Agricultural Conservation Practices

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Agricultural Conservation Agencies

IL Dept. of Ag - SWCD

- Technical Assistance to all landowners
  - Municipalities
  - Construction sites
- Local 5 member Board

USDA - NRCS

- TA to landowners and producers
  - $1000 per year
  - Conservation Plans for farms enrolled in Farm Subsidy Program

- Work to reduce soil erosion (associated nutrients)
- Conserve water resources (buffers, cons. tillage, streams stabilization)
- Education (conservation education to children & adults)
Ferson-Otter Watershed

Parcels in green are all the farms in the watershed. Producers come in to Farm Service Agency or FSA to register their Crops through the USDA.

- 35.8% Residential
- 33.5% Agriculture
- 8.58% Open Space
- 8.05% Vacant
- 5.17% Under Construction
- 3.5% Wetland
Conservation Practices

Kane Co Farms include:
- Row Crop
- Small Grain
- Dairy
- Horse Farms
Treatment Practices

- Grassed Waterway
- Terrace system
- WASCOB – water and sediment control basin
- Sediment basin (settling basin)
- Vegetative Filter Strip
- Waste Treatment Lagoon
- Composting Facility
- Constructed Wetland
Grassed waterway to reduce gully erosion
Terraces, WASCOBs, & Contour Farming
Managing Manure – waste storage

Environmental Quality

- Waste storage structures and lagoons
- Nutrient management plans
- Compost facilities
- Manure spreading

Incentive Program

- Treatment includes:
  - Separate solids from liquid
  - Dilution - to handle all waste as a liquid
  - Can reduce pollution potential of manure:
    - reduce nutrients
    - kill pathogens
Waste Treatment Lagoon

Operating levels of an anaerobic lagoon

- Creating of an operation and maintenance plan for anaerobic lagoon to get optimal drawdown levels
Waste Storage
Settling Basin

Settling Basin Cross Section
Vegetative Filter Strip

- Practice code 393A - EFOTG
- for 300 animal units or less
- Livestock facilities must have settling basin remove solids prior to runoff going to filter strip
- Stream buffers

Table 1. Minimum Flow Lengths for Vegetative Filters Utilizing Overland Flow and Having Various Slopes a/

<table>
<thead>
<tr>
<th>Slope (%)</th>
<th>Velocity (feet/sec.⁻¹)</th>
<th>Flow Length (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>0.04</td>
<td>290</td>
</tr>
<tr>
<td>0.75</td>
<td>0.05</td>
<td>360</td>
</tr>
<tr>
<td>1.0</td>
<td>0.06</td>
<td>435</td>
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<tr>
<td>1.5</td>
<td>0.07</td>
<td>505</td>
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<td>2.0</td>
<td>0.08</td>
<td>575</td>
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<tr>
<td>3.0</td>
<td>0.10</td>
<td>720</td>
</tr>
<tr>
<td>4.0</td>
<td>0.12</td>
<td>860</td>
</tr>
</tbody>
</table>

a/ Design flow depth is 0.5 inch. The assumed Manning’s roughness coefficient is 0.3.

Minimum flow length to give 2 hour contact time
Compost

Composting kills pathogens in manure
The surface flow wetlands cells are composed of an impervious layer to prevent leaching of the contaminants, a growing medium for wetland plants, wetland plants and dikes to contain the wastewater.
CNMP

6 elements

- Manure and Wastewater Handling and Storage
- Land Treatment Practices
- Nutrient Management
- Record Keeping
- Feed Management - optional
- Other Utilization activities - optional
Tank / Manure Spreader

This form of transport becomes an issue when fields are far from the manure source.
Manure spreading

Application may include:
- Surface applications
- Injection
- Irrigation

Pump

Drag Hose
Box Spreader
Side Slinger
Injection
Traveling Gun Sprinkler
Manure Testing

