2018 University of Connecticut - Storrs Research and Extension and Connecticut Agricultural Experiment Station - Research Combined Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 08/15/2019

I. Report Overview

1. Executive Summary

We have reached the penultimate year of our Plan of Work and Accomplishment Report. Over the past several years, new topics have emerged that are creating unique opportunities for research and extension to meet the needs of Connecticut's citizenry. The Connecticut Agricultural Experiment Station (hereafter designated CAES) and the University of Connecticut Storrs Agricultural Experiment Station and Cooperative Extension System (hereafter designated UConn) continue to partner in efforts to address these new challenges and opportunities.

The 2018 report includes six program areas. CAES and UConn jointly address program areas 1-4. These include: (1) food safety, (2) food security and food systems, (3) human and animal health, and (4) sustainable environments. The remaining two programs areas, (5) 4-H and youth development, and (6) community and economic development, are conducted by UConn only. Both organizations address food, health, and sustainability, and all of our program areas address one or more of these.

This report offers specific examples of successful research and public engagement programs conducted by CAES and UConn. In 2018, we organized two workshops that brought together research and Extension professionals from CAES and UConn to identify new opportunities for partnerships and joint research/engagement programs across Connecticut. The workshops resulted in several new collaborations that leverage existing investments and pose opportunities for strengthening the partnerships between our organizations.

Funds are allocated separately to the two institutions. Accordingly, we have separately detailed successes from these programs, an approach that formalizes accountability for funds received by each institution.

In this 2018 report, we highlight the following accomplishments:

Food safety research and education focused on improving safe food practices by producers, processors, and consumers; and improving the safety and quality of value-added dairy products.

During the reporting period, research and outreach in food security and food systems provided Integrated Pest Management training to growers, reduced food insecurity, and increased resilient food systems across spatial scales.

Human and animal health programs addressed knowledge of residents and the media on ticks, mosquitoes, bed bugs, and mold. The southern lone star tick was also found in Connecticut, and integrated tick management research was expanded We also identified nutrition and exercise lifestyle factors essential to successful aging, developed new technologies to reduce the risk of chronic diseases, and reducing obesity in children and young adults through nutrition education and communication.

Sustainable environment programs addressed homeowners' knowledge of watershed protection, and soil and water quality; reduced the number of lakes and ponds with invasive aquatic plants; enhanced forestry management, and the use of geospatial data by land use managers and agricultural producers to make decisions.

Youth development in Connecticut was conducted primarily through 4-H and focused on creating safe, healthy, well-educated children and teens through clubs, after-school programs, and interactive learning experiences. Science, technology, engineering and math (STEM) curricula are an integral part of the youth development activities. Youth also participated in citizenship and volunteer programs that enhance their leadership skills and build our state.

Community and economic development programs addressed the individual and community. Examples included increasing leadership and empowerment in parents, economic development of communities through asset building and greenways, and connecting communities and individuals with financial literacy resources.

In addition to the specific programs reported here, we also have used capacity funds and matching funds to expand and leverage our successes across the state. UConn received a grant from the USDA-NIFA Federally Recognized Tribes Extension Program (FRTEP) to partner with the Mashantucket-Pequot Tribe in Connecticut. This grant enables us to work with new diverse audiences from underrepresented populations in the state. The accomplishments of the project were possible only because federal capacity funds and state matching funds support the research and Extension professional who received the grant.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	62.0	{No Data Entered}	90.0	{No Data Entered}
Actual	58.6	0.0	100.1	0.0

II. Merit Review Process

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

- Internal University Panel
- External University Panel
- External Non-University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel
- Expert Peer Review

2. Brief Explanation

The Merit Review process for CAES and UConn combines internal and external reviews. The peer review, conducted by disciplinary scientists, ensures the scientific merit and relevance of proposed projects. Administrators in the respective organizations also review new Hatch or Extension projects. The Director (or a designee of the Director) provides final approval on all submitted projects. In addition, CAES uses external peer reviews when publications or proposals generated from existing projects are submitted to journals and funding agencies, respectively.

Both organizations rely heavily on stakeholder input to identify new areas for research and Extension engagement programs. Stakeholders are often involved in the co-creation of knowledge through applied research programs. Engagement with stakeholders provides a unique and critical relevance review - stakeholders help define and shape projects that are directly relevant to their production systems or environmental sustainability.

UConn is transitioning to a competitive process for distribution of capacity funds to projects. The competitive process is being phased in and is currently in the second year of a three-year process. Project proposals address NIFA and state of Connecticut agricultural priority areas and in addition to the steps outlined above for approval, the projects proposals are reviewed by an internal and external peer review

panel. The panel ranks the project as must fund, could fund and do not fund. Based on the review panel's recommendation and the Director's approval, projects are selected for funding.

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 non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public

Brief explanation.

Formal and informal stakeholder input is gathered across the state (and at national or international meetings) by CAES and UConn. Presentations, interviews, workshops, and conferences offer informal opportunities to meet with impacted stakeholders and gather input. Methods used to seek input include survey instruments that collect feedback from participants about existing programs, email surveys to potential stakeholders regarding new or proposed programs, and direct comments captured following sponsored events. UConn developed and disseminated several surveys for the general public that were implemented during the 2018 reporting year, and are shaping our future programming priority areas.

CAES and UConn organize multiple conferences, workshops and public meetings throughout the year. These events create opportunities for us to disseminate results of programs to stakeholders, as well as, provide us with stakeholder input on existing and future programs. For example, Plant Science Day, organized by CAES, brings nearly 1,000 visitors (including more than 150 children) to the Hamden research facility. Similarly, more than 300 agricultural producers attended UConn's Vegetable and Small Fruit Growers Conference. These events offer producers, businesses, and citizens the opportunity to interact directly with scientists and Extension professionals. Informal direct contacts with citizens and businesses convey and shape current and future research and Extension activities.

Formalized stakeholder input is gathered from Advisory groups that meet once or twice throughout the year. Advisory group members represent all facets of agriculture, health, environmental sustainability, and youth development as appropriate for CAES and UConn. Scientists and Extension professionals from CAES and UConn also serve on advisory groups across the state. Participation on these advisory groups helps inform and shape research and Extension programs.

Collaboration between CAES and UConn on specific projects and/or workshops and conferences ensures that stakeholder inputs captured by one organization are shared and influences program development in both organizations. CAES and UConn work directly with grower organizations and environmental groups across the state. We receive direct input from these organizations, and partner with multiple state agencies that address agriculture, health, and natural resources. For example, Connecticut is continuing to experience tremendous growth in the number of

microbreweries in the state. CAES has expanded its research program investigating the yield of different hop cultivars in response to industry interest. The findings were presented at a well-attended annual meeting for microbrewers. Similarly, UConn organized meetings for new and beginning farmers and ranchers to understand their needs and shape Extension programs. Feedback from these producers led to extensive resource development including online learning for new and beginning farmers and ranchers.

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
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

Stakeholders are identified using several methods. We use surveys, focus groups, program participation, and needs assessments to identify other individuals and groups. UConn students were identified as a target audience by Extension administrators and we include these individuals through various methods including surveys, on-campus events, and focus groups. Seniors, also referred to as older demographics, are an audience we have identified as needing the services provided by Extension. Our educators identified this model through their work with stakeholders, partners, and program participants.

In addition, a new partnership was formed with the Mashantucket-Pequot Tribe. Through our partnership with the Mashantucket-Pequot Tribe on the USDA NIFA - FRTEP grant, we now receive direct input from this underrepresented group. They provide input on programs being delivered in partnership with the tribe. Members of the tribe also have been exceedingly collaborative in sharing indigenous knowledge about plants, animals and the environment with UConn faculty and staff.

CAES and UConn continue seeking out members from underrepresented groups to participate in programs and provide input into strategic areas for research and Extension. UConn offers programs in Spanish to encourage greater access and participation by Hispanic audiences. Feedback from specific ethnic and minority stakeholders on specialty crops resulted in experiments being conducted on several cultivars of a range of specialty crops. UConn used input from our external focus groups in two of our planned program areas to prioritize outreach programming offered during the reporting period.

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
- Survey of selected individuals from the general public

Brief explanation.

Both organizations use survey instruments to collect input from program participants. This information improves programs and identifies new program areas. Survey data are collected from workshop participants, conference attendees, audiences for scientific talks, stakeholders, and the general population. Needs assessment surveys also gather data and shape programs.

CAES and UConn partner with state and federal agencies on multiple projects and programs. Direct input from state and federal agencies is a key method for collecting input from targeted groups.

Both organizations are active on social media including Facebook, Twitter, Instagram, blog sites, and YouTube. These outlets are used primarily to push information. At the same time, stakeholder engagement on social media provides opportunities for public input on research and Extension programs from audiences we might not otherwise interact with.

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.

Existing programs employ adaptive management strategies that incorporate new information gathered from stakeholder input. We learn from our stakeholders and use that knowledge to update goals and outcomes for our programs. New program areas such as research on the Asian Long Horned tick were added to research and Extension portfolios for CAES and UConn. Stakeholder input is also used to inform research proposals submitted for funding.

In Extension programs, stakeholder input received by the local food program allowed the group to focus initiatives on creating resources for farm to institution, and for food service directors on serving local food in schools. Stakeholder input helped shape the new and beginning farmer trainings into two tracks based on experience level. The human health and nutrition project on decreasing obesity in children and young adults relied heavily on stakeholder input to develop the tailored messages for parents and children. Stakeholders are also involved in evaluating the program, and changing future outreach education.

Brief Explanation of what you learned from your Stakeholders

We learned that stakeholders are very insightful and have the capacity to co-create knowledge that is critical to their economic and environmental sustainability. Our programs are more effective when they address and account for stakeholder input. We learned that addressing agriculture, health, and sustainability issues across the state has relevance to regional, national, and international challenges. The feedback we received did not cause major changes in our programs, however we made changes that create more useful programs to our stakeholders. This feedback allows us to utilize our limited resources in the most effective manner, and deliver research and Extension programs that will have greater impact.

For example, in the tailored messages outreach program, the stakeholder input led to simplification of the methods, and this led to an increase in the change in behavior. Long-term impact is still being evaluated.

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}

Institution Name: Connecticut Agricultural Experiment Station -

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	0	0	976315	0
Actual Matching	0	0	4778360	0
Actual All Other	0	0	602022	0
Total Actual Expended	0	0	6356697	0

Institution Name: University of Connecticut - Storrs

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1800024	0	1026750	0
Actual Matching	1800024	0	1126750	0
Actual All Other	4210862	0	5814635	0
Total Actual Expended	7810910	0	7968135	0

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

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

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
306	Environmental Stress in Animals	0%		20%	
307	Animal Management Systems	0%		17%	
502	New and Improved Food Products	0%		5%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		15%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	50%		3%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	50%		30%	
723	Hazards to Human Health and Safety	0%		10%	
	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	2.0	0.0	3.4	0.0
Actual Paid	1.6	0.0	4.8	0.0
Actual Volunteer	0.2	0.0	0.0	0.0

2. Institution Name: University of Connecticut - Storrs

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
201592	0	55946	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
201592	0	55946	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	275400	0

2. Institution Name: Connecticut Agricultural Experiment Station -

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	124924	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	574021	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	28001	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research under this program is developing more efficient and sensitive analytical methods to detect toxic chemicals and heavy metals in food, and seeks to determine if these constituents are present at allowable levels. Decisions on safety depends on tolerance levels established by the US Environmental Protection Agency (EPA) or the Food and Drug Administration (FDA). Progress was made on all objectives in this program. The activities, services, and events are designed to assist a broad, diverse group of stakeholders by disseminating scientific information to the public through the media, publications, and exhibits. People will have equality of service, ease of access to scientific results, and the ability to see laboratories and field plots. The outputs include numbers of samples tested, scientific publications, and talks and interviews. For example, the Department of Analytical Chemistry reported out results on more than 1498 samples in the current period, with 85% being food or food-related. The following activities were executed: (1) new analytical methods were developed or validated and new instrument platforms were evaluated, (2) new analytes, matrices and equipment were brought under the Laboratory Scope of ISO 17025 Accreditation, (3) information on analytical test results was shared with stakeholders at open house events, in scientific displays at agricultural fairs, and in scientific publications, (4) oral presentations were given to civic groups and professional societies, (5) laboratories were opened to allow adults and youth to meet staff members, see analytical equipment, and ask questions about programs and findings, and (6) scientific staff participated in several local school science fairs. Direct interactions with a broad base of

stakeholders allows public input on the program. Non-traditional stakeholders are reached at agricultural fairs and other public venues when they visit displays. Results of these activities lead to specific outcomes such as removing tainted or adulterated food items from the markets, enabling law enforcement investigations of poisoning cases, and greater public awareness of research on food safety.

Curriculum and training sessions were presented by Extension educators for the Food Safety Modernization Act (FSMA), Good Agricultural Practices (GAP), and HACCP (Hazard Analysis and Critical Control Points). Home cooks, consumers and food service personnel were educated through a website, courses, and workshops. During the reporting period, 574 participants were trained through Extension courses. Each year, twelve articles on food safety topics are written and distributed to newspaper and media outlets statewide. Internal tracking of these articles shows reach extending beyond Connecticut.

