

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

**Program # 5**

**1. Name of the Planned Program**

Animal Production and Protection

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	3%		15%	
302	Nutrient Utilization in Animals	5%		15%	
303	Genetic Improvement of Animals	2%		10%	
304	Animal Genome	4%		11%	
305	Animal Physiological Processes	5%		9%	
307	Animal Management Systems	41%		13%	
308	Improved Animal Products (Before Harvest)	1%		1%	
311	Animal Diseases	28%		16%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	4%		0%	
315	Animal Welfare/Well-Being and Protection	3%		10%	
605	Natural Resource and Environmental Economics	1%		0%	
806	Youth Development	3%		0%	
	<b>Total</b>	100%		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	15.0	0.0	17.0	0.0
Actual	17.5	0.0	8.0	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
819423	0	598730	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
819423	0	598149	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	48561080	0

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

### 1. Brief description of the Activity

Research program activities to:

- Understand of the processes that control/influence reproduction at the molecular and genetic level.
- Develop and test new cropping, grazing and feeding strategies for ruminant and non-ruminant food animals.
- Develop and evaluate management/training strategies for race horses to reduce injuries.
- Add to the understanding of various food animal genomes by improving and integrating genetic maps.
- Understand of the genetic and molecular processes that control/influence the immune system in food animals.
- Develop and evaluate new tools and strategies to detect, prevent and control emerging livestock and poultry diseases.
- Understand the environmental fate and biological effects of vaccines, steroids and other drugs fed to animals.
- Add to the understanding of animal behavior and welfare.

Extension program activities to:

- Assist beef producers with implementing the mandatory electronic identification system and demonstrate methods to use the system to sharpen management skills.
- Provide livestock producers with knowledge and skills to develop and maintain herd-health systems.
- Provide animal industry with up-to-date animal health information.
- Improve farm-specific environmental stewardship related to manure management, including developing whole-farm nutrient management plans, manure value, land use and neighbor relations.

### 2. Brief description of the target audience

Michigan animal producers, agriculture and natural resources industry representatives, animal pharmaceutical industry, animal welfare organizations and regulatory agencies, state agency representatives, state and local elected officials, other researchers and academics, and the interested public.

## V(E). Planned Program (Outputs)

### 1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	1825	3600	11000	0
<b>Actual</b>	2096	4192	16793	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 7  
 Actual: 3

**Patents listed**

MICL01573-Impact of the high variation in number of oocytes in ovaries on ovarian function, health and fertility in cattle; TEC2003-0053-02; 12/258,800,10/27/09. MICL02020-pathogenicity factors of gram-negative bacteria: secretion apparatus structure and function; TEC2007-0002-01Prov; 61/334,090, 5/14/10. MICL02127-Increasing the efficiency of somatic cell nuclear transfer cloning in bovine; TEC2010; 0050-01Prov; 61/259,783, 11/10/09.

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Plan</b>	1	50	
<b>Actual</b>	1	50	51

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

**Output Target**

**Output #1**

**Output Measure**

- Number of research programs on animal production and protection.

Year	Target	Actual
2010	40	27

**Output #2**

**Output Measure**

- Number of adult participants trained in animal management systems.

Year	Target	Actual
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2010 1500 2096

**Output #3**

**Output Measure**

- Number of youth participants trained in animal management systems.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	11000	16793

**Output #4**

**Output Measure**

- Number of adult participants trained in animal diseases.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	1000	1048

