V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Human Health and Safety-OARDC Led

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
<th>%1862 Extension</th>
<th>%1890 Extension</th>
<th>%1862 Research</th>
<th>%1890 Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>703</td>
<td>Nutrition Education and Behavior</td>
<td>0%</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>704</td>
<td>Nutrition and Hunger in the Population</td>
<td>0%</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>721</td>
<td>Insects and Other Pests Affecting Humans</td>
<td>0%</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>722</td>
<td>Zoonotic Diseases and Parasites Affecting Humans</td>
<td>0%</td>
<td>30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>723</td>
<td>Hazards to Human Health and Safety</td>
<td>0%</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>724</td>
<td>Healthy Lifestyle</td>
<td>0%</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>0%</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

V(C). Planned Program (Inputs)

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

<table>
<thead>
<tr>
<th>Year: 2009</th>
<th>Extension</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1862</td>
<td>1890</td>
</tr>
<tr>
<td>Plan</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Actual</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

<table>
<thead>
<tr>
<th>Extension</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith-Lever 3b &amp; 3c</td>
<td>Hatch</td>
</tr>
<tr>
<td>1890 Extension</td>
<td>1862 Matching</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1890 Matching</td>
<td>1890 Matching</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1890 All Other</td>
<td>1890 All Other</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

V(D). Planned Program (Activity)

1. Brief description of the Activity

Faculty in this Planned Program have conducted numerous basic and applied research projects, as noted in the CRIS reports, and published in peer-reviewed journals, and in all types of other media from social networks to on-line trade journals and extension publications. As a matter of routine practice OARDC faculty, staff, and administrators in this, and in all Planned Programs, work in partnership with business, industry, government, NGOs, commodity groups, and other stakeholders on a daily bases. They are as committed to development, as they are to the research element, insuring that research is moved into society to create new products and services, jobs, economic activity, and overall, improve social well - being. Faculty working in this program are academically diverse leading an array of research from obesity and nutrition, to threats for zoonotics, to insects and pests impacts on human health. For 2009 most of the obesity - specific related research is reported within this Planned Program. Where complementary extension activities occur they are reported within the appropriate sections.
2. Brief description of the target audience

Targeted audiences include fellow academic units that depend on scientists in this program for support information and for new health and safety technologies and approaches/measure; fellow agencies or support organizations who will not only use the information but will also extend that information; populations who have not requested the information but will likely benefit from that information; other scientists and scientific groups; specific individuals or groups who have expressed a need for health and safety information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature; political entities; extension personnel; students from pre-school to post doctorate studies; news organizations; and business and industrial groups.

V(E). Planned Program (Outputs)

1. Standard output measures

<table>
<thead>
<tr>
<th></th>
<th>Direct Contacts Adults</th>
<th>Indirect Contacts Adults</th>
<th>Direct Contacts Youth</th>
<th>Indirect Contacts Youth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Actual</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

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

**Patent Applications Submitted**

<table>
<thead>
<tr>
<th>Year</th>
<th>Plan</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Patents listed

3. Publications (Standard General Output Measure)

**Number of Peer Reviewed Publications**

<table>
<thead>
<tr>
<th></th>
<th>Extension</th>
<th>Research</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>0</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Actual</td>
<td>0</td>
<td>25</td>
<td>0</td>
</tr>
</tbody>
</table>

V(F). State Defined Outputs

Output Target

Output #1

**Output Measure**

- Non - commercialized techniques will be tracked

Not reporting on this Output for this Annual Report

Output #2

**Output Measure**

- Peer-reviewed publications will be tracked

<table>
<thead>
<tr>
<th>Year</th>
<th>Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>18</td>
<td>25</td>
</tr>
</tbody>
</table>

Output #3

**Output Measure**

- Commercialized techniques and processes would be tracked
Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- Patents by number and who partnered/purchased/commercialized will be documented.