- Have manure analyzed for:
  - Total nitrogen
  - Ammonium-nitrogen
  - Phosphate
  - Potassium
| Waste and management                                      | 1  | 2  | 3  |  | 1  | 2  | 3  |  | 1  | 2  | 3  |
|----------------------------------------------------------|----|----|----| |   |    |    | |   |    |    |
| Fresh poultry manure                                     | 90 | 92 | 93 | | 80 | 88 | 93 | | 85 | 93 | 98 |
| Fresh swine or cattle manure                             | 75 | 79 | 81 | | 80 | 88 | 93 | | 85 | 93 | 98 |
| Layer manure from pit storage                            | 80 | 82 | 83 | | 80 | 88 | 93 | | 85 | 93 | 98 |
| Swine or cattle manure stored in covered storage          | 65 | 70 | 73 | | 75 | 85 | 90 | | 80 | 88 | 93 |
| Swine or cattle manure stored in open structure or pond   | 60 | 66 | 68 | | 75 | 85 | 90 | | 80 | 88 | 93 |
| (undiluted)                                               |    |    |    | |    |    |    | |    |    |    |
| Cattle manure with bedding stored in roofed area          | 60 | 66 | 68 | | 75 | 85 | 90 | | 80 | 88 | 93 |
| Effluent from lagoon or diluted waste storage pond        | 40 | 46 | 49 | | 75 | 85 | 90 | | 80 | 88 | 93 |
| Manure stored on open lot, cool-humid                     | 50 | 55 | 57 | | 80 | 88 | 93 | | 85 | 93 | 98 |
| Manure stored on open lot, hot-arid                       | 45 | 50 | 53 | | 75 | 85 | 90 | | 80 | 88 | 93 |
Other Requirements

- No application of manure on frozen or snow covered soil over 5% slope unless runoff is controlled e.g. terraces, notill
- No manure applied to cropland with > 15% slope
- No application within 200 feet of wells, sinkholes, or surface water
- In 10-year flood plain, application must be immediately incorporated or injected
Other Requirements

- Application cannot exceed crop removal rate of phosphorus when soil test P is > 300 lb/ac
  - for every 9 lbs. of phosphorus applied above crop needs, the soil test will build by 1 lb.

- A phosphorus risk assessment must be conducted for all fields receiving manure
  - include appropriate practices in plan
## Phosphorus Risk Assessment

<table>
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<tr>
<th>Risk Factor</th>
<th>Phosphorus Risk Potential</th>
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<tbody>
<tr>
<td></td>
<td><strong>Low</strong></td>
</tr>
<tr>
<td>Soil Erosion (RUSLE)</td>
<td>&lt;= T</td>
</tr>
<tr>
<td>Connectivity to Water</td>
<td>&gt; 1000 feet</td>
</tr>
<tr>
<td>Runoff Potential</td>
<td>Hydrologic A</td>
</tr>
<tr>
<td>Soil Test Phosphorus</td>
<td>&lt; 35 lb/ac</td>
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### Phosphorus Inputs

<table>
<thead>
<tr>
<th>Non-incorporated surface application</th>
<th>Incorporate or Inject &gt; 3&quot; deep</th>
<th>Incorporate &lt; 3&quot; deep</th>
<th>&lt;= UI recommendation</th>
<th>&gt; UI to 150% UI recommendation</th>
<th>&gt; 150% UI recommendation</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>All application rates</td>
<td>&lt;= UI recommendation</td>
<td>&gt; UI to 150% UI recommendation</td>
<td>&gt; 150% UI recommendation</td>
<td>&gt; UI recommendation</td>
</tr>
<tr>
<td>Risk Factor</td>
<td>Phosphorus Risk Potential</td>
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<td></td>
<td>Field 1</td>
<td>Field 2</td>
<td>Field 3</td>
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<tr>
<td>Soil Erosion (RUSLE)</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td></td>
<td></td>
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<tr>
<td>Connectivity to Water</td>
<td>Low</td>
<td>High</td>
<td>Med – High</td>
<td></td>
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<tr>
<td>Runoff Potential</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td></td>
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<tr>
<td>Soil Test Phosphorus</td>
<td>Med – 60</td>
<td>Med – 45</td>
<td>High – 100 - 240</td>
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<tr>
<td>Phosphorus Inputs</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
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</table>
How many acres of corn does a producer need to utilize manure from the following:

- 2000 grower pigs, ave. wt. of 180 lbs.
- 0.1 gallon of wash water per head per day
- Manure stored in waste storage pond
- Manure is applied by injection
- 150 bu. corn, 50 bu. soybeans (c-sb rotation)

How many acres to meet nitrogen needs?
How many acres to meet phosphorus needs of corn plus soybeans?
Step 1

