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ECONOMICS AND NUTRIENT MANAGEMENT
The Economics of Nutrient Utilization

Nonmarket Inputs
Climate, Non-purchased Nutrients (e.g. Nitrogen in Rainfall)

Market Inputs
Purchased Nutrients (fertilizers/animal feed), Labor, Fuel, Machinery, etc...

Production
Integrated Systems, Technologies, and Practices

Nonmarket Outputs
Polluting Runoff (-), Odors (-), Landscape Amenities (+), Carbon Sequestration (+)

Market Outputs
Milk, Eggs, Meat, etc...
Private and Public Benefits of Nutrient Management

• *Private Benefits* – Improved profitability from efficient utilization (reduced production costs and/or increased farm revenues)
  – Significant improvements have occurred through time in the Bay region through improved scientific understanding, technological advances, agricultural extension education programs, and farm adoption

• *Public Benefits* – Reduced negative externalities (e.g., water pollution), increased positive externalities (e.g., carbon sequestration)
NM Practices Vary in their Public and Private Benefits

• High Private
  – E.g., nutrient management plans, soil testing, split applications, no-till planting, cover crops, precision feeding

• Low Private
  – Riparian buffer, forested buffer, stream bank fencing, land retirement
<table>
<thead>
<tr>
<th>BMP</th>
<th>Cost*</th>
<th>N reduction efficiency**</th>
<th>P reduction efficiency**</th>
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</thead>
<tbody>
<tr>
<td>Nutrient Management</td>
<td>Plan Development</td>
<td>20 – 30%</td>
<td>20 – 30%</td>
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<tr>
<td></td>
<td>$1600 – Crop Area &lt; 100 acres</td>
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<tr>
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<td>$1900 – Crop Area 101-300 acres</td>
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<td>$2300 – Crop Area &gt; 300 acres</td>
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<tr>
<td></td>
<td>Plan Implementation</td>
<td></td>
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<tr>
<td></td>
<td>$14/ac – basic field crops w/ manure</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>$9/ac – basic cropland, no manure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision Agriculture</td>
<td>$10/ac</td>
<td>4%</td>
<td>n/a</td>
</tr>
<tr>
<td>Continuous No-Till</td>
<td>$22/ac</td>
<td>15%</td>
<td>40%</td>
</tr>
<tr>
<td>Prescribed grazing</td>
<td>$12/ac</td>
<td>9%</td>
<td>24%</td>
</tr>
<tr>
<td>Wetland Restoration</td>
<td>$2350/ac</td>
<td>7 – 25 %</td>
<td>12 – 50%</td>
</tr>
</tbody>
</table>

*PA EQIP Payment Schedule used for all cost estimates

**Chesapeake Bay Program Phase 5.3 Watershed Model data used for N and P efficiencies
Private vs Public Optimization

- Practices that optimize private benefits may not achieve the public benefits sought by policy makers
- State Watershed Implementation Plans for the Chesapeake Bay TMDL call for significant implementation of practices with limited private benefits (e.g., riparian and forested buffers)
- Achieving policy goals will require measures to induce adoption of nutrient management practices that reduce farm profits unless costs are offset by financial assistance
Options (from policy research)

- Financial assistance
  - Nutrient management practice adoption has been significantly supported by financial assistance from federal (E.g., EQIP, CREP) and state conservation programs
  - Budget constraints have limited the potential impact
  - State WIPS anticipate continued assistance
  - How will the federal and state budgetary environment affect future funding?
Options

• Improve efficiency of financial assistance programs
  – Better spatial targeting
  – Greater use of pay for performance vs pay for adoption
  – Greater use of competitive bidding

• New sources of financial support
  – Vibrant water quality trading programs
Options

• Develop regional manure markets
• Increased regulation