2018 University of Vermont Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

UVM Extension (EXT) and the Vermont Agricultural Experiment Station (AES), housed within the College of Agriculture and Life Sciences (CALS), integrate higher education, research and outreach to meet the changing needs of Vermont citizens, communities and organizations. Together, we work to protect and enhance a quality of life characterized by a healthy natural environment, vibrant economy, strong sense of community, resilient youth and a deeply ingrained connection to agriculture.

Our efforts focus on the following crucial areas: agriculture and food systems, environment, nutrition and health, and human and community development. Through multidisciplinary work and integration of research and outreach, these areas continue to fall within and across our planned programs. Because of this and due to the overall size of our planned programs, it is once again most practical to report the bulk of our efforts within the NIFA Global Food Security and Hunger priority area. Since we do not necessarily have programs of sufficient size to divide neatly into other priority areas, we have chosen to report the majority of our efforts within Global Food even if we could allocate some part of the work to other NIFA priority areas. The Global Food program 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.

The annual economic impact of Vermont agriculture is over $2.63 billion. This sector feeds Vermonters and the state economy, and CALS is committed to supporting its growth. We do so by providing research, education and technical assistance tailored to the specific needs of Vermont farmers and producers. Our efforts support many industries that produce signature Vermont products such as maple, apples, milk, artisan cheese, hard cider, wine, artisan beer and ice cream. We provide support through research, workshops, site visits, consultations, electronic communications and more to assist the Vermont community with best management practices.

Dairy makes up 75% of Vermont's agricultural economy. Yet in the past year 61 Vermont dairy farms ended their operations. Only 749 remain, according to the Agency of Agriculture, Food and Markets, compared to about 1,050 a decade ago. Farm budgets are strained by historically low milk prices, reduced income and costs of on-farm environmental upgrades. CALS outreach and research efforts help farmers navigate these and other challenges. This year we delivered more than 3,750 educational activities related to agricultural issues like these to more than 27,000 direct points of contacts. These efforts resulted in the implementation of 1,087 recommended business practices, such as the development of strategic management plans to affect environmental improvements. Changes like these increase business profitability and better secure the financial future of agriculture in Vermont.

Like dairy, maple is an iconic Vermont product. As the largest producer of maple in the United States, Vermont is leading the way with innovative solutions and best practices. A growing number of maple producers are tapping trees with modern, high-yield sap collection systems in place of traditional collection practices. CALS is conducting research to determine whether tapping with these modern methods impacts tree growth to a significantly greater degree than tapping with traditional collection practices. This work

supports long-term tree growth, health and a sustainable future for Vermont maple.

Food safety incidents cost the U.S. economy an estimated $7 billion annually*. Ensuring the safety of locally grown, produced and processed foods is critical to protecting Vermont's reputation and markets. We invest significant effort to help grow and maintain a viable market for local and regional food producers and processors of vegetables, meat, and manufactured food products. From research on the rapid detection of food borne pathogens to exploring disease resistance in dairy cattle, our efforts span from safe production, to safe storage, to safe processing and distribution. For example, CALS's Food Safety Program for Facilities delivered 19 trainings (many with certification) to 258 people over two years and provided direct consultations to businesses in 10 Vermont counties. We also work beyond Vermont's borders by leading the Northeast Center to Advance Food Safety (NECAFS). This collaboration among 12 states and the District of Columbia aims to jointly advance understanding and practice of improved food safety among the region's small and medium sized produce growers and processors. We work across the food system, from farm to table, to support a safe and nutritious food supply.

Vermont's agricultural working landscape symbolizes a way of life strongly cherished by its citizens. These citizen stakeholders recognize the value of Vermont's agriculture and the need to protect our air, water, soil, and human health resources. We address these critical stakeholder issues by conducting research and disseminating essential current science-based information to a broad range of audiences. This increases their knowledge and skills and encourages implementation of cost-effective, environmentally sound sustainable agricultural practices.

Clean water is essential for the health of Vermont's economy and communities. From pasture and grazing to soil and crop management, our efforts have a direct impact on soil and water conservation. CALS vegetable nutrient management classes reached over 10% of the state's commercial vegetable producers and positively impacted over 30% of Vermont land in vegetable production by reducing phosphate applications. Our nutrient management plan courses have also helped dairy farmers reduce their costs, increase yields and quality and minimize negative impacts on water. Over a third of Vermont dairy farms have used the CALS-developed goCrop™ web and mobile application to write their nutrient management plans. Because of this education and guidance, farmers adopted 164 best management practices and positively affected Vermont's cropland, its associated livestock production facilities, and water quality.

Vermonters need to be competent in both life and job skills in order to be successful and economically stable. CALS plays a critical role helping families, adults and youth gain mastery of skills while building connections to each other and to communities of place and practice. This year 765 youth demonstrated mastery of a transferable skill like decision-making, communication or leadership because of their participation in our 4-H Youth Development Program. CALS recognizes the importance of science, technology, engineering, arts and math (STEAM) in preparing young Americans to meet our country's future needs. STEAM-focused programs like our VTeen 4-H Science Pathways Cafés engage youth with local experts to learn about STEAM topics and possible careers. Six cafés reached 205 Vermont teens in grades seven through 12 this year. We recognize that today's youth are tomorrow's leaders and problem-solvers; our youth development programs demonstrate our commitment to growing this future generation.

CALS is committed to improving the physical, mental, and emotional health of our community members. New England has been among the hardest-hit regions in the opioid epidemic. In response, CALS deployed the PROSPER model. Operational since 2013, the PROSPER effort has helped over 1,000 youth and caregivers to navigate peer pressure, reduce risky behaviors, and learn effective communication and parenting skills. By building positive skills through efforts like PROSPER, youth are better equipped to avoid risky behaviors. Childhood obesity is another barrier to health. Two-thirds of Americans are overweight and 75% of high school students are not physically active for 60 minutes per day (Center for Disease Control and Prevention recommendations). Physical activity is important for weight control and optimal health. To help high school students to meet physical activity goals, CALS researchers developed

a mobile gaming app to incentivize 60 minutes of physical activity per day.

The narratives and outcomes listed in this annual report show the breadth and depth of CALS work. From economic development to environmental protection, we follow the needs of our communities and stakeholders and rely on the expertise of our faculty and staff to meet them. The CALS mission of research-based service and educational outreach continues to focus on contemporary problems, needs and challenges of a changing state and world.

Follow this link to see a copy of our Annual Legislative Report 2018:

www.uvm.edu/sites/default/files/UVM-Extension-Cultivating-Healthy-Communities/annualreport2018.pdf

*Hussain, M., & Dawson, C. (2013). Economic Impact of Food Safety Outbreaks on Food Businesses. Foods, 2(4), 585-589. doi:10.3390/foods2040585

Total Actual Amount of professional FTEs/SYs for this State

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	55.0	0.0	28.0	0.0
Actual	58.4	0.0	43.0	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- External University Panel
- Expert Peer Review

2. Brief Explanation

UVM Extension recently completed a strategic planning process and where it was determined that our purpose is to "cultivate healthy communities." To make progress on the purpose, UVM Extension will orient its work around four Result Areas. These provide organizational focus and direction. A number of limited, time-bound strategies implemented over a three- to five-year period, will support each Result Area. When completed, these strategies will make significant progress towards the results. When taken together, this results framework is designed to provide boundaries for decision making about future investments and effort while remaining flexible enough for Extension to adapt to unforeseen challenges and opportunities. UVM Extension will work towards its purpose by organizing its work around these four Result Areas over the next seven to ten years.

Additionally, UVM Extension key staff have monthly telephone meetings with the four states that cooperated to develop an on-line planning and reporting system. These are an opportunity to get feedback on programs and statewide goals and initiatives. Discussions include regional programs, opportunities for multistate work, sharing staff resources and other programming strategies and issues. In addition, staff at the faculty and administrative level access the on-line system (https://lmprs.net) to view peers' work. Program staff, faculty and administration are active in regional and national discussions around program success and challenges.

AES provides the opportunity for seed project funding through a competitive proposal process. Project proposals are evaluated for scientific and technical merit through a peer review process. Projects are intended as seed funding to aid the principal investigator (PI) in establishing a new research direction or other research endeavors.

The AES Director/Dean of CALS looks at a wide range of expertise and appoints individuals to serve on the CALS advisory committee who have experience in the area of dairy farming, state legislation, research, finance, marketing, to name a few. These individuals provide feedback to the Dean that identify research needs that are important to Vermonters.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of the general public
- Other (see narrative for details)

Brief explanation.

Many projects have advisory committees of one form or another that provide a sounding board and input on the current program issues and help prioritize programmatic direction. This input helps in all aspects of programming, including delivery method, outreach and content. Most events ask participants if the programming met their needs and expectations. Post-event evaluations, including six-month follow-up check-ins about behavior change, are standard practice for UVM Extension faculty and staff. This effort also provides an opportunity to gather further input informing future program effort.

A state advisory board meets with the Extension Director and key staff two times per year. They meet with faculty and program staff to hear about programmatic efforts, needs and changes in behavior measured following the educational efforts. The Board serves in an advisory capacity directly to the EXT Director. The members represent a broad perspective with diverse experience and backgrounds.

Partnerships with communities, public and private organizations, and businesses are important to reaching and serving clients with appropriate programming. These relationships remain a critical part of identifying needs and gaps for programming.

UVM Extension recently completed a visioning process to help the organization articulate its future in a new Strategic Plan. We engaged and gathered input from all parts of the organization as well as from external partners. We explored what Extension has been, what it is today and what we would like it to be five years from now. We also reflected on how the ongoing reunification with CALS may influence our programmatic directions. The final plan clarified our purpose and mission, identified potential paths forward that will improve financial security, and brings greater value to UVM, Vermonters, and various stakeholders in Vermont and beyond.

The Director of AES has an advisory board which meets twice a year to provide feedback and advice on future trends of agriculture and life sciences. The Director of EXT and Dean of CALS (Director of AES) meet regularly and share stakeholder input relevant to their work.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Use Surveys

Brief explanation.

