

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Food, 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
112	Watershed Protection and Management	2%	0%	0%	0%
305	Animal Physiological Processes	0%	0%	10%	0%
501	New and Improved Food Processing Technologies	3%	0%	10%	0%
502	New and Improved Food Products	5%	0%	10%	0%
604	Marketing and Distribution Practices	5%	0%	5%	0%
701	Nutrient Composition of Food	0%	15%	0%	0%
702	Requirements and Function of Nutrients and Other Food Components	5%	15%	10%	100%
703	Nutrition Education and Behavior	36%	50%	0%	0%
704	Nutrition and Hunger in the Population	2%	20%	0%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%	0%	15%	0%
721	Insects and Other Pests Affecting Humans	2%	0%	20%	0%
723	Hazards to Human Health and Safety	10%	0%	15%	0%
724	Healthy Lifestyle	30%	0%	5%	0%
	Total	100%	100%	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	8.2	1.5	9.5	2.0
Actual Paid	17.1	3.0	33.2	3.0
Actual Volunteer	2420.0	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
532724	365828	504905	336706
1862 Matching	1890 Matching	1862 Matching	1890 Matching
770232	120708	585842	687361
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1477624	224862	6391466	227001

V(D). Planned Program (Activity)

1. Brief description of the Activity

Food, nutrition, and health - Conduct educational classes, workshops, meetings, and trainings, develop products, curriculum, resources, facilitate coalitions and/or task forces, conduct assessments and community surveys, partner with community agencies and institutions to facilitate programs and community development, create/revise social systems and public policies, conduct research studies, disseminate program and research results through papers, reports, and media, develop and implement marketing strategies using various outlets to promote program participation, disseminate research-based information to consumers using a variety of media and technology resources, cooperate with media and other community agencies to seek effective means of reaching new and non-traditional audiences, and respond to consumer inquiries.

Vector-borne diseases and public health pests - Conduct research to further our understanding of vector-borne diseases caused by insects and pests, and disseminate science-based results to stakeholders through workshops, trainings, etc.

2. Brief description of the target audience

Food, nutrition, and health - Young adults (ages 18 to 59), older adults (age 60 and older), caregivers of older adults, adults with type 2 diabetes, parents and caregivers of individuals with type 2 diabetes, senior center and meal site staff and volunteers, and Extension educators.

Vector-borne diseases and public health pests - Researchers, public health agencies, schools, institutions, Extension educators

Retail and food service employees, retail and food service management, temporary food vendors, child care providers, young adults (ages 25-59), older adults (ages 60 and older), Extension educators, **other researchers, policy makers** and commercial food processors.

Childhood Obesity: young children (ages 2 - 5 years); school-age children; adolescents; parents, foster parents, and grandparents; caregivers (in-home and for-profit day care providers); teachers and other school faculty for young children, youth, and adolescents; school nutrition directors and staff; school

wellness committees; school nurses and other health care providers; and Extension educators.

The Family Nutrition Program (FNP) provides educational programs on food security to limited resource families, primarily youth and mothers with young children.

3. How was eXtension used?

Content by specialists has been uploaded into eXtension. Additionally, agents and specialists are listed as experts for the "Ask an Expert" link. Therefore agents and specialists have answered questions that have come through eXtension from Virginia. eXtension was also used to help people network with others working in the area of local foods and food security.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	120690	50393	1137312	1070

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

Patent Applications Submitted

Year: 2014
 Actual: 1

Patents listed

An ultrafast refolding method for producing cell surface protein ligands and receptors.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	3	182	185

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of adults participating in diabetes educational programs.

Year	Actual
2014	25

Output #2

Output Measure

- Number of adults participating in at least one session on adult nutrition, fitness, worksite wellness, or health.

Year	Actual
2014	72660

Output #3

Output Measure

- Number of research papers published on adult obesity and related chronic disease.

Year	Actual
2014	0

Output #4

Output Measure

- Number of Master Food volunteers trained to extend the work of an Extension educator.

Year	Actual
2014	2420

Output #5

Output Measure

- Number of research papers published on adult obesity and related chronic disease.

Year	Actual
2014	0

Output #6

Output Measure

- Number of research papers published on vector-borne diseases and public health pests.

Year	Actual
2014	5

Output #7

Output Measure

- Number of workshops/trainings conducted on preventing and treating vector-borne diseases and public health pests.