2000 pigs \times 180 \text{ lb} = 360 \text{ animal units}

1000 \text{ lb/animal unit}
Step 2

From Table: “Estimation of Manure Production” - 1.00 ft³/day/AU

360 A.U. × 1.00 ft³/A.U./day × 365 days = 131,400 ft³

or 982,872 gallons (ft³ × 7.48)
Step 3

0.1 gallon wash water × 2000 head × 365 days =
73,000 gallons

Total manure = 982,872 + 73,000 =
1,055,872 gallons

round to 1,056 1000-gallon units
Step 4a

From Table: “Suggested Average Nutrient Content of Manure”

50 lbs. nitrogen per 1000 gallons
35 lbs. phosphorus per 1000 gallons

Nitrogen = 1056 \times 50 = 52,800 lb.

Phosphorus = 1056 \times 35 = 36,960 lb.
Example Swine Operation
What is a CNMP?

Comprehensive Nutrient Management Plan

- Unique to animal feeding operations
  - animals confined for at least 45 days in a 12 month period
- Both production and natural resource protection goals are achieved
  - soil and water resources to RMS level
CNMP’s Must be Developed by...

- Certified Specialists
  - Manure and Wastewater Handling Specialist
  - Nutrient Management Specialist
  - Land Treatment Specialist
Manure and Wastewater Handling and Storage

- Adequate collection, storage, and/or treatment of manure that allows application during favorable weather and compatible with crops
- 313 Waste Storage Facility
- 359 Waste Treatment Lagoon
- 634 Manure Transfer
- 561 Heavy Use Area Protection
Manure and Wastewater Handling and Storage

- Complies with laws and regulations
  - disposal of dead animals
  - disposal of animal medical waste
  - spoiled feed or other contaminants that may be regulated

- Emergency Action Plan that addresses spills and catastrophic events
Land Treatment

- Address soil erosion and water quality to RMS level
- Identify the potential for nitrogen and phosphorus losses from site
  - Phosphorus Risk Assessment
  - Plan appropriate practices
- Document setbacks on map
  - wells, streams, sinkholes, water supplies, etc.
- Document soils information with limiting features
  - sandy or shallow soils, organic soils with high water table, etc.
Nutrient Management

- Cropping sequence, yields
- Soil tests
- Manure tests
- Waste utilization plan
Record Keeping

- Annual manure tests
- Application records
- Nutrient application equipment calibration
- Crops planted
- Storage structures
  - dates and levels of emptying
  - discharge or overflow events
- Transfer of manure to third parties
### Field Application Record

<table>
<thead>
<tr>
<th>Field ID</th>
<th>Acres Receiving Manure</th>
<th>Which Manure Storage?</th>
<th>Application Method\footnote{Application methods: use following code if desired: B = Broadcast, no incorporation or incorporated more than 12 hours after application; BI = Broadcast, incorporated within 12 hours; K = Knife injected; S = Sweep injected; I = Irrigated}</th>
<th>Quality\footnote{T = Top, M = Middle, B = Bottom, A = Agitated}</th>
<th>Rate gal/ton per acre</th>
<th>Number of Loads</th>
<th>Wind Direction</th>
<th>Date</th>
<th>Time</th>
<th>Hauler Initials</th>
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\footnote{T = Top, M = Middle, B = Bottom, A = Agitated}
Feed Management - optional

- Manipulate nitrogen and phosphorus in animal’s diet
  - 1999 study on dairy: reduce 15-30% N and 20% P
- Highly Available Phosphorus (HAP) corn
  - 2000 study showed P excretion reduced 37% in hogs
- Phytase added to feed
  - reduced P excretion 25-54%
Other Utilization activities - optional

- Energy production - methane
- Incineration
- Compost/Pelletize - sell
Programs to Cost Share Conservation

**SWCD**

- Programs:
  - CPP – ag practices
  - CPP – well Sealing
  - CPP – rain gardens, windbreaks etc.
  - SSRP – stream restoration
  - CREP – state-side cons reserve enhancement

**NRCS**

- Programs:
  - WHIP – wildlife habitat
  - EQIP – enviromental quality
  - FRPP – farm-ranchland
  - CRP – cons reserve
  - CSP – cons security
  - CREP – cons reserve enhancement