UVM Extension creates new and continues to develop existing relationships with organizations and agencies in an effort to encourage meaningful conversations. In a small state, relationships are critical in accessing key individuals with knowledge of current relative issues for Vermonters. A part of that effort are monthly group meetings among partners. These partners include leaders from USDA Natural Resources Conservation Service, Vermont Agency of Agriculture, Food, and Markets, Vermont Association of Conservation Districts, USDA Rural Development, USDA Farm Service Agency, representatives from all three Congressional offices, and other organizations as available or interested. This year, UVM Extension conducted five presentations to legislative committees relevant to the program areas we're working in.

UVM Extension's strategic planning process called for a hired facilitator to interview 45 people as part of an information collecting process. These people included faculty and staff who work in Extension; individuals who work at UVM but who are not part of Extension; and stakeholders who are external to UVM. The Strategic Planning process was led by a Core Group of Extension and other CALS faculty and staff. This Core Group considered many names for the 45 interviews, including those recommended by faculty and staff from Extension

Vermont's small towns and high level of citizen involvement create opportunities to connect with Vermonters to understand who is in their communities. Program participants are engaged in developing future programs through on-site data collection feedback tools.

The CALS/AES Dean/Director looks at a wide range of expertise and appoints individuals in the advisory committee who have experience in the area of dairy farming, state legislation, research, finance, marketing, to name a few. New research initiatives are discussed during that meeting. The board reviews the College Strategic Plan and provides information on future trends of agriculture and life sciences. Information regarding the board can be found at https://www.uvm.edu/cals/board_advisors_0.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Survey of the general public
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public

Brief explanation.

UVM Extension works with focus groups, state advisory groups, and utilizes post-event and reflective data collection methods. This year UVM Extension identified five legislative committees relevant to the program areas we're working in and met with them to share our work and seek input on future efforts.

Through Extension's Strategic Planning process, 45 face to face and/or phone interviews were conducted with faculty and staff, individuals who work at UVM but who are not part of Extension, and stakeholders who are external to UVM. The Core Group of the planning process invited larger Extension participation and input by holding a webinar and conducted several day-long workshops to review and provide input on the Strategic Plan.

Individuals on the AES advisory board meet twice a year and provide information on future trends of agriculture and life sciences.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

As a small state we know our citizens. Collected data is used to refine, remove or create new educational programs and delivery methods that will serve the needs of the state. EXT has close relationships with state and local government, an asset when seeking input and when sharing expertise and/or concerns of citizens.

The conversations, comments, thoughts, and questions collected during UVM Extension's strategic

planning process were used to create a final Strategic Plan. The final plan clarifies our purpose and mission and identifies potential paths forward that will improve financial security, and brings greater value to UVM, Vermonters, and various stakeholders in Vermont and beyond. We have established four "Result Areas" around which we will organize our work over the next seven to ten years.

The AES advisory board provides a source of council to the Dean/Director, using member input to help formulate a research direction and aid in the development of a strategic plan.

Brief Explanation of what you learned from your Stakeholders

UVM Extension's strategic planning process resulted in organizational and structural adaptations, clarification of our purpose and mission, and development of four "Result Areas" around which we will organize our work.

Our purpose is to: Cultivate healthy communities

Our mission is to: Provide and facilitate research, education and outreach with our partners for the people of Vermont

Our Result Areas:

- **Result Area 1:** Improve the financial, environmental and social sustainability of Vermont's agriculture, food and forest sectors.
- **Result Area 2:** Increase the resilience of families and individuals around health, education and personal and family well-being.
- **Result Area 3:** Engage with communities to support leadership development, capacity building and diverse voices in decision making.
- **Result Area 4:** Integrate business and conservation to improve the quality of the natural environment where Vermonters live, work and play.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		**Research**	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1892945	0	1459073	0
Actual Matching	2309153	0	2872212	0
Actual All Other	8032474	0	0	0
Total Actual Expended	12234572	0	4331285	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	326514	0	289309	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
112	Watershed Protection and Management	2%		0%	
123	Management and Sustainability of Forest Resources	1%		0%	
133	Pollution Prevention and Mitigation	29%		0%	
136	Conservation of Biological Diversity	0%		1%	
205	Plant Management Systems	4%		11%	
206	Basic Plant Biology	0%		23%	
216	Integrated Pest Management Systems	6%		7%	
305	Animal Physiological Processes	0%		19%	
308	Improved Animal Products (Before Harvest)	0%		3%	
311	Animal Diseases	0%		16%	
402	Engineering Systems and Equipment	6%		0%	
601	Economics of Agricultural Production and Farm Management	37%		11%	
602	Business Management, Finance, and Taxation	6%		0%	
604	Marketing and Distribution Practices	1%		1%	
605	Natural Resource and Environmental Economics	3%		2%	
607	Consumer Economics	0%		4%	
704	Nutrition and Hunger in the Population	0%		2%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	2%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	2%		0%	
723	Hazards to Human Health and Safety	1%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	29.9	0.0	15.0	0.0
Actual Paid	32.3	0.0	24.0	0.0
Actual Volunteer	2.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1048199	0	873059	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1278670	0	1435933	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
4447900	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

UVM Extension projects and programs listed in bold followed by delivery methods.

- **Ag Business Management.** Conferences, courses, consultations and farm visits.
- **Beginning Farmer Initiative**. Focus groups, learning circles, workshops, mini-courses and publications.
- **Community Accreditation for Produce Safety (CAPS).** Technical assistance, online accreditation platform.
- **Engineering for Food Production, Harvest and Storage.** Consultations, workshops, various media.
- **Extension Master Gardener.** Course, train the trainer.
- **Farm Viability.** Farm visits, consultations.
- **Farming Alternatives**. Workshops, consultations, farm visits.
- **Food Safety**. Trainings, webinars, consultations.
- **Forage and Pasture Management Education.** Conference, farm visits, consultations.
- **Grazing and Livestock Programming.** Pasture walks, demonstrations and trials, conference, consultations, various media.
- **Ground Work: Building Capacity to Provide Tractor Education.** Workshops, curriculum development.
- **Livestock Production and Products.** Consultations, discussion groups, workshops.
- **Maple Program.** Conference, workshops, newsletter.
- **NECAFS (The Northeast Center to Advance Food Safety).** Conference, trainings, newsletter, webinars.
- **Nutrient Management Program**. Farm visits, consultations, classes.
- **Organic Grain Project**. Demonstrations, data gathering.
- **Pest Management Education.** Integrated Pest Management (IPM) and Pesticide Education and

Safety Program (PESP) training.

- **Private/Commercial Landowner and Industry Professional Education.** Tour and conference.
- **Soil Health.** Workshops.
- **Sustainable Forests.** Classes, workshop series, various media.
- **Vegetable and Berry Growers**. Consultations, farm visits, meetings, various media, presentations, website.
- **Vermont New Farmer Network**. Conference, networking, consultations.
- **Vermont Tourism and Recreation.** Research, conference.
- **Women's Agricultural Network.** Newsletters, website, classes, workshops, individual and small group consultations.

AES Efforts:

- **Animal Manure Treatment Systems**
- **Storm and Wastewater Management Systems**
- **Perturbation of soil ecosystems by anthropomorphic interventions**
- **Soil nutrient effect on forest ecosystem productivity and lake water quality**
- **Soil fertility/chemistry/physical problems associated with waste disposal and bioremod faction**
- **Economics of organic dairy, crop management and alternative energy**
- **Heifer nutrition, rearing and management**
- **Dairy nutritional immunology**
- **Small ruminant production and management systems**
- **Development of strategies to address applied equine issues**
- **Biofuels from coconuts and other energy sources**
- **Identification of genetic traits that make species invasive**
- **Surveillance and prevention of spread of Asian Longhorned Beetle**
- **Management of thrips pests in forests and greenhouses**
- **Identification/control of fungal propagation**
- **Fungal biological plant protection, collection and management**
- **Explore microbial pesticides and fungal components as IPM strategies**
- **Innate immunity, DNA-based vaccines and mastitis prevention**
- **Hormonal regulation of glucose synthesis and milk production**
- **Functional genomics and photoperiod effects on hormonal cycles/milk production**
- **Female farmers**
- **Performance of agroecological principles in urban/peri-urban agriculture**

2. Brief description of the target audience

Academia: scientists, students
Agriculture/Natural Resources: Watershed-Based Organizations
Agriculture: Agency Personnel
Agriculture: Apple Growers
Agriculture: Beef Producers
Agriculture: Beginning Farmers
Agriculture: Certified Crop Advisors & Crop Consultants
Agriculture: Crop Producers
Agriculture: Dairy Herd Feed Consultants
Agriculture: Dairy Producers
Agriculture: Dairy Professionals
Agriculture: Equine Producers/Owners
Agriculture: Farm Employees

Agriculture: Farm Families
Agriculture: Farm Managers
Agriculture: Farmers
Agriculture: Goat & Sheep Producers
Agriculture: Greenhouse Ornamental Growers
Agriculture: Home Gardeners
Agriculture: Industry Professionals
Agriculture: Livestock producers
Agriculture: Maple Industry
Agriculture: Maple Sugar Producers
Agriculture: Nursery Operators
Agriculture: Ornamentals Industry Professionals
Agriculture: Produce Growers
Agriculture: Service Providers
Communities: Cities and Towns
Communities: Educators
Communities: Local Officials/Leaders
Communities: Non-Governmental Organizations
Communities: Town Health Officers
Community: Government
Community: Health Entities
Environmental Professionals: Environmental Managers
Ecologists
Evolutionary biologists
Food Industry: Food Service Workers
Food Industry: Handlers
Food Industry: Processors
Food Industry: Producers
Forestry: Government Agency Personnel
Forestry: Landscape Industry
Forestry: Loggers
Forestry: Wood Products Businesses
Forestry: Woodland Managers/Foresters
Forestry: Woodland Owners
Policymakers
Public: Adults
Public: Homeowners
Public: Master Gardeners
Public: Master Trainers
Public: Media Outlets
Public: People with Limited Resources
Public: Small Business Owners/Entrepreneurs
Public: Vermont Government Elected Official
Public: Youth
Train-the-Trainer recipients: adults
USDA personnel
STEM students

3. How was eXtension used?

eXtension eOrganic Website: UVM Extension continued development of an Organic Dairy website as part of the eXtension eOrganic project. eXtension Organic Dairy online materials received 3,323

meaningful hits during this reporting period according to Google analytics.

eXtension Farm Energy Website: A resource base of 170+ peer reviewed articles, fact sheets, webinars, videos, ask-an-expert specialists, enterprise budgets, decision making tools, etc., from CenUSA assist bioenergy stakeholders and the public to make choices and overcome obstacles to entering the bioenergy supply chain. The USDA Bioenergy Project CenUSA uses the eXtension Farm Energy website to share the collective knowledge of its 80 collaborators and advisors from seven States, seven Universities, and eight Federal and Industry Partners. eXtension.org provides integration with existing materials from Extension specialists across the US, as well as providing an index in one place of CenUSA's Resources; information on bioenergy feedstock development, the production and logistics of energy crops, economic and environmental performance, and conversion into biofuel.