<table>
<thead>
<tr>
<th>Year</th>
<th>Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Output #5**

**Output Measure**

- Number of graduate students completed

<table>
<thead>
<tr>
<th>Year</th>
<th>Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>

**Output #6**

**Output Measure**

- Total number of OARDC sponsored communication products/efforts, excluding peer reviewed publications, will be reported

Not reporting on this Output for this Annual Report
### V(G). State Defined Outcomes

#### V. State Defined Outcomes Table of Content

<table>
<thead>
<tr>
<th>O. No.</th>
<th>OUTCOME NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Annually release studies on insects, ticks, and mites to protect human health that will provide a set of alternatives leading to health gains with lowered risks, and within economic realities, for the affected populations.</td>
</tr>
<tr>
<td>2</td>
<td>Advance the understanding of means and methods related to transmission of zoonotic diseases to humans, including prevention, that meets consumer demand/health threat, as or before such emerges.</td>
</tr>
<tr>
<td>3</td>
<td>Reduce through research, development, and outreach the negative impact of farm-, recreation-, or industry-related accidents within agriculture and natural resources.</td>
</tr>
<tr>
<td>4</td>
<td>Reduce through research, development, and outreach the exposure to biohazards, pathogens, and similar to the extent that annually such are reduced per capita with an overall time and economic savings to those who may be affected.</td>
</tr>
<tr>
<td>5</td>
<td>Reduce health risk by releasing at least one major study each five years demonstrating techniques, procedures, or products that lessen the chance of contacting, or the impact if contacted, zoonotic diseases.</td>
</tr>
<tr>
<td>6</td>
<td>Reduce safety risk by releasing at least one major study to either manufacturers and/or consumers that will reduce or prevent work or play related accidents every three years.</td>
</tr>
<tr>
<td>7</td>
<td>Create a growing base of knowledge that supports improving human health as it relates to food, environment, and lifestyle</td>
</tr>
<tr>
<td>8</td>
<td>To advance knowledge related to obesity and obesity-related diseases.</td>
</tr>
<tr>
<td>9</td>
<td>To advance knowledge related to childhood obesity</td>
</tr>
</tbody>
</table>
Outcome #1

1. Outcome Measures

Annually release studies on insects, ticks, and mites to protect human health that will provide a set of alternatives leading to health gains with lowered risks, and within economic realities, for the affected populations.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Advance the understanding of means and methods related to transmission of zoonotic diseases to humans, including prevention, that meets consumer demand/health threat, as or before such emerges.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Reduce through research, development, and outreach the negative impact of farm-, recreation-, or industry-related accidents within agriculture and natural resources.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Reduce through research, development, and outreach the exposure to biohazards, pathogens, and similar to the extent that annually such are reduced per capita with an overall time and economic savings to those who may be affected.

2. Associated Institution Types

• 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantitative Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

HEALTH RISK: Antimicrobial drugs are arguably the most important drugs developed in human history. Resistance to antimicrobial drugs has developed against all antimicrobial drugs in almost all types of bacteria (both pathogenic bacteria that cause diseases and non-pathogenic bacteria) and is becoming more and more widespread. The widespread occurrence of antimicrobial resistance not only poses a severe risk to the health and well-being of both humans and animals but also leads to considerable economic losses. The Institute of Medicine estimates the annual cost to be $4 to $5 billion US dollars. Thus, antimicrobial resistance has become a great concern not only in the US but also worldwide.

What has been done
Because a large quantity of antimicrobial drugs (up to 50% of the antimicrobial drugs produced in the US) is used in farm animal production to promote growth performance, much of the concern over antimicrobial resistance is directed at the use of antimicrobial drugs in farm animals. Animal manure is the largest antimicrobial resistance reservoir, thus, animal manure treatment offers a critical control point to contain and/or destroy antimicrobial resistance. OARDC scientists investigated the reduction of antimicrobial resistance to tetracycline and macrolide-lincosamide-streptogramin B (a superfamily of related antimicrobial drugs) in manure treatment systems employed at animal farms.

**Results**

OARDC scientists have identified effective manure treatment systems so that they can be used to reduce the antimicrobial resistance arising from animal farms. Researchers concluded that both composting at elevated temperatures and anaerobic digestion are effective and practical to reduce antimicrobial resistance arising from animal production, up to a 99.99999% reduction. Storage of animal manure and wastes in conventional, on-farm lagoons does not result in any significant reduction of antimicrobial resistance. Treatment of animal manure and wastes by biofilters does not appreciably reduce antimicrobial resistance either.