Year	Actual
2014	20

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase in the number of individuals with diabetes who have improved their Hemoglobin A1c level, meal planning behaviors or physical activity behaviors, three months after participating in a Diabetes Education programs offered in collaboration with a local health care provider.
2	Increase in number of adults that make lifestyle changes which improve their dietary quality and/or physical activity level after participation in VCE programs.
3	Number of discoveries from completed obesity related research projects which focus on examining adult obesity from its root causes to its association with chronic disease.
4	Number of discoveries from completed research projects which focus on vector-borne diseases and public health pests.
5	Increase effective safe food handling and effective marketing and business practices in food industry.
6	Safe Food Preservation to prevent food borne illness.
7	Inflammatory Regulation Of Skeletal Muscle Lipid Accumulation With Obesity
8	Research demonstrates potential value-added benefits of grape pomace

Outcome #1

1. Outcome Measures

Increase in the number of individuals with diabetes who have improved their Hemoglobin A1c level, meal planning behaviors or physical activity behaviors, three months after participating in a Diabetes Education programs offered in collaboration with a local health care provider.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Fighting diabetes for healthier communities and reduced health care costs targets veterans and other senior audiences.

What has been done

Living Well with Diabetes and Balanced Living with Diabetes educational and tracking initiatives

Results

Tracking hemoglobin weight changes resulted in decreased averages in A1c tests for participants. In addition participants reported changes in behaviors resulting in healthier lifestyles. In Southwest Virginia, 63% of (the 70) participants made lifestyle changes after a series of four lessons focusing on prepare healthy foods at home. Balanced Living with Diabetes is another program that enrolled 60 participants in Emporia, VA who are tracking their steps and preparing healthy recipes.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Increase in number of adults that make lifestyle changes which improve their dietary quality and/or physical activity level after participation in VCE programs.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Preparing the next generation to make healthy choices will influence their development and decrease health related illness while addressing obesity. Many programs that Cooperative Extension offers are designed to appeal to the children and youth and delivered using a variety of methods. One of the secondary effects of offering programs to children is the anticipated outcome of children sharing newly learned healthy practices with their families.

What has been done

Increase in social media messages.

Youth programs offered in 2014 include the following:

Healthy Kids Day

4-H Food Challenge

Ag Day at School

Teen Cuisine

Jr. Master Volunteers

Food, Fun & Families

Virginia Supplemental Nutrition Assistance Program (SNAP-Ed)

Read for Health

Stafford Junction Summer Day Camp

Cooking Matters for Teens

Chef Clubs

Chef at Market

Kids in the kitchen summer camp

Summer intern program
4-H Camp staff training
Healthy Weight for Healthy Kids

Results

In one location, 17 college students worked with 4728 youth through camps to teach nutrition. Across the state an additional 1171 youth learned to try new foods, eat healthier snacks and consumer more fruits and vegetables through the multiple curriculum listed above. Many improved hand washing behaviors, learned to use kitchen utensils and appliances, increased physical activity, lowered consumption of sugary drinks, and increased water consumption.

Health & Nutrition social media realized 631 Facebook posts, 519 Tweets, 97 blog posts, and 8 videos were created for use on the Family Nutrition Program's social media channels. A total of 922 individuals have liked FNH Facebook pages, a 73% increase from 2014. Facebook posts reached a total of 103,226 people (155% increase from 2014), leading to 3,172 users who engaged with the posts (likes, comments, shares, post clicks, and profile clicks), an increase of 6% from 2014 and 3,028 interactions (just likes, shares, and comments), a 6% decrease from 2014. The Family Nutrition Program has 251 followers on Twitter, where 43,488 people were reached in 2014. This led to 565 engagements (retweets, favorites, mentions, and post clicks).

The Cultivating Change program at VSU is a preschool program to raise childhood awareness about benefits of consuming local produce. Cultivating Change program has reached over 140 children, 200 adults comprised of parents and grandparents, and 4 childcare center staff to grow, cook, and eat local farm foods. As a result of an end of year farmers market, the participating children have earned \$400 to pay for class parties and activity supplies. The participating parents and center staff have shared that the children are enjoying eating produce and requesting to eat more produce at home and school.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #3

1. Outcome Measures

Number of discoveries from completed obesity related research projects which focus on examining adult obesity from its root causes to its association with chronic disease.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Obesity is an epidemic and through educational programs with individuals, families and communities we are realizing a difference that relates to personal health, health care costs and reduction of preventable diseases.