Collaborators on the food safety program include the Connecticut Departments of Agriculture, Public Health, and Consumer Protection; the 14th Civil Support Team of the Connecticut National Guard, and the FBI Weapons of Mass Destruction Directorate. UConn also works with the University of Rhode Island and the University of Massachusetts on educational outreach in food safety. FSMA regulations continue challenging agricultural producers statewide. UConn programming for producers and processors leveraged the expertise of our partner organizations to train farmers. Our advisory group includes farmers and regulators, and meets to gather information regarding educational outreach needed.

2. Brief description of the target audience

All individuals have a stake in ensuring a safe food supply. Our efforts focus on audiences that include: food producers and importers, food processors, managers of supermarkets, state and federal public health officials and regulators, state and federal legislators and their staff members, educators, Extension specialists, food science researchers, and consumers.

Extension educators market programs to under-represented audiences through partner agencies and non-government organizations. We have partnered with the 4-H program and other local organizations to reach youth audiences with food safety education outreach. Consumer programs are targeted to urban audiences, and partnership with our Expanded Food and Nutrition Education Program has increased the ability of the program to bring food safety education to new audiences.

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	3944	447	441	397

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

Year: 2018

Actual: 0

Patents listed
None

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	3	28	31

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Expert services, consultations

Year	Actual
2018	230

Output #2

Output Measure

- Formal Extension outreach programs

Year	Actual
2018	40

Output #3

Output Measure

- Face to face general group education sessions/workshops

Year	Actual
2018	15

Output #4

Output Measure

- Fact sheets, bulletins and newsletters written or edited

Year	Actual
2018	2

Output #5

Output Measure

- Training of undergraduate and graduate students and post-doctoral scientists

Year	Actual
2018	64

Output #6

Output Measure

- Individual Consultations

Year	Actual
2018	12

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of stakeholders gaining knowledge about food safety
2	Number of state and federal regulatory agencies making decisions on test results
3	Improve food safety through adoption of safe food practices by producers, processors and/or consumers
4	Approaches/techniques developed for inactivating foodborne pathogens
5	Improve the safety and quality of value-added dairy products
6	Develop new technologies for dairy food safey

Outcome #1

1. Outcome Measures

Number of stakeholders gaining knowledge about food safety

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	2388

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Contamination of food with toxic pesticides or heavy metals remains a topic of great concern among stakeholders. Regulators, food producers, retail operators, consumers, and consumer advocacy groups want assurances that foods contain safe and allowable levels of these constituents. Federal and state regulators request analyses of foods and enforce laws by recalling contaminated products from commerce. These programs include fresh and manufactured foods, as well as animal feeds,. For contaminants such as mycotoxins, arsenic and lead, toxicity can occur at very low levels and detection at parts per billion (ppb) or even parts per trillion (ppt) is necessary. Accurate detection and quantitative of toxic contaminants at these levels in complex food matrices is difficult. As such, protocols and equipment used for these scenarios must be validated and shown to be both accurate and robust. To ensure the integrity of results, some federal agencies (FDA) require ISO 17025 Accreditation of reporting laboratories.

What has been done
The Department of Analytical Chemistry at CAES conducts a surveillance program for human food under the FDA-led Manufactured Foods Regulatory Program Standards (MFRPS) and for animal feed under the FDA-led Animal Food Regulatory Program Standard (AFRPS). The CT Department of Consumer Protection (DCP) and the CT Department of Agriculture (DoAg) are partners for the MFRPS and AFRPS, respectively. Additional surveillance activities are conducted under the FDA Food Emergency Response Network (FERN). Technical methods have been validated according to ISO 17025 guidance for both programs and involve analysis for unknown pesticides/aflatoxins by simultaneous gas chromatography with triple quadrupole mass spectrometry (GC-MS/MS) and liquid chromatography with high resolution mass spectrometry (LC-MS/MS), as well as total arsenic analysis by inductively coupled plasma mass spectrometry (ICP-MS). When other state or local agencies submit samples as part of investigations or their own surveillance activity, ISO accredited methods are used to ensure data quality and integrity. Results are reported back to the appropriate regulatory agency in a timely fashion.

Results
A total of 111 samples of food were analyzed for pesticide residues. Of the 111 samples analyzed, 48 (43.2%) contained a total of 120 residues. Of these 48 samples, there was 1 sample that contained a total of 4 violative residues. There were 55 different pesticide active ingredients found at an average concentration of 0.452 ppb, and the average number of pesticide residues per sample containing residues was 2.4. During the same time frame, there were 21 fresh and processed food samples analyzed for total arsenic; none of these were found to be violative. Twenty-nine animal feed samples were analyzed for aflatoxins; all samples but one was officially logged out with no aflatoxins detected. The final sample had Aflatoxin B1 at 1.06 ppb (below the tolerance of 20 ppb total aflatoxin). Separately, 20 samples of rice-based baby foods were analyzed for a range of contaminants, including arsenic species; none of the samples were found to contain contaminants at levels of concern. With US FDA funding and support, the CAES Department of Analytical Chemistry has received and maintained ISO/IEC 17025 Accreditation from the American Association for Laboratory Accreditation (A2LA) for these programs. This year, the Laboratory Scope of Accreditation was expanded to include additional pesticides, food matrices, and analytical equipment. The Department's MFRPS program serves as the sole surveillance and monitoring effort in the state, assuring that the food supply within CT is safe and free from chemical and heavy metal contamination.

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

Outcome #2

1. Outcome Measures

Number of state and federal regulatory agencies making decisions on test results

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	9

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Department of Analytical Chemistry at CAES is asked by other federal, state, and local agencies to analyze foods and related products for adulteration with pesticides, poisons and

heavy metals as part of surveillance and emergency response activity to ensure safety of the food supply. When foods or other samples are found to be contaminated with these constituents at unacceptable levels, regulatory agencies may remove or prevent food products from entering the marketplace. In certain circumstances, law enforcement response may occur.

What has been done

The Department Head of Analytical Chemistry serves on the CT Laboratory Preparedness Committee, which meets the first Monday of each month. This group includes representatives for Public Health, CT Poison Control, the 14th Civil Support Team of the National Guard, US Postal Inspection, CT Homeland Security, the FBI WMD Coordinator, CT State Police ESU, and the CT DEEP Spill Response Team. The focus of this group includes incidents related to food safety and food security within the state. Each year the 14th Civil Support Team of the CT National Guard conducts a First Responder Training for state and local agencies; attendance typically exceeds 100 first responders. During the April 2018 training, the ?field? component of this training exercise was conducted at a local airport and involved an aircraft carrying suspected chemical weapons that were to be dispersed into the water supply. The CAES Department of Analytical Chemistry was tasked with analyzing the suspected chemical weapon that had been secured from the aircraft

Results

Several aqueous samples were delivered by the 14th Civil Support Team of the CT National Guard. Intelligence gathered in the field resulted in an analytical request for the poison sodium azide. Within 4 hours of receiving the samples, Department staff had successfully detected and quantified azide in the samples. Results were logged out to the 14th Civil Support Team of the National Guard, FBI Weapons of Mass Destruction Coordinator, and the CT Department of Public Health Bioterrorism Coordinator to complete this training exercise.

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

Outcome #3

1. Outcome Measures

Improve food safety through adoption of safe food practices by producers, processors and/or consumers

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	574

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The CDC estimates that each year roughly 48 million people get sick; 128,000 are hospitalized; and 3,000 die of foodborne illness. Produce outbreaks have been traced to farmers and packing facilities of all sizes. As a result, wholesale customers are requesting that produce farmers submit to a Good Agricultural Practices audit. The Food Safety Modernization Act (FSMA) Produce Safety rule was enacted in January of 2016.

Produce farmers need to determine if they must comply with the FSMA rule, what parts of the FSMA rule they need to comply with, and by when. They also must determine their eligibility for exemptions. All farmers that must comply with the standards outlined in the FSMA rule must attend an approved Produce Safety Alliance training program. Farmers may need additional help as they navigate through this process due to limited resources of both personnel and funds. Farmers who do not need to comply with the FSMA rule may need to prepare for and submit to a GAP audit.

What has been done

UConn Extension offered 2.5-day courses on the FSMA Preventive Controls for Human Foods Rule at multiple locations. Personalized education for developing a farm food safety plan was offered during one-on-one farm visits. Information sessions were presented at multiple conferences and meetings. A special presentation was developed and presented for the Maple Syrup Producers Association of Connecticut. A three-day International HACCP Alliance approved Hazard Analysis Critical Control Point (HACCP) food safety course required for USDA/FSIS plants was presented. We also provided Produce Safety Alliance Grower Training Courses, and Meat and Poultry HACCP Courses. Training is also provided to students in child care programs, Elderly Nutrition Program site managers, and consumers.

Results

There were 574 participants across all of the food safety programs during the reporting period. The two-day course had 26 fruit and vegetable farmers complete the training. An evaluation covered knowledge in eight topic areas. Results included: 90-95% of respondents stated agree or strongly agree for increased knowledge in three of the topic areas; 80-85% for four of the topic areas, and 75% for one topic area (writing a food safety plan).

When asked if they were confident they could implement food safety practices related to six topic areas, 90-95% responded agree or strongly agree for two topic areas and 80-85% for the remaining four topic areas.

On confidence levels of producers, 52% of the 26 respondents rated their confidence as Strongly Agree; 38% of the 26 respondents rated their confidence as Agree; and 10% stated that they neither agreed nor disagreed. Least confident responses (four of 26) were for writing a farm food safety plan, post-harvest water management, land use management and soil amendment management. Participants felt most confident (17 out of 26) about implementation of sanitation practices, a relatively new practice area for most farmers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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 #4

1. Outcome Measures

Approaches/techniques developed for inactivating foodborne pathogens

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Improve the safety and quality of value-added dairy products

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	775

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Unpasteurized milk and milk products can be a vehicle of food-borne illness. Small-scale producers are often considered a higher risk. Consumer interest is driving the rapid growth of small-scale dairy manufacturing operations throughout the United States, and has resulted in a need to better understand and identify the risks associated with this industry. There is a critical need for actionable, science-based interventions to mitigate these threats based on previous outbreak information and lack of validated control strategies.

What has been done

A dairy safety and quality Extension education program was developed. An online food safety course for artisan chessemakers was created, and launched in 2017. The course was also delivered in-person. A website of resources was built to accompany the course in partnership with

the American Cheese Society. The Extension educator was an instructor at the National Dairy Food Safety Plan Coaching Workshop, a three-year project funded by USDA. The 300-page Best Practices Guide for Cheesemakers was updated and shared through multiple channels with producers. An online course for small-scale ice cream producers and accompanying resources were under development during the reporting period.

In Connecticut, one-one-one consultations with farmers provided individualized education and changed the food safety processes in their dairy plants. These consultations were completed with milk, cheese, butter, and ice cream facilities. Small-scale producers' challenges are taken back to the laboratory to test and develop interventions to see if they will actually work. Actionable interventions are defined as something a producer can implement without significant expense. A team of undergraduate and graduate students work in the laboratory researching each aspect of a problem.

Results

The dairy safety and quality Extension education program had 775 direct adult contacts during the reporting period through all courses and consultations offered. The program emphasizes reaching the smallest producers who have the least access to educational resources. To date the in-person artisan food safety course was delivered at 18 workshops across the country with over 600 attendees including producers, the general public, and state and federal regulators. Evaluation results show that 22% of participants in the artisan food safety course had changed or updated food safety practices and/or programs related to Good Manufacturing Practices in their facility.

Agriculture systems were assessed for food safety risks. Science-based interventions were developed to prevent and mitigate food safety threats. These food safety messages were communicated to stakeholders through various modes, including online and in-person. Presentations were also given at local, state, regional, and national conferences.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Develop new technologies for dairy food safey

2. Associated Institution Types

- 1862 Extension
- 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 dairy industry suffers several billion dollars annually from mastitis disease of dairy cattle. Mastitis is a contagious pathogen that can be passed on during the milking process, can reduce milk production and fertility, and is treated with antibiotics.

What has been done
A UConn scientist, is participating in Hatch Multistate project, accession #1014578. She is collaborating with an expert scientist in biomedical engineering to develop an algorithm to quantify image abnormalities to improve interpretation of ultrasound images for detection of mastitis in heifers. This project also has an extension component that hosts an annual diary conference, conducts individual farm visits to assist specific farm needs and connects students to real-life agricultural practices and challenges facing dairy farmers.

Results
A total of 150 hours were donated by 5 volunteers who conducted individual farm consultations addressing specific farm needs such as milk quality, animal disease remediation and nutritional concerns. Farm protocols were developed for monitoring and minimizing environmental stress on a large dairy farm in Connecticut. Studies found that reducing environmental stress had a positive effect on mastitis control and milk quality. The annual dairy conference reached 207 adults and 435 youth, who gained knowledge on reducing the rate and incident of mastitis, reducing antibiotic use and improving milk quality. In addition, undergraduate students provided problem-solving solutions through direct visit and/or working on 20 diary farms, and completed 3 research project.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Economy
- Appropriations changes
- Competing Programmatic Challenges

Brief Explanation

At CAES, one scientist vacancy within this planned program was filled and the scientist will work on emerging contaminants of concern in food, including perfluorinated compounds and microplastics. Separately, two Post-doctoral Research Scientists that are funded on federal grants (US FDA, USDA AFRI, NSF) continue to work directly on this program; a third

is currently being hired. These are critical positions because the discipline requires the testing of toxic organic chemicals and heavy metals in a range of products by a number of advanced methods on sophisticated equipment. Other staff scientists and technicians that work on state projects with state funds also spend time working on Hatch-funded programs. Although objectives and goals were met, we do note that competitive federal grant-funded positions are now a critical component of this program.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Information on research and service results was obtained during the program by written and oral comments received at public meetings, the CAES annual open house event, guided tours of the laboratory, civic groups' meetings, professional conferences, and at research exhibits. Observations made during interactions with stakeholders inform staff about program effectiveness and value.