**V(G). State Defined Outcomes**

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

O. No.	OUTCOME NAME
1	Number of adult participants with increased knowledge about animal management systems.
2	Number of youth participants with increased knowledge about animal management systems.
3	Number of adult participants with increased knowledge of animal diseases.
4	Number of research programs to understand the processes that control/influence reproduction at the molecular and genetic level.
5	Number of research programs to develop and test new cropping, grazing and feeding strategies for cattle, sheep and other ruminants.
6	Number of research programs to develop and evaluate new nutritional management strategies for non-ruminant animals.
7	Number of research programs to understand the molecular processes that influence growth and meat quality in food animals.
8	Number of research programs to add to the understanding of various food animal genomes by improving and integrating genetic maps.
9	Number of research programs to develop and evaluate new tools and strategies to detect, prevent and control emerging and reemerging livestock and poultry diseases.
10	Number of research programs to understand the environmental fate and biological effects of vaccines, steroids and other substances fed to animals.
11	Number of research programs to develop and evaluate management/training strategies for horses to reduce injuries.
12	Number of research programs to test new cropping, grazing and feeding strategies for food animals.
13	Number of research programs to understand the genetic and molecular processes that control/influence the immune system in food animals.
14	Number of research programs to add to the understanding of animal behavior and welfare.

## **Outcome #1**

### **1. Outcome Measures**

Number of adult participants with increased knowledge about animal management systems.

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

- 1862 Extension

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

Change in Knowledge Outcome Measure

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

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	1260	1781

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

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

To increase beef market share and to position Michigan producers to remain competitive in the market place we must develop breeding programs around the consumer needs. Less than 10% of the beef herds use artificial insemination, yet AI is one of the best management tools to consistently produce a profitable beef product for consumers. Producers need educational opportunities on practical ways to add AI to their management tools to enhance genetic progress and profitability.

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

MSU Extension developed an outreach program to enhance the long term social and economic viability of the Michigan livestock industry by providing information to improve all aspects of livestock management.

#### **Results**

One example of major impact on a farm, after evaluating a feedlot enterprise system based on the information learned in a training and developing a comprehensive nutrition plan to meet the cattle nutritional requirements in a more cost effective and efficient means as well as utilizing growth promotant implants to increase performance efficiencies while minimizing risks of decreased quality grades in the harvested animals, the producer saved \$225.00 in the cost of taking a Holstein feeder calf to slaughter while decreasing the days each steer in the system by 110 days. The producer saved approximately \$33,750 per year who feeds 150 Holsteins per year. It is estimated, the program statewide saved over \$2.5 million.

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

<b>KA Code</b>	<b>Knowledge Area</b>
307	Animal Management Systems

311 Animal Diseases

**Outcome #2**

**1. Outcome Measures**

Number of youth participants with increased knowledge about animal management systems.

Not Reporting on this Outcome Measure

**Outcome #3**

**1. Outcome Measures**

Number of adult participants with increased knowledge of animal diseases.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2010	850	891

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

**Issue (Who cares and Why)**

One example, a high level of concern developed about the spread of hi-path avian influenza and the possibility of a pandemic in the past several years. There is particular concern about an outbreak of AI in small flocks as a result of exposure to wild birds and poor biosecurity procedures compared to the comercial poultry industry.

**What has been done**

A team of people at MSU developed an outreach program to educate small flock owners about the issue. The team included; the MSU Diagnostic Center poultry vet, two faculty specialists from the MSU Animal Science department, MSUE Emergency Mgt specialist, and a MSUE educator. Eight regional seminars were held in the evening or on Saturday.

**Results**

Evaluation results found 85% had a better understanding of good small flock poultry production practices, 88% had a better understand how bird flu is transmitted to poultry, 88% felt that they understand how to reduce the chances of you or your poultry getting bird flu, and 62% believed as a result of the training that they would change the way they managed their poultry flock to

reduce their chance of getting bird flu.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
311	Animal Diseases

#### Outcome #4

##### 1. Outcome Measures

Number of research programs to understand the processes that control/influence reproduction at the molecular and genetic level.

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Condition Outcome Measure

##### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	5	4

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

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

Unless you are a strict vegetarian or lactose intolerant, chances are that dairy and beef products make up half of your diet. According to the U.S. Department of Agriculture, almost 40 percent of the average American diet is dairy, and beef makes up about 10 percent. This makes these products an integral part of our lifestyle and our economy, thus sustained productivity and animal health are critical issues to the cattle industry.

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

Research to: Develop new methods to improve fertility and reproductive efficiency in livestock; and investigate potential health effects of exposure to environmental contaminants in humans and animals, with an emphasis on reproductive performance.

