V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity, Human Nutrition and 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
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 professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	2.5	0.0
Actual	0.0	0.0	3.5	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	244653	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	469071	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	79736	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

West Virginia citizens have the fifth highest level of obesity in the Nation (Center for Disease Control, 2009). 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. Please note that our childhood obesity work was formerly reported under a separate program but has been merged with the closely related research area Human Nutrition and Health to reflect advice on the Plan of Work from NIFA. A food safety project that was formerly reported under this program has also been moved to a new program titled Food Safety, again to reflect the priorities of NIFA.

Bone loss (osteoporosis) may be lessened if bone health is improved by optimizing nutrition intervention. The n-3 polyunsaturated fatty acids (PUFAs) have been suggested to improve bone health. However, n-3 PUFA sources differ in the types of fatty acids, ratio, and structural form. Therefore, a research project was undertaken to determine the effect of n-3 PUFAs from different sources on bone mineral, microarchitecture, and strength and potential mechanisms of affect. Laboratory rats were randomly assigned to a high fat 12% (weight) diet consisting of either corn oil (CO) control or to n-3 PUFA rich flaxseed (FO), krill (KO), menhaden (MO), salmon (SO), or tuna (TO). After 8 weeks of feeding bone mineral content was greater in rats fed TO or SO ($P<0.001$) than CO-fed rats. Bone mineral density in TO-fed rats was higher ($P=0.006$) compared to CO-fed rats. Rats fed TO or SO had a lower ($P<0.005$) TBARS than CO, KO, and MO, indicating that rats fed TO or SO had lower lipid peroxidation. Rats fed FO or MO had improved bone microarchitecture compared to rats fed CO or SO. Serum osteocalcin was higher ($P=0.03$) in rats fed FO compared to rats fed TO or SO. Based on the study results, sources of n-3 PUFAs influenced bone differently. Rats fed FO or MO, rich in alpha-linolenic acid, promoted bone microarchitecture. Rats fed TO and SO, rich in docosahexaenoic acid, increased bone mineralization. There was no effect on bone strength. Both bone mineralization and microarchitecture are required for bone strength. The study results suggest that rather than focusing on a single source of n-3 PUFAs, perhaps a variety of sources of n-3 PUFAs should be consumed in order to improve bone health during growth.

A related study looked at the relative effectiveness of DHA derived from algal versus fish-based PUFAs. In the first study it was determined that DHA from algal oil is not as efficiently incorporated into tissue lipids as DHA from fish oil; nearly 2X as much dietary DHA from algal oil was required. Furthermore, even at equal tissue DHA concentrations, algal oil is less effective at reducing body fat and serum lipids than fish oil. Greater than 4X as much tissue DHA was needed to result in similar serum triglyceride and cholesterol levels as fish oil-fed mice. In the second study they confirmed that coconut oil-fed mice are more sensitive to dietary conjugated linoleic acid, as they are leaner and have enhanced lipolysis.

An integrated research/extension project on local food choices, eating patterns and population health piloted a survey in three WV counties with questions related to importance of price, freshness, organic production and variety of choices to consumers. Based on responses from 219 farmers market customers, the investigators will revise some of the survey questions and expand the project to 10 West Virginia counties in 2011. WVU Extension faculty members initiated a project to help consumers choose more fruits and vegetables. Eleven vegetables that are grown in WV were highlighted. For each vegetable, a faculty member developed a fact sheet and one or more recipes. These were professionally printed and distributed to 10 counties to be handed out at farmers markets. Extension agents gave cooking demonstrations and sponsored fun, educational activities for children at farmers markets to encourage

greater attendance. WVU Extension faculty members conducted a Survey of Home Canning Practices in West Virginia to determine whether people who can foods at home were knowledgeable about and used the recommended safe food preservation practices. More than 1000 surveys were completed and data entered into a database that is being analyzed at this time.

Two studies are developing baseline obesity and nutrition data that will be used to study in the first case the impacts of community environmental factors on the risk of childhood obesity and in the second case the relationship between university student health practices and the risks of excessive weight gain and metabolic syndrome.

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.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	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	3	
Actual	0	3	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Presentations on research at scientific meetings

Year	Target	Actual
2010	3	2

Output #2

Output Measure

- Popular press articles on research

Year	Target	Actual
2010	2	2

Output #3

Output Measure

- Compleated graduate degree programs

Year	Target	Actual
2010	1	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Annual reduction in state incidence of overweight and obesity and obesity related health problems (diabetes, cardiovascular disease, hypertension, etc.)-% reduction
2	Reduction in state incidence of osteoperosis and similar or related disorders - % reduction
3	Increase consumer awareness about the local availability of healthy food choices

Outcome #1

1. **Outcome Measures**

Annual reduction in state incidence of overweight and obesity and obesity related health problems (diabetes, cardiovascular disease, hypertension, etc.)-% reduction

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Reduction in state incidence of osteoperosis and similar or related disorders - % reduction

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Increase consumer awareness about the local availability of healthy food choices

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}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Consumers will not seek out locally grown healthy food choices unless they are aware of price and availability.

What has been done
An integrated research/extension project on local food choices, eating patterns and population health piloted a survey in three WV counties with questions related to importance of price, freshness, organic production and variety of choices to consumers. WVU Extension faculty members initiated a project to help consumers choose more fruits and vegetables. Eleven

vegetables that are grown in WV were highlighted. For each vegetable, a faculty member developed a fact sheet and one or more recipes. These were professionally printed and distributed to 10 counties to be handed out at farmers markets. Extension agents gave cooking demonstrations and sponsored fun, educational activities for children at farmers markets to encourage greater attendance.

Results
Based on responses from 219 farmers market customers, the investigators will revise some of the survey questions and expand the project to 10 West Virginia counties in 2011. WVU Extension faculty members conducted a Survey of Home Canning Practices in West Virginia to determine whether people who can foods at home were knowledgeable about and used the recommended safe food preservation practices. More than 1000 surveys were completed and data entered into a database that is being analyzed at this time.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
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 and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}