Agricultural Conservation Practices

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Agricultural Conservation Agencies

IL Dept. of Ag - SWCD

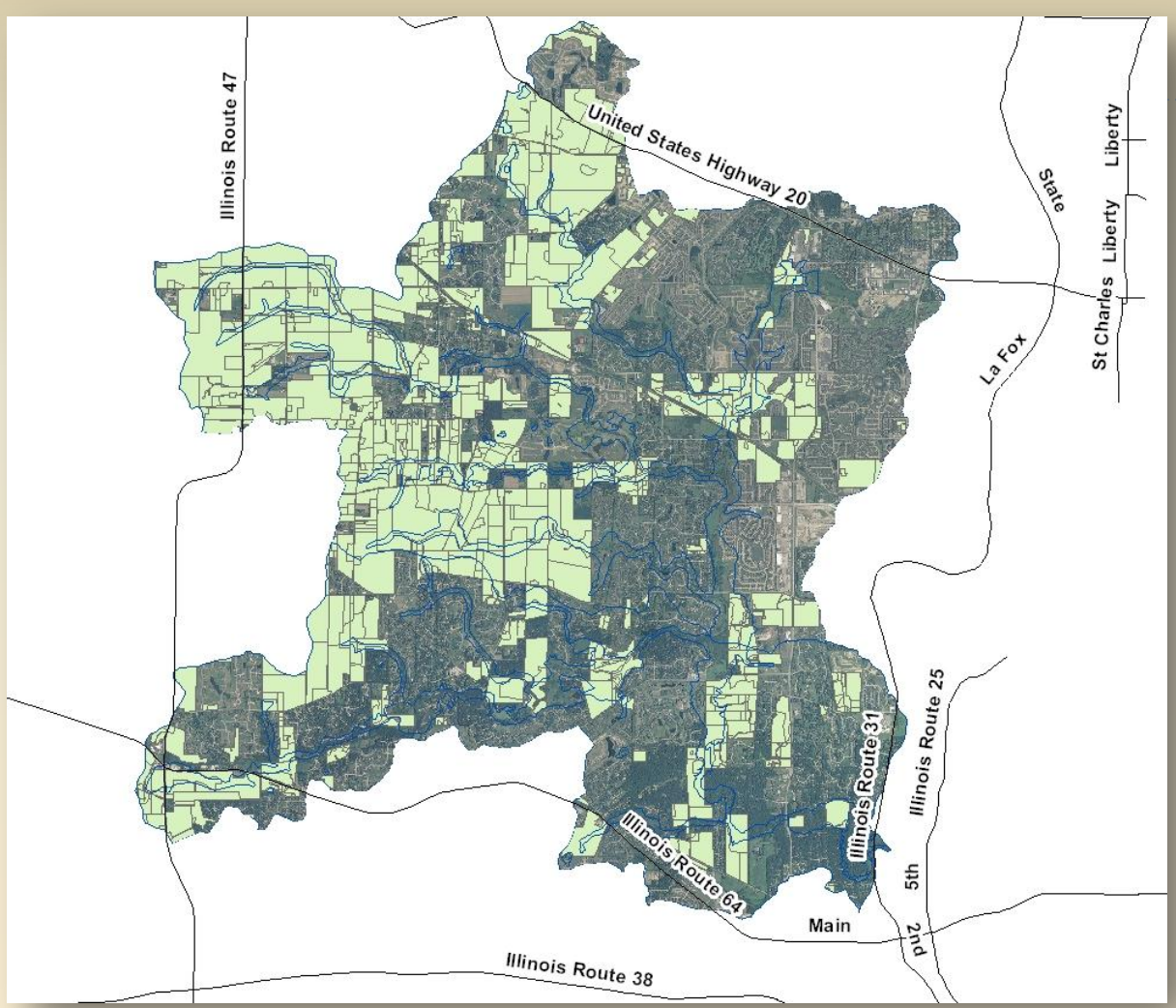
- Technical Assistance to all landowners
  - Municipalities
  - Construction sites
- Local 5 member Board

