V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

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
205	Plant Management Systems	5%		5%	
206	Basic Plant Biology	0%		10%	
212	Pathogens and Nematodes Affecting Plants	0%		5%	
215	Biological Control of Pests Affecting Plants	20%		5%	
216	Integrated Pest Management Systems	25%		10%	
307	Animal Management Systems	5%		5%	
311	Animal Diseases	15%		40%	
315	Animal Welfare/Well-Being and Protection	5%		10%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	15%		5%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	6.1	0.0	1.0	0.0
Actual Paid	5.4	0.0	0.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
491939	0	330294	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
491939	0	330294	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
973384	0	1606060	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Food Systems program area focused on reducing food insecurity in the state of Connecticut. Research and Extension programs addressed food production, food safety, and the broader food system affecting access and distribution of food security. The food production component focused on specialty crops (fruits and vegetables), improving Best Management Practice (BMP) for producers and incorporating pest management strategies and improved business practices. The food safety effort included Good Agricultural Practices (GAP) training for crop producers, Hazardous Critical Control Points (HACCP) training for seafood producers and handlers, and safe practices for food storage for homeowners. The food systems work addressed improving access to fresh fruits and vegetables for low-income families and communities.

Activities included:

- on-line material such as fact sheets, impact statements and news articles
- food safety workshops and webinars
- YouTube videos, and mobile apps
- GAP and HACCP trainings, and individual counseling and assessments
- basic and applied research projects

2. Brief description of the target audience

Our target audience includes:
Consumers
Farmers/producers
Agency and organizations (staff) that serve or handle food at: camps; food pantries and soup kitchens; schools; day care centers, Head Start, senior centers, etc.
Food related businesses - processors, farmers' market masters and vendors, etc.
Seafood industry: seafood processors, dealers, harvesters, importers, and regulatory personnel.
Researchers, state, regional, national and internationally.
Policy makers

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	19799	204334	11378	3184

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

Patent Applications Submitted

Year: 2014

Actual: 1

Patents listed

1. A live attenuated anti-genically marked classical swine fever vaccine

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	4	47	51

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Conferences and Workshops, short courses, reports

Year	Actual
2014	181

Output #2

Output Measure

- New or updated web page(s)

Year	Actual
2014	5

Output #3

Output Measure

- Undergraduate and Graduate Students Supervised

Year	Actual
2014	463

Output #4

Output Measure

- Webinars conducted

Year	Actual
2014	5

Output #5

Output Measure

- YouTube videos produced

Year	Actual
2014	1

Output #6

Output Measure

- Apps developed

Year	Actual
2014	1

Output #7

Output Measure

- Clinical, extension or other expert services

Year	Actual
2014	298

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Reduce food insecurity in the state of Connecticut and across the northeast.
2	Develop food safety plans on farms
3	Develop non-antibiotic based control measures to prevent necrotic enteritis (NE) in turkeys and chickens.
4	Increase economic viability of agricultural producers

Outcome #1

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
2014	150

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to USDA, urban areas with concentrated poverty and minority populations are the critical factors in determining food deserts. In CT food deserts are mainly found in Fairfield County. Bridgeport and Danbury are two of the poorest cities in CT, with the two largest Hispanic populations, 32% and 24% respectively. 2010 US Census data show Hispanics represented almost 17% (155,000) of Fairfield County's population. The vast majority of Hispanics living in food desert areas are detached from agriculture; less than 1% (129 out of 155,000) of Hispanics get involved in the production of their food.

What has been done
UConn Extension's Urban Agriculture Program for Hispanic adults is in its second year. Outputs include:
1. Program participants completed 180 hours of classroom instruction covering: botany, vegetable production, entomology, crop risk management, and IPM.
2. Participants volunteered 1,603 hours working in the farm preparing the land, building raised garden beds, planting and transplanting, maintaining an acre of organic vegetables, and selling produce at the Danbury Farmer's Market and students were enrolled as certified food vendors.
3. Low-risk IPM tactics were applied throughout the production season including: use of resistant cultivars, cultural controls, physical controls, mechanical controls, biological controls.

Results
More than 4,000 pounds of locally produced organic vegetables were distributed among 150 low-income families at Danbury Farmer's Market. From April to October 2014 Urban Agriculture program participants produced a variety of vegetables and herbs including spinach, cilantro, dill,

basil, carrots, beets, tomatoes, peppers, eggplants, zucchini, squash, radishes, and cabbage. All vegetables were produced applying organic production methods and IPM lower-risk tactics. Eleven of 15 participants enrolled in the Urban Agriculture program completed the year round training. This group formed a nonprofit organization to continue promoting urban agriculture among Hispanics. Program participants increased their knowledge on each of the three modules tested (Botany, entomology, and vegetable production) and changed their behavior when producing vegetables by applying low-risk IPM tactics.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
206	Basic Plant Biology
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Develop food safety plans on farms

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	24

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Recently several significant foodborne disease outbreaks were traced to produce packing houses. Since the Good Agricultural Practices (GAP) Audit Program and food safety plans are

being required, there is a need to look at the food safety implications of the packing house environment; determine what types of practices need to be implemented to reduce the risk of contamination of produce in packing houses; and provide training and education opportunities for farmers who need to implement Good Manufacturing Practices and/or Good Handling Practices in their facilities. In addition, the FDA Food Safety Modernization Act (FSMA) Produce Rule, will require farmers to implement a written preventative control plan for safe production and harvesting of fruits and vegetables.

