Managing Manure In No-Till

Cover Crops Make the Difference
Consider the Economics

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Pa No-Till Alliance
I CAN’T NO-TILL BECAUSE I NEED TO TILL IN MY MANURE TO REDUCE THE LOSS OF NITROGEN!
Manure Management Economics

Costs to incorporate vs nitrogen savings

Economics of using cover crops with manure
Manure & No-Till Nitrogen Cost Comparison — per acre

Manure N applied = 250 lbs

- Incorporation in 1 day = 125 lbs N
  50%

- No incorporation = 50 lbs N
  20%*

- Difference is 75 lbs N lost @ 40 cents per lb = $30.00

*Note: some data shows higher amounts of N

Data from Penn State Agronomy Guide
Manure & No-Till Economics
Incorporation Costs

- Tillage incorporation to retain 50% Nitrogen
  - Minimum two passes such as plow disk or chisel disk
  - Must be done in one day for 50% savings
- 2009 Pa Custom Rates for tillage ave $18.00 per pass = total $36.00
At current prices it is cheaper to lose the nitrogen.

- As N costs increase this can change.

But!

- When was manure incorporated?
- Rainfall is cheap incorporation (.5”)

BOTTOM LINE
BOTTOM LINE (2)

- **Timeliness** – Did we delay planting
- **Labor** – Time lost to incorporate manure – did it delay corn planting
- **Use of additives to reduce N loss**
- **Lost value of no-till system if we till**
  (no-till must be continuous!)
- **Biological benefits of surface applied manure**
Nitrogen uptake by Corn

Uptake of Nitrogen by cover crops

<table>
<thead>
<tr>
<th>Jan</th>
<th>Mar</th>
<th>May</th>
<th>July</th>
<th>Sept</th>
<th>Nov</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn N Uptake</td>
<td>Cover N Uptake</td>
<td>Cover N Uptake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>Better</td>
<td>Best</td>
<td>Poor/OK</td>
<td>Poorest</td>
<td>No Cover</td>
</tr>
<tr>
<td>OK</td>
<td>Better</td>
<td>Best</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FALL APPLIED MANURE & COVER CROPS

- Efficiency without Cover Crop is 15-20% = 50 lb N
- Efficiency with Cover Crop = 40-50% = 115 lb N
- Nitrogen saved = 65 lb or $26

Data from PSU Agronomy Guide
Economics

IFSM Model for 100 cow dairy

<table>
<thead>
<tr>
<th>Method</th>
<th>Net Return, $/cow</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-till tilled</td>
<td>800</td>
</tr>
<tr>
<td>Broadcast</td>
<td>750</td>
</tr>
<tr>
<td>Band tilled</td>
<td>700</td>
</tr>
<tr>
<td>Disk tilled</td>
<td>650</td>
</tr>
<tr>
<td>High press. aeration</td>
<td>600</td>
</tr>
<tr>
<td>High press. injection</td>
<td>600</td>
</tr>
</tbody>
</table>
# Soil Loss Comparison

**Soil Loss Tons/Ac/Yr**  
**Manure Spring Applied**  
**CC = cereal rye harvested for silage**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Silage corn - chisel disk</th>
<th>Silage corn - no till</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without cover crop</td>
<td>12</td>
<td>4*</td>
</tr>
<tr>
<td>With cover crop - chisel disk</td>
<td>10</td>
<td><em>not a sustainable no-till system</em></td>
</tr>
<tr>
<td>With cover crop - no till</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
Manure & Cover Crops

No Till can be very successful with manure

- Manure can be an asset in the transition
- Tillage to incorporate manure costs money and takes valuable time

Cover crops are the key

- They save nitrogen
- They increase soil tilth and SOM
- They feed the microbes
- They reduce runoff and nutrient loss
Purpose of cover crop is to manage manure nutrients.

Considerations:
- Time of planting
- Final use of cover (harvest or kill)
- When is manure applied
- Holding nutrients (N) until it will be utilized by the corn crop
- Consider diversity
Timing of N Application
As near to crop use as practical

- **Cover N Uptake**
  - OK
  - Poor

- **Corn N Uptake**
  - Better
  - Best

- **Cover N Uptake**
  - Poor/OK
  - Poorest

Nitrogen uptake over time:
- January (Jan)
- March (Mar)
- May
- July
- September (Sept)
- November (Nov)
SUMMARY

The key to managing manure in no-till is the use of cover crops.
Infiltration and runoff are reduced.
N efficiency can be increased by 50%.
Soil compaction is decreased.
Soil microbial activity near the soil surface is increased.
Out of sight out of mind concept.
Tailor this system for YOUR operation.