

RESEARCH ○ IMPACT

2018 ANNUAL REPORT OF THE



THE UNIVERSITY OF VERMONT
**AGRICULTURAL
EXPERIMENT STATION**

&



THE UNIVERSITY OF VERMONT
EXTENSION





February 2019

Greetings from the College of Agriculture and Life Sciences,

I am pleased to share the 2018 Annual Report of the Vermont Agricultural Experiment Station and UVM Extension with you. The College's experts continue to be engaged in critical research and outreach to address problems in the state and improve the lives of Vermonters. This report spotlights several key questions and areas of focus, including the following:

- Is sub-surface tile drainage effective in combatting runoff and improving water quality?
- Can home cooking reduce chronic disease?
- Positive youth development programs help children and youth prepare for a successful future by engaging with communities and developing transferable skills.
- Agricultural business, water quality and food safety programs support their industries with technical assistance and educational opportunities.

As outgoing Dean of the College, I want to personally thank you for your ongoing support of our efforts. It has been a privilege serving the citizens of our state. Please visit our websites (www.uvm.edu/cals and www.uvm.edu/extension) to learn more about how our work continues to make a positive impact in the lives of Vermonters.

With best regards,

Thomas C. Vogelmann
Dean

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IMPACT

WATER QUALITY



Clean water is essential for the health of Vermont's economy and communities. UVM Extension helps protect Vermont's waterways by teaching farmers how to implement agricultural conservation practices.

Five-Year (2014-2018) Snapshot

3,740

People Received
6+ Hours Direct
Education

51,976

Direct Participants
Reached

874

Educational Activities
Delivered

EXPERTISE

Pasture and Grazing Management

practices have a direct impact on soil and water conservation. UVM Extension faculty and staff provide research, educational opportunities and technical support to enhance successful grass-based livestock production throughout Vermont. Among the current efforts: *The Center for Sustainable Agriculture's Pasture Program*, *Grazing Management Course*, and *goGraze™*.

Soil and Crop Management

education and technical assistance help farmers implement best practices such as cover crops and reduced tillage to decrease nutrient losses to surface water. UVM Extension encourages farmers to build healthy and resilient soils through the *Nutrient Management Program*, *Agronomy and Conservation Assistance Program (ACAP)*, and more.

245

Farmers developed nutrient management plans in accordance with Vermont's Clean Water Law (Act 64)

135

Farms improved water quality by implementing recommended conservation practices (through ACAP) in 2018

1,164

Farmers implemented best agricultural practices improving productivity while protecting water, air, soil and/or other natural resources (2014-2018)

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RESEARCH

ENVIRONMENT

Tile Drainage

Boon or Bust for Lake Champlain Water Quality?

Harmful algal blooms in Lake Champlain have increased in recent decades. The combination of warmer temperatures and more intense precipitation, both due to climate change, have exacerbated this problem.

Non-point source runoff contains excess levels of phosphorus that reach the lake through the stream and river tributary system, and promotes the blooms. Ongoing efforts to reduce phosphorus inputs have had mixed results. Agricultural activities contribute to the problem; however, adoption of the best management conservation practices can contribute to the solution.

Increased installation and use of subsurface tile drainage has become a controversial practice in Vermont. While it has potential to increase crop yields and decrease phosphorus losses to nearby surface waters by decreasing surface runoff and erosion, there is also evidence that tile drainage can result in greater movement of phosphorus in specific situations.

What is subsurface tile drainage? It is a system of plastic pipes, installed below the soil surface, intended to remove excess water from poorly drained soils. It is a technique that may be used in agricultural, industrial and residential

applications. In order to be most effective, systems must be properly designed, sited and maintained.



Research Professor Dr. Donald Ross looks at clay soils that have the potential to develop cracking which promotes rapid downward movement of drainage waters. His research will examine the extent of this problem in on-farm research and look at different field practices to minimize phosphorus loss. These results will be shared with farmers, UVM Extension personnel and regulators analyzing the potential for phosphorus loss from well-managed tile-drained fields.