Extension programs were evaluated with post-program evaluation forms that identified new awareness and/or knowledge of concepts and plans to implement changes in safe food handling behaviors. Follow up surveys to participants in FSMA information sessions were implemented and data is being evaluated.

The artisan cheesemaker online food safety training was evaluated during the reporting period to determine the learners' satisfaction with the training, knowledge gained, attitude, self-efficacy, intention to follow food safety protocols and practice, and changes made post-training. The majority of the learners liked the training and were satisfied with it. A retrospective pre- and post-test knowledge assessment determined that the training program produced significant increases in knowledge. Post training, learners' experiential attitude, instrumental attitude, self-efficacy, and intention scores about food safety were high. It was also determined that the training program could not produce significant changes in practices and behavior. The learners were satisfied with and enthusiastic about the e-learning program and that there was a significant knowledge gain for all five lessons. Self-efficacy, experiential attitude, instrumental attitude, and knowledge gain predicted food safety intention. Instrumental attitude was found to be the strongest predictor of intention in the regression model in which a 50% variance in the intended food safety behavior can be explained by instrument attitude. This suggests that the participants who took this survey had a strong belief in the importance of food safety for cheesemakers. In addition, 22% of participants had changed or updated food safety practices and/or programs related to GMPs in their facility, 58% did not intend to change anything, and 20% intended to change in future.

Key Items of Evaluation

The key items of evaluation and data collection were stakeholders' written and oral responses concerning food analyses; constructive written feedback from grant reviewers for competitive grants; and responses and corrective actions by the State, USDA, and US FDA to remove suspect or adulterated products from commerce. Google Scholar indicated that articles written in previous years by CAES scientists were recognized and cited by scientists in this field (total citations by Google Scholar were 2,748 during the reporting period).

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Food Security and Food Systems

☑ 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
202	Plant Genetic Resources	10%		0%	
205	Plant Management Systems	25%		0%	
206	Basic Plant Biology	10%		50%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		15%	
216	Integrated Pest Management Systems	10%		0%	
601	Economics of Agricultural Production and Farm Management	10%		0%	
603	Market Economics	0%		25%	
604	Marketing and Distribution Practices	5%		5%	
605	Natural Resource and Environmental Economics	5%		0%	
607	Consumer Economics	10%		0%	
704	Nutrition and Hunger in the Population	5%		5%	
	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	5.0	0.0	20.3	0.0
Actual Paid	2.6	0.0	19.7	0.0
Actual Volunteer	21.5	0.0	0.0	0.0

2. Institution Name: University of Connecticut - Storrs

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
221757	0	129972	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
221757	0	129972	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
500441	0	526831	0

2. Institution Name: Connecticut Agricultural Experiment Station -

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	758439	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	2284874	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	308011	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research objectives are to develop novel pest control methods, to understand mechanisms of infection and disease, and to develop high yield resistant cultivars. Activities, events, services, and new crops assisted a diverse group of stakeholders. Activities included: (1) scientists conducted workshops for stakeholders, (2) scientists participated in over 150 organizations and societies, (3) experiments were performed on research farms and growers' properties, (4) cultivar trials on specialty butternut squash, okra, brussels sprouts and hops were completed, (5) pathogens and disease mechanisms of tree species were investigated, (6) stakeholders received information on IPM strategies, (7) research findings were disseminated by displays at agricultural fairs and through talks to civic groups, (8) staff members utilized traditional and social media to provide information on scientific discoveries, (9) staff members educated teachers and indirectly reached youth, and (10) diagnostic plant and insect services were provided. Field experiments solved problems or provided information on new crops. Outcomes included reduced pesticide use, greater understanding and control of pathogens, development of resistant cultivars, the introduction of new specialty crops, and increased farm income. Researchers directly addressed 10,632 citizens' inquiries and conducted 11,155 diagnostic tests. Scientists serve as members in at least 150 professional organizations, which enables stakeholders to directly comment on research and findings. Non-traditional stakeholders were reached at agricultural fairs when they visited displays, as well as through traditional and social media. The annual CAES open house allowed nearly 1000 stakeholders, including 100+ children, to hear presentations on research. Approximately 170 talks were given to convey findings and to

receive public feedback. Publications in peer-reviewed journals or articles written for the general public reached traditional and non-traditional stakeholders.

Extension activities in Food Security and Food Systems included urban agriculture, new and beginning farmers, master gardeners, risk management, business planning, IPM training, and educational outreach through consultations, programs, community presentations, and online media. UConn is a statewide leader for new and beginning farmers and has developed programming in conjunction with multiple partners in the state, including high school agriculture programs and the Department of Agriculture. We leverage curriculum developed for our programs and the experts available at UConn and throughout our region. Connecticut faces increasing pressure from urban sprawl and development. Our urban agriculture program is reaching new audiences, providing entrepreneurial skills, and adopting agricultural production to new areas.

2. Brief description of the target audience

The target audience includes consumers, farmers/producers, agency and organizations that serve or handle food, food-related businesses/processors, farmers' market staff and vendors, seafood industry processors, dealers, harvesters, importers, regulatory personnel, researchers, and policy makers. Additional audiences include teachers, the media, food bank personnel, beekeepers, maple syrup producers, seed companies, and water company officials. Women, minority organizations, and children are under-represented and underserved groups targeted under this program. For example, in the Solid Ground Training Program, we worked with our partners to develop an audience that aligns with the demographics of our state. Efforts in other programs focused on interactions with teachers and students. For example, the Put Local On Your Tray Program reached teachers and students in 38 school districts.

The Master Gardener implemented a hybrid course model with online and in-person components. The hybrid model debuted with the 2018 class, and is marketed to underserved and diverse audiences as it allows a more flexible schedule. The curriculum from the Master Gardener program was translated into Spanish several years ago and is still used by the urban agriculture program to reach Hispanic audiences. The Solid Ground program offers courses in Spanish, and those not offered in Spanish have translators available. Participation in Spanish classes and requests for translation have increased when compared to the previous reporting period.

3. How was eXtension used?

Several CAES staff members are registered in eXtension with consumer horticulture, youth, pesticide environmental stewardship, bee health, grape, eOrganic, and urban IPM communities of practice. New findings, fact sheets, links to Station material, and answers to questions have occasionally been provided to the national eXtension service (www.extension.org).

The UConn Home and Garden Education Center is registered as an eXtension Ask the Expert and responded to over 200 phone calls from over 20 states and several countries during the reporting year.

An Extension educator from UConn works with the Marine Aquaculture Community of Practice through eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	22558	259519	2520	10934

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed
None

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	26	65	91

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Face to face general group education sessions/workshops

Year	Actual
2018	236

Output #2

Output Measure

- Individual consultations

Year	Actual
2018	423

Output #3

Output Measure

- Fact sheets, bulletins and newsletters written or edited

Year	Actual
2018	58

Output #4

Output Measure

- Training of undergraduate and graduate students and post-doctoral researchers

Year	Actual
2018	60

Output #5

Output Measure

- Formal Extension outreach programs

Year	Actual
2018	181

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of homeowners, growers, students and/or media reporters gaining knowledge on insect pests and plant pathogens
2	Number of growers gaining information on IPM practices
3	Reduce food insecurity in the state of Connecticut and across the Northeast
4	Increase the percent of locally grown food that is purchased by Connecticut citizens
5	Increase sustainable, diverse and resilient food systems across scales
6	Improved national and global capacity to meet growing food demand

Outcome #1

1. Outcome Measures

Number of homeowners, growers, students and/or media reporters gaining knowledge on insect pests and plant pathogens

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	22007

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In October 2012 a meeting was held between craft brewers and growers interested in producing hops as well as Connecticut Agricultural Experiment Station (CAES) researchers and Department of Agriculture representatives. The meeting was organized to share ideas concerning the potential market for locally grown hops and clearly demonstrated a potential new market for local hop production to support the rapidly expanding local craft brewing industry. CT breweries and the CT Brewers Guild President expressed support for local hops production. Hops were grown in the Northeast in the past but production moved west as a result of disease problems such as downy and powdery mildews. New cultivars have been developed with resistance to some of these pathogens and hops have become a successful crop in other Northeast states. Hop production could result in farm receipts of $18,000 to $22,500 per acre based on potential average yields of 1,500 lbs. per acre at $12 to $14 per pound. Growers in Connecticut were interested, but one conclusion of our October meeting was that, researchers need to experiment, not farmers, in other words, research to determine the feasibility (benefits and risks) of hop production in CT was necessary before growers would commit the substantial investment required to establish local hop yards.

What has been done

To conduct this project we established new high and low trellis hopyards at two locations (Windsor and Hamden) in Connecticut. We initially grew five hop cultivars in replicated plots, learned and demonstrated growing, training, integrated pest management and harvest techniques and demonstrated these techniques to potential growers. We have since planted an additional 40 cultivars and evaluated suitability and disease susceptibility of these cultivars to downy mildew as well as yield potential and hop quality for many. We also conducted outreach to educate growers and the public about our findings in a timely manner and published an IPM guideline for hop growers in Connecticut.

Results
We collected data regarding hop production at two locations in the state, identified promising cultivars, held multiple meetings, collaborated with the CT Farm Bureau to hold meetings, provided brewers with locally grown hops for test batches of beer with fresh and dried hops, have posted information in a pdf presentation on our website, and have assisted multiple growers to successfully initiate the CT Hop Growers Association. We have identified downy mildew, mites and leaf hoppers as the most important pests limiting production and identified effective means of control. Hop production in CT is now underway where no industry existed before, and hops are now being commercially grown and sold in the state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #2

1. Outcome Measures

Number of growers gaining information on IPM practices

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	450

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Micronutrients are critical in the defense against crop disease. Micronutrients, such as B, Cu, Mn, and Zn, along with beneficial elements like Si, can initiate defense mechanisms in plants against diseases. However, obtaining sufficient levels of the elements in susceptible root organs is compromised by their poor availability in slightly acid-neutral soils and by their poor mobility in plants. When these elements are applied as nanoparticles (NP) (1-100 nm), they perform better than their larger bulk equivalents. The use of nanoparticles (NPs) of metal oxides Cu, Mn, and Zn as micronutrient formulations may offer a highly effective novel platform for crop disease suppression. Nanotechnology has the potential to play a critical role in global food production, food security and food safety.

What has been done

Research at CAES has pioneered the use of NPs of B and NP oxides of Cu, Mn, and Zn to suppress root disease. Foliar applications of NPs CuO and CuPO4 were compared along with different sizes of MSN for their efficacy in suppress disease. We have explored the effect of NPs on Fusarium wilt of begonia chrysanthemum, watermelon, and tomato, and Sudden death disease of soybean in greenhouse trials. A trial was also established on the bacterial blight of cabbage with NP of CuPO4 and CuO. In addition
Foliar application of NPs were applied to pumpkins to suppress powdery mildew in the field.

Results

We found that the availability and function of Cu and Si was enhanced by applying NP of CuPO4 and mesoporous Si NP (MSN). In separate studies, NPs applied to young seedling (500 µg/ml) of cabbage, chrysanthemums, eggplants soybeans, tomatoes and watermelon resulted in enhanced biomass and greater disease suppression than untreated plants. Cabbage yield and disease suppression tended to be better in the presence of NP of Cu. NP CuO increased chrysanthemum dry weights and suppressed Fusarium wilt ($P < 0.001$). Root disease suppression was been enhanced begonia following a single application. A time course with tomato revealed gene expression (by RT-qPCR) in Fusarium infected tomatoes and watermelon the upregulation of polyphenol oxidase and pathogen-related genes was detected within one week after treatment and before the onset of symptoms. In field studies, application of NP Cu on eggplant, and NP of Cu and Si on watermelon have increased fruit yield between 10 and 40% depending on the experiment. NP could further global food sustainability as climate changes increase the threat of drought, stress and disease. Taken as a whole, NP of CuO or CuPO4 and MSN offer a novel approach to improve plant health across many crops.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

Reduce food insecurity in the state of Connecticut and across the Northeast

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	6410

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Contemporary food systems are shaped to generate profits and power for those who can maximize sales via the large-scale production and distribution of inexpensive food. The problem is that this system places far less value on the principles of sustainability, environmental integrity, economic vitality, and social equity. A sustainable food system can meet our needs for fresh, healthy, affordable food today without jeopardizing the ability of future generations from doing the same. This is a global issue that we are addressing locally, statewide, and regionally in New England. In Connecticut, 12% of households experience food insecurity, 33% of children are overweight or obese (more than half of whom are Hispanic and African American), an estimated one out of five residents eat no vegetables daily, 33% of our census tracts live more than a half mile from a healthier food retailer, and only 10% of our cropland is used to harvest fruits and vegetables.