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	27318	321569	681	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	12	24	36

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Class/course

Year	Actual
2018	84

Output #2

Output Measure

- Conference

Year	Actual
2018	11

Output #3

Output Measure

- Consultation

Year	Actual
2018	3627

Output #4

Output Measure

- Consumer publication

Year	Actual
2018	5

Output #5

Output Measure

- Demonstration

Year	Actual
2018	22

Output #6

Output Measure

- Discussion group

Year	Actual
2018	4

Output #7

Output Measure

- Educational/evaluation instrument

Year	Actual
2018	3

Output #8

Output Measure

- Electronic communication/phone

Year	Actual
2018	1041

Output #9

Output Measure

- Field day/fair

Year	Actual
2018	2

Output #10

Output Measure

- Field site visit

Year	Actual
2018	19

Output #11

Output Measure

- Funding request

Year	Actual
2018	26

Output #12

Output Measure

- Presentation

Year	Actual
2018	155

Output #13

Output Measure

- Publication - curriculum
  Not reporting on this Output for this Annual Report

Output #14

Output Measure

- Publication - fact sheet

Year	Actual
2018	36

Output #15

Output Measure

- Publication - magazine article

Year	Actual
2018	4

Output #16

Output Measure

- Publication - manual

Not reporting on this Output for this Annual Report

Output #17

Output Measure

- Publication - newsletter

Year	Actual
2018	41

Output #18

Output Measure

- Publication - newspaper/article

Year	Actual
2018	15

Output #19

Output Measure

- Research project

Year	Actual
2018	186

Output #20

Output Measure

- TV segment/Across the Fence (ATF)

Year	Actual
2018	18

Output #21

Output Measure

- Publication - technical

Year	Actual
2018	67

Output #22

Output Measure

- Tour(s)

  Not reporting on this Output for this Annual Report

Output #23

Output Measure

- Mass Media - blog post/social media/web page/internet site development and updating

Year	Actual
2018	624

Output #24

Output Measure

- Workshop - series

Year	Actual
2018	13

Output #25

Output Measure

- Workshop - single session

Year	Actual
2018	97

Output #26

Output Measure

- Display or exhibit

Year	Actual
2018	9

Output #27

Output Measure

- Trainee/volunteer delivered programming

Year	Actual
2018	90

Output #28

Output Measure

- Mass Media Event

Year	Actual
2018	7

Output #29

Output Measure

- Guest Lectures

Year	Actual
2018	8

Output #30

Output Measure

- Invited Paper

Year	Actual
2018	1

Output #31

Output Measure

- Fact Sheet

Year	Actual
2018	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers that develop a nutrient management plan protecting water and soil
2	Number of Master Gardener participants who earn certification and apply IPM and plant diagnostic skills with home gardeners, youth and community members
3	Number of farmers who implement best agricultural practice(s) improving crop/pasture, product, and/or soil productivity while protecting water, air, soil and/or other natural resource
4	Number of individuals who implement IPM practice(s) increasing the protection of water, air and/or soil
5	Number of individuals and business owners who implement recommended practice(s) that accomplish owner values and goals to improve/protect business sustainability
6	Number of individuals who complete a plan including preventative measures to secure animal health, food safety and public health protecting the food chain and market integrity
7	Number of growers who adopt new crop/plant variety(ies) resulting in maintaining or increasing sales
8	Number of individuals who complete a business plan, start a business (within 18 months of planning) based on personal values, goals and business viability
9	Number of participants who make an intentional, informed decision regarding starting a business based on feasibility, personal goals and values
10	Number passing the USDA GAPs audit to gain or maintain a market for their locally grown crop(s)
11	Number of growers growing organic crops increase revenues improving business sustainability
12	Number of producers who implement produce safety/food safety plans/practices to gain or maintain a market for their locally grown crop(s)
13	Number of farmers who implement key element(s) of their nutrient management plan protecting water and soil
14	Number of farmers who report that accessibility, cost, and associated challenges of child care are factors in their success and wellbeing
15	Number of small parcel (under 25 acres) forest landowners implementing stewardship/management activities to minimize the threat of forest fragmentation.
16	Number of identified new and sustainable disease and arthropod pest management strategies for organic agricultural growers
17	Number of studies that examine the health and growth of tapped versus untapped tree extraction on sugar maple tree growth and health.

18	The number of Vermont polling participants used to help formulate public opinion on the Vermont migrant population.
19	The number of individuals accessing reliable, credible, and up-to-date organic dairy information across the nation.
20	The number of legislators and key decision makers who increase understanding of current local agricultural issues
21	The number of factors threatening food supply that affect agricultural production.
22	Number of studies on a dairy cow's dietary regime to determine if differing regimes will enrich health-promoting bioactive fatty acids in milk.

Outcome #1

1. Outcome Measures

Number of farmers that develop a nutrient management plan protecting water and soil

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	40

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
When implemented correctly, nutrient management allows farmers to reduce costs, increase yields and quality, and minimize negative impacts on water quality. Early versions of UVM Extension's Nutrient Management Plan (NMP) courses taught farmers how to create and store plans on paper. The system worked, but farmers reported the binders as cumbersome, difficult to manage, and ultimately an obstacle to plan implementation.

What has been done
An alternative system was needed and UVM Extension Agronomist Heather Darby met the challenge. Beginning in 2010, Darby worked closely with dairy farmers to create an integrated web and mobile application designed for in-field recordkeeping and real-time calculation of nutrients. From fertilizer used to crops harvested, the web application is now an integral part of nutrient management for Vermont dairy farms. Over a third of Vermont dairy farms have used

goCrop to write their Nutrient Management Plans.

Results
This year, 40 farmers developed Nutrient Management Plans during UVM Extension's NMP course. Since 2015, 245 farmers have attended courses and used goCrop to develop plans in accordance with the Required Agricultural Practices (RAPs) of Vermont's Clean Water Law (Act 64). 92% of goCrop-trained farmers follow their nutrient management plans. The tool continues to evolve with new features including a module for vegetable growers, a grazing component, and a whole farm nutrient balance tool expected to release this year. With UVM Extension and goCrop farmers are learning how to effectively manage nutrients on their farms and in turn are reducing costs, increasing yields, and minimizing negative impacts on water quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #2

1. Outcome Measures

Number of Master Gardener participants who earn certification and apply IPM and plant diagnostic skills with home gardeners, youth and community members

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	37

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
By 2020, the final phase of Vermont's Universal Recycling Law (Act 148) will go into effect. When it does, food scraps will be banned from landfill disposal, and many households will need to find new ways to dispose of this organic waste. Composting is a natural and valuable option which converts food scraps into soil, but it takes training to learn how to do it properly.

What has been done
UVM Extension's Master Composter Program (part of the Master Gardener Program) has offered this education since 2003. More than 1,000 people have participated. Some have gone on to become Certified Master Composter volunteers who educate others and support community-

based projects.

Results
As a result of the Master Composter course, 60 percent of students made changes to the way they dispose of organic waste and another 30 percent had plans to do so within six months. 93 percent said they knew how to compost effectively by the end of the course. Currently, there are 37 Certified Master Composters logging volunteer hours supporting long- and short-term community-based projects. Master Composters use these hands-on opportunities to teach a growing number of Vermonters about composting. In doing so, the program is helping the state successfully implement Act 148, save space in landfills, and make use of valuable organic waste.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

Number of farmers who implement best agricultural practice(s) improving crop/pasture, product, and/or soil productivity while protecting water, air, soil and/or other natural resource

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	164

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As of July 1, 2017, commercial vegetable growers in Vermont are subject to the state's Required Agricultural Practices (RAPs), which limit the amount of phosphorus (P) growers can apply to fields already high in P. Soil tests previously submitted to the UVM Agricultural and Environmental Testing Lab suggest that many farmers have high levels of P in their fields. These farmers need technical assistance to help them change their fertilization strategies to reduce P applications without significantly increasing their costs.

What has been done
UVM Extension held five vegetable nutrient management workshops to help vegetable farmers better understand and comply with the new RAPs. The workshops taught how to interpret soil tests, plan nutrients, and reduce erosion potential on farms. One-on-one technical assistance was also offered. Ninety participants attended the workshops (65 vegetable farmers and 20 service providers). Seven of the farmers who attended own or manage "Certified Small Farm Operations (CSFO)", and must complete a nutrient management plan for the state of Vermont.

Results
Of the 54 workshop participants who completed an evaluation, 90% have created soil amendment plans for this coming season that include using information from the workshop to improve nutrient management. The vegetable nutrient management classes reached over 10% of the state's commercial vegetable producers, and impacted over 30% of the land in vegetable production in Vermont. Since many of these fields are already high in phosphorus, the impact of the workshops will result in immediate reductions in phosphate applications. Implementing nutrient management plans drafted in these workshops has already led to reduced spending on fertilizers, saving farmers money before the season has even begun. The quantitative outcome entered above represents this and other agriculture best practices implemented as a result of UVM Extension efforts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

Outcome #4

1. Outcome Measures

Number of individuals who implement IPM practice(s) increasing the protection of water, air and/or soil

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2018	303

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems

Outcome #5

1. Outcome Measures

Number of individuals and business owners who implement recommended practice(s) that accomplish owner values and goals to improve/protect business sustainability

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1064

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Vermont's Clean Water Act mandates agricultural producers comply with Required Agricultural Practices regulations. Depending on the infrastructure needed to mitigate water quality threats, on-farm environmental upgrade projects to control non-point source pollution can cost $50,000 to $1.1 million. Over the last five years, farmers experienced severely depressed milk prices and reduced home income, leaving many doubting their capacity to pay for improvements.

What has been done

UVM Extension's Agricultural Business Program and partners provide Water Quality Business Analysis assistance. They worked with farms assessing financial impacts of large infrastructure projects, identifying grant/funding sources, and implementing changes. 31 Vermont dairy farmers took advantage of the program between 2017 and 2018. Management teams were convened on some farms to help develop strategic management plans to affect environmental improvements.