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IMPACT AG BUSINESS



Vermont agriculture feeds Vermonters and the state economy, contributing more than \$281 million to Vermont's GDP every year. UVM Extension is committed to supporting this growing business sector by providing education and technical assistance tailored to the specific needs of Vermont farmers and producers.

Five-Year (2014-2018) Snapshot

7,467

Total Direct Participants

325

Educational Activities Delivered

1,375

People Received 6+ Hours Direct Education

EXPERTISE

Farm Viability and **Water Quality Business** provide individualized business planning assistance to ~50 farms each year to analyze finances, assess markets, develop strategic plans, and implement changes. Farm plans integrate business performance, conservation practices, and owner goals to sustain viable farms in Vermont.

Forest Business and **Maple Business** provide business coaching, conduct applied economic research, and develop business education resources to support forest-related businesses in Vermont. The *Business Skills for Logging Professionals* seminar, *Maple Benchmark* publication, and *Maple Economics* workshops are provided annually.



\$275K

To be invested in forest products businesses thanks to plans developed through the Forest Business Program in 2018

95%

Farm loan approval using business plans developed through Ag Business Programs

190+

Maple producers improved their business using Vermont Maple Business Benchmarks 2017-2018

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RESEARCH

AGRICULTURE

Improving Soil Health

The Value of Legumes as a Rotational Crop

Assistant Professor Dr. Eric Bishop-von Wettberg studies the value of winter peas and other legumes as rotational cover crops. Legumes are vital components of crop rotations in nearly all agricultural systems, due to their capacity to provide biologically fixed nitrogen and to break cycles of disease in crops such as wheat and corn. However, many legume crops are deficient in genetic diversity as a result of domestication and breeding, which limits their ability to adapt to new habitats or emerging threats like climate change.

By assessing how genes influence the performance of legumes in crop rotations and as cover crops, von Wettberg's research aims to mobilize nutrients to improve crop yields in agricultural systems. Improving the rotational value of legumes will aid in food security, resilience against climate change, and nutrient management.

Legumes increase soil fertility and crop yields at lower costs and environmental risks without using fertilizers. Many legume cover crops provide erosion control, suppress weeds, and build soil organic matter. To maintain crop health and increase production, it is important for farmers to incorporate legumes into their rotations, using these mixtures with forage

grasses and radish cover crops. This method can be costly when seed prices are high, but further research can help lower this barrier.



Dr. von Wettberg's research on how winter peas and other legumes will provide new options for regional dairy and vegetable farmers to improve soil fertility, and reduce erosion over the winter months. The basic components of his work will help to better define how these crops can improve soil health.

Food Agency

Can Home Cooking Reduce Chronic Disease?

Teaching the ability and capacity to cook at home – “food agency” – are goals in public health and nutrition fields, where there is significant concern that Americans’ diets rely heavily on processed and prepared foods. The choice to have others (in the form of already prepared and processed foods) cook on your behalf has consequences for both individual and population health, contributing to chronic health diseases such as obesity, type 2 diabetes and heart disease.

Ten years ago, **Professor Dr. Amy Trubek** applied her own culinary background to research looking at American home cooks’ knowledge and cooking skills. Focused on individuals located in rural and urban areas of the northeastern United States, including more than 25 in Vermont, this research led to many publications including the 2017 book release, *Making Modern Meals: How Americans Cook Today*.

A key finding of this research showed a consistent reality: Americans are episodic cooks. They have not stopped cooking,

but do so less often. They prepare dinners, but not lunches, for instance. Research shows this is true regardless of income, location or gender.

Trubek studies the possible connections between home meal preparation and chronic health problems. Trubek has identified the importance of social and economic conditions to an individual’s ability to consistently choose home meal preparation. There is clear evidence that new interventions are needed in order to empower people to cook for themselves.

Researchers and advocates in nutrition and public health fields are looking increasingly to home cooking as a means to improve individual and population health. Trubek’s research shows the need to teach about food planning and preparation. She believes a culture of health addressing metabolic diseases must acknowledge both need and the challenges of making and sharing meals. In five years, her goal is to be at the forefront of a movement to integrate such goals and tools into nutrition and public health interventions, initiatives and policy.





