# Agricultural, Natural Resources, and Biological Engineering

Agricultural, Natural Resources, and Biological Engineering

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

### 1. Name of the Planned Program

Agricultural, Natural Resources, and Biological Engineering

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

### 1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 401 | Structures, Facilities, and General Purpose Farm Supplies | 19% | | 19% | |
| 402 | Engineering Systems and Equipment | 27% | | 27% | |
| 403 | Waste Disposal, Recycling, and Reuse | 38% | | 38% | |
| 404 | Instrumentation and Control Systems | 9% | | 9% | |
| 405 | Drainage and Irrigation Systems and Facilities | 7% | | 7% | |
| | **Total** | 100% | | 100% | |

## V(C). Planned Program (Inputs)

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

| Year: 2008 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 5.9 | 0.0 | 15.5 | 0.0 |
| Actual | 6.5 | 0.0 | 27.0 | 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 |
| 502944 | 0 | 313470 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 1279045 | 0 | 1726877 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 52788 | 0 | 452498 | 0 |

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

**1. Brief description of the Activity**

•Conducted energy workshops and educational programs throughout the state that involved key research scientists ranging from chemical engineers to logistics experts to economists. •A team of scientists including experts in animal nutrition, soil fertility, and farm management conducted research and worked with farmers to reduce water pollution, especially phosphorus. •Food safety experts, along with microbiologists and nanotechnology experts, developed sensors that will enhance food safety and risks from bioterrorism. •Livestock facilitiesdesigned and analyzed to determine optimal nutrient management systems from an environmental and cropping systems perspective. •Electro-hydraulic sensors and off-road machine operation systems designed and tested. •Scientists monitored air quality of selected concentrated livestock systems on farms in multiple states to facilitate the determination of science-based EPA regulatory standards.

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

•Indiana livestock producers, especially those managing confined feeding operations •Crop farmers interested in applying animal wastes to enhance yields and reduce water pollution •Stakeholders in the bio-energy industry including Country Mark Cooperative, Indiana State Department of Agriculture, Indiana Soybean Alliance, Indiana Corn Growers,grain processors such as ADM, Cargill, and Tate & Lyle •Officials with federal (EPA) and state (IDEM) regulatory agencies •Off-road farm and industrial equipment manufacturers will be contacted and offered patent licensing opportunities as sensors for machine operation and maintenance are developed and tested

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

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

| | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Year** | **Target** | **Target** | **Target** | **Target** |
| **Plan** | 5000 | 40000 | 2500 | 5000 |
| 2008 | 51904 | 140847 | 28117 | 5469 |

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

**Patent Applications Submitted**

| Year | Target |
|---|---|
| **Plan:** | 3 |
| 2008: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| | Extension | Research | Total |
|---|---|---|---|
| **Plan** | 5 | 20 | |
| 2008 | 0 | 0 | 66 |

## V(F). State Defined Outputs

**Output Target**

**Output #1**

**Output Measure**

Number of educational workshops and seminars on nutrient management and air quality

| Year | Target | Actual |
|---|---|---|
| 2008 | 15 | 30 |

**Output #2**

**Output Measure**

Number of research-based educational programs on bio-fuel production, distribution, and policy

| Year | Target | Actual |
|---|---|---|
| 2008 | 25 | 21 |

**Output #3**

**Output Measure**

Number of websites and publications developed

| Year | Target | Actual |
|---|---|---|
| 2008 | 20 | 66 |

**Output #4**

**Output Measure**

Number of patents applied for and licensing arrangements entered into with off-road farm and industrial equipment manufacturers

| Year | Target | Actual |
|---|---|---|
| 2008 | 5 | 0 |

## V(G). State Defined Outcomes

| O No. | Outcome Name |
|---|---|
| 1 | Number of producers who increase awareness and knowledge concerning science-based methods to manage animal wastes so as to minimize potential soil and air pollution |
| 2 | Number of environmental pollution incidents caused by inappropriate application of animal wastes to soils or emission of animal odors from production facilities |
| 3 | Number of farmers who enhance soil fertility and reduce soil pollution through less reliance on commercial fertilizer and increased reliance on properly applied animal waste |
| 4 | Number of energy producers, farmers, and consumers who increase their knowledge of the technical and economic implications of increased use of Indiana produced corn and soybeans in bio-fuels |
| 5 | Number of technologies developed and disseminated that will increase the efficiency of bio-fuel production |
| 6 | Number of bushels of Indiana produced corn and soybeans used in bio-fuels |
| 7 | Number of farmers who increase their knowledge of livestock building designs that are energy efficient as well as more animal welfare friendly |
| 8 | Number of efficient and animal sensitive farm structures designed that optimize livestock welfare |
| 9 | Number of farmers who increase total livestock production and profitability through the adoption of building designs that are energy efficient as well as more animal welfare friendly |
| 10 | Number of livestock facitlities designed that minimize odor emissions and potential air pollution |

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**Outcome #1**

**1. Outcome Measures**

*Not reporting on this Outcome for this Annual Report*

**2. Associated Institution Types**

**3a. Outcome Type:**

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|

## 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

**Brief Explanation**

{No Data Entered}

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

**1. Evaluation Studies Planned**

After Only (post program)
Retrospective (post program)
Before-After (before and after program)
During (during program)
Time series (multiple points before and after program)
Case Study
Comparisons between program participants (individuals,group,organizations) and non-participants
Comparison between locales where the program operates and sites without program intervention
Other (hits and use of web site)

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}