What has been done
During year 2 of the Good Manufacturing Practices project we were able to further enumerate some of the microbiological testing results to develop a more complete picture of the presence of potential pathogens and other indicators in the packing house environments we explored. We created a picture survey of ten farms. An online survey was sent to 178 fruit and vegetable farmers via email. A workshop was organized and presented to 24 farmers in March of 2014. The workshop included: a review of food safety hazards associated with packing house processes and products, reviews of survey results and micro study, good manufacturing practices, sanitation standard operating procedures, allergen controls, and other areas related to food safety.

Results
Data collected via the email survey found that 78% of farms do not have a food safety plan. A model food safety plan was developed as a tool for farmers. As a result of this model safety plan, farmers will be better equipped to begin the task of conducting a food safety assessment of their packing house facility. In addition they will be positioned to improve their policies and practices, and to update or develop new food safety plans using the information and resources provided at the workshop.

Micro testing of 8 farms found:
- No E. coli O157:H7 was found
- Salmonella spp.(not enumerated for pathogenic species) were found in one farm on 4 surfaces including 2 floor drains, a cooler floor and fork lift tire
- Fecal coliforms were ubiquitous on almost every surface at every packing house, indicating the need for attention to sanitation by all
- Listeria spp. was present in all 8 packing houses: When enumerated, one pathogenic type, L.ivanovii, was found at all 8 farms. A variety of locations were involved, including sinks, drains, bins, conveyor rollers, cookers, floors, packaging, and counters.

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 #3

1. Outcome Measures

Develop non-antibiotic based control measures to prevent necrotic enteritis (NE) in turkeys and chickens.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Necrotic enteritis (NE) is a serious disease affecting the small intestine of chickens and turkeys. Economic losses due to mortalities, reduced growth rate, medication costs and condemnations in the slaughterhouse can be considerable. In a severe flock outbreak,the mortality rate can be 50%. The disease has been reasonably well controlled for many years by the use of antibiotic growth promoters. However, use of these products is now banned in many countries, and their use is threatened in other countries, including in the U.S. Alternative strategies are needed to prevent the disease.

What has been done
A Hatch research project is studying NE in turkeys by developing a NE disease model. No disease model for NE currently exists for turkeys. The model will be used to understand the factors involved in development of the disease in turkeys, and also for future studies of intervention strategies, hopefully leading to non antibiotic based control measures to prevent the disease, which would remove concerns that consumers have about development of antibiotic resistance among human pathogens resulting from the feeding of antibiotics to animals.

Results
Attempts to produce the disease experimentally have been carried out, following the plan in the approved project proposal, but with additional variables (younger ages) introduced based on an unexpected but relevant finding during vaccination attempts in chickens. The experiments were designed and executed by the PI with assistance from a graduate student and undergraduate student workers. Some small mild gross lesions were detected in the intestine of a few birds but

microscopic examination of the tissues is needed to determine if they are Clostridial induced lesions or not. Students gained experience in the management and manipulation of turkeys, and the design and execution of scientific research experiments. Histological evaluations need to be completed before final conclusions can be drawn.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

Outcome #4

1. Outcome Measures

Increase economic viability of agricultural producers

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	9670

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Although the Food Quality Protection Act imposes stringent safety standards on pesticides used on food in the U.S. pesticide residues are still detected in fruits, vegetables, grains, meats and dairy products. Pesticides have many uses and we can be exposed to them through water and air as well as food. Because there is a trend toward home gardening, as well as buying local and organic foods, there is also an increased public resistance to pesticide use and a need for responsible pest management practices that minimize environmental effects.

What has been done

UConn's Integrated Pest Management (IPM)program integrates the application of multiple tactics through the selection of appropriate tools and education to the agricultural industry to provide sustainable, science-based approaches for the management of plant pests (insects, mites, diseases, wildlife, weeds). IPM Program team members conducted intensive on-site educational training for fruit and vegetable producers, and greenhouse growers. Growers received information on the current status and recommendations for important plant pests and training via pest messages, email alerts, webinars, newsletters, articles in national trade journals, websites, social media, consultations via phone, site visits to their operations, workshops and conferences. The use of IPM (including cultural controls, biological control agents, biological fungicides, physical and mechanical controls, the use of resistant cultivars, and behavioral modification) reduced plant losses due to plant pests.

Results

Broader adoption of IPM practices enhanced responsible pest management and reduced management and production costs; minimized adverse environmental and economic effects from pests; resulted in improved ecosystem quality and plant performance; and improved plant health, quality, yields, and aesthetics.
* 9,670 participants received IPM training and increased their knowledge and awareness of managing plant pests (insects, mites, diseases, wildlife, and weeds, including invasive plants), resulting in improved decision-making regarding management options.
* More than 41 New England vegetable growers have switched to Deep Zone Tillage (reduced tillage) to help maintain or improve crop yields with a changing climate that is warmer and wetter in the Northeast.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
206	Basic Plant Biology
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

- Urban agriculture participants were administered pre and post-tests for each of the classroom modules.
- Urban agriculture field activities (soil testing, IPM tactics, organic production methods, etc.) were evaluated through observations conducted by instructors and demonstrations made by participants.
- Urban agriculture participants kept logs of their field activities were they reported what they did in the field; from insect and disease identification to IPM tactics applied (planting, transplanting, scouting, weeding, watering, hand picking Japanese beetle, removing leaves with mildew, removing tomatoes with calcium deficiency, etc.).
- Packing house post workshop evaluations were completed the day of the program.
- IPM programs were evaluated by the following methods: pre- and/or post-program surveys, focus groups, key informant interviews, and testimonials.

Key Items of Evaluation