### 4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>723</td>
<td>Hazards to Human Health and Safety</td>
</tr>
</tbody>
</table>

**Outcome #5**

1. **Outcome Measures**

   Reduce health risk by releasing at least one major study each five years demonstrating techniques, procedures, or products that lessen the chance of contacting, or the impact if contacted, zoonotic diseases.

2. **Associated Institution Types**

   - 1862 Research

3a. **Outcome Type:**

   Change in Knowledge Outcome Measure

3b. **Quantitative Outcome**

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantitative Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

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

**Issue (Who cares and Why)**

INFORMING H1N1 RESEARCH: Often by the time a new flu stain arrives, there is inadequate time to conduct the necessary research to effectively stop its spread. H1N1, in 2009, has proven to be one of the more problematic stains, having killed more than 16,000 people worldwide.

**What has been done**

Before the World Health Organization declared H1N1 as a major flu outbreak, science had a jump-start on the H1N1 virus, in part due to research conducted by OARDC. Researchers applied reverse genetics to determine the genetic makeup, disease-causing mechanisms, and immunity of the influenza virus. These researchers are also studying the genetic makeup, disease-causing mechanisms, and processes of immunity of an H1N1 virus found at an Ohio county fair that, like the virus responsible for the 2009 pandemic, contained genes of swine, avian, and human influenza viruses.

**Results**

In addition to helping to determine the genetic makeup, disease-causing mechanisms, and immunity of the influenza virus, OARDC scientists are analyzing avian and swine influenza viruses to pinpoint which specific genes provide those viruses that have the ability to jump from one animal species to another, or from animals to...
people. OARDC is building a Plant and Animal Agrosecurity Research Facility on the Wooster, Ohio campus that will further enhance researchers' ability to prepare and respond such crisis. Construction begins in 2010 with an expected completion date of 2011.

4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>722</td>
<td>Zoonotic Diseases and Parasites Affecting Humans</td>
</tr>
</tbody>
</table>

Outcome #6

1. Outcome Measures

Reduce safety risk by releasing at least one major study to either manufacturers and/ or consumers that will reduce or prevent work or play related accidents every three years.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

create a growing base of knowledge that supports improving human health as it relates to food, environment, and lifestyle

2. Associated Institution Types

● 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantitative Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

OBESITY is perhaps the largest and fastest growing risk factor for premature mortality in the United States today. Nevertheless, despite a great deal of effort aimed at combating the obesity problem through education and improved food labeling, risk management efforts have been largely unsuccessful and obesity rates have continued their dramatic rise. The process needs new and different research to inform the process.

What has been done

Efforts to use nutrition education to combat the growing obesity problem in the USA have been largely unsuccessful. One possible reason for the persistence of the obesity problem is the presence of consumers who discount hyperbolically. To counter this phenomenon, sophisticated agents may try to employ commitment devices to protect long - term health goals from short - term consumption decisions. OARDC scientist used data from the Continuing Survey of Food Intakes by Individuals to examine the impact of hyperbolic discounting and use of commitment devices to influence individuals' caloric consumption.

Results

The OARDC researchers' results suggest that obese dieters display behavior consistent with hyperbolic discounting. Hyperbolic discounting is when an individual is given two similar rewards, they show a preference for the one that arrives first. This suggests that impatience lies at the root of this problem and that policymakers may want to allocate more resources toward helping obese or potentially obese persons overcome their impulsive behavior by helping them build more effective commitment mechanisms.
4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>703</td>
<td>Nutrition Education and Behavior</td>
</tr>
<tr>
<td>724</td>
<td>Healthy Lifestyle</td>
</tr>
</tbody>
</table>

Outcome #8

1. Outcome Measures

To advance knowledge related to obesity and obesity-related diseases.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantitative Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>(No Data Entered)</td>
<td>0</td>
</tr>
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</table>

3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

OBESITY, CONJUGATED LINOLEIC ACID (CLA), AND INSULIN RESISTANCE: Obesity is a growing epidemic that is characterized by dysregulation of metabolism, which can lead to type 2 diabetes as well as many other costly and chronic health conditions. The total estimated cost of diabetes exceeds $175 billion annually in the US. There is considerable evidence that the weight-loss supplement conjugated linoleic acid (CLA) reduces adipose mass, in part, by shuttling lipids away from adipose and into the liver and skeletal muscle. While CLA may be beneficial, there are risks to those users who have insulin regulation problems. Insulin resistance is a problem in non-obesity health issues as well.