What has been done

UConn Extension sustainable food systems outreach and training programs included a multi-faceted approach to addressing the issue. Put Local On Your Tray promotes local food in school cafeterias, and connects farmers with institutions. Service-learning programs include Connecticut Food Justice VISTA Project, Summer Meals Outreach Team VISTA Project, and FoodCorps Connecticut (UConn has an advisory board role on FoodCorps). The HeartCTGrown project helps connect consumers to local agriculture. The Solid Ground Training Program is offered for new farmers and funded by USDA-NIFA Beginning Farmer and Rancher Development Program Award #2016-70017-25416. We leveraged this grant funded project by collaborating with Extension educators and resources available across all programs.

Tools and unique workshops were developed and implemented. A guide, Finding Your Market: A CT Farmers Guide to Selling Their Farm Products Directly to Consumers, was written, edited and published in print and online for farmers. The New Farmer Bucket List was updated and made available online and in print. A campus dialogue on food justice was facilitated with over 70 attendees from across the university, including undergraduate and graduate students, faculty, and staff. Monthly e-newsletters were sent for Put Local On Your Tray to school food service directors, and others interested in the program.

Results

The impact of these combined efforts increased public awareness and support of local food systems, improved access to healthy, affordable food, increased stakeholder collaboration, and fostered emerging leaders in the field.

During the reporting period, 38 schools from all eight counties were reached through Put Local On Your Tray. The Tray program features a suite of communication materials and tools for 15 products suited for farm-to-school programming, and technical advisors ready to help school food service directors source, serve and celebrate local food in their schools. A local procurement online tutorial series was developed. During the reporting period the website had 1,500 users with 2,800 sessions. The average session duration was 3 minutes and 47 seconds. The procurement resources page was the third most popular on the site, with 319-page views.

Our VISTA program works at 11 sites statewide. The 16 service members recruited 1,015

volunteers for the food justice program, and the volunteers donated 6,410 hours to their communities. There were also 15 VISTA Summer Associates with sponsors of the USDA Summer Meals Program to improve outreach and participation in summer meals.

The Solid Ground program offered 26 core trainings for new and beginning farmers at seven partner locations, with a combined attendance of over 300 unique individuals. Courses were offered in Spanish as well, or with translation available. Farmers also had access to one-on-one training from experts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
607	Consumer Economics
704	Nutrition and Hunger in the Population

Outcome #4

1. Outcome Measures

Increase the percent of locally grown food that is purchased by Connecticut citizens

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Increase sustainable, diverse and resilient food systems across scales

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	39929

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lack of access to healthy and locally grown food affects nutrition and obesity rates. Studies show that food deserts are common in lower income neighborhoods and communities. In Connecticut, food deserts are found in Fairfield County, where Bridgeport and Danbury are located (two of the poorest cities in Connecticut). These cities also report the two largest Hispanic populations in the state with 32% and 24% of the total population respectively.

What has been done

The Master Gardener program at UConn shifted the educational focus of the program away from landscape gardens and towards food producing gardens and container gardens that can be grown in urban areas. An urban agriculture program offered in English and Spanish, Listo Para Iniciar, was developed, using curriculum from the Master Gardener program and the Integrated Pest Management Program. A resurgence in food production questions and interest from the public has led both programs and their volunteers to focus on building diverse and resilient food systems.

The Master Gardener program educates approximately 190 new participants each year, and had 192 new students last year. During the reporting period there were 740 active volunteers, a 19% increase from the previous year. Master Gardener volunteers work through their local UConn Extension Center and the Bartlett Arboretum in Stamford to provide information to the community, with a shifting focus towards urban community gardens, and younger residents with no prior gardening experience. Food is grown in community gardens statewide and donated to local food pantries and non-profit organizations.

The urban agriculture program includes three components: classroom instruction, hands-on vegetable production, and entrepreneurship. Classroom instruction as well as field activities were delivered in English and Spanish. Participants are administered pre- and post-tests at the beginning and end of each module to measure knowledge gain.

Results

Our 740 active volunteers donated 39,929 hours to their communities in 2018. Included in this time was 14 signature projects that raise thousands of pounds of vegetables for food pantries. Trained Master Gardener volunteers taught 350 hours of courses for UConn Extension. We received $8,825 in grants from the Connecticut Master Gardener Association for our outreach programs.

UConn Extension offered two urban agriculture courses during the reporting period. We collaborated with Green Village Initiative from Bridgeport, and implemented a year-round urban agriculture program in English and Spanish at their site. We had 21 urban residents from Bridgeport start the program, and 15 participants completed. Participants were 25-60-year old adults. In the New Milford class, 17 urban residents from Bethel, Danbury, and Norwalk enrolled in and completed the program. Participants were 30-55-year old adults.

Each urban agriculture program participant attends up to 150 hours of class instruction, for a total of 4,800 hours of instruction during the reporting period. Participants who successfully complete the program pass five modules (botany, soils, vegetable production, entomology, and Integrated Pest Management) with a grade of 70% or higher. In addition, each program participant volunteered up to 80 hours in the field, where they applied their newly gained knowledge on vegetable production, and they each spent 40 hours selling produce at a local Farmers Market. This is 3,840 hours of field work and entrepreneurial experience.

4. Associated Knowledge Areas

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

604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
607	Consumer Economics
704	Nutrition and Hunger in the Population

Outcome #6

1. **Outcome Measures**

Improved national and global capacity to meet growing food demand

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

A number of scientists have IPM and related investigations as part of their research and all goals laid out under this planned program were met. In addition, new scientists hired in this program continue to expand their active lines of research within this planned program. As such, meeting and/or exceeding future targeted outcomes is anticipated

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Researchers conducted a number of evaluation studies during this reporting period and verified that there were knowledge changes in stakeholders. Moreover, nearly 215 site visits and 165 talks enabled direct evaluation of acceptance of new crop cultivars, IPM strategies, and cultivation practices.

Extension used a variety of formative and summative assessment tools. In our service learning programs, we used mid-year evaluations and end-of-year evaluations for service members, and use progress reporting tools to record direct and indirect impacts on clients. In our farmer training programs, we used post-workshop evaluations. In our farm-to-school pilot programming, we used an evaluation tool designed for K-12 students in response to taste tests. Master Gardener participants are administered knowledge tests before achieving certification. Extension courses are evaluated by our team of educators through survey research and exit interviews. Findings from the urban agriculture program indicate that average knowledge gains were as follows: botany 67.3%, soils 52.8%, vegetable production 66.3%, entomology 79.8%, and IPM 67.4%.

Key Items of Evaluation

Google Scholar verified recognition of published articles within this program written by research staff at CAES. There were over 1945 citations for this planned program; direct contacts within the program exceeded 19,000, including nearly 2,300 youth. Indirect contacts exceeded 2,800; including over 460 youth. On-site observations and evaluations verified success in increased use of 5 new IPM methods and new cultivars, as well as control methods.

In Extension, our core impact areas during the reporting period are 1) advancing business models and practices that will help food producers succeed and be profitable; 2) helping consumers connect to fresh, healthy, affordable food through local food system practices and consumer education; 3) developing the next generation of food system leaders through training, internships, and service learning; and 4) supporting stakeholder networks that are working on strategies that improve the values of sustainability in our food system. The Master Gardener program is using evaluation results to increase volunteer retention rates and the number of active volunteers serving the program annually.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Human and Animal Health

☑ 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
301	Reproductive Performance of Animals	0%		3%	
302	Nutrient Utilization in Animals	0%		1%	
303	Genetic Improvement of Animals	0%		2%	
305	Animal Physiological Processes	0%		7%	
311	Animal Diseases	32%		30%	
315	Animal Welfare/Well-Being and Protection	0%		2%	
501	New and Improved Food Processing Technologies	0%		5%	
701	Nutrient Composition of Food	0%		7%	
702	Requirements and Function of Nutrients and Other Food Components	0%		15%	
703	Nutrition Education and Behavior	15%		15%	
704	Nutrition and Hunger in the Population	5%		4%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	30%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		4%	
723	Hazards to Human Health and Safety	15%		0%	
724	Healthy Lifestyle	3%		5%	
	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	1.0	0.0	9.8	0.0
Actual Paid	0.5	0.0	16.4	0.0

Actual Volunteer	0.1	0.0	0.0	0.0

2. Institution Name: University of Connecticut - Storrs

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
72561	0	461575	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
72561	0	561575	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
588042	0	2653665	0

2. Institution Name: Connecticut Agricultural Experiment Station -

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	70744	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	1359445	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	126005	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

At CAES, a primary emphasis is on the role of arthropods in transmission of human disease-causing pathogens. The research objectives focus principally on ticks and mosquitoes and include assessing vector competence of local vector populations; evaluating the impact of temperature on vectors, pathogens, vector-pathogen interactions and transmission efficiency; characterization of the genetic diversity and structure of vectors and pathogen populations; investigation of vector-host-pathogen interactions; investigation of invasion biology of exotic vectors; testing biological control strategies for reducing vector populations; and evaluating the role of vertebrates as reservoirs for arthropod-transmitted pathogens. The Tick Testing Program was expanded to include testing for the agents of babesiosis and anaplasmosis. The southern lone star tick, an aggressive species associated with at least six human diseases, was found established in part of Connecticut. In addition to ongoing passive tick surveillance, the CAES will conduct active tick surveillance in Connecticut, starting spring 2019. Integrated tick

management research was expanded. For mosquitoes the objectives include investigating the vectors of encephalitis and related viruses, blood meal sources in mosquitoes, if biological control strategies can control vectors, and which vertebrates serve as reservoirs for pathogens. Surveillance activities were expanded to include the Zika virus. Research on the role of mosquito midgut proteins and other metabolites in controlling flavivirus susceptibility were continued. Investigations on the role of invasive plants as refuges for disease-carrying ticks continued, as did assessments of the relationship of deer populations to Lyme disease prevalence. Investigations on bed bug presence and control were continued. Activities focused on the success of control methods were coordinated with public health officials and a tick IPM working group. Public forums on tick-borne diseases and bed bugs were held. CAES with partners in the CDC-funded Northeast Regional Center for Excellence in Vector-Borne Diseases held a "boot camp" for public health officials on mosquitoes, ticks, and their associated diseases. Additional studies are being carried out on the genomic ecology of the microsporidia, which are single-celled, intracellular parasites of all animal species.

UConn Extension and Storrs Agricultural Experiment Station programs address research and outreach activities focused on human and animal health. These include: identifying nutrition and exercise lifestyle factors essential to successful aging; developing new technologies to reduce the risk of chronic diseases; safeguarding human and animal health through diagnostics and vaccine development; conducting workshops and webinars; providing training to relevant stakeholder audiences, counseling, and assessments; and producing online resource materials such as fact sheets, impact statements and news articles.

Our Connecticut Veterinary Medical Diagnostic Laboratory had 1,261 active private clients, and worked with UConn departments, local police departments or animal control officers, Departments of Agriculture from states other than Connecticut, universities other than UConn, and other Veterinary Diagnostic Laboratories. This year the laboratory reached youth audiences through participation with the State FFA Convention. The laboratory is the only accredited program in New England and leverages multiple funding sources to complete their vitally important work.

Human health projects at UConn worked to use communication and technology to improve health and nutrition issues in children and young adults. The team partnered with schools and community organizations, and used a collaborative approach with educators and researchers from several disciplines to reach over 200 children and their families.

UConn researchers received two patents in animal health. Participation in 1 Hatch Multistate research project, and 3 Hatch projects occurred during this reporting period.

2. Brief description of the target audience

Target audiences include all individuals with a stake in preventing disease and improving the health of humans and animals. Producers, processors, retailers, regulators, members of the scientific community and the public are all part of the target audience. This program benefits a broad range of stakeholders, including local and national public health officials, elected officials, regulators, and citizens.

Underserved audiences are included in the target audience, and actively engaged through programs, partners, and stakeholders. For example, the human nutrition program partnered with school systems and non-profit organizations in underserved communities to reach minority audiences. A stakeholder group from this program helped refine messages to be culturally relevant and more meaningful for our participants. The partnerships of research and Extension programs introduces our work to audiences we might not otherwise reach. Marketing and communication efforts will continue to focus on these audiences.

