Maryland Department of Agriculture

Anaerobic Digestion Workshop
October 2, 2018
Maryland Nutrient Management

Update on FIV Soils Data, Tier Groups, Management
Next steps for PMT, transition and compliance
Enhanced Nutrient Management
Anaerobic Digestion and Nutrient Management
    Practical, on-farm application and necessary BMPs needed
    Land application and associated issues and considerations
Cost-Share Programs available in Maryland
Maryland Nutrient Management

Working with farmers to seek full compliance with Maryland’s Nutrient Management Law
Farmers, agricultural and environmental groups cooperating to reach WIP Goals
Blending practical work experience with new technology to generate results
We are very aware of current economic conditions and issues facing farmers today
Seeking a balance between compliance and cooperation to reach state-wide goals
Maryland Fertility Index Value (FIV) Scale

- **0 - 25** = LOW, yield response is likely.
- **26 - 50** = MEDIUM, yield response is possible.
- **51 - 100** = OPTIMUM, yield response is not likely.
- **101 and greater** = EXCESSIVE, very unlikely.

- Below a P-FIV of 150, manure may be applied at a Nitrogen-based rate.
- A P-FIV value above 150 requires a PSI/PMT calculation before any Phosphorus can be applied.
- A field with a P-FIV of 500 or greater cannot receive a Phosphorus application of any kind.
Maryland State Soil P-FIV Data Totals  
(as of June 1, 2018)

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Total AIR Acres (2014)</td>
<td>1,277,930</td>
</tr>
<tr>
<td>Total Acres Submitted</td>
<td>1,114,418</td>
</tr>
<tr>
<td>Percentage Reported</td>
<td>87.20%</td>
</tr>
<tr>
<td>Number of Fields Submitted</td>
<td>76,699</td>
</tr>
<tr>
<td>P FIV &lt; 150</td>
<td>79.5%</td>
</tr>
<tr>
<td>P FIV 150-499</td>
<td>18.9%</td>
</tr>
<tr>
<td>P FIV &gt; 500</td>
<td>1.6%</td>
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PMT Statewide Tier Group Data

PMT Tier Groups
1,661 Operations Reported, 187,870 acres
Tier Group A- 150-300 FIV (transition 2020)
  1,313 operations, 122,705 acres
Tier Group B- 300-450 FIV (transition 2019)
  252 operations, 54,271 acres
Tier Group C- >450 FIV (transition 2018)
  96 operations, 10,894 acres
### Phosphorus Management Tool

**Overview of How it Works**

**RISK**

**Could add time if services are not adequate.**

#### 7 YEAR TRANSITION SUMMARY

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</thead>
<tbody>
<tr>
<td>Tier C - Avg. FIV P 450 and above</td>
<td>PSI/PMT</td>
<td>PSI/PMT</td>
<td>TM1</td>
<td>TM1</td>
<td>TM2</td>
<td>TM2</td>
<td>PMT</td>
<td></td>
</tr>
<tr>
<td>Tier B - Avg. FIV P 300-450</td>
<td>PSI/PMT</td>
<td>PSI/PMT</td>
<td>PSI</td>
<td>TM1</td>
<td>TM2</td>
<td>TM2</td>
<td>PMT</td>
<td></td>
</tr>
<tr>
<td>Tier A - Avg. FIV P 150 - 300</td>
<td>PSI/PMT</td>
<td>PSI/PMT</td>
<td>PSI</td>
<td>PSI</td>
<td>TM1</td>
<td>TM2</td>
<td>PMT</td>
<td></td>
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**PSI = Phosphorus Site Index**

**TM1 = Transition Management Phase 1**

**TM2 = Transition Management Phase 2**

**PMT = Phosphorus Management Tool**
### Phosphorus Management Tool

**Overview of How it Works**

**MANAGEMENT**

<table>
<thead>
<tr>
<th>PMT Risk Category</th>
<th>Transition Management Phase I</th>
<th>Transition Management Phase II</th>
<th>PMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>N-Based (not to exceed 3 Yr. C.R.)</td>
<td>3 Yr. Crop Removal</td>
<td>3 Yr Crop Removal</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>3 Yr Crop Removal P</td>
<td>2 Yr Crop Removal</td>
<td>1 Yr Crop removal</td>
</tr>
<tr>
<td>HIGH</td>
<td>1 Yr Crop Removal</td>
<td>50% of 1 Yr C.R.</td>
<td>No Addtl. P</td>
</tr>
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</table>
Next Steps- Soils Data

We will continue to target farms for Implementation Reviews, where we do not have soils data. This has and will continue to have a negative impact on our implementation compliance percentage.

We will begin random auditing for accuracy in case acreage was inadvertently missed during the reporting process.
Research Exemption Forms

Must have a specific objective and purpose
Support or supervision from the UM or qualified private company
Limited in the percentage of available cropland enrolled
Must follow the procedure outlined by the UM
Results to be shared with MDA
Limited participation to date, but this is an available opportunity

Example- One farm followed the N recommendation of PSI and Greenseeker, compared yield results, costs, and reached a conclusion, although different fields responded differently.
Anaerobic Digestion and Nutrient Management in MD.

What goes in... and what comes out.

Where does the end product go, what will it be used for?

