Trials and Economics of Implementing Ag BMP’s in Mercer County, Ohio

Theresa Dirksen, Ag Solutions Coordinator

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Mercer County and the Grand Lake St. Marys Watershed

- Highest livestock density in the state at approximately 370 animal units per 250 acres
- Highest soil test P levels in Ohio
- GLSM declared “distressed” in 2011
GLSM “Distressed Watershed Designation”

- Currently 135 Comprehensive Nutrient Management Plans are being maintained
  - Mercer SWCD and local ODA staff maintain these plans
- 80 Feedlot Covers
- 110 Dry Manure Storage Barns
- 20 Holding Ponds/Aerobic Lagoons
- 12 Wastewater Irrigation Systems
- 20 Silage Leachate Collection Systems
- 3 Treatment Wetlands
- 5 Mortality Compost Structures
- Cover crops more widely used

- $10.3 million over 4 years
Costs of BMP’s

• Nutrient Management Planning
  • Grid soil sampling ~$9/ac
  • Random soil sampling ~$2/ac
  • Manure analysis cost per year ~$35/sample
  • SWCD’s provide technical service

• Feedlot Covers
  • ~$14 - $25 per square foot

• Dry Manure Storage Barns
  • ~$20 per square foot

• Cover crops
  • ~$30 - $100 per acre

• What is farmer’s economic advantage?
• Ag Solutions was formed in early 2011 and is a group of farmers who live and work in the Grand Lake St. Marys watershed area who have come together to seek effective, affordable solutions to the environmental issues impacting the lake while promoting the growth and vitality in our farm communities. Upon the group’s formation, the group was facilitated by the Marion Community Development Organization (MCDO). Due to lack of funding and diminishing leadership, in 2016, the Mercer County Commissioners devoted funding to hire a coordinator.

• Also own and operate a 180-head dairy farm in Mercer County.
Manure Dewatering Pilots

KDS Separator
- Swine Solids
- Dairy Solids

GEA Centrifuge – Swine Manure

Digested Organics – Swine Manure
Manure Dewatering Pilots

- Technologies work; issue is cost
- Liquid manure is currently land applied at agronomic rates for around $0.01 per gallon
- Operating costs of any technology need to be in line with $0.01 per gallon for adoption
- We are on the right track in finding options and/or combinations to achieve this
Polymer, coagulant used as noted and electricity
Final estimated operating cost = $0.015 per gallon

<table>
<thead>
<tr>
<th>Raw Swine</th>
<th>Swine Effluent (polymer)</th>
<th>Swine Solids (polymer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>95.22%</td>
<td>98.06%</td>
</tr>
<tr>
<td>Volatile Solids</td>
<td>282.74 lb/1000 gal</td>
<td>Volatile Solids 95.86 lb/1000 gal</td>
</tr>
<tr>
<td>Total N</td>
<td>41.61 lb/1000 gal</td>
<td>Total N 33.8 lb/1000 gal</td>
</tr>
<tr>
<td>Ammonia N</td>
<td>40.09 lb/1000 gal</td>
<td>Ammonia N 31.78 lb/1000 gal</td>
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<tr>
<td>Organic N</td>
<td>1.52 lb/1000 gal</td>
<td>Organic N 1.02 lb/1000 gal</td>
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<tr>
<td>P</td>
<td>7.09 lb/1000 gal</td>
<td>P 0.92 lb/1000 gal</td>
</tr>
<tr>
<td>P2O5</td>
<td>16.21 lb/1000 gal</td>
<td>P2O5 2.1 lb/1000 gal</td>
</tr>
<tr>
<td>K</td>
<td>21.94 lb/1000 gal</td>
<td>K 18.67 lb/1000 gal</td>
</tr>
<tr>
<td>K2O</td>
<td>26.42 lb/1000 gal</td>
<td>K2O 22.45 lb/1000 gal</td>
</tr>
<tr>
<td>Ortho P</td>
<td>467 ppm</td>
<td>Ortho P 69 ppm</td>
</tr>
</tbody>
</table>

% P Removal 87.05%

<table>
<thead>
<tr>
<th>Raw Dairy</th>
<th>Dairy Effluent (polymer + coagulent)</th>
<th>Dairy Solids (polymer + coagulent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>95.74%</td>
<td>98.35%</td>
</tr>
<tr>
<td>Volatile Solids</td>
<td>258.49 lb/1000 gal</td>
<td>Volatile Solids 77.58 lb/1000 gal</td>
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<tr>
<td>Total N</td>
<td>16.71 lb/1000 gal</td>
<td>Total N 10.79 lb/1000 gal</td>
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<tr>
<td>Ammonia N</td>
<td>11.87 lb/1000 gal</td>
<td>Ammonia N 10.2 lb/1000 gal</td>
</tr>
<tr>
<td>Organic N</td>
<td>4.83 lb/1000 gal</td>
<td>Organic N 0.59 lb/1000 gal</td>
</tr>
<tr>
<td>P</td>
<td>1.78 lb/1000 gal</td>
<td>P 0.51 lb/1000 gal</td>
</tr>
<tr>
<td>P2O5</td>
<td>4.07 lb/1000 gal</td>
<td>P2O5 1.18 lb/1000 gal</td>
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<tr>
<td>K</td>
<td>12.54 lb/1000 gal</td>
<td>K 9.78 lb/1000 gal</td>
</tr>
<tr>
<td>K2O</td>
<td>15.09 lb/1000 gal</td>
<td>K2O 11.81 lb/1000 gal</td>
</tr>
<tr>
<td>Ortho P</td>
<td>122 ppm</td>
<td>Ortho P 48 ppm</td>
</tr>
</tbody>
</table>

% P Removal 71.01%
Other BMP’s
Other BMP’s

- It takes cost-share or grants to offset cost of establishment
- Trials with “new” practices or things “new” to Mercer County

- Allows us to educate
- Stream Restoration
- Wetlands (treatment trains and more)
- Waterway with wetlands
- Drainage retention (saturated buffers)
Monitoring with Wright State University Lake Campus

- GLSM Distressed Watershed rules efficacy project
- Saturated buffer and drainage retention ponds
- Reconstructed wetlands
Annual Flow and Nutrient Summary
Questions?
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