

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity, Human Nutrition and 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
501	New and Improved Food Processing Technologies			15%	
502	New and Improved Food Products			15%	
702	Requirements and Function of Nutrients and Other Food Components			20%	
703	Nutrition Education and Behavior			30%	
724	Healthy Lifestyle			20%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	3.5	0.0
Actual Paid Professional	0.0	0.0	2.3	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	199357	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	405257	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	266470	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

West Virginia citizens have the third highest level of obesity in the Nation (32.4%, Center for Disease Control, 2011). West Virginia is also above the national averages for incidence of diabetes, high blood pressure, and cardiovascular disease, as well as for osteopenia and osteoporosis. Station research in human nutrition and health is focused on determining the current and potential impacts of diet, nutritional education and dietary intervention on obesity and obesity related conditions (diabetes, elevated cholesterol and plasma lipids, heart attack, stroke and some cancers). The program also is testing the efficacy and safety of bioactive compounds in foods, including krill protein, and is developing omega-3 DHA enhanced diets and educational programs to support their adoption.

A number of projects continued to look at the effects of omega-3 DHA enhanced diets on various aspects of human health, either directly or through animal models. One study using rats as a model investigated whether different sources of Omega-3 polyunsaturated fatty acids (PUFA) from different oil sources affects lung fatty acid composition, eicosanoid metabolism, and oxidative stability. The n-3 PUFA, alpha-linolenic acid (ALA, 18:3n-3) was only detectable in the lungs of rats fed ALA-rich fish oil. The study results have implications for individuals consuming n-3 PUFA supplements to promote health and for the development of recommendations regarding lung health. Another study looked the relative efficacy of different sources of Omega-3 PUFA's on serum cholesterol and triglycerides using mice as models. The investigator determined that fish oil was more effective at reducing serum triglycerides than the other sources but all source had at least some effect on serum cholesterol levels. The omega-3 fatty acids, DHA and EPA were incorporated into tissue lipids but DHA was incorporated at a greater amount in mice fed fish oil. Liver mRNA abundance has not been changed significantly for most genes tested. In the cultured adipocytes we determined that exposing cells to fatty acids from coconut oil made the cells more sensitive to conjugated linoleic acid-induced lipolysis than exposing them to the fatty acid from soy oil, consistent with previous results in mice.

Another study looked at the consumer acceptance of an Omega-3 fortified food product. Surimi, a lean source of fish protein, is consumed worldwide in various forms. Considerable increases in U.S. consumption of surimi products was observed in the 1980s but tapered off in recent decades. Consumer demand for foods enriched with omega-3 fatty acids including DHA and EPA has increased due to potential health benefits. Therefore, a nutritionally-enhanced surimi frank fortified with flaxseed or salmon oil was developed. Sensory evaluation, consumer acceptance and shelf-life studies were conducted. Flaxseed or salmon oil was added at 2 g/100g sample, franks without added oil served as a control. Product composition, quality indicators over a 21-d storage period and sensory evaluations were measured. The control had less total lipid than the oil-fortified franks ($P < 0.05$). The oil-fortified franks were darker than the control ($P < 0.001$) and color values did not change over time ($P > 0.05$). Salmon oil franks had greater MDA concentrations ($P < 0.001$); however, MDA did not change over time regardless of frank type ($P > 0.05$). There were differences in textural properties between frank types ($P < 0.05$), with the flaxseed franks being softer and less gummy, cohesive and chewy than the control franks. Participants evaluated product attributes (visual appeal, color, aroma, texture, flavor, and acceptability) on a hedonic scale; there were no differences ($P > 0.05$) between franks. Fifty four panelists reported consuming sausage on a weekly to monthly basis and most (50/79) indicated interest in purchasing this type product. Results indicate that surimi franks were accepted by young adult consumers, which may indicate market potential of these types of products. The value-added food products developed from surimi enable the seafood and aquaculture industries to diversify its product offerings with highly nutritious food products.

2. Brief description of the target audience

The target audience for this program area includes dieticians, nutritionists, policy makers, researchers, extension specialists, 4-H and other youth program developers, community leaders and State citizens.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	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: 2012
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	6	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Presentations on research at scientific meetings

Year	Actual
2012	7

Output #2

Output Measure

- Popular press articles on research

Year	Actual
2012	1

Output #3

Output Measure

- Completed graduate degree programs

Year	Actual
2012	6

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Annual reduction in state incidence of obesity -% reduction
2	Participants in nutrition workshops will increase their knowledge of the relation between nutrition and health (% of participants reporting a gain in knowledge).
3	Participants in nutrition workshops will gain an understanding of how to make healthy food choices (% reporting a gain in understanding).
4	Development of food products containing enhanced amounts of omega-3 polyunsaturated fats (PUFA) that are acceptable to consumers.