How is the end product addressed, is it waste, manure, soil amendment?

Is there an opportunity for a regional digester and what are the benefits and concerns.

Beneficial re-use of waste water. If it has nutrients, we need to use it productively.

Any organic material applied to farmland must be tested and included in a NMP.

Financial feasibility. The NM Program does not require it and we do not want to be responsible for a farmer making an investment or commitment that does not work out.
Anaerobic Digestion and Nutrient Management in MD.

Nutrient Management Requirements for Maryland

There currently are no direct statements in NM Law regarding anaerobic digestion. Digestate can be applied to cropland according to a Nutrient Management Plan. A digester should be located on land with adequate acreage. A regional digester could be located on public land or commercial property. Concerns about bio-security and traffic. On-farm digesters, farmers are skeptical, it’s “buyer beware.” There seems to be the need for adequate financial cost-share incentives.
Anaerobic Digestion and Nutrient Management in MD.

Nutrient Management Issues - Benefits and any Potential Concerns

Digestion produces biogas and digestate

Bulk of material leaving digester is about 90%-95% of mass brought in

PAN - Nitrogen is more plant available after the digestion process

What about livestock, pasture and vegetables? Restrict digestate applications?

N losses - ammonia and leaching, leads to application method considerations
Anaerobic Digestion and Nutrient Management in MD.

Animal manures (dairy, beef, poultry, swine)
Food Processing Residuals (DAF from poultry, milk, potato)
Brewery Waste
Food Waste from fresh produce
Food Waste from uneaten food or plate waste
Crops grown for biogas production??
MD. Nutrient Management

Benefits/Reasons for Digestion

• Greatly reduce or eliminate odor from highly odorous manures and other organics
  This could be the future for land application of DAF from poultry plant processing
  Beneficial reuse of food waste

• Generation of biogas

  Nutrient Capture Systems

• Separation of phosphorous from poultry litter
• Keep litter for application close to where it is generated, reduce need for transport
• Meet a need for organic growers, use of litter on high P soils
• Transport removed P to deficient regions more efficiently
Anaerobic Digestion and Nutrient Management in MD.

Animal Waste Technology Fund Current Projects

Retrofit to an existing anaerobic digester. The system upgrade will provide all or most of the farm’s energy requirements. Also will convert more manure to solids to improve transportation to farms/fields where phosphorous can be better utilized.

Install a blending/bagging system at an existing anaerobic digester/nutrient capture system facility.

Both projects provide nutrient management benefits
Ammonia Loss By Injection Method
October 13, 2016
DeBaugh Farms

- Veenhuis Euroject: 4.0 Parts Per Million
- Vredo: 2.0 Parts Per Million
- Yetter: 1.5 Parts Per Million
- Surface Application: 20.0 Parts Per Million
Financial Benefit

Average Dairy Farm Manure

Total nitrogen 28 lbs. per 1,000 gallons
Organic nitrogen 17 lbs. per 1,000 gallons
Ammonia nitrogen 11 lbs. per 1,000 gallons

Ammonia nitrogen is available first year if not lost to volatilization. 11 x $0.76/lb. = $8.36/1,000 gals. A typical 6,000 gallon application could supply 66 lbs. of ammonia nitrogen at a value of $50.16.

Can you afford to lose $$$$ into the air?
Anaerobic Digestion and Nutrient Management in MD.

Practices and BMPs Needed in Addition to the Digester

Solids separation
- Liquid can be spray irrigated, land applied, or re-used for flushing barns
- Dried separated solids can be re-used as bedding material
- Composted separated solids can be field applied or sold as compost

Adequate storage for liquid and solids
- Winter spreading moratorium Dec. 16-March 1

Heavy Use Areas as needed
Funding Resources for New Environmental BMPs
MACS
(State Cost-Share Program)

Waste Storage Structures $200,000 limit
Heavy Use Area Protection $ 50,000 limit
Stream Crossing $ 50,000 limit
Watering Facility $ 50,000 limit
Fencing $ 50,000 limit
Spring Development $ 50,000 limit

Farm Limit-With Waste Storage $300,000
Farm Limit- Without WSS $150,000
Cover Crops, Manure Transport, Manure Incorporation and Injection.

New technology is evaluated and reviewed for efficiency benefits and new practices are added to the list for cost-share when deemed appropriate.

When a practice has gone beyond the assigned practice life, that funding is available for new practice installation.
EQIP
(Federal Funding)

Current Farm Limit is $450,000

Waste Storage Structures
Heavy Use Areas
Solids Separators
Roofed WSS
Roof Runoff

EQIP Projects are Competitive and Funds are Allocated Based on Calculated Benefit
Chesapeake Bay Trust Fund

Provides funding for contractual positions in SCD offices

Provides funds to MDA and SCD for conservation related work
Chesapeake Bay Trust Fund

Innovative Animal Manure Technology Demonstration

2014- $2,034,454 awarded in Projects
2015- $1,175,943 in Projects
2016- $1,750,302 in Projects
2018- $2,674,975 in Projects
Non-Traditional Sources

National Fish and Wildlife Grants
Conservation Innovation Grants (NRCS)
Chesapeake Bay Trust Pioneer Grant Program
Mid-Shore Riverkeeper Conservancy
Chesapeake Bay Foundation