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	7215	24694	225	4759

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

Patent Applications Submitted

Year: 2018
Actual: 2

Patents listed

1. Rationally developed African swine fever attenuated virus strain protects against challenge with parental virus Georgia 2007 isolate
2. Efficient sperm sorting

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	5	65	70

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Faces to face general group education sessions/workshops

Year	Actual
2018	131

Output #2

Output Measure

- Individual consultations

Year	Actual
2018	37

Output #3

Output Measure

- Fact sheets, bulletins and newsletters written or edited

Year	Actual
2018	4

Output #4

Output Measure

- Training of undergraduate and graduate students and post-doctoral researchers

Year	Actual
2018	573

Output #5

Output Measure

- Formal Extension outreach programs

Year	Actual
2018	31

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of residents gaining knowledge of ticks, mosquitoes, bed bugs, and mold
2	Number of media reporters gaining knowledge of ticks, mosquitoes, bed bugs, and mold
3	Improved human and animal health through adoption of dietary and other behavioral activities by practitioners and consumers.
4	Develop new dietary approaches to reduce risk of chronic diseases

Outcome #1

1. Outcome Measures

Number of residents gaining knowledge of ticks, mosquitoes, bed bugs, and mold

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	11224

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The prevalence of tick-associated diseases continues to increase in the U.S. There were 42,743 cases of Lyme disease reported to the CDC in 2017. The prevalence of infection in 4,458 human parasitizing blacklegged ticks in Connecticut tested at the CAES Tick Testing Laboratory (CAES-TTL) was 32% for Lyme disease agent, 7% for anaplasmosis and 6% for babesiosis. The number of submissions of lone star tick, Amblyomma americanum, which is associated with at least six human diseases including ehrlichiosis and red meat allergy, to the CAES-TTL has been increasing, mainly in the southwestern region of Connecticut. An established population of this tick was detected on a peninsula (Manresa Island) in the town of Norwalk in southwestern Connecticut in 2017. The application of pesticides remains the primary methods for tick control, and there is growing interest in biological, natural, and integrated methods. Meanwhile, outbreaks of mosquito-borne diseases continue to pose serious risks to the public. Since the emergence of West Nile virus in 1999, more than 40,000 human cases and 1,900 deaths have been reported; more than 3 million human infections are estimated. Eastern Equine Encephalitis (EEE) virus strikes at irregular intervals in the northeastern U.S., with an estimated case fatality rate of 33-50%. Bed bug inquiries and identifications (3,603) together with consultations on delusional infestations (300) were the leading inquiries performed by the Insect Information Office at CAES in 2018.

What has been done
A new 5-year integrated tick management (ITM) project was initiated in late 2016 in cooperation with the USDA-ARS to determine if another IPM approach could reduce the abundance of the tick Ixodes scapularis and the entomological risk of tick-borne disease. Baseline data was collected in 2017 and interventions began in 2018. This tick is the main vector for several human disease-causing pathogens. The strategies included spraying the entomopathogenic fungus Metarhizium anisopliae (Met52 biopesticide), rodent targeted bait boxes, and the 4-poster passive deer treatment station in various combinations with controls in several different neighborhoods. New

studies of the rodent-targeted Lyme disease vaccine bait were initiated in 2018. The 4-poster stations were also placed at Manresa Island in summer 2018 for the control of A. americanum. Mosquito projects included mapping the distribution and predicative modeling of the invasive Asian tiger mosquito (Aedes albopictus) at the northern limit of its range. Mosquitoes were sampled from up to 91 statewide trapping sites from 1997-2017 to track the establishment and range expansion of this species in Connecticut. In addition, Ae. albopictus larvae were monitored in tire habitats and tires were retrieved from the field in the spring and flooded to evaluate overwintering success of hatching larvae. Population genetics of Culiseta melanura, the principle vector of EEE virus has been studied throughout eastern U.S.

Results

The interventions in the 5-year ITM program to control blacklegged ticks were fully implemented in 2018. The combination of fipronil-based bait boxes, broadcast application of the Met52 biopesticide, and the deer-targeted 4-posters had the most impact; questing nymphs on the lawn and woodland plots were reduced 72 and 95%, respectively. The number of juvenile ticks on white-footed mice (Peromyscus leucopus) was 86% lower than pretreatment counts in 2017. A three-year overwintering survival study for I. scapularis under differing conditions of snow and leaf litter that began in the winter of 2016-2017 was completed. Survival in Connecticut ranged from 93% with snow and leaf litter cover to 77% with no snow or leaf litter cover. Ae. albopictus was first detected during statewide surveillance in 2006. This species was detected every year since then, except for 2010, with increasing abundance and distribution. Field-collected females tested positive for Cache Valley and West Nile viruses, highlighting the threat posed by this mosquito. Ae. albopictus overwintered in Connecticut under mild winter conditions as shown by recovery of larvae hatching in spring and by early seasonal detection of larvae and adults. Recent activities on the microsporidia include protein analysis of a tandem duplication of manganese superoxide dismutase and tertiary structural analysis; genome sequencing of a Vairimorpha necatrix; classical ecology of aquatic microsporidia in Crustacea; and development of the microsporidial portion of the Silkworm pathogen database.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety

Outcome #2

1. Outcome Measures

Number of media reporters gaining knowledge of ticks, mosquitoes, bed bugs, and mold

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	52

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The media often seek information on mosquitoes, ticks, bed bugs and associated pathogens. There is also interest in information on how arthropod vectors impact the spread of disease. Zika, West Nile, Eastern Equine Encephalitis (EEE), and related viruses constitute ongoing threats to human health by causing severe illness or death. Since its introduction into the United States in 1999, West Nile virus has sickened tens of thousands of people resulting in nearly 2,000 deaths. The first human fatality of EEE virus occurred in CT during 2013. Emerging viruses such as Zika and Chikungunya create great concern among the general public. Public health officials have requested studies on the ecology of mosquitoes, viruses and biological control of mosquitoes. Tick-associated diseases including Lyme disease, babesiosis, anaplasmosis, and emerging Powassan virus are considered major public health concern in the northeastern U.S. including Connecticut. Disease cases from infected ticks have tripled in the past 13 years, and Lyme disease with an estimated 329, 000 cases annually is the most prevalent vector-borne disease in the U.S. There is a growing interest in media outlets to cover ticks and tick-borne diseases, which reflects the heightened public concern

What has been done
There were at least 70 reporters who sought information on ticks, bed bugs, mosquitoes and encephalitis viruses by interviewing CAES scientists. Stakeholders specifically note concerns over new ticks, tick-borne diseases, and viruses such as Zika, West Nile and Eastern Encephalitis that cause human illnesses. Last year more than 195,000 mosquitoes were tested for viruses. Viruses cultured from mosquitoes were identified by advanced molecular techniques. Results were conveyed to the general public via press releases, social media and through coordinated efforts with the Connecticut Department of Public Health. Tens of thousands of residents and stakeholders were kept informed of recent research findings and the significance of new scientific advances.

Results
Over 70 separate interactions with the press resulted in dozens of articles on bed bugs, ticks, mosquitos and other disease carrying arthropods. The original articles were re-distributed by dozens of additional media venues that ran the original stories and content. These results had impact because mosquito control programs targeted the most important mosquito species and state residents took precautions to avoid mosquito bites. The long-term benefit continues to be healthy human and domestic animal populations, as well as situational awareness regarding new emerging diseases such as Zika and Powassan virus.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety

Outcome #3

1. Outcome Measures

Improved human and animal health through adoption of dietary and other behavioral activities by practitioners and consumers.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Obesity is increasingly affecting residents of Connecticut. Recent statistics report that 20% of children and 36% of young adults are afflicted by obesity (Poulin & Peng, 2018). Young toddlers? diets often deviate from expert recommendations, and economic disadvantage challenges families' ability to offer and consume healthy foods.

What has been done

A team of Extension educators, faculty, and graduate students in Allied Health Sciences and Nutritional Sciences at UConn are working with community partners to take a multi-faceted approach to addressing health and nutrition issues in schools and families through research and outreach. The goal is to improve family dietary quality and energy balance in families of economic disadvantage. The team is leveraging funding from UConn, the Child Health and Development Institute of Connecticut, and SNAP-Ed in supporting the multi-faceted approach.

Simple messages were developed for families to help them establish healthy eating behaviors in toddlers. Messages are tailored to the families so they are more meaningful. Communication and educational outreach are culturally relevant and tailored to the populations served. Materials and classes are offered in English and Spanish. A new Hatch project will build off of this project and use tailored messages for health promotion and obesity prevention using e-health and m-health in middle school students, adolescents, and young adults.

Results

The goals for the message program at Sage Park Middle School are to increase fruit and vegetable consumption, increase breakfast program participation, and decrease food insecurity in middle school students. These goals were identified as problem areas by the middle school staff and the Hunger Action Team.

In the quantitative phase, 200 students completed an internet-based survey on what foods and

activities they like or dislike, and their attitudes and beliefs. The students completed the survey on Chrome books available to each student at school. The students received messages tailored to their responses. From initial analysis of this quantitative phase, the tailored messages were well received by students ? 78% agreed that they learned new information, 86% reported the messages were helpful, and 73% would like to receive more messages in the future.

In the qualitative phase, the complete findings of the quantitative survey were shared with project stakeholders. The feedback was used to identify priority areas where student behaviors differ from recommendations. Feelings and feedback from students will be obtained through focus groups.

A survey for parents of toddlers in East Hartford was administered to 134 participants. The goal is to help parents identify one or two behaviors that could be addressed with better communication, and that they are willing to change. Behavior changes include reducing sugary drinks, replacing snacks with healthier ones, practicing responsive eating, or adding variety to fruits and vegetables. Initial analysis shows the results are supported by previous research. There is a lack of vegetable diversity and variety in children's diets. Numerous parents cited that they are serving their children sugar sweetened beverages.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Develop new dietary approaches to reduce risk of chronic diseases

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)

Heart disease continues to be the largest cause of death in the United States (U.S.), contributing almost 600,000 deaths per year. Atherosclerosis, characterized by an accumulation of cholesterol

and formation of plaque in the artery wall, is a major contributor to heart disease. Blood HDL-cholesterol (HDL-C) levels are strongly protective against future risk of heart disease. HDL is now appreciated to have many chronic disease protective properties in addition to removing cholesterol from artery plaque, including anti-inflammatory and antioxidant effects. However, in certain chronic inflammatory diseases like obesity and atherosclerosis, normally protective HDL particles become dysfunctional and may actually worsen disease outcomes. In light of increasing obesity and heart disease incidence in the U.S., there is a need to identify novel dietary approaches aimed at preventing HDL dysfunction associated with these chronic inflammatory diseases.

What has been done

Black elderberry (Sambucus nigra) is a fruit that grows throughout the United States, including Connecticut. Elderberries contain high amounts of anthocyanins, and previous studies suggest that plant-derived anthocyanin pigments may benefit HDL metabolism and reduce inflammation. A UConn Hatch funded research project is examining whether black elderberry extract has protective effects against HDL dysfunction in chronic inflammation.

Results

Research studies in mice demonstrated the protective effect of anthocyanins and the protective effects of black elderberry supplementation on the functions of HDL. Black elderberry supplementation resulted in a reduction in low-grade inflammation, as well as the prevention of cholesterol accumulation in arteries, or atherosclerosis, in a mouse model of heart disease. Studies also demonstrated protective effects of black elderberry on obesity-related inflammation and diabetes development in a mouse model of diet-induced obesity. The long-term goal of this project is to provide dietary recommendations that will reduce heart disease.

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

A combination of federal and state grant funds were available for this program; at CAES shifts in scientists' work times from state projects to Hatch projects did occur. There were no delays in re-hiring temporary workers on grant funds, which is critical as traps and other techniques used require technical expertise not present among the general public. A new CDC-funded Center of Excellence has had significant positive impact on outputs from this program, including the hiring of post-doctoral research scientists. There were no changes in public policy, priorities, or research areas that impacted this program

V(I). Planned Program (Evaluation Studies)

Evaluation Results

As in previous years, evaluations were conducted to assess program effectiveness. Verbal feedback from municipal and public health officials, as well as the general public, indicated significant interest in work conducted and results generated under this planned program. Our programs use surveys and exit interviews to identify gaps in Extension outreach and to enhance future programs.

Key Items of Evaluation

Researchers collected data mainly by on-site evaluations conducted following talks to specific civic or professional groups, as well as at our annual open house and other public venues. Significant direct interactions with traditional and social media, as well as with stakeholders, continued at CAES. Direct interactions were with over 6100 individuals, including 150 youth; there were 70 direct interactions with reporters and the media. During this reporting period, there were a total of nearly 900 citations in Google Scholar for scientists in this program.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Sustainable Environments

☑ 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	20%		12%	
112	Watershed Protection and Management	10%		10%	
123	Management and Sustainability of Forest Resources	10%		2%	
131	Alternative Uses of Land	10%		5%	
132	Weather and Climate	10%		5%	
133	Pollution Prevention and Mitigation	0%		4%	
135	Aquatic and Terrestrial Wildlife	0%		10%	
202	Plant Genetic Resources	0%		12%	
205	Plant Management Systems	10%		20%	
215	Biological Control of Pests Affecting Plants	10%		5%	
216	Integrated Pest Management Systems	20%		5%	
605	Natural Resource and Environmental Economics	0%		10%	
	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	4.0	0.0	6.9	0.0
Actual Paid	6.3	0.0	8.9	0.0
Actual Volunteer	1.0	0.0	0.0	0.0

2. Institution Name: University of Connecticut - Storrs

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
606793	0	379257	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
606793	0	379257	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1452655	0	2307318	0

2. Institution Name: Connecticut Agricultural Experiment Station -

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	22208	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	560020	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	140005	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

For CAES efforts, the research objectives are: to identify processes that control pollutant fate in the environment; develop methods to remediate contaminated soil and water; characterize the spread of, and methods to control, invasive aquatic plants; and to determine the causes of sudden vegetation dieback (SVD) and its impacts on sediment-atmosphere carbon exchange. The environmental pollution program covers both fundamental and applied aspects, and deals with pesticides, volatile organic compounds, dyes, hormones and hormone-mimicking compounds, pharmaceuticals, petroleum hydrocarbons, munitions chemicals, and engineered nanomaterials. Studies are conducted on the binding of organic pollutants to soil particles; the nature of the organic matter and black carbon in the soil and their effects on adsorption of contaminants; the bioavailability of contaminants in soil and black carbon particles; the design of catalysts for trapping and degrading chemical pollutants in soil, water and air; the design of carbons for trapping nutrients in animal wastes; and novel approaches for water treatment based on advanced oxidation chemistry. The Invasive Aquatic Plant Program (IAPP) tracks occurrences of invasive aquatic plants, tests novel control strategies, and provides public outreach via talks, workshops and an invasive aquatic plant webpage that serves as an online repository for aquatic vegetation maps, herbarium specimens, and research results. IAPP has performed nearly 345 lake surveys since 2004, and found approximately 60 percent contain one or more invasive plant species. IAPP has published numerous research articles, and presented at hundreds of public education events. A large number of state residents are served directly by visits to infested lakes, identification of problems, and assistance with management.