Results
Seven farms received assistance completing Water Quality and Dairy Improvement grants, with a total of $233,650 awarded. Funds were instrumental in leveraging more than an estimated $1.5 million in federal Environmental Quality Incentives Program (EQIP) and state Best Management Practice (BMP) funds. Some projects are still under construction. The quantitative outcome number listed above compiles results from this work and that of many other agriculture-related UVM Extension programs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
723	Hazards to Human Health and Safety

Outcome #6

1. Outcome Measures

Number of individuals who complete a plan including preventative measures to secure animal health, food safety and public health protecting the food chain and market integrity

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	35

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Food safety incidents cost the U.S. economy an estimated $7 billion annually. Vermont has an international reputation for high-quality specialty food products. When businesses expand product lines into larger markets, they must provide stringent proof to buyers that internationally accepted food safety practices are followed. Learning and adopting these practices is a daunting task for any small business.

What has been done
UVM Extension's Food Safety Program for Facilities helps food producers meet those requirements. Through partnerships with the Vermont Department of Health (VTDH), the International HACCP (Hazard Analysis and Critical Control Points) Alliance, and others, UVM Extension offers necessary training and certification for food processors. Over two years, UVM Extension delivered 19 trainings (many with certification) to 258 people and provided direct consultations to businesses in ten Vermont counties.

Results
So far, 35 businesses have made improvements to their operations including completing or implementing food safety plans. One of those businesses is Fat Toad Farm. Ten years ago, Fat Toad Farm was a small-scale diversified farm making cheese and caramel on a dirt road in Brookfield, Vermont. The business now sells its award-winning goat's milk caramel sauces nationwide. Food safety has always been a priority, but the world of national distribution pushed them to the next level. They took advantage of UVM Extension's expertise to comply with the Food Safety Modernization Act (FSMA), and to guide them as they look toward expansion. Improvements like these better position Fat Toad Farm to capture a national retail market, ultimately supporting local business and Vermont agriculture.

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

Outcome #7

1. Outcome Measures

Number of growers who adopt new crop/plant variety(ies) resulting in maintaining or increasing sales

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Number of individuals who complete a business plan, start a business (within 18 months of planning) based on personal values, goals and business viability

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
601	Economics of Agricultural Production and Farm Management

Outcome #9

1. Outcome Measures

Number of participants who make an intentional, informed decision regarding starting a business based on feasibility, personal goals and values

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	23

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Beginning farmers (less than 10 years in operation) are a growing part of Vermont's agricultural economy. New farmers provide direct access to local food through farmers markets, CSAs and farmstands, and are increasingly servicing wholesale and institutional markets. Vermont's new farms now comprise about 28% of the total number, and have an aggregated market value of about $129 million, or about 16% of Vermont's agricultural economy. A key challenge is helping these agricultural entrepreneurs build viable, sustainable businesses.

What has been done
Since 1995, UVM Extension has offered the Growing Places course, which helps beginning farmers learn the nuts and bolts of successful farm business start-up. Participants learn about: goal setting and decision making; financial and business management; accessing capital and credit; and, marketing. Participants acquire basic farm business skills and learn how to access to USDA program and services that support new farm, food and natural resource based businesses. In 2018, 34 people enrolled in the online Growing Places course.

Results
At the center of Growing Places is development of a whole-life (holistic) goal statement. Participants identify their core values, the activities to which they devote their time, and what they hope to achieve in life. The process encourages discussion among all the business's decision-makers so that everyone is on the same page early in the process, and ensures participants are building a business at a scale that suits their lifestyle and meets their needs. Of the 34 participants in 2018, 23 developed a goal statement. 100% of respondents to a follow-up survey reported that the course increased their knowledge, skills and/or confidence related to starting an agricultural business, and several indicated they were already using their goal statements in planning and decision making activities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #10

1. Outcome Measures

Number passing the USDA GAPs audit to gain or maintain a market for their locally grown crop(s)

Not Reporting on this Outcome Measure

Outcome #11

1. Outcome Measures

Number of growers growing organic crops increase revenues improving business sustainability

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	32

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #12

1. Outcome Measures

Number of producers who implement produce safety/food safety plans/practices to gain or maintain a market for their locally grown crop(s)

Not Reporting on this Outcome Measure

Outcome #13

1. Outcome Measures

Number of farmers who implement key element(s) of their nutrient management plan protecting water and soil

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	24

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
602	Business Management, Finance, and Taxation

Outcome #14

1. **Outcome Measures**

Number of farmers who report that accessibility, cost, and associated challenges of child care are factors in their success and wellbeing

Not Reporting on this Outcome Measure

Outcome #15

1. **Outcome Measures**

Number of small parcel (under 25 acres) forest landowners implementing stewardship/management activities to minimize the threat of forest fragmentation.

Not Reporting on this Outcome Measure

Outcome #16

1. **Outcome Measures**

Number of identified new and sustainable disease and arthropod pest management strategies for organic agricultural growers

Not Reporting on this Outcome Measure

Outcome #17

1. **Outcome Measures**

Number of studies that examine the health and growth of tapped versus untapped tree extraction on sugar maple tree growth and health.

2. **Associated Institution Types**

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Maple syrup production is based on the premise that tapping trees to collect sap has no substantive detrimental effects on the overall health of the trees, and thus is a longterm, sustainable agricultural activity.

What has been done
Research compared the growth rates of trees tapped for maple syrup production compared to those of untapped trees under the same growth conditions. The work will examine the health and growth of tapped and untapped maple trees as part of an ongoing multi-faceted assessment of sustainable tapping guidelines. The objectives is to determine whether tapping trees for maple production significantly impacts long-term tree growth and health, and whether tapping with modern, high-yield sap collection practices impacts tree growth to a significantly greater degree than tapping with traditional collection practices.

Results
For five years the research studied the health and growth of untapped maple trees, trees tapped with conventional gravity methods, and trees tapped with modern high yield methods. Growth was measured at the start of the study and at the end of each growing season. There were no significant differences in tree growth or any health parameters measured, although there was a slight tendency for trees subjected to high yield methods to grow slightly slower. The research will continue to measure growth over the next five year period to determine whether the trend towards slower growth continues.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #18

1. Outcome Measures

The number of Vermont polling participants used to help formulate public opinion on the Vermont migrant population.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	613

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #19

1. Outcome Measures

The number of individuals accessing reliable, credible, and up-to-date organic dairy information across the nation.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	3323

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #20

1. Outcome Measures

The number of legislators and key decision makers who increase understanding of current local agricultural issues

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	12

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

Outcome #21

1. Outcome Measures

The number of factors threatening food supply that affect agricultural production.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Efficient allocation of essential resources-food, energy, water and ecosystems services-is the single most important task for any economy. Demand for essential resources remains the same, regardless of price, for those who can afford them, but not for the poor. Failure to ensure food security for growing populations could have catastrophic consequences.

What has been done
The study researches resource allocation mechanisms and economics designed to balance the biophysically possible with what is socially, psychologically and ethically desirable. Using a recent World Bank database, research estimates impacts of food price and income changes on demands for food across countries and income groups.

Results
Factors threatening food supplies include climate change, ecosystem degradation and environmental policies. The goal is to inform policies, which can ensure sustainable, just and efficient allocation of food and other essential resources.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
704	Nutrition and Hunger in the Population

Outcome #22

1. Outcome Measures

Number of studies on a dairy cow's dietary regime to determine if differing regimes will enrich health-promoting bioactive fatty acids in milk.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The goal is to improve the health of milk and its related products to optimize health and prevent disease development by improving the nutritional and functional properties of cow's milk.

What has been done
Two objectives; the first was to identify the community structure of the rumen microbiota. The second was to look at the importance of specific rumen microorganisms producing the bioactive fatty acids.

Results
The study showed that there is potential to increase the content of bioactive fatty acids in dairy products through management of the cow's diet, shifting rumen microbial communities resulting in altered fatty acids available to the mammary gland for incorporation into milk fat.

4. Associated Knowledge Areas

KA Code	Knowledge Area
308	Improved Animal Products (Before Harvest)

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

Integrated Pest Management (IPM): Soil building takes time and on some farms, investments in soil quality will take more than the duration of the project to show results; schools may lack personnel or funding to dedicate time and energy to IPM practices; growers are receptive to expand their use of IPM, but make changes in their production practices slowly to reduce negative impacts; new pesticides, biological controls and other

effective IPM tactics are still being tested, and need to be assessed under field conditions before they are broadly adopted; the costs of some IPM practices are considerably higher than chemical pesticides which reduce adoption by growers; customers in general have limited knowledge of IPM, though they are willing to pay more for IPM produced products when informed of the benefits of this production approach.

Food Safety: Cost of program implementation. Cost of personnel training to understand food safety regulations. A person's perception of risk associated with foods sometimes does not match the science of food safety.

Vegetable and Berry Program: Weather; costs of production inputs such as energy; consumer demand and prices received for products sold; federal, state, and local regulations; availability of farmland and labor; ability to find relevant and timely technical information to support good production and management decisions.

Increased Population: Food and Agriculture Organization (FAO) www.fao.org (2011) estimates that population growth and greater affluence will increase the demand for food by 70% by 2050.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

New England Vegetable and Fruit Conference: on post-conference evaluation forms, 165 growers said they had implemented a new practice on their farms that they learned about at a prior New England Vegetable and Fruit Conference.

The Northeast Center to Advance Food Safety (NECAFS): When asked "Has NECAFS helped you improve your food safety training, education and/or outreach?" 36 (92%) respondents answered "Yes." Answers to the follow-up evaluation question "If so, how?" resulted in themes focused on the value of networking and communication, as well as sharing of resources and information. Networking that led to training delivery and direct funding were also cited by respondents, though less frequently.

Nutrient Management Program:

- In FY18, the Champlain Valley Crop, Soil & Pasture Team consulted and provided technical assistance and education to 135 farms who planned and implemented conservation practices that improved water quality including 9,584 acres of Nutrient Management Plans on 97 farms, 2,482 acres of reduced tillage and no-till on 64 farms, 422 acres of new cover crop acres on 32 farms, and implemented 772 acres of improved pasture grazing systems on 71 farms.