What has been done

Master Food Volunteers are reaching more people than a single Extension educator can reach, delivering a 30-hour peer-reviewed curriculum. By partnering with organizations such as Farmer?s Markets, hospitals, libraries, churches, colleges, and universities the message of movement, fitness, and wellness is being delivered. Many outreach programs are being used including Small Steps to Health and Wealth, Walk-a-Weigh, and Cooking for Crowds,Real Food: Beat the Clock, Herbal Flavor, Soup?s On, Holiday Lights, Protein Power, Get Fruity, Veggie Tales, Extraordinary Eggs, Super Salads, Tasty Treats and No-Knead Bread

Results

In 2014, 86 volunteers reached over 11,000 adults and youth contributing 5326 volunteer hours conducting food demonstrations, doing displays in public places, health and wellness fairs and programs as well as physical activity promotion programs. Through the SNAP-Ed program alone, 113, 789 individuals were reached. Programs such as these are encouraging participants to try new foods (86%) and finding that their nutrition decisions have been influenced positively (78%).

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Number of discoveries from completed research projects which focus on vector-borne diseases and public health pests.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Increase effective safe food handling and effective marketing and business practices in food industry.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia has many small and large food related businesses. As the food industry is a large part of the state economy, Cooperative Extension is heavily involved in teaching practices focused on safe food handling skills coupled with wise management and customer-centric practices to increase the bottom line financially.

What has been done

- Quality customer service training
- ServeSafe training in restaurants, schools, day care, churches, and other formal and informal food serving venues
- Hazard Analysis and Critical Control Points (HACCP) training delivered in English as well as Spanish
- Good Manufacturing Practice sessions
- Food Innovations consultation program to assists food businesses with quality assurance, food safety, developing a competitive edge, and marketing to third parties

- Food Safety Modernization Act (FSMA) awareness
- Good Agricultural Practices (GAP) sessions
- Use of print and social media and new marketing techniques for Farmer's Markets
- Farmers Markets acceptance of Electronic Benefit Transfer (EBT)

Results

One five-county area trained 66 participants who increased their knowledge in quality customer service and effective customer communication for hospitals, hotels and restaurants. Seventeen HACCP and Good Manufacturing Practice sessions were delivered to over 250 participants. Post monitoring revealed improved sanitation practices and reduction of product contaminants for better market quality and bringing organizations into safe food handling compliance. ServeSafe resulted in a potential annual savings of over \$2 million, lifting the burden of foodborne illness.

The Good Agricultural Practices (GAP) sessions reached 158 fruit and vegetable producers. Delivering safe food handling practices to vendors at farmers markets is reaching growers and market managers alike. Evaluation results with 76 participants showed a 58% increase in hand washing and sanitary toileting practices, 77% improved cleansing and packing processes and 64% improved transporting conditions. In Southwest Virginia, twelve new markets (such as rabbit and aquaculture) were developed and launched in 2014.

Farmers markets vendors began to observe repeat customers and increased foot traffic after social marketing techniques were used. Over 2000 new contacts were made through 23 market food cooking demonstrations alone. One vendor noted a 158% increase in sales over the previous year. Families and Vendors educated about use of the EBT to shop Farmer's Markets. which helped increase business but also increase access to fresh food consumption by low income clients who use EBT cards.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
604	Marketing and Distribution Practices
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
723	Hazards to Human Health and Safety

Outcome #6

1. Outcome Measures

Safe Food Preservation to prevent food borne illness.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As more families gain greater control over what they eat, they are becoming increasingly interested in food preservation. However, preventing food borne illness such as botulism is of concern.

What has been done

Delivered programs through Master Food Volunteers, mobile demonstration kitchens, and food handler trainings. These included consumers preparing foods in their homes, individuals from non-profit organizations such as church, civic groups, and public service organizations preparing food occasionally for the public.

Results

Over 800 Virginia residents feel more confident in safely preserving low and high acid foods and practicing safer hygiene and safer cross food contamination practices. VCE conducted food handler trainings in 50 counties, including: 43 manager food safety certification courses (16 hour nationally recognized certification program) were provided to 541 individuals from the food service industry, schools, senior and day care centers; 45 employee food safety certification courses (6 to 10 hour trainings) were provided to 603 individuals were food handlers preparing foods in non-supervisory roles; 20 general safe food handling and preparation courses were provided to 314 individuals.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #7

1. Outcome Measures

Inflammatory Regulation Of Skeletal Muscle Lipid Accumulation With Obesity

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Skeletal muscle lipid accumulation occurs with obesity and contributes to the development of insulin resistance. SCD1 activity is elevated in skeletal muscle of obese humans and contributes to dysregulated fatty acid metabolism. Toll-like receptor signaling and NF-kB activation are involved in fatty acid-induced insulin resistance in skeletal muscle.