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IMPACT YOUTH & 4-H



Vermonters need to be competent in both life and job skills in order to be successful and economically stable. UVM Extension 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.

Five-Year (2014-2018) Snapshot

4,555

Educational Activities
Delivered

67,771

People Reached

28,309

People Received 6+
Hours Direct Education

EXPERTISE

Positive Youth Development helps children and youth make healthy choices by building positive relationships while exploring areas of interest in safe, supportive environments. UVM Extension provides experiential learning opportunities for young people to develop life and job ("transferrable") skills. Current activities include *4-H Clubs Program*, *Teens Reaching Youth (TRY) for the Environment*, *4-H Science Cafés*, and more.

Family and Wellness programs reinforce the belief that healthy people and families are the foundation of Vermont communities. UVM Extension partners with local/state agencies and organizations to promote and support family wellness, and strengthen family relationships and parenting skills through education. Current offerings include *Promoting School-community-university Partnerships to Enhance Resilience (PROSPER)* and *Coping with Separation and Divorce (COPE)*.



95%

Graduating high school seniors from 4-H Club programs believe 4-H helped them get into college

815

Youth demonstrated mastery of transferrable skills in 2018

1,155

Adults believe COPE positively impacted their parenting in 2018

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RESEARCH

FOOD SECURITY

Resource Allocation

The Economics of Supply and Demand in a Crowded, Unequal World

Efficient allocation of essential resources – food, energy, water and ecosystems services – is the single most important task for any economy.

In mainstream theory, price balances supply and demand to ensure resources flow to those who value them most. Prices increase with scarcity, leading consumers to demand less and producers to supply more. Demand for essential resources remains the same, regardless of price, for those who can afford them, but not for the poor.

For example, during the global food crises of 2007-2008 and 2011-2012, grain prices doubled in response to a small decrease in supply, increased corn ethanol production, and commodity speculation. Consumption by the destitute plunged, resulting in malnutrition, rioting and political turmoil, including the Arab Spring. Consumption and excessive food waste by the affluent were unchanged. When inequality is high, markets allocate food to those who need it least.

Factors threatening food supplies include climate change, ecosystem degradation and

environmental policies that affect agricultural production, such as limits on phosphorous or nitrogen. Speculation exacerbates price fluctuations, and inequality ensures the affluent outbid the poor for limited food. Failure to ensure food security for growing populations could have catastrophic consequences.

Professor Dr. Joshua Farley is an ecological economist researching 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, Farley's research estimates impacts of food price and income changes on demands for food across countries and income groups. He analyzes supply- and demand-side threats to food security, taking climate change,

environmental policies, commodity speculation and global currencies into account. His goal is to inform policies which can ensure sustainable, just and efficient allocation of food and other essential resources.





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IMPACT FOOD SAFETY



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. UVM Extension works across the food system, from farm to table, to support a safe and nutritious food supply.

Five-Year (2014-2018) Snapshot

80,366

Points of Contact
Made

657

Educational Activities
Delivered

1,570

People Received 6+ Hours
Direct Education

EXPERTISE

Food Safety experts support many aspects of our food system. The *Northeast Center to Advance Food Safety (NECAFS)* is a regional center hosted at UVM Extension focused on supporting training, education and outreach related to the Food Safety Modernization Act (FSMA) among small processors, and small- and medium-scale growers.

Food Safety for Produce Growers includes on-farm education, technical assistance, grower trainings, implementation of safety improvements, and certification through the *Community Accreditation for Produce Safety (CAPS)* program. Much of this work is done in partnership with the Vermont Agency of Agriculture, Food and Markets.

Food Safety for Processors improves the safety of manufactured foods by training, certifying, and consulting with small- to large-scale food processors. UVM Extension offers trainings like *Preventative Control for Human Food*, and *Sprout Safety*, to ensure compliance with state and federal regulations and industry-driven food safety certifications.

\$23M

Estimated annual sales of fresh produce from 113 farms enrolled in CAPS in 2018

130

Food processors and food safety professionals received training in 2018

113

Growers drafted, revised and finalized CAPS Produce Safety Plans in 2018

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