V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program
Livestock Waste Management

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>112</td>
<td>Watershed Protection and Management</td>
<td>25%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>133</td>
<td>Pollution Prevention and Mitigation</td>
<td>25%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>403</td>
<td>Waste Disposal, Recycling, and Reuse</td>
<td>50%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>0%</strong></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 1862</th>
<th>Extension 1890</th>
<th>Research 1862</th>
<th>Research 1890</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>5.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Actual</td>
<td>5.0</td>
<td>0.0</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></th>
<th>Extension</th>
<th></th>
<th>Research</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith-Lever 3b &amp; 3c</td>
<td>156000</td>
<td>1890 Extension</td>
<td>Hatch</td>
<td>0</td>
</tr>
<tr>
<td>1862 Matching</td>
<td>234000</td>
<td>1890 Matching</td>
<td>1862 Matching</td>
<td>0</td>
</tr>
<tr>
<td>1862 All Other</td>
<td>0</td>
<td>1890 All Other</td>
<td>1862 All Other</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1890 All Other</td>
</tr>
</tbody>
</table>

V(D). Planned Program (Activity)

1. Brief description of the Activity
   • Develop presentation materials
   • Develop resource material
   • Provide presentations and workshops
   • Translate scientific materials into lay materials
   • Identify emerging issues
   • Evaluate effectiveness of activities

2. Brief description of the target audience
   • Owners, managers and employees of animal operations
   • Agribusiness and agrifinance personnel
   • Government agency personnel

V(E). Planned Program (Outputs)

1. Standard output measures
2009 North Dakota State University Combined Research and Extension Annual Report of Achievements and Results - Livestock Waste Management

Direct Contacts
Youth

Indirect Contacts
Adults

Indirect Contacts
Youth

Plan
400
400
0
0

Actual
800
2000
15
0

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

Patent Applications Submitted

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

<table>
<thead>
<tr>
<th>2009</th>
<th>Extension</th>
<th>Research</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}
V(G). State Defined Outcomes

<table>
<thead>
<tr>
<th>O. No.</th>
<th>OUTCOME NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of individuals requesting information</td>
</tr>
<tr>
<td>2</td>
<td>Number of individuals demonstrating increase in subject knowledge and skills</td>
</tr>
<tr>
<td>3</td>
<td>Number of individuals implementing recommended action or practice</td>
</tr>
<tr>
<td>4</td>
<td>Number of individuals requesting assistance</td>
</tr>
<tr>
<td>5</td>
<td>Number of people trained to assist producers with nutrient management training</td>
</tr>
<tr>
<td>6</td>
<td>Estimated dollar value of adopted best management practices</td>
</tr>
<tr>
<td>7</td>
<td>Number of nutrient management plans implemented</td>
</tr>
<tr>
<td>8</td>
<td>Surface water quality monitoring data collected in watersheds before and after bmp implementation</td>
</tr>
<tr>
<td>9</td>
<td>Number of farmers and individuals who provide technical assistance to farmers with increased knowledge of manure best management practices to increase farm profitability and protect the environment.</td>
</tr>
</tbody>
</table>
Outcome #1

1. Outcome Measures

Number of individuals requesting information

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of individuals demonstrating increase in subject knowledge and skills

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of individuals implementing recommended action or practice

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of individuals requesting assistance

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Number of people trained to assist producers with nutrient management training

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Estimated dollar value of adopted best management practices

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Number of nutrient management plans implemented

Not Reporting on this Outcome Measure
Outcome #8

1. Outcome Measures

Surface water quality monitoring data collected in watersheds before and after bmp implementation

Not Reporting on this Outcome Measure

Outcome #9

1. Outcome Measures

Number of farmers and individuals who provide technical assistance to farmers with increased knowledge of manure best management practices to increase farm profitability and protect the environment.

2. Associated Institution Types

- 1862 Extension

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>275</td>
</tr>
</tbody>
</table>

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With the increased emphasis on handling manure in an environmentally friendly manner and the increase in cost of commercial fertilizer, producers are greatly interested in using livestock manure as a replacement for commercial fertilizer in crop production while protecting the environment. Manure can be a viable substitute for commercial fertilizer but management considerations must be taken into account such as nitrogen mineralization rate of the manure, timing of manure application and conservation management practices on fields targeted for manure use.

What has been done

A comprehensive educational program has been developed that integrates outcomes of manure utilization research with manure management best management practices (bmp's). Statewide educational programs were delivered in the classroom, on-farm at field days and in one-on-one consultation. Providers of technical information to farmers were also targeted in the educational programs as well as fellow extension educators. Using the feedback from these groups, complimentary manure management research was initiated to address concerns and issues.

Results

Farmers in three regions of the state have been engaged directly in an on-farm runoff monitoring project where their input is used to develop any needed manure management bmp's. This project has led to a strong partnership between the farmers who are involved, NDSU, the United States Geological Survey and the ND Dept. of Health and will not only lead to farmer derived manure bmp development but will have policy implications as well. Extension publications on manure spreader calibration, animal carcass disposal and feedlot management have been developed. Results of manure nitrogen mineralization research leading to changes in manure use recommendations were published in a refereed journal. In the past year, manure best management practices education was delivered at over 30 group meetings across the state. Impacts of these educational programs triggered television and radio interviews that enhanced statewide coverage of the educational goals. A website devoted solely to nutrient management education and research was developed and marketed to constituents. A case study on farmer adoption of manure composting was conducted and is in the process of being published.

The livestock manure management of these targeted North Dakota farmers will be improved and will affect the manure from approximately 140,000 head of cattle annually. This manure will be spread on about 27,500 acres...
and has a fertilizer value of $1.5M of nitrogen, $1.2M of phosphorus, and $1.95M of potassium based on credits relative to commercial fertilizer sources. The net result of this project is improved utilization of this resource by crops, reduced environmental risks, and increased profits for North Dakota farmers.

4. Associated Knowledge Areas

<table>
<thead>
<tr>
<th>KA Code</th>
<th>Knowledge Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>112</td>
<td>Watershed Protection and Management</td>
</tr>
<tr>
<td>133</td>
<td>Pollution Prevention and Mitigation</td>
</tr>
<tr>
<td>403</td>
<td>Waste Disposal, Recycling, and Reuse</td>
</tr>
</tbody>
</table>

V(H). Planned Program (External Factors)

**External factors which affected outcomes**
- Natural Disasters (drought, weather extremes, etc.)
- Competing Programmatic Challenges

**Brief Explanation**

North Dakota suffered extensive overland flooding in the spring of 2009. The flooding events forced alternative educational programming which took time away from the planned nutrient management programming.

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

1. Evaluation Studies Planned
   - After Only (post program)
   - Retrospective (post program)
   - During (during program)
   - Case Study

**Evaluation Results**

(No Data Entered)

**Key Items of Evaluation**

(No Data Entered)