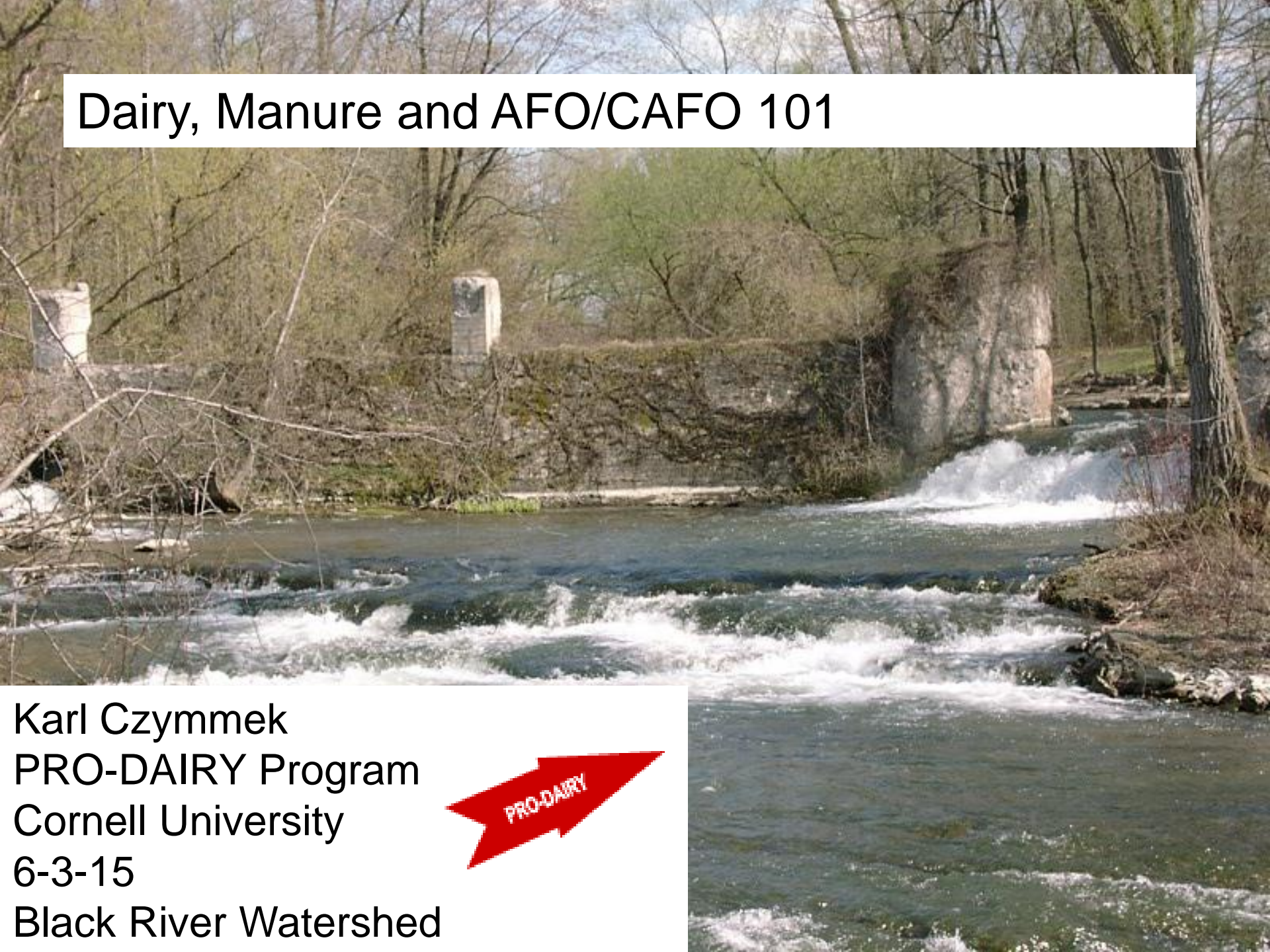


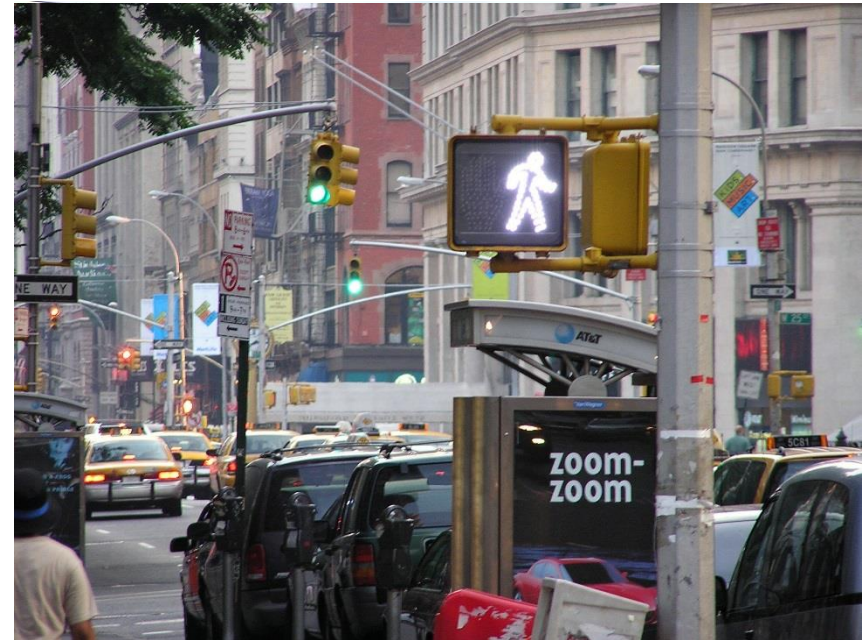
Dairy, Manure and AFO/CAFO 101

Karl Czymmek
PRO-DAIRY Program
Cornell University
6-3-15
Black River Watershed



Can you believe it?

- EPA estimates that >850 billion gallons of raw, untreated waste is discharged into surface waters each year! (USEPA, 2004)
- More than 27 billion gallons in NYS alone (Riverkeeper.org)



Mu

nge

- Tension:
 - Odor vs wa
 - Air vs Water
 - Surface Wa
 - N vs P
 - Pathogens
 - Costs
 - Homeowne
 - Municipal



Why dairy cows in NY?

- Sustainable water supply
- 3-4' annual precip
 - excess most years
 - fairly even distribution
- Cool climate
- Good for cows
- Good for forage production
- Good land base



What is manure?

- Urine plus feces of the cows
- 80-90% or more water
- Most from the cow, plus varying amounts of spilled drinking water, milking center washwater, rainwater
- Bedding material
 - Sawdust, recycled paper, straw, chopped hay, sand

Forms of manure

- Liquid/slurry
- Usually from milking cows
- Often includes milking center washwater
- Pumpable
- May be odorous (storage)



Forms of manure

- Semi-solid/solid
- Separated solids
- Heifers/dry cows
- Bedded pack
- Conventional barns where more solid bedding is used
- Must scoop/bucket
- Different spreaders
- May or may not stack well
- Often daily spread



Nutrient Management Basics

- Fertilizers are labeled:
%N - %P₂O₅ - %K₂O
- A 20-5-10 means that the product contains, *by weight*.
 - 20 percent N
 - 5 percent P₂O₅
 - 10 percent K₂O
- Many options available
- Manure contains critical nutrients
- Manure challenges:
 - N-P-K ratio
 - Low density/bulk
 - Cannot afford to haul long distances



Did you know?

- Under New York law, phosphorus-containing fertilizer may only be applied to lawn or non-agricultural turf when:
- A soil test indicates that additional phosphorus is needed for growth of that lawn or non-agricultural turf; or
- The fertilizer is used for newly established lawn or non-agricultural turf during the first growing season.

NMP: Accounting for nutrients

- Know:
 - nutrient levels in the soil (soil test by field)
 - how much manure is produced
 - manure nutrient content (manure test by source)
 - N credits from
 - soil OM
 - sod plowdown
 - legumes (eg soy)
 - past manure
 - Calculate application rates

