V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships			10%	
201	Plant Genome, Genetics, and Genetic Mechanisms			1%	
202	Plant Genetic Resources			7%	
204	Plant Product Quality and Utility (Preharvest)			3%	
205	Plant Management Systems			13%	
211	Insects, Mites, and Other Arthropods Affecting Plants			6%	
212	Pathogens and Nematodes Affecting Plants			6%	
213	Weeds Affecting Plants			8%	
216	Integrated Pest Management Systems			3%	
301	Reproductive Performance of Animals			4%	
302	Nutrient Utilization in Animals			3%	
303	Genetic Improvement of Animals			2%	
305	Animal Physiological Processes			3%	
311	Animal Diseases			11%	
403	Waste Disposal, Recycling, and Reuse			3%	
501	New and Improved Food Processing Technologies			2%	
502	New and Improved Food Products			3%	
601	Economics of Agricultural Production and Farm Management			3%	
605	Natural Resource and Environmental Economics			6%	
702	Requirements and Function of Nutrients and Other Food Components			3%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	12.4	0.0
Actual Paid Professional	0.0	0.0	12.3	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	980831	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1594004	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

Conduct scientific research. Publish peer-reviewed journal articles and other publications. Present findings at professional meetings, at field days for growers, and at other venues. Educate undergraduate and graduate students.

2. Brief description of the target audience

Maine crop and livestock farmers, aquaculture industry, food processors and marketers, Cooperative Extension staff, other scientists, state policymakers, regulators, and legislators, classroom teachers

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	30	30

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of completed research projects
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of other publications:

Year	Actual
2013	43

Output #3

Output Measure

- Total amount of extramural funding ($):

Year	Actual
2013	1455069

Output #4

Output Measure

- New web site: umaine.edu/localwheat

Year	Actual
2013	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies, and management systems
2	More sustainable, diverse, and resilient food systems in Maine
3	Improved animal genetics
4	Number of plant releases:
5	Number of new or improved innovations developed for food enterprises

Outcome #1

1. Outcome Measures

Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies, and management systems

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Demand for local organic food has inspired new interest in growing bread-quality wheat in New England. Our region's farmers have long produced small grains for animal feed on dairy and crop farms, but lack local knowledge and research information regarding production for the organic bread market. MAFES researchers are working with peers in New Hampshire and Vermont to build farmers' capacity to produce high-quality organic bread wheat.

What has been done
Experiment Station scientists have conducted extensive screening of spring and winter wheat cultivars and component studies of fertility and weed management practices for organic production in northern New England. In addition, they have initiated more intensive characterization of regionally adapted genotypes, with an expanded range of grain quality and hedonic tests.

Results
This project is helping to create local, organic food grain economies in our region. The field research projects have provided new information that was implemented directly by farmers in our region. Twenty-five of the 30 (83%) northern New England commercial grain farmers who completed a recent survey reported they had adopted at least one and on average three new management practices based on the project?s research results. These included selecting adapted varieties based on the project?s variety trial reports (72%); increasing seeding rates (43%) and spatial density (33%) to better suppress weeds; topdressing nitrogen on winter grains (29%) to improve grain quality; and changed a marketing practice (13%).

4. Associated Knowledge Areas

KA Code	Knowledge Area

205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

More sustainable, diverse, and resilient food systems in Maine

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Demand for local organic food has inspired new interest in growing bread-quality wheat in New England. Our region's farmers have long produced small grains for animal feed on dairy and crop farms, but lack local knowledge and research information regarding production for the organic bread market. MAFES researchers are working with peers in New Hampshire and Vermont to build farmers' capacity to produce high-quality organic bread wheat.

What has been done
Experiment Station scientists have conducted extensive screening of spring and winter wheat cultivars and component studies of fertility and weed management practices for organic production in northern New England. In addition, they have initiated more intensive characterization of regionally adapted genotypes, with an expanded range of grain quality and hedonic tests

Results
Farmers and millers reported increased yields (47%); improved grain quality and crop value (75%); new buyer contacts (40%); increased or maintained employment (33%), and increased wheat acreage (80%). The economic value farmer respondents placed on the benefits they gained from the project was on average $7,000 each. For farmer/millers and millers, this value was over $35,000 each. Grain buyers also have benefitted. Of the 14 bakers and distributors who responded to a survey, 71% increased their use of locally grown grains, 36% developed new products, and 86% contacted someone new. Eight estimated an economic value of the project for their business, which ranged from $500 to $20,000, and averaged over $5,000 each. Additionally, organic wheat acreage has increased from 300 acres in 2008 to just under 1,700 acres in 2013

(MOFGA Certification Services, LLC and Vermont Organic Farmers, L.L.C.) and they are well-positioned to meet further increases in demand.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Improved animal genetics

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Oyster culture comprises a growing portion of the aquaculture production in Maine waters. In 2006, the harvest of eastern oysters, C. virginica, was worth in excess of $1.4 million with >3 million oysters harvested, representing a 67% increase over the 2005 harvest. However, outbreaks of disease still cause considerable damage to the industry and limit its expansion. The impact of disease has been partially alleviated through improved husbandry and genetic improvement programs.