###### **Results**

Experiments were completed in cattle or with granulosa cells isolated from cattle to show that: concentrations of anti-Mullerian hormone (AMH) are highly variable among 12-month old dairy heifers, but static during estrous cycles and positively associated with ovary size and number of follicles 3mm or greater in diameter; a 20 percent decrease in energy requirements during the first trimester of pregnancy decreased follicle numbers and increased blood pressure in the female

offspring; and dairy cows with a high somatic cells count had daughters with relatively low AMH concentrations compared with cows with a low somatic cell count.

Scientists conducting research on the reproductive performance of swine discovered that the site of sperm deposition impacts fertility to insemination of aged sperm.

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

<b>KA Code</b>	<b>Knowledge Area</b>
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals
304	Animal Genome
305	Animal Physiological Processes
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

#### **Outcome #5**

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

Number of research programs to develop and test new cropping, grazing and feeding strategies for cattle, sheep and other ruminants.

Not Reporting on this Outcome Measure

#### **Outcome #6**

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

Number of research programs to develop and evaluate new nutritional management strategies for non-ruminant animals.

Not Reporting on this Outcome Measure

#### **Outcome #7**

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

Number of research programs to understand the molecular processes that influence growth and meat quality in food animals.

Not Reporting on this Outcome Measure

## **Outcome #8**

### **1. Outcome Measures**

Number of research programs to add to the understanding of various food animal genomes by improving and integrating genetic maps.

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

- 1862 Research

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

Change in Knowledge Outcome Measure

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

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	5	4

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

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

Genetic maps are an integral part of several statistical models that are commonly used to find disease genes. A better understanding of these maps will allow for the development of increasingly accurate models that will provide researchers and producers with reliable estimates in a practical amount of time and will greatly enhance disease prevention and treatment efforts.

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

Research to: enhance and integrate genetic and physical maps of agriculturally important animals for cross-species comparisons and sequence annotations; facilitate integration of approaches toward a better understanding of biological mechanisms underlying economically important traits; and to develop methods for producers and consultants to evaluate dairy herd performance.

#### **Results**

Research using the cow as a dual-purpose biomedical model to address infertility in beef/dairy cows and humans has identified gene differences that have implications in diagnostics and markers in the surrounding cells that are predictive of a bad quality egg. Based on this knowledge, treatments were developed that can be added while these eggs are maturing so that more embryos develop and can be transferred to the cow. This new discovery will allow for enhanced reproductive efficiency, especially for in vitro production of embryos.

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

<b>KA Code</b>	<b>Knowledge Area</b>
304	Animal Genome
305	Animal Physiological Processes

## **Outcome #9**

### **1. Outcome Measures**

Number of research programs to develop and evaluate new tools and strategies to detect, prevent and control emerging and reemerging livestock and poultry diseases.

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

- 1862 Extension
- 1862 Research

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

Change in Action Outcome Measure

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

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	7	4

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

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

Animal disease in the United States could seriously damage the livestock and poultry industries. For example, eradication of avian influenza in the United States following an outbreak in the mid-1980s resulted in the destruction of 17 million birds and cost taxpayers nearly \$65 million. The collective effort and vigilance of researchers, livestock producers, veterinarians and state and local government officials is needed to ensure adequate disease surveillance and to provide the needed resources to prevent, respond and/or eliminate disease outbreaks.

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

Research to: collect and screen for bacterial strains with antagonistic properties for foodborne pathogens and test their efficacy; better understand parasitic and mutualistic interactions in a bacteria-nematode insect association; and improve immune recognition in order to protect against or eliminate viruses and diseases such as Johne's disease.

#### **Results**

Additional sequencing of the Heterorhabditis bacteriophora nematode genome this past year completes most of the sequencing data generation for this genome project, which was initiated in June 2005. This sequence has been submitted to Entrez public database along with other sequence data from the genome project. This will revolutionize research in H. bacteriophora and be important for gaining insights into the nematode biology related to symbiosis, parasitism and the biological control of insects.