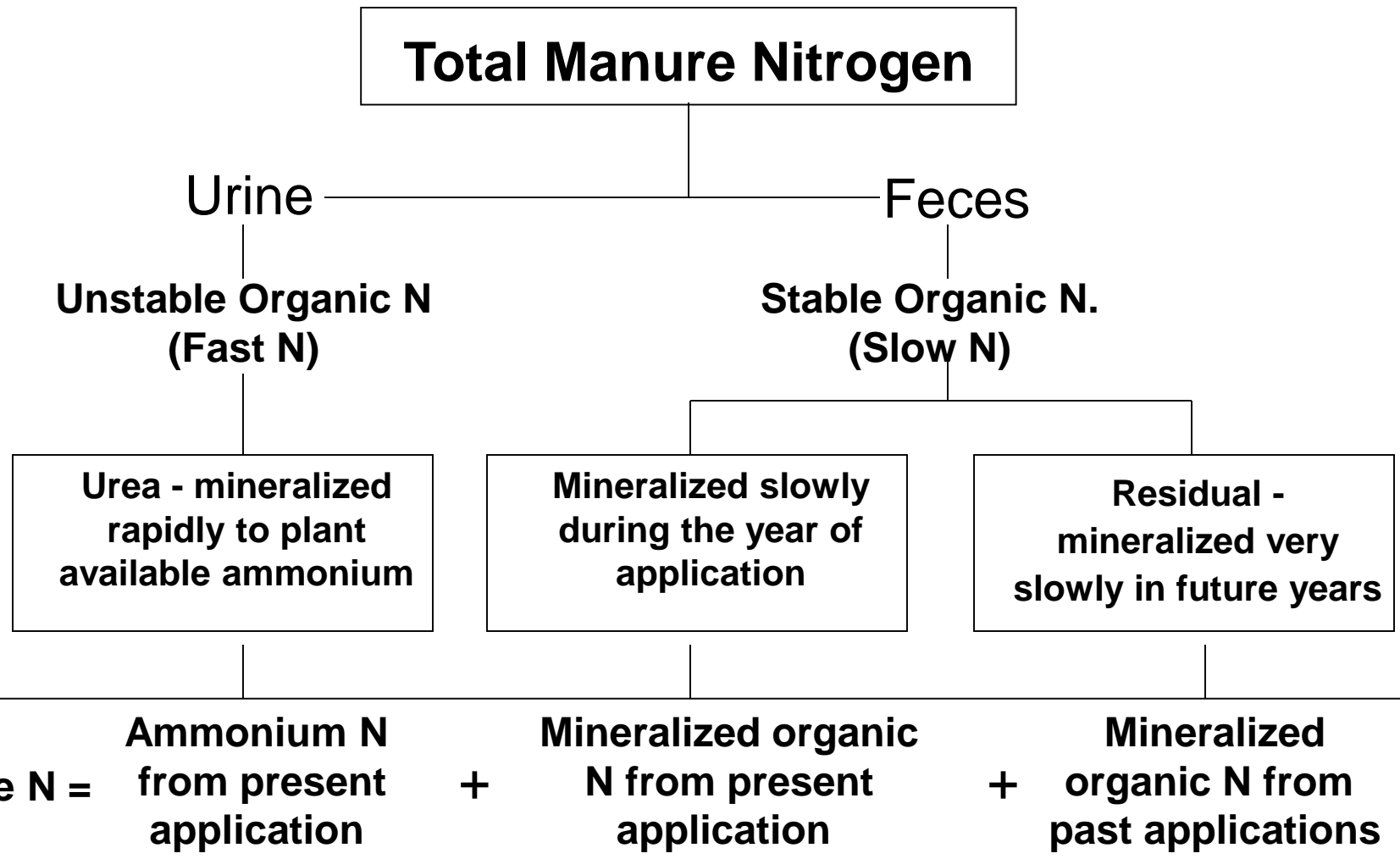
Manure Nutrient Availability

N credits from manure are based on:

- Initial nutrient content
- Current applications
- Past applications
- Time and method of application
 - Spring versus fall application
 - Incorporation versus surface application



Form and degree of nitrogen availability in manure



Nutrient Management Basics

- Two key ingredients for proper manure management:
 - Manure and land base need to be in balance
 - Then within the farm, good practices and decisions need to be made
- Nationally and globally, not all livestock farms are balanced
- Stocking density and linking manure application to crop need are key issues
 - NY CAFO regs require balance and proper practices!



How do farm practices protect water quality?

Some examples of the agricultural practices that protect water quality include:

Manure Storage Systems

Storing manure until conditions are appropriate for field application protects water bodies from manure runoff.



Construction of an agricultural waste system.

Ontario State

New York State
Soil & Water
Conservation Committee

10B Airline Drive
Albany, NY 12235
(518) 457-3738
www.nys-soilandwater.org

New York State
GRANT FUNDING
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**AGRICULTURAL
ENVIRONMENTAL
MANAGEMENT**

Barnyard Runoff Management Systems



Diverting rainwater from the barnyard keeps manure and other substances from washing into nearby streams. This prevents NPS pollution, keeps the barnyard dryer, and improves herd health.

Ontario State

Construction of a barnyard runoff management system.



For more information
contact your County
Soil & Water
Conservation District

Short-Duration Grazing Systems

Planting forage and rotational grazing maximizes production while reducing nutrient and sediment runoff. Alternative water supplies eliminate the need for livestock to enter water bodies.



Completed short-duration grazing system.