What has been done
MAFES researchers are using genetic selection to develop and provide to commercial and public hatcheries high-performance, disease-resistant broodstock so that growers have access to oyster seed with enhanced survival and growth which, in turn, leads to increased oyster production.

Results
The University of Maine Shellfish Hatchery produced oyster seed for the two selectively bred lines and three hybrid lines. Seed for a third selectively bred line was provided by a commercial hatchery. These six lines were deployed in triplicate bags at industry partner sites in Maine, and at sites in Massachusetts, Rhode Island, and Connecticut. Overall, oysters reached market size at

all sites during our 2-year field trial at all but one site. Although we observed substantial variation in oyster growth among sites, there was little evidence of line-specific effects or line-by-site interactions for growth. In contrast, there were large differences in yield among both lines and sites; the differences in yield were driven by variation in survival. These patterns lead to significant site by line interactions for survival and yield. There was clear evidence of disease pressure at several sites in our field trial.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
311	Animal Diseases

Outcome #4

1. Outcome Measures

Number of plant releases:

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done
The Maine Potato Board (MPB) in partnership with the University of Maine has released two new potato varieties, Easton and Sebec. Easton, a new french fry processing potato variety, resulted from a cross between Silverton Russet and AF1668-60. Sebec is expected to primarily be useful for out-of-field potato chip production in growing areas that currently rely on the standard chipping variety Atlantic.

Results
Field evaluations conducted since 2004 indicate that Easton is typically higher yielding than the standard french fry processing variety Russet Burbank and that it produces lighter-colored French fries. It also typically had less hollow heart and fewer tuber defect problems than Russet Burbank. While french fry processing is expected to be the primary market for Easton, it also has excellent

flavor and is very good boiled, mashed, or baked. It has outstanding late-season vigor and good resistance to Verticillium wilt. Research indicates that Easton can be grown with approximately 25% less nitrogen and potassium fertilizer than Russet Burbank. Field evaluations conducted since 2003 indicate that Sebec is high yielding and widely adapted. Sebec typically produces yields equal to or greater than Atlantic, with a much lower incidence of internal tuber defects than Atlantic. Sebec produces good-quality potato chips directly from the field, but with its good flavor, it can also be used for fresh market consumption. Sebec also has good resistance to Verticillium wilt.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
212	Pathogens and Nematodes Affecting Plants

Outcome #5

1. Outcome Measures

Number of new or improved innovations developed for food enterprises

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
While the lobster fishery in Maine has experienced record high catches in the past two years, the value of the catch has declined while the cost of doing business has increased. In addition, more of the catch has gone to processing as opposed to live shipping. The trend in the industry is to look more to value-added product development as a way to maintain and ultimately increase the worth of the catch and the economic viability of the industry.

What has been done
MAFES scientists are working to enhance the viability of the lobster industry through development of value-added products, particularly those made with materials typically underutilized or part of

the waste stream of lobster processing (i.e. residual meat from bodies and walking legs, shell, hemolymph and other liquids).

Results
The scientists have developed a new, non-invasive technique for determining lobster viability for shipping using a load cell to measure the closing strength of the claw. This closing strength is related to muscle mass, which correlates with vigor for shipping. We can obtain the most value for our lobster by selecting those that should be sold locally (weak closing strength) versus those that are able to be shipped to Asia (strong closing strength). The researchers are also working on an all Maine lobster and cheese ravioli and a ?jerky? made from lobster byproducts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluations are currently conducted at the project and program levels. At the project level, all projects are reviewed by an internal research council and external peer reviewers when initiated and again at completion by the research council. During the research council final evaluation, the focus is on determining if terminating projects met their stated objectives, secured extramural funding, and produced peer-reviewed publications. For FY13, 13 projects went through the review process in this program area. As for other measures of successful research programs, faculty in this program area published 30 peer-reviewed articles and secured more than $1,400,000 in extramural funding.

Researchers use a variety of methods to evaluate their own research projects including evaluations retrospectively, before-after, and during the life of the project; case studies; and comparisons between treatment/intervention and nontreatment/nonintervention.

At the program level, external NIFA review teams are asked to review the research programs of schools/departments. These teams provide input on the impact and productivity of research programs supported through the station. The station is working to

develop a standard program-level evaluation process, which will be used to evaluate each station program area. Our current plans include an approach based on use of expert panels as recommended by the federal Government Accounting Office with individual program evaluations occurring every four to five years on a staggered time table.

Key Items of Evaluation

Faculty in this program area published 30 peer-reviewed articles and secured more than $1,400,000 in extramural funding.