- Farmers that attended a Nutrient Management Planning update class reported the following: 98% implemented a practice to improve water quality (buffer, cover crops, no-till, etc) and 78% implemented practices that improved forage yield or quality.

Vermont Tourism and Recreation: University of Vermont Extension and partners organized the third annual Vermont Open Farm Week, with 43 farms open to visitors August 14-20, 2017. UVM Extension took the lead on providing technical assistance to participating farms to ensure best practices with regards to liability, safety, and other

precautions for farms open to visitors. After Open Farm Week ended, we conducted an online survey of the 43 farms that participated, and 23 responded (53 percent). When asked how OFW was beneficial, 97 percent (22 farmers) selected "Very Helpful" or "Helpful" for at least one benefit. One respondent left that question blank, along with most of the survey. Specifically, 86 percent (18 farmers) reported OFW was helpful for attracting new customers/visitors, 67 percent (14) said it was helpful for increasing sales, and the 40 percent (8) said it was helpful for increasing profits. In addition, 72 percent (16) said it was helpful for gaining experience for themselves and their staff and 86 percent (19) reported that it was helpful for educating customers/visitors about farms and food. By implementing recommended practices and participating in OFW, 22 farms were able to "accomplish owner values and goals to improve/protect business sustainability."

Engineering for Food Production, Harvest and Storage: A cohort of 12 NRCS field office employees participated in a Farm Energy Workshop focused on use of energy audits in Bordentown, NJ on August 22-24, 2017. The workshop and its content was developed by several university extension personnel with expertise in farm energy in coordination with the NRCS National Energy Program Leader. The workshop resulted in an increase in both knowledge (+1.1 on scale 0-5) and confidence (+1.1 on scale 0-5) related to farm energy topics among the cohort. Feedback from participants encouraged the development of future trainings to include a greater level of pre-training coordination of training topics, inclusion of detailed calculations and review of audits, and coverage of the NRCS processes that lead from AgEMP to on-farm implementation.

Key Items of Evaluation

- 165 growers said they had implemented a new practice on their farms that they learned about at a prior New England Vegetable and Fruit Conference.
- 98% of farmers that attended a Nutrient Management Planning update class reported implementing a practice to improve water quality (buffer, cover crops, no-till, etc) and 78% implemented practices that improved forage yield or quality.
- By implementing recommended practices and participating in Open Farm Week, 22 farms were able to "accomplish owner values and goals to improve/protect business sustainability."

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Community Development and the Personal and Intellectual Development of Youth and Adults

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
124	Urban Forestry	11%		0%	
608	Community Resource Planning and Development	4%		0%	
802	Human Development and Family Well-Being	6%		0%	
805	Community Institutions, Health, and Social Services	22%		0%	
806	Youth Development	57%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	17.1	0.0	0.0	0.0
Actual Paid	16.5	0.0	0.0	0.0
Actual Volunteer	21.7	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
535917	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
653751	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
2274096	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

4-H Positive Youth Development: programming helps youth acquire Life Skills in the following areas: Decision Making; Critical Thinking; Problem-Solving; Communication; Goal-Setting; and Skills for Everyday Living to succeed as adults. Delivery Methods include 6-8 sequential learning hours using experiential learning techniques for in-school, afterschool, or out-of-school settings.

Science, Technology, Engineering, Arts and Math (STEAM): programming shows how science and engineering issues affect youths' lives and prepares a future generation of scientists and engineers. The 4-H STEAM program presents 4-H with a new opportunity to connect to the LGU's STEAM research community and integrate with current youth workforce development initiatives.

Community Leadership: assessing, addressing and expanding community capacity through leadership and public policy education efforts including building--and educating members and clientele of--coalitions and collaboratives.

Coping with Separation and Divorce (COPE): parent education for parents of minor children involved in divorce, establishment of parentage, separation, dissolution of civil unions, and changes in parental rights and responsibilities. This is a court mandated program.

High School Equivalency Program (HEP): helps eligible migrant and seasonal farm workers and members of their immediate family obtain the equivalent of a high school diploma, and subsequently gain employment or pursue postsecondary education. HEP offers program participants a free tablet and access to online curriculum available in both English and Spanish, thus enabling program participants to complete an individualized and self-paced course of study in preparation for passing the GED exam. This program is offered in partnership with other New England states of Maine, Massachusetts and New Hampshire.

Migrant Education Program (MEP): provides educational support services to eligible children and youth who relocate independently or with their families in order to obtain seasonal or temporary employment in agriculture. Delivery Methods: Outreach to schools, agricultural employers, and social service agencies throughout the state.

PROSPER [PROmoting School-community-university Partnerships to Enhance Resilience]: a delivery system of evidence-based programs for the purpose of improved Child and Family Outcomes such as long-term reductions in substance use; reduced youth behavior problems; and long-term effects on school engagement and academic success, with similar benefits occurring for both low- and high-risk groups.

Tax School: UVM Extension Tax School provides the latest in-depth and up-to-date training on Federal and Vermont Tax law and regulations. The training can provide up to 15 total hours of CE credits for EAs/AFSPS and up to 16 hours for CPAs.

Vermont Urban and Community Forestry program: a joint initiative between the University of Vermont Extension and the Department of Forests, Parks and Recreation. The mission of the program is to promote the stewardship of the urban and rural landscapes to enhance the quality of life in Vermont communities. The program provides educational, technical and financial assistance in the management of trees and forests, in and around the built landscape as well as First Detector education for invasive pests. Delivery methods include classes, meetings, various media, and community volunteer projects.

2. Brief description of the target audience

4-H Community or Project Clubs Participants (Youth)
4-H Leaders (Adult)
4-H Special Interest or Short-Term Program Participants (Youth)
4-H: Adult Volunteers
4-H: Camp Board Directors
4-H: Youth
4-H: Youth Volunteers
Adults
Age 19 - 24 Young Adult
Age 25 - 60 Adult
Age 6 - 18 Youth
Agriculture: Farm Families
Agriculture: Farmers
Agriculture: Farmers with disabilities
Agriculture: Government Agency Personnel
Agriculture: Industry Professionals
Agriculture: Livestock producers
Communities: Cities and Towns
Communities: Educators
Communities: Local Officials/Leaders
Communities: Non-Governmental Organizations
Communities: Schools
Community leaders and citizens
Community: Family Court Personnel
Extension: Faculty/Staff
Forestry: Landscape Industry
Forestry: Woodland Managers/Foresters
Funders
Policy Makers: Legislators
Public: Families
Public: General
Public: Migrant In School Youth
Public: Migrant Out of School Youth
Public: Nonprofit Organizations
Public: Parents
Public: Small Business Owners/Entrepreneurs
Public: Volunteers
School Enrichment Program Participants (Youth)
Tax Preparers
Train-the-Trainer recipients: adults
USDA personnel

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	28251	230906	9876	505

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- 4-H Afterschool

Not reporting on this Output for this Annual Report

Output #2

Output Measure

- 4-H Club

Year	Actual
2018	288

Output #3

Output Measure

- 4-H Day Camp

Year	Actual
2018	1

Output #4

Output Measure

- 4-H Overnight Camp

Year	Actual
2018	1

Output #5

Output Measure

- 4-H School Enrichment

Year	Actual
2018	37

Output #6

Output Measure

- 4-H Short-term/special interest

Year	Actual
2018	132

Output #7

Output Measure

- Class/course

Year	Actual
2018	920

Output #8

Output Measure

- Conference

Year	Actual
2018	6

Output #9

Output Measure

- Consultations

Year	Actual
2018	1506

Output #10

Output Measure

- Discussion Group

Year	Actual
2018	14

Output #11

Output Measure

- Field Site Visit

Year	Actual
2018	1966

Output #12

Output Measure

- Funding request

Year	Actual
2018	3

Output #13

Output Measure

- Presentations

Year	Actual
2018	49

Output #14

Output Measure

- Publication - fact sheet

Not reporting on this Output for this Annual Report

Output #15

Output Measure

- Publication - newsletter

Year	Actual
2018	47

Output #16

Output Measure

- Publication - newspaper/article
  Not reporting on this Output for this Annual Report

Output #17

Output Measure

- TV segment/Across the Fence (ATF)

Year	Actual
2018	9

Output #18

Output Measure

- Train the Trainer sessions
  Not reporting on this Output for this Annual Report

Output #19

Output Measure

- Workshop - series

Year	Actual
2018	200

Output #20

Output Measure

- Workshop - single session

Year	Actual
2018	50

Output #21

Output Measure

- Trainee Delivered Programming

Year	Actual
2018	87

Output #22

Output Measure

- Mass Media: blog post/social media/web page/internet site updating

Not reporting on this Output for this Annual Report

Output #23

Output Measure

- Display or Exhibit

Year	Actual
2018	29

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of eligible migrant youth enrolled in the Vermont Migrant Education Program
2	Number of individuals (youth and volunteers) in short term and/or afterschool programs increase STEAM related knowledge and/or skills in content and careers
3	Number of parents undergoing family transition through parentage, divorce or separation who understand the impact of these changes and their behavior on their children.
4	Increase in number of youth reached with positive youth development programming demonstrate mastery for targeted life skills, including: decision making; wise use of resources; communication; accepting differences; leadership; useful/marketable skills; healthy lifestyle choices; and/or self-responsibility
5	Number of volunteers and staff demonstrating new techniques/activities in clubs and programs to better prepare youth to develop life and job skills, learned through 4-H training and development
6	Number of individuals who use skills and effectively participate in addressing community issue(s) (e.g. green infrastructure, local leadership, hunger, volunteerism, etc.)
7	Number of participants who are English language learners increase their level of English proficiency
8	Number of communities or community group/organization(s) establishing or expanding projects to improve or mitigate a community issue
9	Number of migrant out of school youth who gain proficiency in a new life skill
10	Number of migrant children and youth who demonstrate school readiness, advancement, or completion
11	The number of individual clinics or other health entities that incorporate new or improved policies or practices that increase access for Limited English Proficiency populations

Outcome #1

1. Outcome Measures

Number of eligible migrant youth enrolled in the Vermont Migrant Education Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	287

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services
806	Youth Development

Outcome #2

1. Outcome Measures

Number of individuals (youth and volunteers) in short term and/or afterschool programs increase STEAM related knowledge and/or skills in content and careers

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	941

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
American Youth are losing ground in science, technology, engineering, arts and math (STEAM) compared to peers in other nations. Although the United States is currently the world's economic and military leader, too many young Americans do not have the STEAM career skills necessary to succeed and meet our country's needs in the future. American inventiveness and competitiveness in the global marketplace are at risk as student interest and performance in STEAM disciplines declines at the same time that STEAM literacy and mastery expectations rise (Business Roundtable, 2005).

