

**V(A). Planned Program (Summary)**

**Program # 4**

**1. Name of the Planned Program**

Food Safety

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                              |                 |                 | 3%             |                |
| 112     | Watershed Protection and Management                              |                 |                 | 3%             |                |
| 133     | Pollution Prevention and Mitigation                              |                 |                 | 3%             |                |
| 204     | Plant Product Quality and Utility (Preharvest)                   |                 |                 | 3%             |                |
| 501     | New and Improved Food Processing Technologies                    |                 |                 | 55%            |                |
| 502     | New and Improved Food Products                                   |                 |                 | 5%             |                |
| 602     | Business Management, Finance, and Taxation                       |                 |                 | 3%             |                |
| 603     | Market Economics   |                 |                 | 3%             |                |
| 604     | Marketing and Distribution Practices                             |                 |                 | 3%             |                |
| 604     | Marketing and Distribution Practices                             |                 |                 | 3%             |                |
| 606     | International Trade and Development                              |                 |                 | 2%             |                |
| 607     | Consumer Economics   |                 |                 | 2%             |                |
| 702     | Requirements and Function of Nutrients and Other Food Components |                 |                 | 3%             |                |
| 703     | Nutrition Education and Behavior                                 |                 |                 | 2%             |                |
| 723     | Hazards to Human Health and Safety                               |                 |                 | 3%             |                |
| 724     | Healthy Lifestyle  |                 |                 | 4%             |                |
|         | <b>Total</b>   |                 |                 | 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  | 10.0     | 0.0  |

|                          |     |     |     |     |
|--------------------------|-----|-----|-----|-----|
| Actual Paid Professional | 0.0 | 0.0 | 9.5 | 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              | 304459         | 0              |
| 1862 Matching       | 1890 Matching  | 1862 Matching  | 1890 Matching  |
| 0                   | 0              | 2096704        | 0              |
| 1862 All Other      | 1890 All Other | 1862 All Other | 1890 All Other |
| 0                   | 0              | 2337393        | 0              |

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

This program will result in multiple outputs as a result of the following proposed activities:

- Conducting laboratory, pilot-plant experiments and data collection
- Conducting research experiments
- Developing knowledge and new technology of food processing systems
- Developing curricular materials
- Developing quality monitoring protocols
- Developing products, curriculum, resources
- Developing services
- Presenting seminars and professional talks
- Conducting workshops and training sessions
- Publishing scientific findings
- Partnering

**2. Brief description of the target audience**

There are diverse audiences for information this project generates. They can be classified into four general groups: (1) the general public and food consumers; (2) state and federal food regulatory agencies; and (3) the research community including scientists working in government, industry, and academic sectors; and (4) the commercial food processing industry or commodity groups.

**3. How was eXtension used?**

eXtension was not used in this program

**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         | 11       | 0     |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- IMPROVED ANIMAL AND PLANT PRODUCTION SYSTEMS...1 - number of experiments or tests to reduce percentage of mortality, to enhance hatchability, or to identify a marker of immunity

Year                      Actual  
 2013                      0

**Output #2**

**Output Measure**

- EFFECTS ON AND PROTECTION OF HUMAN and ENVIRONMENTAL/ECOLOGICAL HEALTH...1 - Agricultural/Environmental chemical analyses to - assess risks of toxins - develop analytical methods and biomarkers for agricultural chemicals and other contaminants - evaluate the variation and patterns in the incidence of human pesticide exposures - identify, validate, localize and characterize specific responsive genes, which have the potential to serve as biomarkers of toxins - develop and evaluate transgenic lines that show changes in reporter gene expression in response to toxicants

Year                      Actual

2013 0

**Output #3**

**Output Measure**

- TECHNOLOGY, MODELS AND ANALYSES THAT INFORM DECISION-MAKERS, INDUSTRY, AND PEERS REGARDING FOOD PRODUCTS...1 - determine best food processing technology and method for food product development and safety, including high pressure processing, laser technology, and radio frequency identification tags, 2 - develop value-added products through a systematic product development strategy

| <b>Year</b> | <b>Actual</b> |
|-------------|---------------|
| 2013        | 0             |

**Output #4**

**Output Measure**

- OTHER SCHOLARLY EXCELLENCE: participation on professional boards and panels, as well as science panels, awards, etc.

| <b>Year</b> | <b>Actual</b> |
|-------------|---------------|
| 2013        | 0             |

