Use of GeoBag for Phosphorus Removal

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What will be discussed:
• Choosing the right technology
• Use of chemicals
• Jar Test
• Effectiveness
• Positive and Negatives
• Alternatives

What is the Right Choice?
• Need to understand the farm operation
• What are the resource concerns?
• What is trying to be accomplished?
• What percentage of the nutrients need to be separated?

The archived presentation is available at:
https://articles.extension.org/pages/21819/chronological-webcast-archive
Chemicals To Enhance Solid-Liquid Separation For Geobag

1. Use of a variety of chemicals can increase concentration reductions of TS, VS, P to 70% to 90%.
2. Proper chemical rates will prevent geobag from plugging.
3. Cost of chemicals and proper injection are main concerns.
4. Land and containment cost should be considered in the economics.

Typical Chemicals Used

- Metal Salts
  - Alum
  - Aluminum Sulfate
  - Al2(SO4)3
  - Lime
  - Calcium Carbonate
  - CaCO3
- Ferric Chloride
- Ferric Sulfate

- Polymers
  - Natural
  - Synthetic

Treatment Tips

- High-molecular weight cationic polymers are typically the best performers with animal manures.
- Coagulants are commonly used to enhance mechanical solids separation process.
- Metal salts coagulants (Al & Fe) will form insoluble precipitants with soluble phosphorus in manure slurries.

Interparticle Bridging
### Jar Test Results

<table>
<thead>
<tr>
<th>Location</th>
<th>Nutrient</th>
<th>Influent mg/L</th>
<th>Geobag mg/L</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL</td>
<td>P2O5</td>
<td>2000</td>
<td>200</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>TKN</td>
<td>4900</td>
<td>1700</td>
<td>65%</td>
</tr>
<tr>
<td>NC</td>
<td>P2O5</td>
<td>304</td>
<td>108</td>
<td>64%</td>
</tr>
<tr>
<td></td>
<td>TKN</td>
<td>1012</td>
<td>574</td>
<td>43%</td>
</tr>
<tr>
<td>Virgin Is.</td>
<td>TKN</td>
<td>899</td>
<td>245</td>
<td>73%</td>
</tr>
<tr>
<td>(Aquaculture)</td>
<td>P2O5</td>
<td>670</td>
<td>156</td>
<td>77%</td>
</tr>
</tbody>
</table>
Livestock and Poultry Environmental Learning Community Webinar Series

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Aquaculture

- High phosphorus removal rate
- Moderate nitrogen removal rate
- Solids can be land applied or used for other applications
- Can be used for multiple animal types
- Relatively small footprint
- Dewatered without additional effort

Geobag Selection

**Positives**
- High phosphorus removal rate
- Moderate nitrogen removal rate
- Solids can be land applied or used for other applications
- Can be used for multiple animal types
- Relatively small footprint
- Dewatered without additional effort

**Negatives**
- Potential plugging of geobag
- Chemicals are costly
- System monitoring is necessary
- Geobag only has a one-time use
- Takes time for water to be removed

Geobag Variation

Dewatering Beds with porous tiles

NCA&T Senior Design Project