What has been done
UVM Extension's VTeen 4-H Science Pathways Cafés are a free, fun way for teens to explore STEAM with local experts in the field. Each two-hour cafe brings in a local scientist to guide teens through discussion and hands-on activities to learn about a topic. Six cafés have been offered so far, reaching a total of 205 Vermont teens in grades seven through 12. More cafés, including follow-up labs, are planned for the coming year.

Results
According to post-program evaluations, 84% of café participants gained new STEAM knowledge. From astrobiology to the science of stress, the cafés offer informal introductions to new topics and possible careers in Vermont. Fifteen-year-old participant Lena Ashooh reflected that "through this café we can see that there are professions within the state, within science, that are really exciting and engaging"? The VTeen 4-H Science Pathways Cafes are only part of UVM Extension's efforts to engage children and youth with STEAM-related programming that prepares them to meet our country's current and future needs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

Number of parents undergoing family transition through parentage, divorce or separation who understand the impact of these changes and their behavior on their children.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1155

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #4

1. Outcome Measures

Increase in number of youth reached with positive youth development programming demonstrate mastery for targeted life skills, including: decision making; wise use of resources; communication; accepting differences; leadership; useful/marketable skills; healthy lifestyle choices; and/or self-responsibility

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	765

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

Number of volunteers and staff demonstrating new techniques/activities in clubs and programs to better prepare youth to develop life and job skills, learned through 4-H training and development

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	127

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #6

1. Outcome Measures

Number of individuals who use skills and effectively participate in addressing community issue(s) (e.g. green infrastructure, local leadership, hunger, volunteerism, etc.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	71

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
New England has been among the hardest-hit regions in the opioid epidemic. "Deaths from opioid-related overdoses increased 159% in Vermont between 2010 and 2016 and continue to climb" (Vermont Opioid Coordination Council). The impact of the opioid crisis is broad and vulnerable populations (like youth) are at high risk. Research shows that when parents are engaged in their children's school activities, students have better behavior, higher academic achievement, and partake in fewer risky behaviors such as sexual activity, tobacco, and other drug use.

What has been done
UVM Extension deployed PROSPER (a delivery model for evidence-based substance abuse prevention-focused) in three Vermont communities. PROSPER Teams, composed of community stakeholders, cooperate to deliver curricula that build protective factors. Youth learn to navigate peer pressure and reduce risky behaviors while parents learn effective communication and parenting skills. Operational since 2013, the PROSPER effort has reached over 1000 individuals including 5th, 6th and 7th graders and families.

Results

In the 2017-2018 program year, a pre/post evaluation survey showed that 60% of parent/caregiver participants now try to see things from their child's point of view while 58% can explain to their child the consequences of not following rules concerning alcohol use. Being able to communicate and empathize with your children goes a long way in building protective factors. Three community teams with 26 volunteers provide leadership, are sustaining the model, and contributing towards a healthier community. Children and adolescents who use alcohol and drugs at an early age are more likely to face problems with substance use as adults, but by building positive skills through efforts like PROSPER, youth are better equipped to avoid risky behaviors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
124	Urban Forestry
608	Community Resource Planning and Development
802	Human Development and Family Well-Being
806	Youth Development

Outcome #7

1. Outcome Measures

Number of participants who are English language learners increase their level of English proficiency

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	46

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

805	Community Institutions, Health, and Social Services
806	Youth Development

Outcome #8

1. Outcome Measures

Number of communities or community group/organization(s) establishing or expanding projects to improve or mitigate a community issue

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	42

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Vermonters are at greater risk for serious heat-related illnesses, and even death, when the statewide average temperature reaches 87°F or hotter, according to an analysis completed by the Vermont Department of Health. Since 2000, Vermont has had an average of seven days per year when the temperature reached 87°F or hotter and by mid-century, climate models predict an increase of 15 to 20 hot days per year. Vermont residents may be more affected by heat in part because many homes and businesses are not well designed to deal with summer heat.

What has been done
The Vermont Urban & Community Forestry Program (UCF; a partnership between UVM Extension and Vermont Department of Forests, Parks and Recreation) targeted communities in Vermont that are most vulnerable to heat-related illness with a free tree giveaway program called Energy Saving Trees. When planted properly, a single mature tree can save a homeowner up to 20% on energy costs. The program uses a research-based, easy-to-use online mapping tool that takes the guesswork out of tree planting to maximize the cooling benefits of trees.

Results
In the program's pilot year (2017), UCF worked in the Vermont towns of Newport and Bennington to give away 200 free trees to 109 residents. In 2018, UCF selected Barre and Rutland and gave away 300 trees to 160 residents. By planting trees in strategic locations to maximize shade and energy saving benefits, these trees are expected to save participating residents over $275 in energy savings during the first 20 years. The shade and cooling benefits provided to residents will also reduce the likelihood and risk to heat related illnesses. Additionally, these trees will add to a home's property value, reduce a homeowner's carbon footprint, improve air quality, reduce stormwater runoff and provide food and shelter for wildlife.

4. Associated Knowledge Areas

KA Code	Knowledge Area
124	Urban Forestry
608	Community Resource Planning and Development
806	Youth Development

Outcome #9

1. Outcome Measures

Number of migrant out of school youth who gain proficiency in a new life skill

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	124

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Youth who arrive from Mexico and Central America to work on Vermont farms often have limited practical skills and little to no competence or confidence communicating in English. Although most have completed the equivalent of middle school in their home countries, English and life skills instruction does not transfer well to their new environments. This makes it challenging for migrant farmworkers to communicate basic needs or access necessary community services.

What has been done
UVM Extension's Migrant Education Program (MEP) partnered with farm business owners and managers, primarily in the dairy industry, to provide 181 life skills lessons (a menu of 10 different lessons) to 81 youth farmworkers. Each lesson is designed to increase self-sufficiency by teaching a concrete life skill or sharing information immediately relevant to the student's life on the farm. These lessons help foreign workers acclimate to life in Vermont, better communicate their needs and access community services.

Results
Of the 181 lessons taught, students showed improved knowledge and/or increased proficiency in 124 of them. Out-of-School youth farmworkers are strongly focused on their employment and saving money for the future. They have little time or energy for education, but they often have a strong need for life skills and survival English. Visits by a compassionate mentor who presents

short, concrete, immediately relevant lessons improve the students' sense of self-efficacy and plant a seed of learning that may sprout into their seeking ongoing educational opportunities. Education like this creates a stronger more capable workforce for Vermont's dairy industry.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #10

1. Outcome Measures

Number of migrant children and youth who demonstrate school readiness, advancement, or completion

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	101

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #11

1. Outcome Measures

The number of individual clinics or other health entities that incorporate new or improved policies or practices that increase access for Limited English Proficiency populations

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	12

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Transportation is often an issue for rural youth to participate in out of school hours programming.

Two issues often hinder the effective planning and management of Vermont's urban and community forestry resource: 1) a need for greater awareness that urban and community forests that are planned and designed as green infrastructure will become valuable components of sustainable communities, and 2) a need for political and human capital to manage this resource.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Migrant Education Program: 181 Life Skills mini-lessons were taught to 81 out-of-school youth students. Each Life Skills mini lesson uses a Pre and Post assessment. Pre assessments with a 3 or below on the 5 point scale indicate non proficient on the individual life skill. 124 of the lessons taught showed that students gained proficiency in the skill of focus.

4-H Positive Youth Development Program: In this global society where content can be found immediately, employers are having a hard time finding employees with the ability to work independently and collaboratively, with the grit and determination necessary for success. The more youth participate in 4-H Positive Youth Development (PYD) activities, the more likely they are to reach goals, have high academic competence, and the more likely they are to contribute to our communities (Tufts Study). **Evaluation Question(s):** Are 4-H youth better prepared for college and careers by learning and practicing important life skills? **Type of Evaluation:** summative. **Methodology:** record books, common measure survey, observation, and interview. **Target Audience:** 4-H club youth. **When:** Fall - end of 4-H year. **Results:** FY18 evaluations found that 765 youth applied the following life skills needed for 21st-century career development: problem-solving, decision-making, communication, collaboration, and leadership.

Key Items of Evaluation

- 124 of the Life Skills mini-lessons lessons taught by the Migrant Education Program showed that students gained proficiency in the skill of focus.
- FY18 4-H Positive Youth Development Program evaluations found that 765 youth applied the following life skills needed for 21st-century career development: problem-solving, decision-making, communication, collaboration, and leadership.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Climate Change

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		13%	
112	Watershed Protection and Management	0%		5%	
121	Management of Range Resources	0%		12%	
122	Management and Control of Forest and Range Fires	0%		12%	
123	Management and Sustainability of Forest Resources	17%		18%	
132	Weather and Climate	24%		12%	
133	Pollution Prevention and Mitigation	26%		12%	
136	Conservation of Biological Diversity	0%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		2%	
205	Plant Management Systems	0%		2%	
601	Economics of Agricultural Production and Farm Management	24%		3%	
602	Business Management, Finance, and Taxation	9%		0%	
704	Nutrition and Hunger in the Population	0%		4%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	2.4	0.0	4.0	0.0
Actual Paid	1.8	0.0	8.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
57455	0	259166	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
70087	0	582323	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
243802	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Invasive Pests - monitoring of the Asian Long Horned Beetle and Hemlock Woolly Adelgid; interception and prevention if possible, mitigation through work with bioactive fungi and natural enemy species; work with the US forest service, US Agricultural Research Service (ARS), and the maple industry.

Maple Production - research and extension efforts at the Proctor Maple Center are directed at extending the sugaring season, maximizing yield, and minimizing disease to trees.

Monitoring of the Eastern Forests - Species change and demarcation levels are being observed, documented and modeled for northern forests through remote sensing and on-the-ground observations.

Invasive Plants - research will continue on the genetic and physiological basis for "invasiveness" of problem plant species and introductions.

Climate Change Adaptation - work with growers with irrigation, drainage, plant selection and harvest. "Climate Change Best Management Practices" (CCBMPs) provides education through workshops and focus groups to help farmers boost adoption of climate change mitigation and adaptation strategies.