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

| O. No. | OUTCOME NAME   |
|--------|--|
| 1      | 2a - Characterize and model toxins arising from food production and processing (analytical) *<br>New analytical methods and biomarkers to cost-effectively identify and track agricultural chemicals and other contaminants through time and space * Develop and transgenic lines of zebrafish for response to toxicants   |
| 2      | 3 - Methods to improve Animal Health production systems, for example through -<br>improvement of maternal diet - enhancement of the efficacy of vaccination programs -<br>development of diagnostic methods to assess immune health  |
| 3      | A2 - Percentage of health risks reduced due to information regarding toxins arising from food production and processing  |
| 4      | A4 - Improved food handling and regulations - Individuals and industry modify food production and handling practices. - Intervention strategies reduce bacterial contamination, increase shelf life, and reduce occurrences of food-borne illnesses.   |
| 5      | A3 - Improved animal husbandry, such as - Poultry industry changes feed formulations to reduce embryonic mortality during incubation (thereby enhancing hatchability) and to improve animal health and to produce health-enhancing nutrients (thus developing value-added poultry foods). - Livestock producers use diagnostic methods and new vaccination programs to increase immunity (innate and acquired) in domestic animals   |
| 6      | A6 - Informed policy-making and management related to food processing that prevent incidences of food-borne illnesses.   |
| 7      | Change Indicator - Economic: - Application of knowledge and new leading-edge food technologies will result in improved food quality, value and safety with positive impacts on value-added food production, processing, handling, and distribution systems. - Sustainable competitive advantage for Northwest food industries that are able to accurately gage consumer demand for their products. - Improve the food economy by developing new, stronger, and growing food businesses in the state. - Help reduce the state's unemployment through the creation of jobs in these food companies. - Hatchability and value-added poultry foods will bring increased economic returns to the US poultry industry. |
| 8      | Change Indicator - Societal: - Better human and animal health, well-being, and survivability result with the use of nutrition and nutrigenomics and organic production. - Reduce health care costs associated with prostate cancer and improve the quality of life of thousands of American men . - Control the growth in the rate of obesity and osteoporosis among youth and solutions reverse trends in childhood obesity - Build environmental public health capacity - Mitigate how federal expenditures related to the farm subsidy program are linked to Medicaid expenditures for obesity related health conditions.   |
| 9      | Change Indicator - Environmental (risk assessment, policies and management of exposure):<br>- Enhanced environmental quality within an economically responsible context. - Reduced exposure of human and aquatic organisms to fluorochemicals - Moderate the relative contribution of regional U.S. and Canadian agricultural sources (both current and historic uses of these chemicals) and long-range or global sources in contributing to the deposition of agricultural chemicals to remote ecosystems in the Western U.S. - Minimize the risk of adverse impact of pesticide use on human health.  |
| 10     | 1 - Understanding nutritional relationships to health, such as a) learn the mechanisms behind the health benefits of fruits and vegetables, and b) new risk factors in prostate cancer and novel dietary modifications to reduce the incidence of prostate cancer.   |

|    |   |
|----|---|
| 11 | 2b- Characterize and model toxins arising from food production and processing (mechanisms, effects ) * Identify agents, mechanisms, and dose response for reducing fetal risk from toxic chemicals * evaluate dioxin toxicity to humans and characterize specific responsive genes to toxicants * Examine mechanisms that underlie the immune suppression * Identify role of polymorphisms and mediators in relieving dioxin toxicity * Evaluate effects of aging on bioavailability of agricultural contaminants * Determine ways to evaluate extent that landfills are a significant source of fluorochemicals and the extent to which they are present in crops intended for human consumption |
| 12 | 2c - Characterize and model toxins arising from food production and processing (education) * Provide technical training and resources to agricultural and regulatory stakeholders on ecotoxicology of pesticides and integrated pest, nutrient, and water management.   |
| 13 | A1 - Nutritional health or additives provide disease mitigation, e.g., zinc supplementation will be an effective strategy in limiting the incidence of prostate cancer and effective dietary intervention strategies are broadly applied to reduce obesity  |
| 14 | 4 - Develop technologies and control strategies to improve food safety  |
| 15 | 5 - Detect incidences and pathways of food borne illnesses to: * reduce regulatory actions * reduce potential economic loss from diminished productivity * reduce incidences reported and absences due to illness.  |
| 16 | 6 - Prepare information about food processing that informs policy makers and managers   |

**Outcome #1**

**1. Outcome Measures**

2a - Characterize and model toxins arising from food production and processing (analytical) \* New analytical methods and biomarkers to cost-effectively identify and track agricultural chemicals and other contaminants through time and space \* Develop and transgenic lines of zebrafish for response to toxicants

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|------|--------|
| 2013 | 0      |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**  
{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