Outcome #1

1. Outcome Measures

Annual reduction in state incidence of obesity -% reduction

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

West Virginia citizens have the third highest level of obesity in the Nation (32.4%, Center for Disease Control, 2011, a drop of .1 percent). West Virginia is also above the national averages for incidence of diabetes, high blood pressure, and cardiovascular disease, as well as for osteopenia and osteoporosis.

What has been done

Station research in human nutrition and health is focused on determining the current and potential impacts of diet, nutritional education and dietary intervention on obesity and obesity related conditions (diabetes, elevated cholesterol and plasma lipids, heart attack, stroke and some cancers). Ninety six young adults have been enlisted into a study involving nutrition and chronic illness and three family fun nights were held to recruit families and young children to study the effectiveness of use of incentives in public programs to reduce obesity.

Results

These projects are in the data collection and analysis phases, results will be reported in forthcoming reports.

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior

Outcome #2

1. Outcome Measures

Participants in nutrition workshops will increase their knowledge of the relation between nutrition and health (% of participants reporting a gain in knowledge).

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Participants in nutrition workshops will gain an understanding of how to make healthy food choices (% reporting a gain in understanding).

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Development of food products containing enhanced amounts of omega-3 polyunsaturated fats (PUFA) that are acceptable to consumers.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Omega-3 PUFA's are claimed to have positive effects on humans by reducing triglycerides and cholesterol. Research is needed on the relationship between different sources of omega-3 PUFA's and health and applied research is needed to develop consumer acceptable products that contain omega-3 PUFA's.

What has been done

One study using rats as a model investigated whether different sources of Omega-3 polyunsaturated fatty acids (PUFA) from different oil sources affects lung fatty acid composition,

eicosanoid metabolism, and oxidative stability.

Another study looked the relative efficacy of different sources of Omega-3 PUFA's on serum cholesterol and triglycerides using mice as models.

Another study looked at the consumer acceptance of an Omega-3 fortified food product. Surimi, a lean source of fish protein, is consumed worldwide in various forms. Therefore, a nutritionally-enhanced surimi frank fortified with flaxseed or salmon oil was developed.

Results

The n-3 PUFA, alpha-linolenic acid (ALA, 18:3n-3) was only detectable in the lungs of rats fed ALA-rich fish oil.

The investigator determined that fish oil was more effective at reducing serum triglycerides than the other sources but all source had at least some effect on serum cholesterol levels. Results indicate that surimi franks were accepted by young adult consumers, which may indicate market potential of these types of products. The value-added food products developed from surimi enable the seafood and aquaculture industries to diversify its product offerings with highly nutritious food products. Patent applications are being considered.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
702	Requirements and Function of Nutrients and Other Food Components
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Competing Public priorities

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

This year evaluation consisted of annual evaluation of short term impacts as documented in Outputs and State Defined Outputs and Outcomes. As described in the plan of work, we will be developing a longer term program specific evaluation process in conjunction with our College Visiting Committee. This process and the timetable for

evaluation will be determined at our Spring 2013 Visiting Committee Meeting.

We have conducted an internal review of our nutrition and obesity programs. We have concluded that work in this area is hampered by the separation of extension from the experiment station, as they are in separate units. While we do work together on funded integrated projects, our programs could be better integrated. Second, because of planned investments in faculty, our nutrition, healthy food design and obesity research programs are growing in the areas of nutritional biochemistry, clinical/outreach work with the public, and social science analysis of eating and exercise habits.

Key Items of Evaluation

In terms of the first issue, the lack of a permanent dean/director in the experiment station and an interim director in extension has somewhat delayed new cooperative efforts. We now have a permanent dean/director in the experiment station and hopefully will soon have a permanent director of extension. In any case, we will be working together to better coordinate our nutrition and obesity efforts. We also relocated one food technology specialist from the extension building to the agricultural sciences building to encourage joint research and extension in the food technology area.

We have decided to also invest in our infrastructure for our new planned research building (construction to begin 2013, completion in 2015). The new building will include enhanced laboratories in the nutritional biochemistry area, a new sensory kitchen/lab for taste testing new nutritionally-enhanced products, and a health/obesity intervention clinic to work in a research and outreach capacity with the public.