Forest Health and Sustainability - work with mostly small forest landholders to make decisions that protect forest stands and the ecosystems within, mitigate fragmentation of forest lands and assist with forest land transfer.

Sustainable Transportation - work within the transportation sector to assist them in reducing CO2 emissions while saving fuel and reducing wear and tear on equipment through vehicle certification and certification for staff through education programs.

2. Brief description of the target audience

- Agriculture: Farmers
- Agriculture: Produce Growers
- Agriculture: Service Providers
- Agriculture:Government Agency Personnel
- Extension: Faculty/Staff
- Researchers

- Agriculture: Maple producers
- Public: Immigrant population
- Public: Forest land owners
- Public: Business/Commercial
- Public: Professional Drivers
- Ecologists
- Evolutionary biologists

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	9164	14900	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	0	3	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Research Projects

Year	Actual
2018	19

Output #2

Output Measure

- Consultations

Year	Actual
2018	228

Output #3

Output Measure

- Workshop Series

Year	Actual
2018	31

Output #4

Output Measure

- Mass Media: blog post/social media/web page/internet site updating

Year	Actual
2018	16

Output #5

Output Measure

- Publication - popular press

Year	Actual
2018	5

Output #6

Output Measure

- Focus Groups

  Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Research Conferences

Year	Actual
2018	2

Output #8

Output Measure

- Scientific Meeting(s)

Year	Actual
2018	2

Output #9

Output Measure

- Presentations

Year	Actual
2018	81

Output #10

Output Measure

- Conferences

Year	Actual
2018	2

Output #11

Output Measure

- Course

Year	Actual
2018	1

Output #12

Output Measure

- Workshop - single session

Year	Actual
2018	20

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of climate change management practices identified for Vermont farms that aid in climate change adaptation
2	Number of ecological and evolutionary factors identified that influence invasive plants in Vermont
3	Number of landowners who actively engage with their land to protect/improve/create woodlands
4	Number enterprises who implement recommended environmental behaviors to meet or exceed terms to have vehicles certified through the eRating program
5	Number of new and continuing enterprise/organizations offering CST 'eco-driver' and/or 'idle free' themed certification courses to employees and related stakeholders in order to promote saving fuel, money, and reducing environmental impacts.
6	Number of individuals who implement one or more best practices that mitigate the effects of climate change for farm, forest, or garden
7	Number of drivers completing a personal pledge to embrace 'Eco-driving' practices
8	Number of eRating certified vehicles
9	Number of social medium platform engagements that have increased during catastrophic weather events.
10	Number of Treatment Options for Targeting Water Pollution Reduction from Farms

Outcome #1

1. **Outcome Measures**

Number of climate change management practices identified for Vermont farms that aid in climate change adaptation

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Number of ecological and evolutionary factors identified that influence invasive plants in Vermont

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Number of landowners who actively engage with their land to protect/improve/create woodlands

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Number enterprises who implement recommended environmental behaviors to meet or exceed terms to have vehicles certified through the eRating program

2. **Associated Institution Types**

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	41

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
133	Pollution Prevention and Mitigation

Outcome #5

1. Outcome Measures

Number of new and continuing enterprise/organizations offering CST 'eco-driver' and/or 'idle free' themed certification courses to employees and related stakeholders in order to promote saving fuel, money, and reducing environmental impacts.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	81

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
133	Pollution Prevention and Mitigation

Outcome #6

1. Outcome Measures

Number of individuals who implement one or more best practices that mitigate the effects of climate change for farm, forest, or garden

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Number of drivers completing a personal pledge to embrace 'Eco-driving' practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	7604

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
602	Business Management, Finance, and Taxation

Outcome #8

1. Outcome Measures

Number of eRating certified vehicles

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	2506

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
602	Business Management, Finance, and Taxation

Outcome #9

1. Outcome Measures

Number of social medium platform engagements that have increased during catastrophic weather events.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Natural disasters are becoming increasingly expensive as climate change and development are exposing communities to greater risks. Disaster preparation and recovery are critical for climate change resilience, and social media is being used more and more to communicate before, during, and after disasters. While there is a growing body of research aimed at understanding how people use social media surrounding disaster events, most existing work has focused on a simple disaster case study.

What has been done
In this study, five of the costliest disasters were analyzed in the last decade in the United States (Hurricanes Irene and Sandy, two sets of tornado outbreaks, and flooding in Louisiana). Vermont's Tropical Storm Irene was part of the storms analyzed. The research explored the frequency of both generic and specific food-security and quantified the relationship between network size and Twitter activity during disasters.

Results
Research found differences in tweet volume for keywords depending on disaster type, with people using Twitter more frequently in preparation for Hurricanes, and for real-time or recovery information for tornado and flooding events. Further, it was found that people share a host of general disaster and specific preparation and recovery terms during these events. Individuals with average sized networks are most likely to share information during these disasters, and in most cases, do so more frequently than normal. This suggests that around disasters, and ideal form of social contagion is being engaged in which average people rather than outsized influentials are key to communication.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
704	Nutrition and Hunger in the Population

Outcome #10

1. Outcome Measures

Number of Treatment Options for Targeting Water Pollution Reduction from Farms

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Stormwater runoff from (paved and dirt roads, rooftops, parking lots) and areas where farm operations occur adversely impacts the water quality of rivers, lakes, and other receiving waters.

What has been done
Research was performed on soil media and plant combinations for agricultural operations runoff treatment using bioretention cells: 1. layers of stone and sand only, with no vegetation, 2. layers of stone and with switchgrass and 3. layers of stone and sand with switchgrass and a "low-phosphorus" compost amendment placed at the roots of each switchgrass plant. Water is sampled during storm events to compare the quality of the inflow to the outflow and to measure the performance of three different bioretention cells.

Results
Preliminary results indicate that the planted bioretention systems (cells 2 and 3) retained more runoff than the unplanted cell 1. For cell 2, although plant biomass was lower in the absence of compost in the first growing season, plant survival was the same as in cell 3. In the second growing season, biomass was nearly identical in the two vegetated bioretention cells, with and without low-phosphorus compost.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations

Brief Explanation

The political climate: changing policy and budget priorities may have an impact on public attitudes toward a program focused on increasing energy efficiency, reducing fossil fuel consumption, and reducing the environmental impacts.

July 20, 2017 the governor announced the creation of the Vermont Climate Action Commission (VSAC) to provide recommendations to decrease greenhouse gas and meeting energy needs from renewable sources.

Variable weather has reduced the length of maple production, a Vermont specialty crop, by 10% over the past 50 years.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Results include;

Key Items of Evaluation

Climate change forecasts include increases in precipitation averages, frequency of extreme weather events, and changing plant and animal communities. These changes impact farm viability. Research provides much needed information through targeted audiences to help the agricultural community make informed decisions.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Sustainable Energy

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
206	Basic Plant Biology	0%		50%	
601	Economics of Agricultural Production and Farm Management	0%		50%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.6	0.0
Actual Paid	0.0	0.0	1.7	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	17000	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	137373	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Energy Crop Research Projects

Renewable energy workshops

Economic feasibility and market potentials for oilseed and farm-scale biodiesel production

Using plant cell walls as a source of biofuels

2. Brief description of the target audience

- Adults
- Agriculture: Crop Producers
- Agriculture: Farmers
- Research scientists
- Agribusinesses
- Policymakers
- Educators

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total

Actual	0	1	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Workshop - single session

Year	Actual
2018	1

Output #2

Output Measure

- Research Projects

Year	Actual
2018	2

Output #3

Output Measure

- Conference papers

Year	Actual
2018	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of research studies that access the financial and economic feasibility of converting cow manure into renewable energy products
2	Number of research findings that propose using plant cell walls as a source of biofuels
3	Number of Vermont Farms financially reviewed with operating biodigester systems.

Outcome #1

1. Outcome Measures

Number of research studies that access the financial and economic feasibility of converting cow manure into renewable energy products

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Number of research findings that propose using plant cell walls as a source of biofuels

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology

Outcome #3

1. Outcome Measures

Number of Vermont Farms financially reviewed with operating biodigester systems.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The research focuses on community based biodigester systems and consumer demand is highly significant because individual biodigester systems are only viable to large dairy farms due to the huge investment and the development of renewable energy markets such as the Cow Power

program; however, it is highly restricted by the lack of consumer willingness to pay for such products.

What has been done
The goal of this research is to expand the markets for renewable energy products from cow manure and other waste through integrated research and extension. The study expanded the data collection and analysis of biodigesters on Vermont dairy farms.

Results
A survey will be developed and conducted in 2019 with an operating community-based biodigester system and two communities with proposed biodigester systems.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
511	New and Improved Non-Food Products and Processes	0%		16%	
604	Marketing and Distribution Practices	9%		0%	
607	Consumer Economics	9%		0%	
703	Nutrition Education and Behavior	6%		25%	
704	Nutrition and Hunger in the Population	30%		5%	
724	Healthy Lifestyle	14%		45%	
805	Community Institutions and Social Services	32%		0%	
903	Communication, Education, and Information Delivery	0%		9%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	6.3	0.0	3.0	0.0
Actual Paid	7.8	0.0	5.0	0.0
Actual Volunteer	0.6	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
251374	0	202999	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
306645	0	334003	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1066676	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Enhancing Healthy Food Access:

• **Senior Farm Share:** Produce is distributed to approximately 900 households of older and disabled adults who live in subsidized housing. Extension role in this collaborative project involves production of educational materials and conducting program evaluation.

• **Measuring Food Security among Vermont Resettled Refugees:** As a follow-up to previously held focus groups, 25 resettled refugees will participate in individual interviews to understand their household food management strategies, which will be used to reconsider food security policy.

• **Northeast Kingdom Produce Coupon Program:** Approximately 400 households will receive coupons to use in independent markets for the purchase of fresh produce. They will also receive brief education. Extension's role is in program design and evaluation.

• **VT Dept. of Health Produce Prescription Project:** UVM Extension will conduct an evaluation of this newly designed program.

• **Farm to School**: UVM will partner with members of the Farm to School network to continue work on identifying and marketing the economic value of participating in Farm to School, and to assess the impact of the coming year's Farm to School grants.