**4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>               |
|----------------|-------------------------------------|
| 133            | Pollution Prevention and Mitigation |
| 723            | Hazards to Human Health and Safety  |

**Outcome #2**

**1. Outcome Measures**

3 - Methods to improve Animal Health production systems, for example through - improvement of maternal diet - enhancement of the efficacy of vaccination programs - development of diagnostic methods to assess immune health

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| <b>Year</b> | <b>Actual</b> |
|-------------|---------------|
| 2013        | 0             |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

It has been estimated that approximately one third of all cancers are related to diet. Diet, if contaminated with carcinogens such as aflatoxin B1, markedly increase the risk of cancer. However, consumption of diets rich in fruits and vegetables have been repeatedly shown to decrease the incidence of a number of cancers in humans. One of the most effective classes of such phytochemical cancer chemopreventive agents are those found in cruciferous vegetables (Brussels sprouts, broccoli, kale, watercress, etc.). Two of the most widely studied phytochemicals from cruciferous vegetables are indole-3-carbinol and sulforaphane. Very little work has been done addressing the question of: "can we protect the fetus from chemical carcinogens which are known to be ingested by the mother, cross the placenta and cause cancer in the offspring."

**What has been done**

A major thrust of this program examines mechanisms of cancer prevention by food (now with additional funding from the National Cancer Institute) to test phytochemicals from cruciferous vegetables (indole-3-carbinol and sulforaphane) and compare the efficacy of these dietary supplements to the whole foods from which they were derived. We have developed a mouse model for testing chemoprevention by foods and phytochemicals against transplacental carcinogens. Studies are also underway to further investigate mechanisms of action of mycotoxins in food, primarily aflatoxin B1, the potential for this mycotoxin to cross the placenta and cause liver cancer later in life in the offspring and how we can supplement the mother's diet to provide protection from that exposure.

**Results**

The program is now partnering closer with The Linus Pauling Institute at Oregon State University to maximize the impact of the research and we have a new emphasis on the exciting area of epigenetics. The goals and objectives of these studies are to maximize the benefits of foods containing anti-cancer phytochemicals, identify any risks associated with their consumption to, as far as possible, eliminate the specific toxicants in the food supply that contribute to health deficits.

**4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>  |
|----------------|--|
| 501            | New and Improved Food Processing Technologies                    |
| 502            | New and Improved Food Products                                   |
| 702            | Requirements and Function of Nutrients and Other Food Components |
| 703            | Nutrition Education and Behavior                                 |
| 723            | Hazards to Human Health and Safety                               |
| 724            | Healthy Lifestyle  |

**Outcome #3**

**1. Outcome Measures**

A2 - Percentage of health risks reduced due to information regarding toxins arising from food production and processing

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| <b>Year</b> | <b>Actual</b> |
|-------------|---------------|
| 2013        | 0             |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

{No Data Entered}

**What has been done**

{No Data Entered}

**Results**

{No Data Entered}

### 4. Associated Knowledge Areas

| <b>KA Code</b> | <b>Knowledge Area</b>  |
|----------------|--|
| 702            | Requirements and Function of Nutrients and Other Food Components |
| 703            | Nutrition Education and Behavior                                 |
| 723            | Hazards to Human Health and Safety                               |
| 724            | Healthy Lifestyle  |

#### Outcome #4

##### 1. Outcome Measures

A4 - Improved food handling and regulations - Individuals and industry modify food production and handling practices. - Intervention strategies reduce bacterial contamination, increase shelf life, and reduce occurrences of food-borne illnesses.

Not Reporting on this Outcome Measure

#### Outcome #5

##### 1. Outcome Measures

A3 - Improved animal husbandry, such as - Poultry industry changes feed formulations to reduce embryonic mortality during incubation (thereby enhancing hatchability) and to improve animal health and to produce health-enhancing nutrients (thus developing value-added poultry foods). - Livestock producers use diagnostic methods and new vaccination programs to increase immunity (innate and acquired) in domestic animals

Not Reporting on this Outcome Measure

**Outcome #6**

**1. Outcome Measures**

A6 - Informed policy-making and management related to food processing that prevent incidences of food-borne illnesses.

Not Reporting on this Outcome Measure

**Outcome #7**

**1. Outcome Measures**

Change Indicator - Economic: - Application of knowledge and new leading-edge food technologies will result in improved food quality, value and safety with positive impacts on value-added food production, processing, handling, and distribution systems. - Sustainable competitive advantage for Northwest food industries that are able to accurately gauge consumer demand for their products. - Improve the food economy by developing new, stronger, and growing food businesses in the state. - Help reduce the state's unemployment through the creation of jobs in these food companies. - Hatchability and value-added poultry foods will bring increased economic returns to the US poultry industry.