We are monitoring cases of SVD throughout CT and RI, and we are measuring soil gas fluxes to monitor soil carbon cycling, as well as characterizing how microbial communities respond to SVD.

Extension outreach efforts were conducted through multiple programs. Our objective is to help our target audiences make informed land use and development issues by providing natural resource and sustainable environment education and outreach. Pesticide safety education training was offered throughout the state to farmers, municipal officials, and other individuals. These trainings are offered annually with an increasing number of participants, however we highlighted other efforts in our report this year. UConn conducted programs, workshops, and conferences providing re-certification education for numerous people related to geospatial technology, forest resources, wildlife, and land use.

Our geospatial technology program cuts across all discipline areas with the Connecticut Environmental Conditions Online (CT ECO) website. The 25,000 annual visitors are seeking data related to numerous issues and challenges in agriculture, wetlands management, coastal climate mitigation, forest management, and development. Our forestry program complements the work and resources available online through CT ECO.

2. Brief description of the target audience

Target audiences for these programs include elected municipal officials, municipal land use staff and commissioners, researchers, city/town volunteers and citizens, state environmental and agriculture regulators, land trusts and other conservation organizations, private land owners, master gardeners, teachers, and students. Efforts were made to contact under-represented and under-served groups, including women, members of minority organizations, and children. Many Extension programs are a partnership with another organization, and Extension leverages our partnerships to recruit under-represented and under-served groups. For example, land use programs related to climate adaptation partnered with urban areas to offer resources. Turf and pesticide safety education focus equally on rural and urban areas with the School IPM program. Additional outreach to urban areas was conducted prior to programming through our partner organizations to ensure that all audiences knew of available trainings. Youth were reached through presentations in schools that tie into school curricula, partnerships with 4-H, and the weeklong Natural Resource Conservation Academy held annually for high school students at UConn. Educators participate in the steering committee the state Envirothon, engaging high school audiences with environmental issues through education and a daylong competition.

3. How was eXtension used?

An Extension educator serves on the Climate Science Learning Network Advisory Board for eXtension. Our educators have also worked with eXtension on invasive species initiatives. Another educator is a member of the Respirator Collaboration Team for the Pesticide Safety Education Program through eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	21016	735327	476	170

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

Patent Applications Submitted

Year:	2018
Actual:	2

Patents listed

1. Aronia plant named 'UCONNAM166'
2. Aronia plant named 'UCONNAM165'

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	23	81	104

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Face to face general group education sessions/workshops

Year	Actual
2018	336

Output #2

Output Measure

- Individual consultations

Year	Actual
2018	111

Output #3

Output Measure

- Fact sheets, bulletins and newsletters written or edited

Year	Actual
2018	45

Output #4

Output Measure

- Training of undergraduate and graduate students and post-doctoral researchers

Year	Actual

2018	340

Output #5

Output Measure

- Formal Extension outreach programs

Year	Actual
2018	439

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of homeowners gaining knowledge about watershed protection and soil and water quality
2	Number of lakes and ponds surveyed and/or cleared of invasive aquatic plants
3	Improved climate mitigation strategies and their adoption
4	Development of new knowledge in land use resource protection
5	Increase knowledge and use of geospatial technologies
6	Increase knowledge of native cultivars to support pollinator habitat.

Outcome #1

1. Outcome Measures

Number of homeowners gaining knowledge about watershed protection and soil and water quality

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	125

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Pollution affects human safety and health, and threatens the vitality of the natural environment. We have addressed broad issues related to understanding the fate and biological accessibility of pollutants in the environment and the development of novel methods for removing pollutants from waste streams and decontaminating water and soil.

What has been done
Projects on fate and remediation of chemical contaminants carried out in 2018 included i) interactions of contaminants with environmental particles, ii) bioavailability of contaminants associated with environmental particles, iii) pollution prevention and remediation, and iv) chemistry of the natural environment. It covers many types of pollutants, including industrial solvents and chemicals, fumigants, insecticides, herbicides, pharmaceutical compounds, personal care products, engineered nanomaterials, and greenhouse gases.

Results
Examples of the above project topics are given. In one we looked at the effects of air present during pyrolysis of biomass on the adsorptive properties of the chars that are formed. The results contribute to our understanding the behavior of black carbon in the environment and aid in the design of biochars for application in agriculture and environmental remediation. Hot air enlarges pores and increases surface area, properties that lead to a general increase in adsorption of organic compounds. Hot air oxidation also populates char surfaces with carboxyl and hydroxyl groups, which leads to enhancement of specific interactions with certain compounds. Adsorption of nitrous oxide, a potent greenhouse gas emitted from soil in part by agricultural activities, was studied in detail using biochars exposed to varying amounts of air during pyrolysis. Adsorption of N2O by the chars was greater and more reversible than by soils or soil mineral phases and was enhanced by air oxidation. It is concluded that char added at levels above 1% in soil would act as a strong and reversible sink for N2O, and could be responsible for the temporary nature of

emission suppression observed in some cases. Another study dealt with the chemistry of drinking and re-use water treatment using peroxymonosulfate (PMS), a bulk oxidant being considered in many advanced oxidation processes. Normally, PMS is activated by the input of energy or reducing agents to generate sulfate and/or hydroxyl radicals that are highly reactive towards most organic compounds. This study showed that PMS without explicit activation undergoes direct reaction with a variety of compounds, including antibiotics, pharmaceuticals, phenolics, and commonly-used singlet oxygen traps and quenchers. We concluded that PMS reacts directedly with these compounds through non-radical pathways that must be taken into account in advanced oxidation processes and other applications of peroxysulfates.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management

Outcome #2

1. Outcome Measures

Number of lakes and ponds surveyed and/or cleared of invasive aquatic plants

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Extensive growth of invasive aquatic weeds such as Eurasian watermilfoil (Myriophyllum spicatum) and Brazilian waterweed (Egeria densa) can significantly reduce water quality and alter native aquatic habitats. Stakeholders requested assistance with determining the species of aquatic vegetation and for integrated weed control. A large number of state residents are served directly by visits to infested lakes, identification of problems, and assistance with management.

What has been done
IAPP has performed over 345 lake surveys since 2004, and found approximately 60 percent contain one or more invasive plant species. CAES staff mapped native and invasive aquatic vegetation in 4 new and 11 previously surveyed water bodies. The effects of 10 years of winter drawdown on invasive plants were quantified in the state's largest lake, as was a recent

introduction of the plant eating grass carp (Ctenopharyngodon idella). Tests on controlling a new introduction in the state - Brazilian waterweed (Egeria dense) - in Fence Rock Lake with bottom placement of herbicide were successful and no regrowth occurred. Tests with benthic barriers in Lake Quonnipaug showed nuisance aquatic plant control in the beach area could be accomplished with a one month placement before swim season.

Results

After 15 years of surveillance, nearly 60 percent of Connecticut lakes and ponds have been shown to contain invasive plants. These plants cover approximately 10 percent of the combined area of all Connecticut lakes and the problem is increasing. The coverage of Eurasian watermilfoil shows a negative relationship to drawdown depth and duration in Candlewood Lake. Tests on controlling Brazilian waterweed found bottom placement of the herbicide Diquat resulted in near complete control the following year. We have largely restored Bashan Lake to pre-infestation conditions after years of selective fall herbicide applications. Long-term benefits will be protection of native lake ecosystems and prevention of associated economic losses.

Information from the program is disseminated to the public and stakeholders on the identification, prevention, and management of invasive aquatic species. We make efforts to engage citizens, lake associations, and other stakeholders. CAES scientists have organized several workshops on the identification of invasive aquatic plants, make presentations to professional organizations, and speak to numerous lake associations, town meetings, and student groups. Information is free and readily available via our website, included interactive lake maps, an herbarium, and publications (http://www.ct.gov/caes/IAPP). The invasive aquatic plant control and outreach efforts have resulted in the protection of lakes and provided scientifically proven methods for use by others. Our workshops have trained hundreds of citizens to recognize and report new infestations in order to prevent future problems and the associated control expenditures. IAPP has published numerous research articles, and presented at hundreds of public education events.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
135	Aquatic and Terrestrial Wildlife
205	Plant Management Systems

Outcome #3

1. Outcome Measures

Improved climate mitigation strategies and their adoption

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	1500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The state of Connecticut is approximately 60% forested. Mitigation strategies are needed for forest management as our climate changes, particularly to address invasive insects and storm damage. Forests can also be harvested as another source of income for land owners who are seeing shifts in other products they own and manage.

What has been done

The Extension forestry project has several initiatives to help land owners in Connecticut, including the local wood products initiative, the small-scale forest management methods program, Stormwise, and the Forest Stewardship Short Course.

The local wood products initiative is an information and education program promoting locally grown, harvested, processed and manufactured wood products. Small-scale forest management methods is a program to research, demonstrate and promote scale-appropriate solutions for small-acreage forest management and habitat management needs. Stormwise promotes an innovative combination of arboricultural and silvicultural techniques and methods in roadside forest management to promote storm resistant forest conditions for power system resiliency. The Forest stewardship short course is a six-session short course for woodland owners in forest stewardship planning.

Results

The forest stewardship program trained 20 woodland owners and they completed the course with near-complete forest stewardship plans for their properties, totaling approximately 1500 acres. Forest ecology and management topics were presented to Natural Resource Conservation Academy (NRCA) attendees at several times and locations during the weeklong program for high school students. A climate adaptation workshop for forest practitioners was a daylong event that trained the practitioners to address climate change issues for Connecticut forests. A separate training was conducted for citizens and conservation organizations in Guilford, and focused on forest and wildlife habitat assessment and planning.

During the previous reporting period, gypsy moth outbreaks were a problem in Connecticut, causing thousands of acres worth of damage statewide. Over 22,000 people were reached during that time period through social media alone. Concern now is with dead and dying trees damaging property and injuring people. During this reporting period, the Extension educator gave four presentations about gypsy moth life cycle, activities, and implications, including one to students and members of the University of Connecticut community, and another to students and members of the Central Connecticut State University community. A radio interview was completed, and numerous individual consultations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
132	Weather and Climate
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Development of new knowledge in land use resource protection

2. Associated Institution Types

- 1862 Extension
- 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 New England cottontail (NEC), Sylvilagus transitionalis, the only rabbit native to the northeastern U.S., is threatened by the loss of habitat due to development and forest succession. In 2006, the U.S. Fish and Wildlife Service (USFWS) designated NEC as a candidate for listing under the federal Endangered Species Act in 2006. Managers from throughout the region developed the Conservation Strategy for NEC that was adopted in 2012. The large management effort to create young forest and the research accomplishments led the USFWS to conclude in 2015 that listing was not warranted.

What has been done
UConn Hatch project, accession #1000754, contributed to the efforts being executed under the guidance of the Conservation Strategy for the New England Cottontail. The researcher assessed competition among NEC and the Eastern Cottontail by quantifying habitat use and survival of these two species when they co-occur in the same habitat patch. She also described how other mammals, particularly NEC predators, are using these sites. This research provided training experience for three MS students.

Results

Research studies demonstrated that both species of cottontail have the same adult survival rates when they co-occur within the same habitat patch. This result suggests that the cottontail species must differ in other vital rates, such as juvenile survival or reproductive output. The comparison of NEC and Eastern Cottontail microhabitat use when the species co-occurred in the same habitat patched demonstrated that NEC use locations with dense vegetation above them to avoid avian predators; whereas EC use locations with dense vegetation surrounding them to avoid terrestrial predators. Mammalian community composition was quantified among patched with and without NEC and daily activity patterns for all species were quantified. Bobcats and coyote were active during all hours of the day; whereas, cottontail activity drops to zero during daylight hours. We collected evidence that cottontail use of brushpiles may be limited because large brushpiles also attract bobcats and other predators. In addition, the research studies examined forest regrowth among houses and demonstrated that forest regeneration can have a positive effect on some species, such as salamanders, that are initially negatively affected by disturbance and habitat loss that occurs during housing development construction. This project provided information to wildlife managers in Connecticut and southern New England on the value of habitat recovery.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land

Outcome #5

1. Outcome Measures

Increase knowledge and use of geospatial technologies

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	150000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Connecticut is a small state that faces extreme development pressure, and must address climate adaptation challenges. Natural resource information is needed by local, state and federal

agencies and the general public to make informed land use and development issues.