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

<b>KA Code</b>	<b>Knowledge Area</b>
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303	Genetic Improvement of Animals
305	Animal Physiological Processes
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

## **Outcome #10**

### **1. Outcome Measures**

Number of research programs to understand the environmental fate and biological effects of vaccines, steroids and other substances fed to animals.

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

- 1862 Research

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

Change in Condition Outcome Measure

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

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	5	3

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

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

Michiganders are an exceptionally vulnerable population due to their chronic exposure to complex mixtures of endocrine disruptors that include legacy environmental contaminants (e.g., dioxin, PCBs, DDT) within the Great Lakes basin. A comprehensive molecular and physiological understanding of the interactions that may occur is critical to human health. Also, vaccines, steroids, antibiotics and other substances are added to animal feed to improve growth rates by controlling parasitic and bacterial diseases. With the recent major expansion in concentrated animal feedlot operations, the potential risks from these operations must be assessed.

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

Research to: identify the environmental transformations undergone by animal feed additives and determine their environmental fate; assess the potential of these substances to alter the immune response and cause severe disease symptoms in animals and humans; and develop multistage hierarchical models to facilitate greater efficiency of inference in general mixed model microarray experiments.

#### **Results**

Bromiated flame retardants (BFRs) have been incorporated into a variety of consumer products for several years. Demonstration of BFRs in the environment, wildlife and humans has prompted concern for these emerging contaminants. Two of the commercial polybrominated diphenyl ether

BFRs (octa-BDE and penta BDE) are no longer being produced because of environmental concerns. As a result, the production and use of non-PBDE BFR alternatives, such as BTBPE, have increased. Previous studies had indicated that mink - a sentinel wildlife species was sensitive to a commercial penta-BDE mixture (no longer on the market) as indicated by reproductive impairment and alteration of thyroid hormone concentrations. Therefore it was of interest to determine sensitivity of the mink to BTBPE. The results of this study indicate that exposure to BTBPE at dietary concentrations up to 2.0 ppm feed had no effect on the reproductive performance of mink and the survivability and growth of their offspring.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
315	Animal Welfare/Well-Being and Protection

#### Outcome #11

##### 1. Outcome Measures

Number of research programs to develop and evaluate management/training strategies for horses to reduce injuries.

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	2	3

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

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

Due to improvements in nutrition, management and health care, horses are living longer, more useful lives. It's not uncommon to find horses and ponies living well into their 20s and 30s. Although genetics play a determining role in longevity, providing proper care and nutrition plays a key role in horses' health, performance and overall well-being.

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

Research to: investigate ways to manipulate bone density and strength through mechanical loading to help prevent injuries to performance horses and increase the longevity of livestock; investigate ways to manipulate the equine diet to optimize skeletal health and improve the overall

welfare of horses; define the role that EHV-5 plays in the development of spontaneous equine multinodular pulmonary fibrosis.

### **Results**

Research to determine the cause and pathology of exercise-induced pulmonary hemorrhage (EIPH) in horses resulted in a breakthrough discovery - it was discovered that horses with the disease have chronic scarring around their pulmonary veins, making the veins less flexible and unable to cope with the significant increase in blood pressure that occurs during intense exercise. Research is now under way to determine what causes this chronic scarring in the first place. These findings will ultimately allow us to intervene in creative ways to prevent EIPH from occurring in these horses.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

## **Outcome #12**

### **1. Outcome Measures**

Number of research programs to test new cropping, grazing and feeding strategies for food animals.

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

- 1862 Research

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

Change in Condition Outcome Measure

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

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	{No Data Entered}	4

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

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

As production costs rise, environmental concerns increase and consumer expectations become higher, those involved in the agrifood industry are looking for ways to maximize reproductive and performance efficiencies in a way that is economically and environmentally sustainable, and that protects human and animal health.

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

Research to: develop a local/regional pasture-based beef production system encompassing the entire beef production chain; investigate strategies to maximize production output (milk) and

ecosystem functions (processes and services) in grazing dairy systems managed under different scenarios for the optimization of automatic milking and pasture systems; better understand the mineral needs of the pig; and evaluate the effectiveness of mannanigosaccharides on egg production, egg weight and bird livability of laying hens.