**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)**

In recent years, greater concerns with respect to diet and nutrition have led to an increased number of marketing and promotional messages focused on the benefits of eating fresh fruit and vegetables. Both consumers and retailers have responded to the spotlight on fresh produce, resulting in increased purchases, marketing resources and even new legislation to promote Specialty Crop production in the US. Consumers and households are also fueling changes in the food system as they seek to purchase their produce through channels as diverse as direct marketing and traditional supermarkets, and with expectations as broad as picking their own produce to highly branded products with 3rd party certifications. Still, little is known about the response of increasingly demanding consumers and food supply chain partners, the changing coordination and supply chain responses of fruit and vegetable enterprises or the response to regulations and policies developed to oversee and guide new innovations in this sector. Our

intended outcomes and impacts are to inform policymakers on the market performance of fresh produce enterprises under new policies and marketing strategies, and guide industry stakeholders in their long-term planning on consumer behaviors and demand changes.

#### **What has been done**

Objective 1: Develop demand and market valuation models for the produce sector that can be used to evaluate effects of increasingly complex product differentiation schemes (organic, enhanced health claims, biodynamic), trade, commodity marketing programs, labeling programs (local, food miles, Fair Trade), traceability systems, and food safety events in the U.S. produce markets. Objective 2: Analyze the relative benefits and costs, to producers and consumers, of government and industry-led marketing and policy programs (certifications, Leafy Greens marketing order, Country of origin labeling, farmers markets) using both theoretical approaches and empirical evidence from multi-state applied research projects. Objective 3: Assess the changing coordination and supply chain management strategies being implemented in the fruit and vegetable sector and identify strategic organizational and marketing implications for a set of firms that are diverse in terms of commodity, marketing approach and size of operation (including small and mid size farms).

#### **Results**

New methods were developed and utilized for evaluating industry-led variety development in the context of a consumer sensory test. Findings were disseminated to agricultural students and to domestic and international visitors at the Food Innovation Center Experiment Station.

#### **4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>                         |
|----------------|---|
| 501            | New and Improved Food Processing Technologies |
| 502            | New and Improved Food Products                |
| 602            | Business Management, Finance, and Taxation    |
| 603            | Market Economics                              |
| 604            | Marketing and Distribution Practices          |
| 604            | Marketing and Distribution Practices          |
| 606            | International Trade and Development           |
| 607            | Consumer Economics                            |
| 703            | Nutrition Education and Behavior              |
| 724            | Healthy Lifestyle                             |

#### **Outcome #8**

##### **1. Outcome Measures**

Change Indicator - Societal: - Better human and animal health, well-being, and survivability result with the use of nutrition and nutrigenomics and organic production. - Reduce health care costs associated with prostate cancer and improve the quality of life of thousands of American men . - Control the growth in the rate of obesity and osteoporosis among youth and solutions reverse trends in childhood obesity - Build environmental public health capacity - Mitigate how federal expenditures related to the farm subsidy program are linked to Medicaid expenditures for obesity related health conditions.

Not Reporting on this Outcome Measure

### **Outcome #9**

#### **1. Outcome Measures**

Change Indicator - Environmental (risk assessment, policies and management of exposure): - Enhanced environmental quality within an economically responsible context. - Reduced exposure of human and aquatic organisms to fluorochemicals - Moderate the relative contribution of regional U.S. and Canadian agricultural sources (both current and historic uses of these chemicals) and long-range or global sources in contributing to the deposition of agricultural chemicals to remote ecosystems in the Western U.S. - Minimize the risk of adverse impact of pesticide use on human health.

Not Reporting on this Outcome Measure

### **Outcome #10**

#### **1. Outcome Measures**

1 - Understanding nutritional relationships to health, such as a) learn the mechanisms behind the health benefits of fruits and vegetables, and b) new risk factors in prostate cancer and novel dietary modifications to reduce the incidence of prostate cancer.

Not Reporting on this Outcome Measure

### **Outcome #11**

#### **1. Outcome Measures**

2b- Characterize and model toxins arising from food production and processing (mechanisms, effects ) \* Identify agents, mechanisms, and dose response for reducing fetal risk from toxic chemicals \* evaluate dioxin toxicity to humans and characterize specific responsive genes to toxicants \* Examine mechanisms that underlie the immune suppression \* Identify role of polymorphisms and mediators in relieving dioxin toxicity \* Evaluate effects of aging on bioavailability of agricultural contaminants \* Determine ways to evaluate extent that landfills are a significant source of fluorochemicals and the extent to which they are present in crops intended for human consumption

Not Reporting on this Outcome Measure

### **Outcome #12**

#### **1. Outcome Measures**

2c - Characterize and model toxins arising from food production and processing (education) \* Provide technical training and resources to agricultural and regulatory stakeholders on ecotoxicology of pesticides and integrated pest, nutrient, and water management.

