazing cattle in cold, humid climates like the Northeast can lead to loss of soil, water quality degradation, and damage to pastures. With climate change resulting in muddier springs and falls, farmers are looking for solutions that are cost effective for protecting both environment and pastures. Joshua Faulkner, UVM Extension Research Assistant Professor and Farming and Climate Change Program Coordinator, offers an innovative option. Response: Faulkner introduced Vermont to its first woodchip heavy-use area in 2016. Designed for use on small to medium farms, the woodchip system reduces pasture damage, increases comfort and performance of cows, and keeps dirty water out of streams and waterways. Faulkner's research shows that this results in up to a 50% reduction in water runoff. And the water that does run off is cleaner, too. This reduces the infrastructure, labor, and space required to handle and/or treat this water. Results: There are now six systems in Vermont and New Hampshire with more on the way. Farmers report comfortable animals, and reduced wastewater production and implementation costs. These results led the Natural Resources Conservation Service (NRCS) and the Vermont Agency	Climate Change

		of Agriculture to include woodchip pads in their list of conservation practices which are eligible for financial assistance.	
16.	**Examining the Social Media Response to Food Insecurity During Disasters**	Relevance: There has been increasing focus on understanding the effects of climate change on agricultural systems, including necessary adaptations to ensure future food security. However, climate change is likely to affect food systems far beyond just agricultural production including through direct avenues such as transportation and trade, food storage and food safety and through more indirect impacts including agritourism loss. Response: Recovery is critical and social media is being used more and more to communicate before, during and after disasters. Results: Research suggests that during a disaster, an ideal form of social contagion is being engaged which average people, who have "average" sized networks are more likely to share information during these disasters.	Climate Change; Global Food Security & Hunger
17.	**Monitoring Irrigation Water Usage in Partnership with USDA Northeast Climate Hub**	Relevance: Climate change is leading to more intense droughty periods in the Northeast. These periods are not typical for the region, and producers are struggling with how to manage water efficiently during these periods to maintain productivity. Moreover, such droughty periods are expected to increase in the future and there is a significant gap in Extension programming to help producers prepare and manage for this likelihood. Response: During the 2018 and 2019 growing seasons, in collaboration with the USDA Northeast Climate Hub, irrigation water usage was (and currently is being) monitored on several commercial vegetable farms. Soil moisture sensors with real-time data upload to a web-based interface	Climate Change

		were also installed on the farms, in multiple crops and types of irrigation. Farmers were presented with data mid-season and post-season, and potential management changes were discussed. Results: As a result of this work, at least one farmer altered their management, and reduced water application amounts due to over-irrigation. The same farmer also recognized that other crops were dramatically being under-irrigated and began devising a strategy for how to better meet the water needs of those crops. Other participating farmers have become very engaged with the research team. Also as a result of this work, a fact sheet was produced highlighting results from the 2018 growing season. This fact sheet was distributed to thousands of recipients through the USDA Northeast Climate Hub newsletter. A webinar was also given to discuss results and experiences with over 100 service providers and agency personnel across the Northeast. These efforts led a team of investigators from across the Northeast to collaborate on a large funding proposal in the latter part of FY19.	
18.	**Increasing Crop Diversity to Hinder the Effects of Climate Change**	Relevance: Recent advances in diversified farming within the northeastern US have highlighted the need to increase native crop diversity in order to foster ecosystem services, such as maintaining soil quality and increasing biomass/yield, in the face of climate change. Cool season grasses (subfamily Pooideae) are a fundamental component of the native and agricultural Vermont flora, comprising the majority of forage, cereal, and turf grasses.	Climate Change

		Response: Research was conducted to determine the gene response of diverse pooids to freezing/drought stress and to see if they can be used in diversified farming. Results: Research suggests that Pooideae are ancestrally cold resistance and that drought resistance has happened more recently. Research found that Pooideae are strongly locally adapted to seasonal variation in temperature and aridity.	
19.	**Expanding the Markets for Renewable Energy Products**	Relevance: The U.S. produces more than 70 million tons of organic waste each year. Through biodigesters, electricity and other energy products are produced from cow manure and other agricultural wastes. Individual biodigester systems are viable to only large farms due to the huge investment and development of renewable energy markets, such as the COW Power Program. These markets are highly restrictive due to the lack of consumer willingness to pay for such products. Response: Data collection and comprehensive analysis of individual and community based biodigester systems are currently underway. Results: Educational materials and policy recommendations are being developed with the goal to expand the markets for renewable energy products generated from cow manure and other organic waste.	Sustainable Energy
20.	**Examining Cooking as a Health Behavior**	Relevance: Rise in obesity in America correlates with the decline in the frequency that Americans cook at home.	Childhood Obesity

		Response: Studies are being done to determine if the addition of cooking classes to the standard behavioral weight loss program will improve weight loss and diet quality. Results: Research is ongoing, but indicates that cooking may be an important behavior to encourage people to promote health.	
21.	**Bridging the Health Care Gap**	Relevance: The stability of the Vermont dairy industry depends on immigrants who work an average of 69 hours per week in a physically demanding job. Barriers like language, lack of transportation and fear of lost income delay workers from receiving care, resulting in more significant health problems, decreased productivity, and increased work absenteeism. Response: The statewide Bridges to Health (BTH) program, a collaboration among UVM Extension, Bi-State Primary Care Association, the Open Door Clinic and Vermont Care Network, is the only health care support system in Vermont for immigrant farmworkers. Outreach to workers on local farms helps them communicate emergent, urgent and preventative care needs to employers and receive timely, affordable care -- in their local communities and native language. In 2018, BTH coordinated nearly 1,700 in-clinic and on farm health appointments for farmworkers in all 14 Vermont counties. Results: BTH's coordination and support allowed 450 immigrant farmworkers/family members to gain access to health care services at over 90 health sites. This assistance allowed farmworkers to maintain physical, mental, and emotional health. For employers, avoiding costs of health-	Childhood Obesity

		related absenteeism, turnover, lost productivity and expertise, and training/replacing new employees helps the bottom line.	
22.	**Clearing a Barrier to Weight Loss**	Relevance: Research shows that the single best predictor of success in weight loss programs is self-monitoring. Unfortunately, self-monitoring is commonly viewed as unpleasant and time-consuming and many can't muster the will power to do it. Response: An online study was conducted. Program participants recorded the calories and fat for all foods and beverages they consumed, as well as portion sizes and preparation methods. This study is the first to quantify the amount of time that dietary self-monitoring actually takes for those who successfully lose weight. Results: What was most predictive of weight-loss success was not the time spent monitoring—those who took more time and included more detail did not have better outcomes—but the frequency of log-ins, which confirmed the conclusions of earlier studies. The most successful participants in an online behavioral weight-loss program spent an average of just 14.6 minutes per day on the activity.	Childhood Obesity