

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food, Nutrition & Health

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			6%	
204	Plant Product Quality and Utility (Preharvest)			26%	
304	Animal Genome			5%	
305	Animal Physiological Processes			5%	
503	Quality Maintenance in Storing and Marketing Food Products			8%	
702	Requirements and Function of Nutrients and Other Food Components			10%	
703	Nutrition Education and Behavior			2%	
723	Hazards to Human Health and Safety			18%	
724	Healthy Lifestyle			20%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	3.4	0.0
Actual	0.0	0.0	1.0	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	144490	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	91840	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

Two of the supported scientists participated in multistate research projects NC1028 Promoting healthful eating to prevent excessive weight gain in young adults, and NE1023 Improving plant food (fruit, vegetable and whole grain) availability and intake in older adults

Blood samples were drawn from female athletes before and after an arduous exercise to evaluate the zinc transport and metabolism of endothelial cells to explore micronutrient metabolism in the blood.

Several experiments were completed to evaluate the potential effects of polybrominated diphenyl ether (PBDE) on obesogenicity.

Breeding combined with laboratory analyses continued toward developing squash cultivars with greater concentration and availability of beneficial carotenoids and xanthophylls such as lutein, which are important for vision and other aspects of human health.

An in vitro model of porcine lung alveolar macrophage was developed to complement in vivo studies in pigs and small laboratory animals, and research continued into impacts of different fatty acid profiles on alveolar macrophages associated with development of airway allergies humans.

2. Brief description of the target audience

The target audience for this program area includes scientists, animal and human nutritionists, professionals interested in micronutrient metabolism, vegetable growers interested in nutritional benefits for use as a marketing tool, consumers concerned with nutritional benefits of the produce they purchase, dairy and other farmers involved in farm animal products, nutritionists, and the scientific community at both the national and regional levels.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	600	4300	120	0
Actual	75	5000	0	0

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

Patent Applications Submitted

Year: 2010
 Plan: 0
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	0	6	
Actual	0	7	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of undergraduate students directly involved in the projects

Year	Target	Actual
2010	6	8

Output #2

Output Measure

- Number of graduate student directly involved in the projects

Year	Target	Actual
2010	6	6

Output #3

Output Measure

- Number of presentation at regional, national, or international scientific meetings

Year	Target	Actual
2010	9	8

Output #4

Output Measure

- Number of non-peer-reviewed publications (theses, abstracts, newsletters, fact sheets, articles, etc)
Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Number of peer-reviewed publications
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of graduate students involved and trained
2	Number of undergraduate students involved and trained
3	Increased knowledge through publications and other means
4	Develop vegetable cultigens having high concentration and availability of beta-carotene and related nutrients.
5	Evaluate impacts of environmental chemicals on obesogenecity.

Outcome #1

1. Outcome Measures

Number of graduate students involved and trained

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of undergraduate students involved and trained

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Increased knowledge through publications and other means

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Develop vegetable cultigens having high concentration and availability of beta-carotene and related nutrients.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	2010

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Carotenoids are a class of fat soluble, orange-pigmented, complex molecules, some of which are important human nutrients. Beta-carotene is important in development and eye function, and a broader role in health has been attributed to carotenoids in reducing the risk of several degenerative health problems and certain cancers, in photoprotection of skin, and photoprotection of the eye provided by the carotenoids lutein and zeaxanthin. Squash are unique in that many varieties are a good source of lutein, typically provided only by green leafy vegetables. A major proportion of the carotenoids in many varieties of squash, including lutein, are molecularly linked to fatty acids by ester bonds, and these bonds have to be broken prior to absorption of carotenoids into the blood stream.

What has been done

During the past four years we completed studies of carotenoid content and profiles in breeding lines and selected varieties of squash. Results show highly diverse carotenoid profiles among different squash cultigens, and many cultigens contain abundant carotenoids not known to provide nutritional benefits.

We developed squash breeding lines in which most of the lutein is non-esterified, and also squash lines in which non-esterified beta-carotene is the major carotenoid. These breeding lines are being utilized to develop new hybrid varieties with improved nutritional benefits in terms of carotenoid composition.

Results

Our research on eating quality and total carotenoid levels in squash in relation to harvest period and storage time provides base-line information on proper harvest period and storage time for maximizing eating quality and nutrition in squash. This information provides guidelines for growers and consumers of squash that are being disseminated through Cooperative Extension and presentations at grower meetings.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
503	Quality Maintenance in Storing and Marketing Food Products

Outcome #5

1. Outcome Measures

Evaluate impacts of environmental chemicals on obesogenicity.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	2010

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Polybrominated diphenyl ether (PBDE) is commonly used as a flame retardant on children's pajamas and other products. Recent evidence has suggested that these and other environmental chemicals might be implicated in contributing to development of obesity.

What has been done

Using growing rats we learned that PBDEs disrupt macronutrient metabolism and energy balance, and that the obesogenicity of PBDEs can be modulated by diet. PBDE exposure during pregnancy and lactation affected body weight of dams, and developmental exposure of rats to flame retardants interacted with the diet of the offspring to influence weight gain.

Results

Findings suggest that PBDEs impact not only adipose tissue but also liver metabolism and could contribute to weight gain in experimental animals and humans. This knowledge can be used by health professionals and policy makers toward reducing potential exposure to environmental chemicals that may contribute to the national obesity epidemic.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
723	Hazards to Human Health and Safety

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (None)

Brief Explanation

Not applicable this year.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}