Barr. Ellivert, WIS. State

Stream Crossings and Fencing



Installing fencing around streams and ponds minimizes livestock contact with water, which protects and improves water quality.

USDA NRCS

Completed stream crossing.

Voluntary Program:

Self-assessment
Implement as time and \$ allows
Many thousands of farm
participants statewide
All farm types



AGRICULTURAL
Water Source
& Control
PROGRAM

CAFO Regulatory Program

- Animal Feeding Operation or AFO: any location where animals are housed for 45 days per year in a barn or barnyard area (where grass does not grow)
- Concentrated Animal Feeding Operation or CAFO: any AFO location with more than 300 milking cows (medium CAFO) or 700 milking cows (large CAFO)
- CNMP: Comprehensive Nutrient Management Plan. Farmstead and field management plan to protect water quality.



CAFO FINAL RULE - LARGE CAFO THRESHOLDS

| Animal Type | Large CAFO |
|---|--|
| Dairy Cows | 700 |
| Heifers | 1,000 |
| Veal Calves | 1,000 |
| Beef Cattle | 1,000 |
| Swine | 2,500 (55 lbs or more) 10,000 (under 55 lbs) |
| Horses | 500 |
| Sheep or Lambs | 10,000 |
| Turkeys | 55,000 |
| Chickens, liquid manure | 30,000 |
| Chickens, other than a liquid manure system | 125,000 (not laying hens) 82,000 (laying hens) |
| Ducks | 30,000 (except liquid manure system) 5,000 (liquid manure system) |

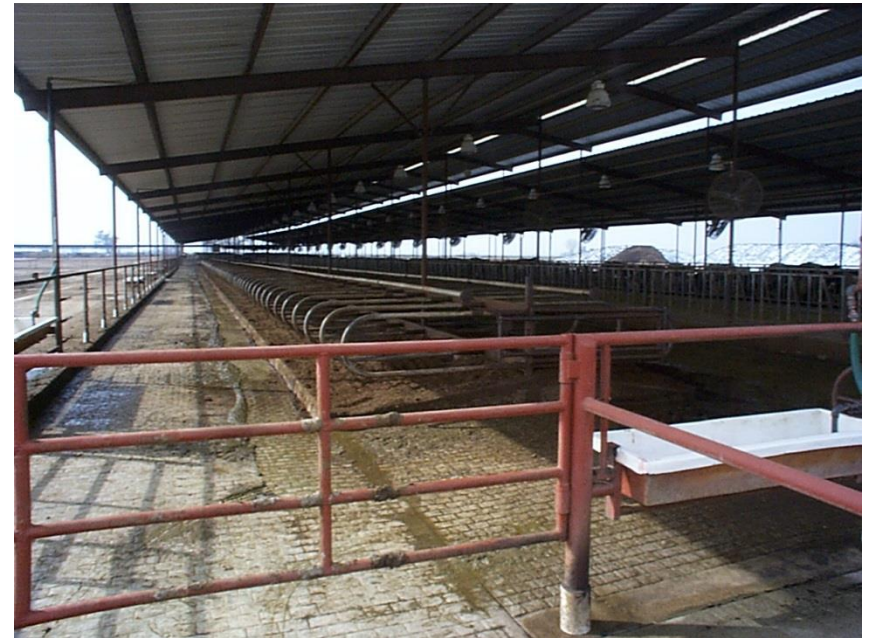
CAFO FINAL RULE - MEDIUM CAFO THRESHOLDS

| Animal Type | Medium CAFO |
|---|---|
| Dairy Cows | 200 - 699 |
| Heifers | 300 - 999 |
| Veal Calves | 300 - 999 |
| Beef Cattle | 200 - 999 |
| Swine | 3,000 - 9,999 (under 55 lbs) |
| Horses | 150 - 499 |
| Sheep or Lambs | 3,000 - 9,999 |
| Turkeys | 16,500 - 54,999 |
| Chickens, liquid manure | 9,000 - 29,999 |
| Chickens, other than a liquid manure system | 37,500 - 124,999 (not laying hens) 25,000 - 81,999 (laying hens) |
| Ducks | 10,000 – 29,999 (except liquid manure system) 1,500 – 4,999 (liquid manure system) |

NY Regulates Medium CAFOs too

NY CAFO Permit

- Pollution control
- Point source: No discharge from farmstead
- NPS: manage fields and manure application
- USDA Standards and Land Grant Guidelines
- Exceeds fed
 - Certified planner
 - Medium cafo's
 - Erosion control
 - PE certification/inspection



NY CAFO Plan, follows NRCS standards, prepared by 3rd party certified planner for:

Farmstead Areas

- Bunk silo/Feed Storage runoff
- Milking center
- Barnyards
- Manure Handling and Storage
- Mortalities
- Record keeping

Field Areas

- Land Application of Manure & Fertilizer
 - Land grant guidelines
 - Frequent soil and manure tests
 - Spreading setbacks
- Soil Conservation practices (in some)
- Record keeping

Engineered Manure Storage/Handling



Bunk Runoff



Milking center washwater



Barnyard runoff



Mortality Handling



Field Buffers



Manure application setbacks: 15' (incorporated), 35' (vegetated buffer) or 100' (row crop) from “waters of the state”

Other practices

- Cover crops
- Grass waterway
- Etc
- Are often recommended and may be required in some situations



Manure/Nutrient Management Plan for all fields

- Rate, placement and timing for
 - Manure
 - Fertilizer
- Based on crop need
- No discharge to water



Recordkeeping

- Rainfall
- Weather conditions during application periods
- Manure and fertilizer rates/timing, Crop history, etc

Wells

- CAFO: 100' setback
- More if necessary to protect
- Dug well?
- Spring?
- Drilled well properly installed and maintained???
- Where are they?
- Zoning rules?
Enforcement?



Manure storage:

- USDA-NRCS standards
- Requires PE design and “as-built” certification
- Dictates clay content or liner, berm compaction, sideslope, separation distance from bedrock and groundwater, O&M, etc.
- USDA Standards ensure that properly designed and constructed manure storages do not fail.



Why Manure storage?

- Winter 2014
- Winter 2015
- Industry recognizes need for more storage



Why is stored manure pungent?

- Naturally occurring microbes
- Thrive in anaerobic environment
- Create odorous compounds
- So, this BMP creates another problem: odor
- Many farms shift to direct placement in the soil-injection or incorporation



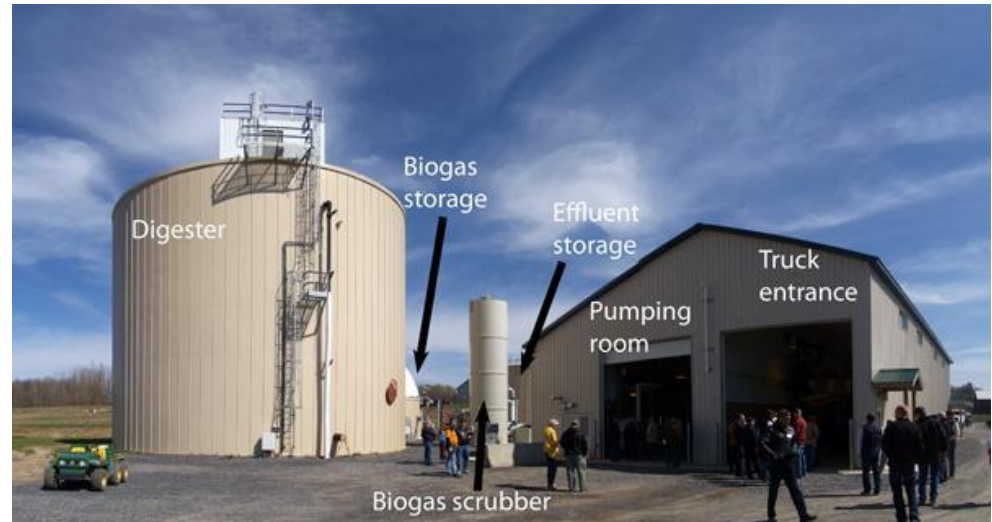
Why satellite storage?

- Manure is mostly water
- Bulky and costly to haul
- NMPs require broad distribution according to crop need
- Getting manure to land base in off-season
- Allows rapid distribution when spring hits
- Optimal for direct injection with drag hose system



What about Anaerobic digestion?

- Methane generated from manure
- Manure NOT converted to gas
- Odor control
- Reduce GHG emissions
- Nutrients conserved
- Volume mostly conserved
- Challenging economics
- Can be part of a solution



Bottom Line:

- 1) farms need to be in balance so that nutrients can be recycled
- 2) farms need to use BMPs to reduce risk of loss, even when in balance
- 3) manure storage plays a critical role in reducing risk
- 4) NY CAFO Permit drives 1-3.

Web Resources

- <http://www.dec.ny.gov/permits/6285.html>
- <http://www.agmkt.state.ny.us/SoilWater/aem/index.html>
- <http://nmssp.cals.cornell.edu/>
- <http://www.ny.nrcs.usda.gov/technical/practices/index.html>

Questions?