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

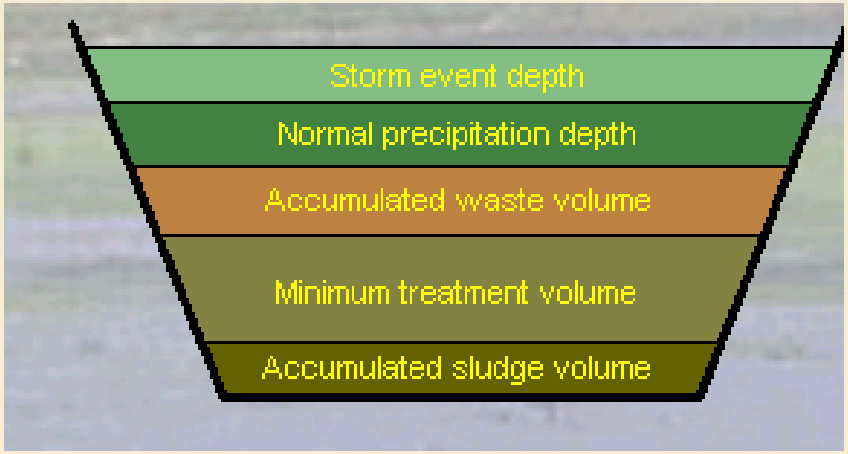
Incentive Program

- 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

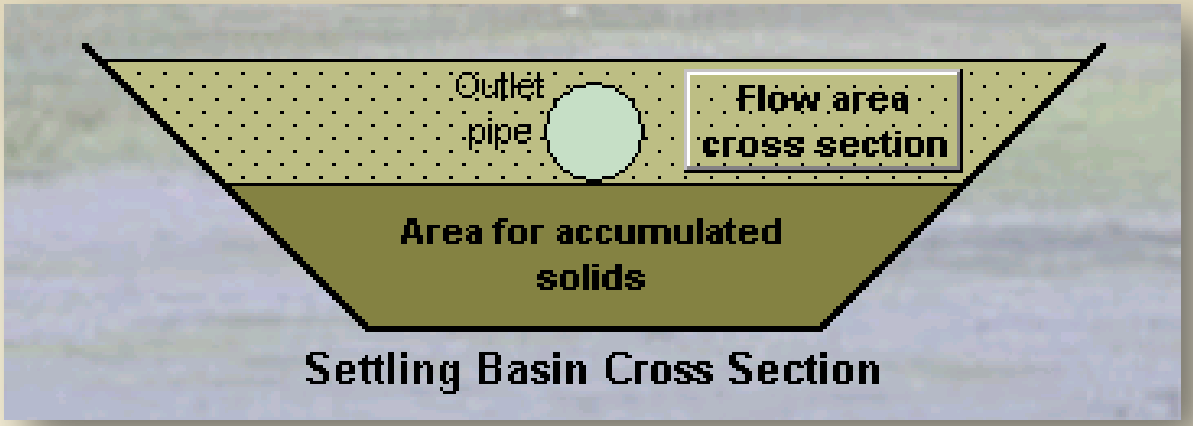
Operating levels of an anaerobic lagoon

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



Waste Storage

Settling Basin



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/

Slope %	Velocity (feet/sec.$^{-1}$)	Flow Length (ft.)
0.5	0.04	290
0.75	0.05	360
1.0	0.06	435
1.5	0.07	505
2.0	0.08	575
3.0	0.10	720
4.0	0.12	860

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

Constructed Wetland

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.

Surface flow Constructed Wetland Cell Section

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

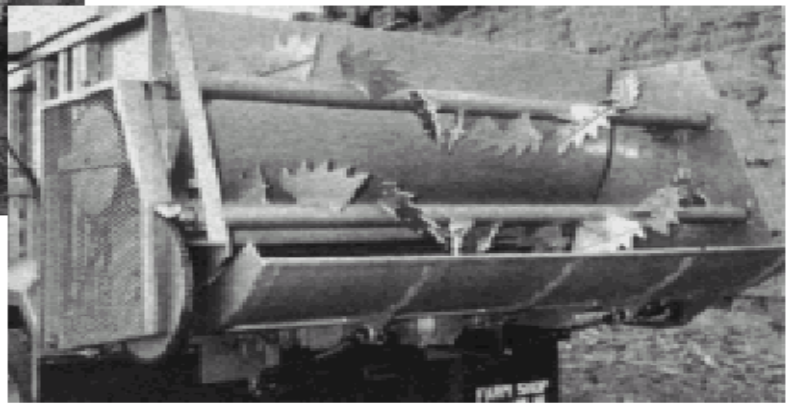
Manure spreading

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

Mineralization Rates
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Table 11–9 General mineralization rates for nitrogen, phosphorus, and potassium*

Waste and management	Years after initial application								
	1	2	3	1	2	3	1	2	3
	Nitrogen			Phosphorus			Potassium		
	Percent available (accumulative)								
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 (undiluted)	60	66	68	75	85	90	80	88	93
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

Risk Factor		Phosphorus Risk Potential		
		Low	Medium	High
Soil Erosion (RUSLE)		<= T	> T to <= 2T	> 2T
Connectivity to Water		> 1000 feet	200-1000 feet	< 200 feet
Runoff Potential		Hydrologic A	Hydrologic B	Hydrologic C & D
Soil Test Phosphorus		< 35 lb/ac	35-70 lb/ac	> 70 lb/ac
Phosphorus Inputs	Incorporate or Inject > 3" deep	All application rates		
	Incorporate < 3" deep	<= UI recommendation	> UI to 150% UI recommendation	> 150% UI recommendation
	Non-incorporated surface application		<= UI recommendation	> UI recommendation