Puentes a la Salud/Bridges to Health: work with latino farm workers and farm employers in collaboration with the UVM medical school and nursing students providing needs related to health care access or home health, provide health and nutrition education, and food access. Delivery methods: farm visits, phone, consultation.

Local Foods/Farm to Plate: unifies business, government and non-profits to scale up local food production and consumption. Network of more than 160 organizations working to achieve goals to re-localize food production and distribution.

Crowdsourcing Approach to Understand Weight Loss Behavior in Men: a strategic model used to draw a responsive, motivated group of individuals, who are able to provide solutions beyond those that traditional forms of research can.

Outdoor Family Weekend: an annual weekend event that creates opportunities for families to experience

being outdoors together while learning about environmental conservation, outdoor safety and wilderness skills. Families engage in healthy behaviors and acquire skills through outdoor recreation activities like kayaking, hiking, and fishing.

"Food Agency:" a measure of an individual's ability to set and achieve food-related goals in life. Studies to determine use patterns for food purchasing, preparation/cleanup, eating/drinking and traveling associated with food consumption.

2. Brief description of the target audience

Age 60 - Senior
Agriculture: Beginning Farmers
Agriculture: New American Farmers
Agriculture: Migrant workers
Communities: Non-Governmental Organizations
Community: Health Entities
Public: Families with Limited Resources
Public: Health Providers
Age 6 - 12 School Age
Agricultural Scientists

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	494	5	25	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total

Actual	0	2	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Consultation

Year	Actual
2018	232

Output #2

Output Measure

- Workshop Series

Year	Actual
2018	27

Output #3

Output Measure

- Workshop - single session

Year	Actual
2018	12

Output #4

Output Measure

- Presentations

Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Radio

Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Television

Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Demonstration
  Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Research Project

Year	Actual
2018	14

Output #9

Output Measure

- Field Site Visits

Year	Actual
2018	25

Output #10

Output Measure

- Conference
  Not reporting on this Output for this Annual Report

Output #11

Output Measure

- Discussion Group

Year	Actual
2018	52

Output #12

Output Measure

- Fact Sheet

Year	Actual
2018	5

Output #13

Output Measure

- Evaluation Instrument

Year	Actual
2018	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals who incorporate one or more healthful eating practices and/or physical activity to prevent/manage disease and/or obesity
2	Number of individuals who select and prepare a variety of produce to help prevent/manage disease and/or obesity
3	Number of weight loss programs that help/reduce adult obesity.
4	Number of individuals who take steps to meet daily needs for health, education, social and personal wellbeing
5	Number of studies that examines cooking as an intervention target for weight control in overweight adults.
6	Number of mobile gaming apps developed to improve physical activity in high school students.

Outcome #1

1. Outcome Measures

Number of individuals who incorporate one or more healthful eating practices and/or physical activity to prevent/manage disease and/or obesity

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	71

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #2

1. Outcome Measures

Number of individuals who select and prepare a variety of produce to help prevent/manage disease and/or obesity

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	538

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

Outcome #3

1. Outcome Measures

Number of weight loss programs that help/reduce adult obesity.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #4

1. Outcome Measures

Number of individuals who take steps to meet daily needs for health, education, social and personal wellbeing

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	247

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The stability of the Vermont dairy industry depends on immigrants who work an average of 69 hours per week in a physically demanding job. These long laborious hours increase their risk of poor health and fatigue. Significant barriers like lack of transportation and fear of lost wages prevent workers from addressing health care needs and thus meeting productivity potential. Delays in accessing health care services either for illness or injuries can result in more significant health problems, decreased productivity, and increased absenteeism at work.

What has been done

UVM Extension's Bridges to Health (BTH) program helps immigrant workers communicate health care needs to their employers and access timely, affordable care in their native language and local communities. Each year, 1,000 immigrant farmworkers and family members receive

information from BTH about where and how to access local care, and 450 are assisted in accessing health care services. BTH is a statewide program and the only healthcare support system in Vermont for immigrant farmworkers.

Results
Last year, Bridges to Health (BTH) coordinated nearly 1,700 in-clinic and on farm health appointments for farmworkers in all 14 Vermont counties, helped farmworkers access services at over 90 health sites, and empowered 232 individuals to proactively seek assistance accessing health care services to address a health need. BTH is helping Vermont's immigrant farmworkers maintain physical, mental, and emotional health. With good health, workers are more productive, resulting in cost savings for employers who would otherwise have to address health related absenteeism and turnover.

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices
607	Consumer Economics
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle
805	Community Institutions and Social Services

Outcome #5

1. Outcome Measures

Number of studies that examines cooking as an intervention target for weight control in overweight adults.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In the public health, there is concern that Americans rely too much on processed and prepared foods. This results in on-going problems seen with obesity, type 2 diabetes and heart disease.

What has been done

Studies were conducted to explore how young American adults, (college students) learn to cook. Research group developed a pedagogy "food agency" to ascertain the level of importance of economic and social conditions to individuals ability to stay empowered, to consistently act, and to choose making a meal at home versus alternatives.

Results
Three studies were performed; two using the "food agency" pedagogy and one evaluating students in a cooking lab. Observations included notable changes in a students demeaner with the student becoming more confident. Students felt in an educational setting that it was difficult to home cook thus what they learn will help them in future practices. Students did say that cooking did help with calming, increased confidence, and organization.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #6

1. Outcome Measures

Number of mobile gaming apps developed to improve physical activity in high school students.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
75% of high school students in Vermont are not physically active for 60 minutes/day, the guideline from the Center for Disease Control and Prevention. Physical activity is important for weight control and optimal health. Establishing a physical active lifestyle during adolescence is desirable, as adolescents is in a critical period for obesity development.

What has been done
The study intends to help high school students to meet physical activity goals by using a mobile gaming app to incentivize 60 minutes of physical activity per day.

Results

The mobile gaming app was developed and was published in the Games for Health Journal.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Government Regulations
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

2015 Dietary Guidelines for Americans.

USDA National School Lunch Program implemented regulation requiring children to select a fruit or vegetable with their school lunch.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Enhancing Healthy Food Access: A pre and post survey with all Food Insecurity Nutrition Incentive (FINI) program participants identified impacts of the program on their fruit and vegetable intake. Comparisons of the pre to post survey showed statistically significant improvements in the variety of produce consumed and self efficacy related to produce consumption. 538 participants improved the variety of produce they consumed.

Key Items of Evaluation

Food Insecurity Nutrition Incentive (FINI): 538 participants improved the variety of produce they consumed.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		19%	
212	Diseases and Nematodes Affecting Plants	0%		4%	
215	Biological Control of Pests Affecting Plants	0%		12%	
216	Integrated Pest Management Systems	0%		2%	
311	Animal Diseases	0%		1%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	0%		11%	
403	Waste Disposal, Recycling, and Reuse	0%		2%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		15%	
602	Business Management, Finance, and Taxation	0%		7%	
607	Consumer Economics	0%		1%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		4%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		22%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	5.0	0.0
Actual Paid	0.0	0.0	5.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	106849	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	382580	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Please note: UVM Extension's Food Safety work is reported within the Global Food Security and Hunger Planned Program area.
Research - develop methods for detection and evaluate potential for growth and survival of pathogens of concern to Vermont artisan cheese makers.

Food Safety - working with small scale producers on best practices that enable them to provide a safe food product.

2. Brief description of the target audience

- Small scale meat and produce farmers
- Artisan cheese makers and consumers
- Researchers
- Organic farmers
- Policymakers
- Food Sectors
- Food Processors
- Environmental Experts
- Vegetable Growers
- Pest Managers/Crop Consultants

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2018

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	0	16	16

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Research Projects

Year	Actual
2018	7

Output #2

Output Measure

- Publications

Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Presentations

Year	Actual
2018	10

Output #4

Output Measure

- Non Referred Publications

Year	Actual
2018	9

Output #5

Output Measure

- Conference Papers

Year	Actual
2018	7

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of research projects working with farmers to improve food safety of artisan cheeses.
2	Number of safety measures used for cheese and milk intended for artisan cheese production

Outcome #1

1. Outcome Measures

Number of research projects working with farmers to improve food safety of artisan cheeses.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases
503	Quality Maintenance in Storing and Marketing Food Products
607	Consumer Economics
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Number of safety measures used for cheese and milk intended for artisan cheese production

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is the growing population of artisan cheesemakers in Vermont and nationally requires education and technical assistance in order to address food safety concerns associated with cheeses. An outbreak of food borne illnesses linked to Vermont artisan cheese could severely damage this important value-added sector of the Vermont economy.

What has been done
Preventing Listeria contamination of artisan cheese require routine and effective environmental monitoring of product contact surfaces within the production environment.

Results
Measures to improve food safety with artisan cheese producers; raw milk testing, improved surveillance of cheesemaking environments to control pathogens, improved and cost effective test methods, and control of pathogens on wooden shelves used for cheese aging.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Other (Food safety requirements of food)

Brief Explanation

Vermont Act 64; land use options

V(I). Planned Program (Evaluation Studies)

Evaluation Results

With the implementation of the Food Safety Modernization Act of 2011, the Hazard Analysis and Critical Control Point requirements for food safety plans became a regulatory requirement. The changes have had an important impact on small and artisanal cheesemakers.

Food safety pathogen epidemiology and detection research are addressed across the entire on-farm cheese production chain. Integration of detection technologies and an improved understanding of pathogen epidemiology mitigate food safety risk on dairy farms producing cheese or other raw milk products.

Crops are highly susceptible to arthropod pests. Chemical insecticides were used to prevent damage; however, resistance to and human health concerns have caused growers to seek alternative measures. Agricultural growers have transitioned to IPM and cultural and biological controls are used to suppress pests.

Key Items of Evaluation

In March, 2017, the FDA reported an outbreak of listeriosis caused by consumption of cheese produced in New York and resulted in two deaths and six cases of illness. Federal regulations do not regulate the presence of pathogens in raw milk used for the manufacture of raw milk products. Consumer interest in artisan and farmstead cheese is driving explosive growth of on-farm cheese operations throughout the United States and in Vermont. Many of Vermont enterprises are small to very small establishments. Researchers are addressing the need to focus on assuring the microbiological safety of cheeses produced on the farm. Vermont boasts the highest number of artisan cheese makers per capita in the United States. In order to allow this industry to grow and prosper, it is essential that the safety of artisan cheese be assured.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
1335	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.