#### **Results**

Weanling pigs (n=160) were used to evaluate dietary microminerals (Cu, Fe, Mn, Se and Zn) on performance, tissue minerals, and liver and plasma enzymatic activities during a 35-day post weaning period. Results indicated that innate microminerals Cu and Mn from a complex nursery diet may meet the pig's micromineral needs, but the weaned pig's need for Fe, Se or Zn were not met in the basal diet.

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

<b>KA Code</b>	<b>Knowledge Area</b>
302	Nutrient Utilization in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)

#### **Outcome #13**

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

Number of research programs to understand the genetic and molecular processes that control/influence the immune system in food animals.

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

- 1862 Research

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

Change in Condition Outcome Measure

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

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	{No Data Entered}	3

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

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

The release of immune-activating and modulating factors has broad implications for improving the immune response of food animals. For dairy cows in particular, a better understanding of the neutrophil system is critical to the sustainability of dairy operations and cow health. Research to improve immune recognition for all food animals is necessary to protect against or eliminate viruses, cancer, etc.

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

Research to: gain a clear understanding of the molecular and cellular mechanisms that mediate changes in neutrophil function in periparturient cows; how to improve immune recognition in order to protect against, or eliminate, viruses and cancers; and better understand the regulation of gene expression during early embryogenesis.

#### **Results**

Research findings showed that in a certain cell type in a mouse embryo, a regulatory protein known as Brahma Related Gene 1 fails to turn off a gene critical to early embryo vitality. This work has important implications for humans and cattle because the stages being looked at in mouse development where the highest number of pregnancies are lost -- those occurring between days 0.5 and 6.5 -- correspond to the early stages of development for humans and cattle.

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

<b>KA Code</b>	<b>Knowledge Area</b>
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals
304	Animal Genome
305	Animal Physiological Processes
311	Animal Diseases

#### **Outcome #14**

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

Number of research programs to add to the understanding of animal behavior and welfare.

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

- 1862 Extension
- 1862 Research

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

Change in Knowledge Outcome Measure

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

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	{No Data Entered}	2

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

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

Our society has placed increased emphasis on the welfare of research and exhibit animals. U.S. law now requires attending to exercise requirements for dogs, and the psychological well-being of

non-human primates. Animal welfare without knowledge is impossible. Animal behavior researchers look at the behavior and well-being of animals in lab and field. Good animal welfare requires solid science that informs and directs policies and practices related to disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter.

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

Research to: identify management practices and environmental conditions, particularly for young animals, that allow expression of positive natural behaviors while improving animal welfare in the context of environmentally-sustainable production systems.

#### **Results**

Research using wireless sensors to remotely monitor the health and well-being of egg-laying chickens in non-cage housing systems has shown that the sensors are accurate at detecting the physical location of the hens and that the information can be used to determine where hens spend their time, how the group of hens is distributed through the available space, if there is a circadian rhythm to their behavior and whether access to resources may be limited due to crowding or the presence of dominant hens. The data will serve as a scientific basis for determining the resources and space allocations that chickens need and can be used by consumers and producers to design non-cage systems for laying hens that provide the best possible welfare for the animals.

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

<b>KA Code</b>	<b>Knowledge Area</b>
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

### **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**

The economic challenges being faced by Michigan continue to affect these programs, particularly related to funding and staffing levels due to budget cuts, funding reallocations, appropriations changes and competing public priorities. Attrition and faculty departures

have also had an impact on outcomes. For example, in the last reporting year, we have gone from 135 Hatch-funded faculty (representing 89.5 FTEs) to 108 Hatch-funded faculty (representing 77.1 FTEs). Further, because of the inclusion of the five new national priorities in this year's reporting, many of the projected numbers in our original planned programs had to be revised and, as a result, are skewed, significantly so in some cases. Five out of six of the original planned programs are included in the report, but a significant number (about 35 percent) were migrated into the new planned programs.

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

### **1. Evaluation Studies Planned**

- After Only (post program)
- Before-After (before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

## **Evaluation Results**

### **Key Items of Evaluation**