What has been done

Connecticut Environmental Conditions Online (CT ECO) offers convenient access to the most up-to-date and complete natural resource information available statewide. CT ECO includes a variety of online maps and tools for viewing Connecticut's environmental and natural resources such as protected open space, farmland soils, wetland soils, aquifer protection areas, water quality classifications, and drainage basins. Each can be viewed separately or in conjunction with other environmental and natural resource information. In addition, CT ECO includes several dates of high-resolution orthophotography, as well as statewide elevation data.

CT ECO is a website that provides access to many of Connecticut's statewide geospatial data layers in different formats including over 9000 PDF maps, 10 map viewers (and counting), 138 data services and in some cases, data download. The website contains 18 aerial imagery datasets, the most recent having three-inch pixels, and statewide elevation with one-foot contours. CT ECO is a partnership between the Connecticut Department of Energy and Environmental Education and UConn Extension's Center for Land Use Education and Research. One of our Extension educators is the principal architect, builder, and maintainer of CT ECO.

Results

Over 25,000 people use CT ECO each year and some days, over 150,000 data requests are made. Users of CT ECO include land use managers, municipal officials, farmers, private citizens, agency staff, and others. A recent survey was conducted about the value of CT ECO to its users. The results are currently being analyzed. Initial results show a lot of people from different backgrounds including pri¬vate business, state and local government, nonprofits, education, and citizens use CT ECO and it saves them a lot of time and money.

We had 10 volunteers work on CT ECO during the reporting period. These volunteers helped UConn test new features, implement the survey to a wide variety of people, provide stakeholder input, and help build out features on the website.

A viewer for the Long Island Sound Blue Plan was added to CT ECO during the reporting period. The purpose of the Long Island Sound Blue Plan is to identify and protect places of traditional use and ecological significance, and to minimize conflicts, now and in the future. This includes preserving a collective vision of Long Island Sound, and facilitating a transparent, science-based decision-making process. The Blue Plan Map Viewer contains data layers for the plan in a format for exploration by CT ECO users.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
132	Weather and Climate

Outcome #6

1. Outcome Measures

Increase knowledge of native cultivars to support pollinator habitat.

2. Associated Institution Types

- 1862 Extension
- 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)
Pollinators play a role in food production. Crops that provide fruit, vegetables, seeds, nuts and oils depend on pollination. However, pollinator populations in the U.S. have been falling for decades. Domestic managed honeybee populations dropped from 6 million colonies in 1947 to 2.5 million currently. While no single factor is causing the current crisis, a combination of stressors contribute to the declining population. Inadequate diets, natural habitat loss, mite infestations, diseases, loss of genetic diversity and exposure to potentially harmful pesticides all contribute to population losses. (http://www.ncsl.org/research/environment-and-natural-resources/pollinator-health.aspx) Nursery growers supply native plants for habitat restoration and pollinator gardens, but they sell cultivars of native species, which may vary in flower and habit from the wild species form.

What has been done
Research based information can contribute to the suitability of native cultivars to support pollinators and guide the nursery industry on the use of cultivars to support pollinator habitat. UConn's Hatch project, accession #1010264, is collecting data on whether native shrub cultivars support pollinators as well as wild germplasm. Preliminary findings indicate that cultivars are not universally less or more attractive to pollinators and must be evaluated on a case by case basis. Studies to date found that the dominant insect group was Andrenids for Aronia melanocarpa and Physocarpus opulifolius, both of which produce clusters of white flowers in early spring. There was no significant difference in insect visitation between A. melanocarpa and its compact cultivars and C. alnifolia and its compact and pink flowered cultivars. Overall, D. fruticosa and its cultivar "Goldfinger" both having yellow flowers, attracted more insects than D. frutisoca "Pink Beauty" which has pink lowers. H arborescens and P opulifolius attracted more total insect pollinators than their respective cultivars.

Results

Data collected on insect visitation for five native shrub species and cultivars can be used by professional horticulturists, green industry professionals and home garden consumers, to guide their decisions when selecting plants for pollinator support. Outreach activities provided education on how to successfully utilize native plants to support pollinators. Study results were disseminated to the scientific community at the American Society for Horticultural Science Annual Conference, and to communities of interest through Extension outreach events, including the UConn Native Plants and Pollinators Conference and Rhode Island Master Gardeners. The long term goal is to improve pollinator habitat through increased use of shrub species and their cultivars that support pollinators. UConn's Native Plant conference reached 270 industry professionals and consumers, with 47% of attendees reporting they were extremely likely to use what they learned in landscaping, designing or growing plants for pollinators.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Competing Public priorities
- Other (Staff changes)

Brief Explanation

There were no external factors that negatively affected outcomes during this reporting period. However, the current economy, changes in state or federal appropriations, and resulting staff changes remain the primary external factors that could affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Direct stakeholder participation in the invasive aquatic weed program, including associated workshops and town meetings, remains the primary venue for results evaluation. Pre- and post-tests are given to participants in Extension programs. Survey research is used to evaluate knowledge gained, program effectiveness, and future needs. Research plot evaluation dictates Extension programming in turf grass areas as stakeholders need the latest updates to effectively manage their fields.

Key Items of Evaluation

Written information on evaluation forms following workshops held in different towns was an important information collection method for program assessments. During this reporting period, there were nearly 1800 citations (Google Scholar) for scientific articles written by several scientists for the planned program. These citations indicate that

knowledge was gained by scientists and potentially used in their studies.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

4-H/Youth Development

☑ 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
205	Plant Management Systems	15%		0%	
307	Animal Management Systems	15%		0%	
703	Nutrition Education and Behavior	15%		35%	
724	Healthy Lifestyle	15%		35%	
806	Youth Development	40%		30%	
	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	7.0	0.0	0.1	0.0
Actual Paid	3.5	0.0	0.0	0.0
Actual Volunteer	57.2	0.0	0.0	0.0

2. Institution Name: University of Connecticut - Storrs

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
293300	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
293300	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1100487	0	14209	0

2. Institution Name: Connecticut Agricultural Experiment Station -

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	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	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

Our 4-H/Youth Development planned program offers hands-on opportunities in science, technology, engineering, and mathematics (STEM), leadership, citizenship, and healthy living. Youth have the opportunity to: (1) explore the environment and nature, (2) grow their own food with all types of gardens, (3) learn about technology and robotics, (4) develop photography or drama skills, and (5) care for animals.

Youth ages 5-19 can be part of an Explorers or traditional club, be an individual member, attend 4-H Camp, participate inn a field trip, or have their new skills evaluated at a 4-H Fair. Our adult volunteers contribute to individual events, short-term or long-term projects with national curriculum, ongoing group activities, and through committee membership. Training and support are offered for all volunteers through UConn Extension.

2. Brief description of the target audience

Target audiences are youth, families, school personnel, youth-serving agencies and organizations, community organizations, and agency staff. Volunteers involved with youth and adults are also targeted. We reach underserved audiences in the state through multiple partnerships and marketing initiatives. For example, our 4-H Sports and Nutrition program works in Bethel and Danbury, and partners with our Expanded Food and Nutrition Education Program (EFNEP) on nutrition outreach education. Our 4-H FANs program works with the FoodCorps service members to expand their reach and provide support for school

gardens.

In Connecticut, multiple 4-H clubs and afterschool activities target urban youth and diverse populations. We work in large cities including Danbury, Meriden, New Haven, Waterbury, New Haven, and Windham. Partnering with non-government organizations and schools allows our 4-H program to reach diverse audiences that are not part of the traditional 4-H model. These cities are also under-represented in overall 4-H enrollment. We have improved our representation numbers each year using these methods.

The 4-H Education Center at Auerfarm in Bloomfield is an institution that changes and adapts to the interests and needs of suburban and urban youths and families. More than 10,000 children visit the farm each year through school field trips and other community and school opportunities at the farm.
We serve school groups throughout the year and the farm hosts its own 4-H club that helps develop the resources on the sprawling property that includes barns, gardens, and an orchard. Youth learn basic principles of food production, plant science, animal husbandry, and environmental education. Our Master Gardener volunteers support 4-H youth activities at the farm, collaborating with our 4-H educators and volunteers on curriculum and outreach.

3. How was eXtension used?

Our Extension educator serves eXtension as an Ask the Expert on equine topics. Many of the questions received are from 4-H and youth audiences.

V(E). Planned Program (Outputs)

1. Standard output measures

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	41259	325461	172179	85317

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed
None

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

- Face to face general group education sessions/workshops

Year	Actual
2018	8

Output #2

Output Measure

- Individual consultations

Year	Actual
2018	5

Output #3

Output Measure

- Fact sheets, bulletins and newsletters, written or edited

Year	Actual
2018	12

Output #4

Output Measure

- Formal Extension outreach programs

Year	Actual
2018	188

Output #5

Output Measure

- After-school programs (sites), conducted or organized

Year	Actual
2018	69

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Youth demonstrate increased knowledge or skills in one or more of the three 4-H program emphasis areas
2	Number of youth developing knowledge or skills in science, technology, engineering and math (STEM)
3	Increase in the health and wellbeing of youth participating in 4-H program activities
4	Increase positive impact on communities through volunteer mentors

Outcome #1

1. Outcome Measures

Youth demonstrate increased knowledge or skills in one or more of the three 4-H program emphasis areas

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of youth developing knowledge or skills in science, technology, engineering and math (STEM)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	10785

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The United States ranks 27th among developed nations with college students receiving science or engineering degrees. We are 38th out of 71 countries in a measurement of math, science, and literacy skills in 15-year-olds. It is critical to engage youth in STEM related fields of study and introduce them to possible career opportunities in these areas. Nearly all of the 30 fastest growing occupations in the next decade will require at least some background in STEM. Women and minorities are under-represented in science careers and a diverse pool of trained scientists is needed to frame and solve problems and educate others.

Statistics show that sixty three percent of high school graduates are not prepared for college-level science and 57 percent are not prepared for college level math. Only 1 in 5 STEM college students feel their K-12 education prepared them for STEM college courses. 4-H programs provide youth with hands-on, engaging STEM experiences that build excitement around STEM topics and careers.

What has been done

STEM education is offered through 4-H clubs, afterschool programs, Science Saturdays, mini-camps, workshops, conferences, and competitions. For example, eight youth from the Granby 4-

H Club successfully launched three experiments into space on a NASA rocket in June of 2018 as part of the Cubes in SpaceTM program. The 4-H members spent four months writing their experimental proposals, and then participated in two rounds of interviews. Only 80 experiments out of 450 submitted were selected. This program is one of three robotics project areas in the Granby 4-H curriculum. Other youth participated in the VEX robotics competition with their projects.

All eight counties in Connecticut had youth participate in the National 4-H Science Experiment every October. In October of 2017 the Science Day Challenge was "Incredible Wearables", a hands-on STEM project that challenges young people to build a wearable fitness tracker that will help people lead healthier lives. One Extension educator conducted the experiment with a high school field hockey team. She stated: The team is not exposed to 4-H activities. Yet, I walk in and hand them the science kits and the handbook, divide them into groups and ask them to complete the experiment, and every year I get responses saying "it was my favorite activity of the year," and "we should be doing this in school."

Results

There were 10,785 technology and engineering 4-H projects in 2018. Of these, 9,946 were STEM related. In a survey of 4-H youth, the team found that 83% of participants learned new things about science through 4-H. We had fourteen youth participate in robotic competitions with international participants. 4-H members note that they have benefited from participating in the 4-H Robotics Program by gaining and enhancing their skills; for example, in the area of spatial geometry or in programming using the C language. Also, these experiences have provided opportunities for them to demonstrate and strengthen their teamwork and cooperation skills in preparation for their future education and careers.

The LEGO EV# robotics programs in Windham County reached 250 students in two school systems. In Griswold, the program was six weeks long and targeted 4th-6th graders. In Windham, the program was 12 weeks and offered to 6th through 8th graders. The 4-H Libraries Rock STEM program reached 131 youth in three towns, and the 4-H STEM Military Partnership reached 55 youth from 10 towns through an eight-week program. Curriculum for all of these programs was targeted to the community needs. The technological equipment and education are otherwise not available to many of the populations served.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
307	Animal Management Systems
806	Youth Development

Outcome #3

1. Outcome Measures

Increase in the health and wellbeing of youth participating in 4-H program activities

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	2474

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Obesity is a complex disorder based on genetics, environment, development and behavior. According to the CDC, 17% of all youth ages 2 to 19 are obese. This rate has not changed since 2003-04. Children from low-income households are at greatest risk for developing obesity given the high calorie, but poor-quality diets and limited opportunities for physical activity. Poor diet quality and lack of physical activity over a lifetime places adult at much greater risk for a multitude of chronic diseases such as cancer, hypertension, cardiovascular disease, and diabetes.

What has been done

Youth were taught to prepare healthy and nutritious meals through their 4-H projects. UConn Extension had 303 youth participate in food and nutrition projects in 2018, 1,374 in fitness and sports, and 797 in healthy lifestyles. A total of 2,474 4-H participants increased their health and wellbeing through the programs offered. These include workshops, club-based activities, and multi-week educational sessions that cover a range of topics.

