Overview of Manure Management Alternatives

Peter Wright
Professional Engineer
PRO-DAIRY
Department of Biological and Environmental Engineering at Cornell University
Future Predictions

All farms will have to consider environmental impacts of their operations.

Environmental considerations will become more and more detailed.
NYSERDA Objectives:

Improve:
   Environment
   Economics
   Energy
Incorporation of Manure

Environment
- Preserves Ammonia
- Balances N:P ratio
- Controls Odors
- Reduces Pathogen loss

Economics
- Less compaction
- More timely

Energy
- Reduced fuel use
Nutrient Ratios with Incorporation

Change in P and K With Ammonia Retention

<table>
<thead>
<tr>
<th>LB Nutrient</th>
<th>Incorporated</th>
<th>Broadcast</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>P</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>K</td>
<td>250</td>
<td>350</td>
</tr>
</tbody>
</table>
Economics to Drive Manure Treatment Technology

$500 feed value

$75 NPK value

$25 Fertilizer

$504 ($15/cu.yd)
Anaerobic Digestion

Environmental
  Reduced odors
  Reduced emissions
  Green power
  Nutrient management
Economics
  By-product production
  Co-digestion
Energy
  Use of biogas as heat or electricity
Synthetic Covers

Rigid (wooden or concrete) or flexible (plastic) covers hold gases and odors inside tank.

Most flexible covers float on the liquid surface.
Pathogens

Waterborne Pathogens from Agriculture

Cryptosporidium parvum
Giardia
Esherichia coli O157:H7
Campylobacter
Salmonella
Fecal Coliform data for digested dairy manure

- Raw Manure Farm A
- Digester Effluent
- Digested Separated Liquid
- Digested Separated Solids
- Digested Storage
What to look for

- Systems that may work in your situation

- Lessons learned
  Can they be applied to your system
  Can they be turned into opportunities
Cornell Goals

Document and Evaluate
Optimize
Value Added
Transfer Technology
Conclusions:

- Animal Agriculture does affect the environment
- There are opportunities to control that impact
- There are potential Win Win solutions
- More research is needed