Phosphorus Risk Assessment

Risk Factor	Phosphorus Risk Potential		
	Field 1	Field 2	Field 3
Soil Erosion (RUSLE)	Low	Medium	Low
Connectivity to Water	Low	High	Med – High
Runoff Potential	High	High	High
Soil Test Phosphorus	Med – 60	Med – 45	High – 100 - 240
Phosphorus Inputs	Low	Low	Low

Example Problem

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

$$\frac{\text{2000 pigs} \times \text{180 lb}}{\text{1000 lb/animal unit}} = \text{360 animal units}$$

Step 2

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

360 A.U. X 1.00 ft3 / A.U. / day X 365 days =

131,400 ft3

or 982,872 gallons (ft3 X 7.48)

Step 3

0.1 gallon wash water X 2000 head X 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"

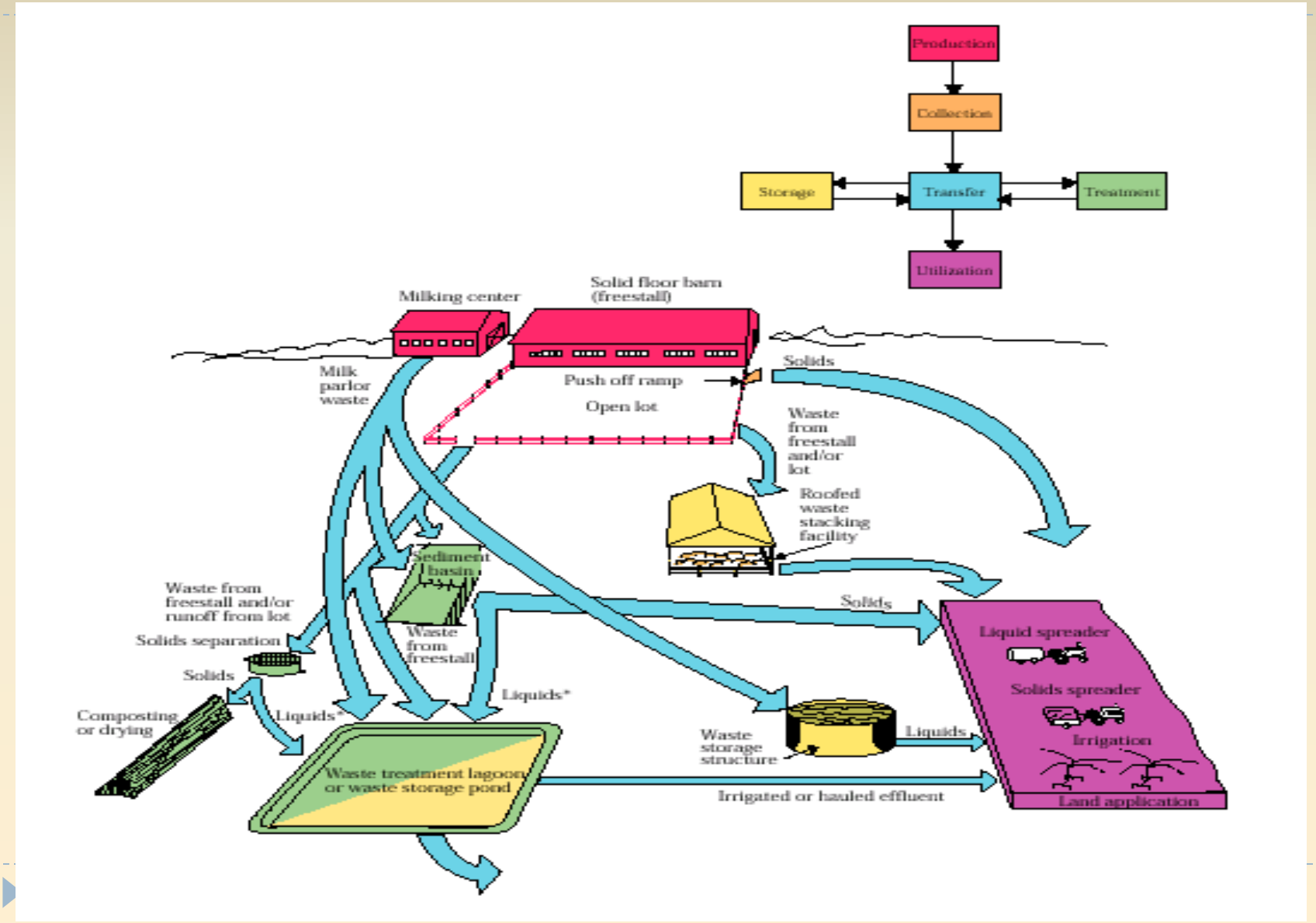
50 lbs. nitrogen per 1000 gallons

35 lbs. phosphorus per 1000 gallons