UConn Extension 4-H Sports and Nutrition Program (4-H Legends) is one program in this area. It is a year-round program that utilizes soccer to enhance physical activity while at the same time promoting healthy eating habits. The program consists of two components: sports and nutrition. The sports component will allow participating children to play in three soccer categories: U-9 (children older than 7 but younger than 9 years old), U-11(children older than 9 but younger than 11 years old) and U-13 (children older than 11 but younger than 13 years old). Teams will consist of male and female children and will be enrolled in local soccer tournaments. The nutrition component involved children and their parents. Nutrition classes were scheduled on one of the days when both teams practice together. There were 12 classes, one hour each in length for parents and children. The classes were offered monthly and will follow the Expanded Food and Nutrition Education Program (EFNEP) guidelines and utilize the EFNEP pre and post surveys for parents and children.

Results

Each 4-H Sports and Nutrition program participant had up to 200 hours of physical activity in the reporting period. Participating children had soccer practice twice a week for five hours per week. In addition, both children and their parents received between 18-20 hours of family nutrition education. Nutrition education occurred once per month for 1 1/2 to 2 hours each time. There were 24 youth in the program during the reporting period. That equaled 4,800 hours of physical activity, and 960 hours of nutrition education.

The 4-H FANs program focuses on fitness, nutrition, gardening and fun. During the school

year students met weekly to participate in fun activities designed to teach healthy eating, exercise and gardening. Summer Story Days, held on Wednesdays, included guest readers and food demonstrations where students created healthy snacks. Families attending took home a bounty of fresh vegetables from the students' garden, and recipes from our team of educators. The program reached 130 youth during the reporting period.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
806	Youth Development

Outcome #4

1. Outcome Measures

Increase positive impact on communities through volunteer mentors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	114500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research has shown that caring adults play an absolutely essential role in the healthy development of youth. The mission of the Connecticut 4-H Youth Development program is to help youth make good decisions, and develop leadership and citizenship skills, while improving self-confidence. All youth need support and positive experiences to grow to their fullest capacity and to become productive adult citizens.

What has been done

Volunteers are an integral part of the 4-H program in all eight Connecticut counties. Our 4-H volunteers' range in service from one year to over 40 years. We also have programs that formalize volunteer involvement through mentoring. The Connecticut 4-H Mentoring Project is a prevention program designed to assist youth in acquiring knowledge, building character, and developing life skills in a fun learning environment that will help them become self-directing, productive members of society. Waterbury and Bridgeport have participated in the Connecticut 4-

H Mentoring Project for 8 years, and are presently serving over 120 youth, ages 10-14.

Another program, the ACES 4-H Club at Whitney East/West high school works with teens with special needs, and helps students develop confidence, communicate more effectively and enjoy events and competitions beyond their community. FC 4 is another positive youth development program where youth gain skills, contribute to their communities, and have ownership of their groups, making decisions and learning from the results of their decisions.

Results

In 2018, 114,500 hours were donated by 3,784 4-H youth and adult volunteers in all citizenship areas, with an approximate value of $2.8 million to the communities served according to the Independent Sector. The number of hours volunteered increased by 15% over the previous year, and the number of enrolled 4-H volunteers more than doubled over the previous reporting period. Of all adult 4-H volunteers, 73% are female, and 27% are male. The majority have three years or fewer as a 4-H volunteer, and 57% live in towns with 10-50,000 residents. A survey of 4-H members found that 75% talked about their community needs through the 4-H program, and 94% were inspired to volunteer in their community because of 4-H.

One 4-H youth volunteer stated: "I am very grateful that teaching archery (in 4-H) helped me come out of my shell. Addressing the groups of people coming through our archery range gave me new found courage that has carried over into my other parts of my life. I now take on leadership roles in class, finding myself leading groups through trigonometry projects, and at cross country meets I feel more comfortable conversing with other runners."

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Competing Programmatic Challenges

Brief Explanation

The economy and competing programs are challenges to the planned program area. Extension educators are using competitive grant funds and innovative programming to maintain program outcome levels.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

This was the pilot year of a 5-year longitudinal study for the UConn 4-H program using Common Measures 2.0. In this pilot year, 51.96% of youth surveyed indicated that at 4-H they learned how to act professionally (an additional 33.33% replied that 4-H sort of helped them learn this), 54.92% indicated that 4-H helped them a lot with identifying what they were good at (an additional 40.98% indicated that 4-H helped them a little at this). As a result of their 4-H experience 44.63% indicated that they have a better idea of what they might actually do after high school (with 33.06% indicating that because of 4-H they sort of

have a better idea). The data from this pilot year indicate that UConn 4-H is making a difference for career and workforce readiness for youth engaged in 4-H. We are adding additional questions to future surveys that will assist us in better understanding the impacts of our program, and guide our decisions towards creating and improving programs that help our youth thrive.

Key Items of Evaluation

UConn 4-H was one of 10 states selected for a pilot program, in the form of the Common Measures 2.0 Cohort Challenge Grant, to implement Common Measures program evaluation. The UConn 4-H team developed a user-friendly survey platform using online Qualtrics software for the National 4-H Common Measures 2.0 instrument. The 4-H team designed an annual survey that can be used by UConn 4-H youth to capture data relevant to each individual's program participation. The team customized features in Qualtrics to match surveys to participants' UConn 4-H program experience, ensuring they received relevant surveys. The team developed this evaluation platform with an eye on the future, and is now poised to conduct a 5-year longitudinal study of program impacts.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Community and Economic Development

☑ 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
724	Healthy Lifestyle	20%		50%	
801	Individual and Family Resource Management	25%		0%	
802	Human Development and Family Well-Being	20%		50%	
807	Disaster Preparedness, Mitigation, Response, and Recovery	10%		0%	
903	Communication, Education, and Information Delivery	25%		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	1.0	0.0	0.1	0.0
Actual Paid	5.3	0.0	0.0	0.0
Actual Volunteer	1.1	0.0	0.0	0.0

2. Institution Name: University of Connecticut - Storrs

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
404021	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
404021	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
569237	0	37212	0

2. Institution Name: Connecticut Agricultural Experiment Station -

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	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	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

Connecticut citizens are linked to Extension specialists and current research priority areas identified by our stakeholders through the Community and Economic Development planned program. Critical issues include (1) community planning, (2) improving conditions for families and communities through leadership development, and (3) preparedness training.

Specific activities in the planned program include: workshops, trainings, health fairs, continued promotion of YouTube videos for children on healthy homes; volunteer training programs; online material such as fact sheets, and community economic development programs. Impact statements and news are disseminated through blogs, websites, press contacts, and social media.

2. Brief description of the target audience

Parents, youth, children, teachers, elected officials and policy makers are target audiences for this planned program. Through collaboration with our partner organizations, such as schools, state agencies, non-profits, and town governments we are reaching larger numbers of diverse and under-served audiences. UConn is also striving to reach new audiences through a variety of communication methods including email marketing, websites, and social media. Partnerships with other organizations, municipal officials, and key stakeholders have led our programs to reach wider audiences and broaden our impact. Translation is available for programs and materials, and some programs are offered in multiple languages. Our partners help non-traditional audiences connect with Extension resources to improve their

lives and communities.

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	9331	2073	1517	279

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed
None

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	8	0	8

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Face to face general group education sessions/workshops

Year	Actual
2018	17

Output #2

Output Measure

- Individual consultations

Year	Actual
2018	2

Output #3

Output Measure

- Fact sheets, bulletins and newsletters written or edited

Year	Actual
2018	4

Output #4

Output Measure

- Training of undergraduate and graduate students or post-doctoral researchers

Year	Actual
2018	9

Output #5

Output Measure

- Formal Extension outreach programs

Year	Actual
2018	188

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Program participants demonstrate increased leadership, parenting, or financial management skills
2	Economic Development of Communities

Outcome #1

1. Outcome Measures

Program participants demonstrate increased leadership, parenting, or financial management skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	130

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Teens and college students often have limited preparation for some of the big financial decisions they will make as young adults. They are often unfamiliar with the costs associated with common expenses and the challenge of making financial decisions. As many may consider or already have a student loan to help finance their further education, it is important that they understand how a college loan will fit within their budgets as young working adults. Parents and other adults often recognize this, but may not know how to address it. Few students have access to personal finance classes in high school.

What has been done

Workshops for participants and to train volunteers were conducted throughout the state. By training others, the educator increases the impact of the program. Examples of workshops offered include: Welcome to the Real World, Connecticut Edition (three locations), Spring Cleaning Your Debt, Financial Fitness Checkup, Financial Action Fair, Take Financial Action: Save Money (two locations), Beyond Paycheck to Paycheck, Financial Jeopardy, Volunteer Financial Coaching Training, Your Money, Your Goals Financial Education, and Making Change: Growing Your Finances.

Welcome to the Real World, Connecticut Edition is a simulation learning activity that gives young people, including UConn undergraduate students, the opportunity to imagine their lives as financially independent working adults making lifestyle and spending decisions and living within their means. This event was held for Hill Regional Career High School students in business classes. The simulation was held on two days. Nine volunteers were trained and assisted with the simulation by staffing expense tables.

The volunteer coaching training is a three-session series with nine hours of instruction for volunteers. The purpose is to provide volunteers with financial tools they can share with clients to help them address a variety of common financial issues. A 350-page toolkit was also prepared and distributed to all volunteers. There were 27 volunteers trained who donated 83 hours to their

communities on financial education.

Results

In one Welcome to the Real World: Connecticut Edition we had 129 students complete an end of the event survey, and indicate that "participating in this program has given me a chance to think more concretely about my future. 130 indicated that the simulation helped them apply the concepts being taught. 118 indicated that the exercise caused me to rethink some of my plans such as those related to my future occupation, lifestyle, where I will live or others. Overwhelmingly, they would recommend the program to their friends and provided answers such as these as to why they would:
"it gives insight of the real world and how to deal with money"
"it teaches you future responsibilities"
"you get a sneak peek of the real word"
"it helps you realize that things aren't as cheap as you think they are and how they add up"
"because it scares you into finding a good paying job"
"it teaches you about balancing and priorities"
"Most definitely because it can help those who have spending problems save a lot of money"

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
801	Individual and Family Resource Management

Outcome #2

1. Outcome Measures

Economic Development of Communities

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	818

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

While Connecticut has a wealth of resources to promote physical activity (including over 2,000 miles of trails in State Parks alone) and exercising in outdoor spaces has been shown to impact physical and mental health outcomes, many outdoor assets remain underutilized or inaccessible to the populations who might most benefit from them.

What has been done

Data collected from 1,003 multi-use trail users in Connecticut in 2017 through the Connecticut Trail Census found that only 11% of trail users surveyed identified as Black or Hispanic (compared to 26.9% of the general state population). Similarly, while 35.8% of the general state population reports incomes < $50,000, only 21.9% of trail users surveyed were in this income range. Significant disparities exist in Connecticut related to lack of physical activity and health risk.

Data were collected on 16 different trails in Connecticut, with diverse geographic locations. Counts were continued in 2018. The team trained 63 community volunteers to work at trail locations and calibrate counts with the infrared counters, and these volunteers donated 818 hours to the program. There are 15 trail advocacy groups from the state that are involved in the project. Involvement with the Northeast Regional Center for Rural Development (NERCD) has also helped leverage resources and partners.

Results

Average daily use in the summer was 336 people (across all 16 trails) versus 221 in the fall for the reporting period. Of trail users, 44% were male, and 56% were female. Ages of respondents had 25.74% ages 55-64, and 22.15% ages 45-54. Trail users represented 165 unique zip codes in Connecticut and Massachusetts.

One town stated: "Used [CTTC trail use data] as part of town's Branding Committee efforts to get more/better access to downtown from the trails."

The team is continuing to conduct trail census counts, and is partnering with the Expanded Food and Nutrition Education Program (EFNEP) to help other residents incorporate trail use into a healthy lifestyle. The cities of Danbury, New Haven, Hartford, Meriden, and New Britain, all have existing outdoor recreation amenities, EFNEP education programs, and community partners with capacity to partner with UConn Extension to market public events that encourage residents to incorporate trail activity into their health and sustainability programs. This project will continue growing and expanding.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
903	Communication, Education, and Information Delivery

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

External factors have impacted this program, and our educators are leveraging grants and external partnerships to maintain impact levels of programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Participants in all of our financial education programs learned that they could be more in control of their finances and identified steps they could take to improve their financial status. They were encouraged to review their savings behavior and take steps to increase it.

At a Welcome to the Real World financial education program, 30 of the participants completed the evaluation. All agreed or strongly agreed that the program gave them a chance to think more concretely about their futures and apply the concepts taught. There were 29 participants that indicated the exercise caused them to rethink some of their future plans such as those related to career choice. Another 28 participants indicated that the exercise gave them an opportunity to think about their spending priorities.

Comparisons between the pre-workshop surveys and the end of session surveys at financial education programs show gains in knowledge and confidence in all categories.

Key Items of Evaluation

The Connecticut Trail Census program has received additional funding for the next reporting period from the state for $206,000. The program was a partnership, and UConn will be assuming the lead role going forward, with partners serving on an advisory council. Connecticut Trail Census also received $5000 for events encouraging healthy lifestyles through nutrition and trail use that partner with the Expanded Food and Nutrition Education program, expanding their education and outreach into new areas. Both funding sources for the Connecticut Trail Census will leverage commitments from Extension and our partners, and allow the team to continue seeking outside funding for the project.

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)	
0	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.