What has been done

Because of the strong link of insulin resistance with steatosis, the abnormal lipid retention in a cell, OARDC researchers sought to investigate the extent that CLA-induced steatosis in muscle increased insulin resistance. In another OARDC study, insulin resistance in association with certain cancers were investigated.

Results

An OARDC study found no evidence for the induction of insulin resistance by CLA when provided in the presence of rosiglitazone. Rosiglitazone is an insulin sensitizer and one of the most commonly used drugs for the treatment of type 2 diabetes. This new knowledge is most important in that it now provides a basis for scientists to investigate the complementary effects of CLA and rosiglitazone to lower body fat in humans while maintaining insulin sensitivity needed by those afflicted with type 2 diabetes. The future of this research could potentially lead to monumental breakthroughs in both type 2 diabetes and weight loss, two of the worst health problems plaguing the nation. A parallel study has found insulin resistance in association with some cancers that result in cachexia, a condition causing chronic fat and muscle loss. In laboratory studies rosiglitazone, paradoxically, has reduced the chromic fat and muscle loss induced by the onset of insulin resistance due certain cancers. Final studies hold great promise for patients with cachexia.

4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>703</td>
<td>Nutrition Education and Behavior</td>
</tr>
</tbody>
</table>
Outcome #9

1. Outcome Measures

To advance knowledge related to childhood obesity

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantitative Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>{No Data Entered}</td>
<td>0</td>
</tr>
</tbody>
</table>

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

CHILDHOOD OBESITY is a chronic national problem that has severe economic, health, social, and psychological impacts impacting both the child, the family/caregivers, and nation.

What has been done

Scientists at Ohio State University investigated three factors that may influence childhood obesity - eating dinner as a family, getting adequate sleep, and limiting their weekday television viewing time. Other studies have linked obesity to the individual behaviors of excessive TV viewing, a lack of sleep and, to a lesser extent, a low frequency of family meals. But this is the first study to assess the combination of all three routines with obesity prevalence in a national sample of preschoolers.

Results

The USDA supported national study suggests that preschool-aged children are likely to have a lower risk for obesity if they regularly engage in one or more of three specific household routines: eating dinner as a family, getting adequate sleep, and limiting their weekday television viewing time. In a large sample of the U.S. population, the study showed that 4-year-olds living in homes with all three routines had an almost 40 percent lower prevalence of obesity than did children living in homes that practiced none of these routines. The researchers suggested that adopting these three household routines could be an attractive obesity-prevention strategy for all families with young children, especially because these routines may benefit children's overall development. However, they also cautioned that this study alone does not confirm whether the routines themselves, or some other factor, protect children from obesity.

4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>703</td>
<td>Nutrition Education and Behavior</td>
</tr>
<tr>
<td>724</td>
<td>Healthy Lifestyle</td>
</tr>
</tbody>
</table>
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.)
- Other (Equipment design; extramural funding; federal/state base funding;)

Brief Explanation

Shifts in economy can impact manufacturers abilities to attend to or government responsiveness to human health. Within this program area public monies, and the fluctuations in appropriations of such, have dramatic effect on human health. Issues of diet, access to healthy foods, food fads, social pressure, access mental health services and similar all can have major affects on this Planned Program. Likewise public policy and the publics priorities and perceptions, especially regarding risks, are major external factors impacting this program. Priority of this research for limited dollars and the resulting competition impact the extent of research that can be carried out. Other factor is migrant populations entering the workforce without fully understanding the risks. New populations who have recently immigrated into the area, often do not understand risk and are subject to disease because of uninformed choices. Items such as potential levels of public exposure to certain zoonotic diseases are major external factors. Likewise public willingness to learn safety procedures in terms of pests or zoonotic disease threats are factors that are beyond the researchers control. Often times formative evaluation though can lessen the impact of externalities by seeking feedback throughout the life of the program. Internal factors such as the availability of base funding to ensure a core faculty and staff, availability of extramural funds, and programmatic demands that often exceed resources, are affecting outcomes.

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

1. Evaluation Studies Planned

Evaluation Results

Key Items of Evaluation