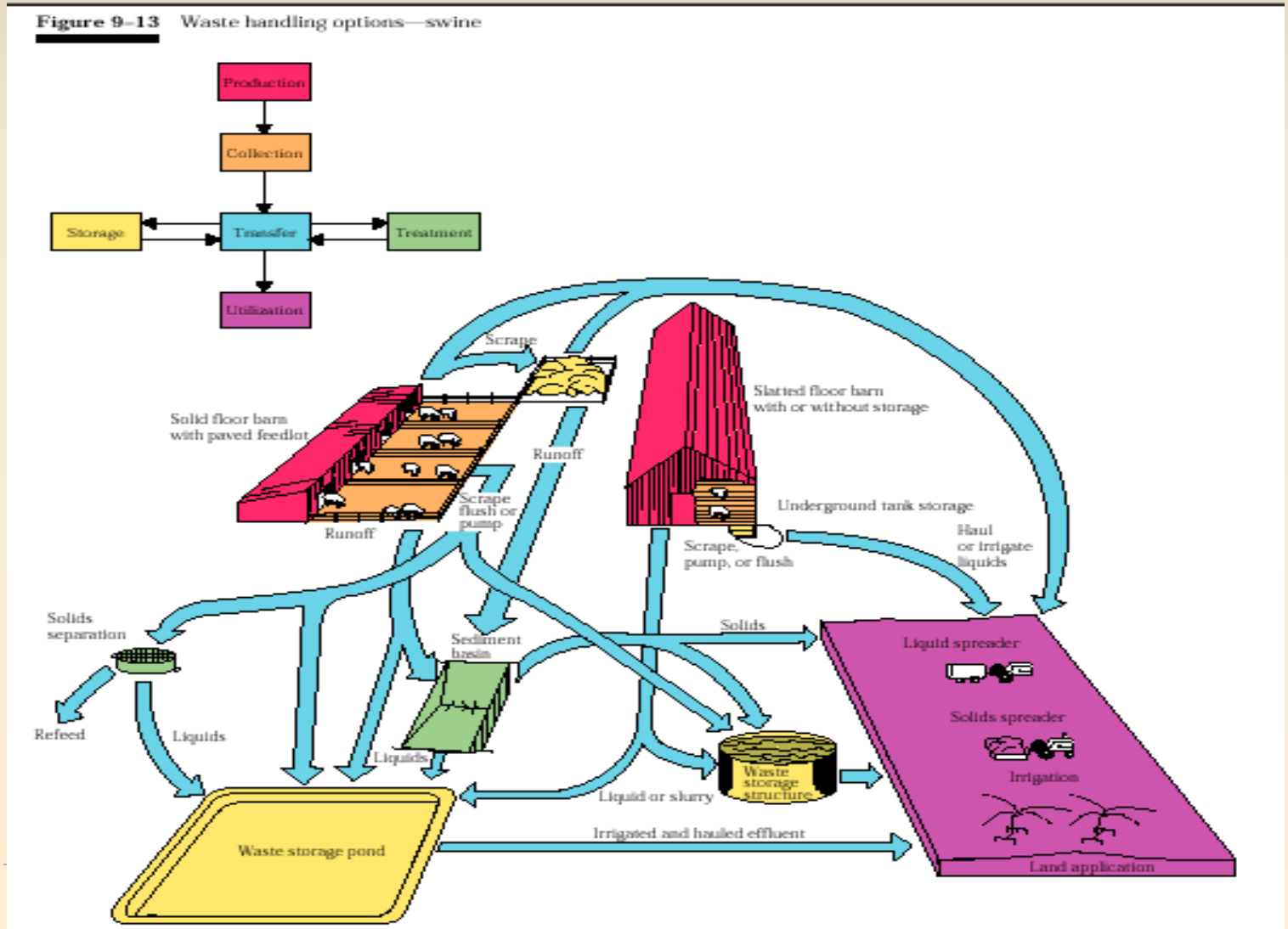
Nitrogen = 1056 X 50 = 52,800 lb.

Phosphorus = 1056 X 35 = 36,960 lb.

Example Dairy Operation



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

Record Keeping

Form 15-A

Year:_____

Field Application Record

Field ID	Acres Receiving Manure	Which Manure Storage?	Application Method[1]	Quality[2]	Rate gal/ton per acre	Number of Loads	Wind Direction	Date	Time	Hauler Initials

[1] 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

[2] 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
- Phtytase added to feed
  - reduced P excretion 25-54%

Other Utilization activities - optional

- Energy production - methane
- Incineration
- Compost/Pelletize - sell

Programs to Cost Share Conservaiton

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