Not Reporting on this Outcome Measure

### **Outcome #13**

#### **1. Outcome Measures**

A1 - Nutritional health or additives provide disease mitigation, e.g., zinc supplementation will be an effective strategy in limiting the incidence of prostate cancer and effective dietary intervention strategies are broadly applied to reduce obesity

Not Reporting on this Outcome Measure

### **Outcome #14**

#### **1. Outcome Measures**

4 - Develop technologies and control strategies to improve food safety

#### **2. Associated Institution Types**

- 1862 Research

#### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

#### **3b. Quantitative Outcome**

| <b>Year</b> | <b>Actual</b> |
|-------------|---------------|
| 2013        | 0             |

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

General human populations are exposed to polyaromatic hydrocarbons (PAHs) primarily through diet, including environmental contamination of food stuffs, through production of PAHs during cooking or processing, and through environmental contaminants such as tobacco smoke or pollution. The goals of this research are to explain mechanisms by which (i) chemical agents commonly available in foods can prevent cancer and (ii) natural cellular systems suppress cellular damage by environmental compounds like PAHs. Chemoprevention/carcinogenic studies will use (live) transgenic mouse models to investigate whether individuals whose genetic makeup puts them at increased risk may benefit from dietary chemoprevention. Biochemical experiments will employ purified human proteins and complex human nuclear extracts. The information gained will directly enhance two of the most promising approaches to prevention (as opposed to treatment) of environmentally-induced cancers: (i) identification by genetic screening of individuals at particular risk (here, to environmental polyaromatic hydrocarbons-induced cancers) and (ii) chemoprevention by relatively simple dietary changes and/or supplements.

### **What has been done**

In this project, we expect to elucidate mechanisms by which (i) chemopreventive agents commonly available in foods - represented here by red raspberry extract (RE) and major RE components, cyanidin-3-O-glucosides (C3OGs) - antagonize transplacental cancer by polycyclic aromatic hydrocarbons (PAHs) and (ii) natural cellular systems, particularly mismatch repair (MMR), suppress mutagenesis, hence carcinogenesis, by (PAHs). Exposure to PAHs has been implicated as causative in human carcinogenesis. Common underlying premises are (1) that PAHs are well-known environmental mutagens and carcinogens, (2) that individual chemically different PAHs are likely to pose different intrinsic risks, and (3) that obvious strategies for minimizing risk to humans are (3a) dietary supplementation with chemopreventive agents expected to antagonize carcinogenesis and (3b) screening for partial genetic deficiencies in cellular systems expected to suppress (with different) efficiencies mutagenesis and carcinogenesis. The program objectives are to test the hypothesis that specific chemopreventive agents (RE and C3OG) efficiently antagonize transplacental lymphomas induced by specific PAHs, and to determine the biomedical mechanisms and efficiencies of mismatch repair (MMR) processing of DNA containing specific PAH-purine adducts to determine effects of deficient nucleotide excision repair (NER) and/or MMR on PAH-induced mutation in transgenic mice.

### **Results**

This project was initiated in 2013. Preliminary results are expected in 2014.

## **4. Associated Knowledge Areas**

| <b>KA Code</b> | <b>Knowledge Area</b>  |
|----------------|--|
| 133            | Pollution Prevention and Mitigation                              |
| 501            | New and Improved Food Processing Technologies                    |
| 502            | New and Improved Food Products                                   |
| 702            | Requirements and Function of Nutrients and Other Food Components |
| 703            | Nutrition Education and Behavior                                 |
| 723            | Hazards to Human Health and Safety                               |
| 724            | Healthy Lifestyle  |

## **Outcome #15**

### **1. Outcome Measures**

5 - Detect incidences and pathways of food borne illnesses to: \* reduce regulatory actions \* reduce potential economic loss from diminished productivity \* reduce incidences reported and absences due to illness.

Not Reporting on this Outcome Measure

## **Outcome #16**

### **1. Outcome Measures**

6 - Prepare information about food processing that informs policy makers and managers

Not Reporting on this Outcome Measure

### **V(H). Planned Program (External Factors)**

#### **External factors which affected outcomes**

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

#### **Brief Explanation**

{No Data Entered}

### **V(I). Planned Program (Evaluation Studies)**

#### **Evaluation Results**

{No Data Entered}

#### **Key Items of Evaluation**

{No Data Entered}