What has been done

TLR4 signaling through NF-kB increases SCD1 activity and contributes to free fatty acid-induced skeletal muscle lipid accumulation and insulin resistance in humans. Objective: Use a euglycemic-hyperinsulinemic clamp, in combination with a 6 h lipid/heparin infusion, to determine if the TLR4/NF-kB pathway mediates increased SCD1 activity, skeletal muscle lipid accumulation, and insulin resistance in humans. Rationale: Acute hyperlipidemia causes an increase in intramuscular lipid accumulation and the development of insulin resistance in both animals and humans. This response is associated with reductions in IκB protein content, a marker of increased NF-kB activity. Specific Aim 3 proposes to expand on Aim 2 and to apply a model of acute hyperlipidemia to humans. Six hours of lipid infusion induces skeletal muscle lipid accumulation and insulin resistance in nonobese, healthy humans. This technique, in combination with the hyperinsulinemic-euglycemic clamp, will be used to assess the role of the TLR4 signaling, NF-kB activation, and increased SCD1 activity in acute lipid-induced insulin resistance.

Results

The highlight of this work is that as little as 5 days of high fat feeding in healthy, human males disrupts the normal metabolic response in skeletal muscle to a meal. Five days of high fat feeding

induced metabolic inflexibility in skeletal muscle, which occurs in the absence of insulin resistance. These findings suggest that metabolic inflexibility may be the initiating insult that causes insulin resistance in response to high fat feeding. Metabolic inflexibility occurred in concert with activation of proinflammatory signaling pathways, e.g., p38-MAPK. Interestingly, metabolic inflexibility was not associated with activation of NF- κ B.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
724	Healthy Lifestyle

Outcome #8

1. Outcome Measures

Research demonstrates potential value-added benefits of grape pomace

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Grape pomaces are the major by-product of wine production and are generally treated as a low-valued waste. They are rich in phenolic compounds which exhibit strong antioxidants and antimicrobial activities. However, these activities are affected by grape variety.

What has been done

To characterize the phenolic compounds of pomaces of four Virginia-grown grapevine varieties, namely Cabernet Franc (red), Chambourcin (red), Viognier (white) and Vidal Blanc (white). Total phenolic, flavonoid, anthocyanins, tannin contents, phenolic composition profile, and antioxidant activity (2,2'-diphenyl-1-picrylhydrazyl (DPPH) and 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) free-radical scavenging capacity assays) were performed. Furthermore, antibacterial activities of the four pomaces extracts were assessed against four microbial pathogens, including two Gram-positive strains (*Listeria monocytogenes* and *Staphylococcus*

aureus) and two Gram-negative strains (Escherichia coli and Salmonella arizonae).

Results

Significant differences ($p < 0.05$) of the phenolic compounds and their free radical scavenging activity among the four pomaces were observed. Generally, the pomaces from red grapes had the higher phenolic contents and antioxidant activities than their white counterparts. Cabernet Franc exhibited the highest total phenolic, flavonoid and tannin contents and the strongest ABTS free-radical scavenging capacity, while Chambourcin had the highest anthocyanins content and DPPH free-radical scavenging capacity. HPLC study showed that a total of 7 phenolic compounds were determined, and catechin, epicatechin, ellagic acid and ferrulic acid were the major phenolic compounds presented in the samples. All phenolic compounds extracts demonstrated antibacterial effect, however, a different response degree varied with the tested microorganism. Antimicrobial activity was more effective against Gram-positive than Gram-negative. The pomace extracts from two white grape varieties exhibited the most effective against *S. arizonae*. These results indicated grape varieties had the significant effect on phenolic compounds, free radical scavenging and antimicrobial activities of pomace extracts. Identify antioxidant and antimicrobial properties will lead to potential use of grape pomace extracts as functional ingredients or as natural antimicrobial agents in food packaging, which will add significant value to pomace that could benefit grape producers and the wine industry locally and nationally.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Family and Consumer Sciences agents continue to be lower in number than agents in 4-H Youth Development and ANR thereby reducing the number of participants they are able to reach. FCS programs have begun to engage volunteers therefore extending their outreach. 4-H Youth Development Agents as well as ANR agents have increased their delivery of programs related to food, nutrition of health, also extending the reach of VCE in these focus areas.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}