

What Are We To Do With All Of This Stuff?

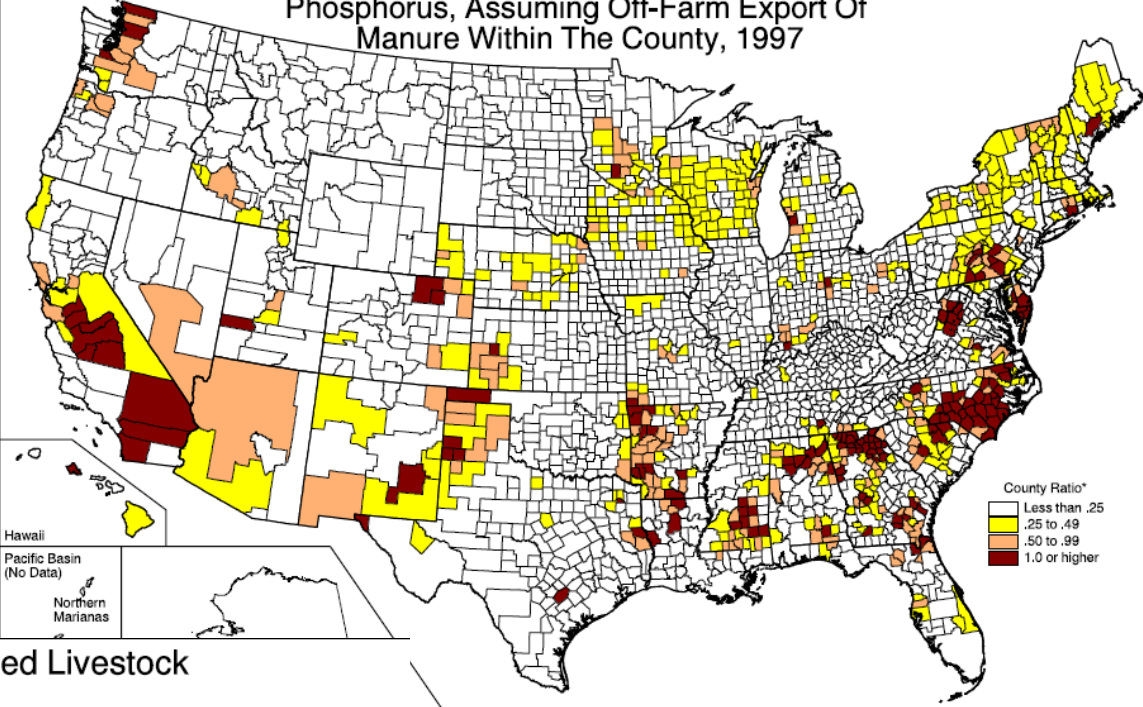
A photograph of a large farm complex. In the foreground, there is a field of green and yellowing corn. Behind the cornfield, there are several long, low buildings with light-colored walls and dark roofs. A red truck and a blue truck are parked in front of one of the buildings. In the background, there are rolling hills under a clear sky.

Jeff Porter,
Environmental Engineer
USDA-NRCS
FPPC Technology Summit
St. Petersburg, FL
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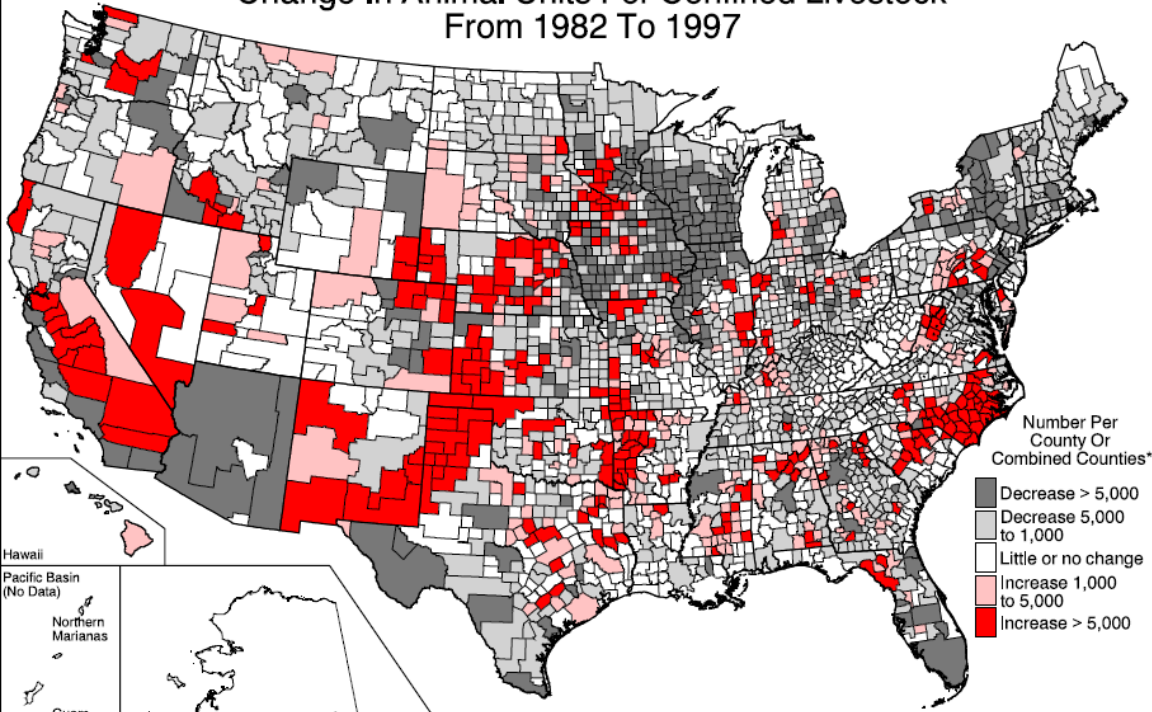
What is the problem?

Excess Nutrients
Too Many Animals

Ratio of Manure Available For Land Application To Assimilative Capacity For Phosphorus, Assuming Off-Farm Export Of Manure Within The County, 1997



Change In Animal Units For Confined Livestock From 1982 To 1997



Distribution
and proper
utilization of
nutrients!!!

How To Decide

- Landowner Goals and Objectives
- Regulatory Requirements
- Operational Size
- Operation Type
- Available Application Area
- Required Application Area
- Distance From Water Bodies
- \$\$

Manure Management Options

- Agronomic Practices
 - Land Application
 - Cover Crops
 - Crop Rotation
- Biological
- Chemical
- Physical
- Other



Land Application

- Currently only 5% of cropland receives manure application
- Still very important option
- Utilize when possible
- Importance of soil quality, crop requirements and manure tests
- Using some of the other options might increase land application base

Traveling Gun



Injection System

Solid Manure Spreading



Cover Crops



Crop Rotations

Biological

- Anaerobic Digestion
- Aerobic Treatment
- Anaerobic Treatment
- Composting



Complete Mix



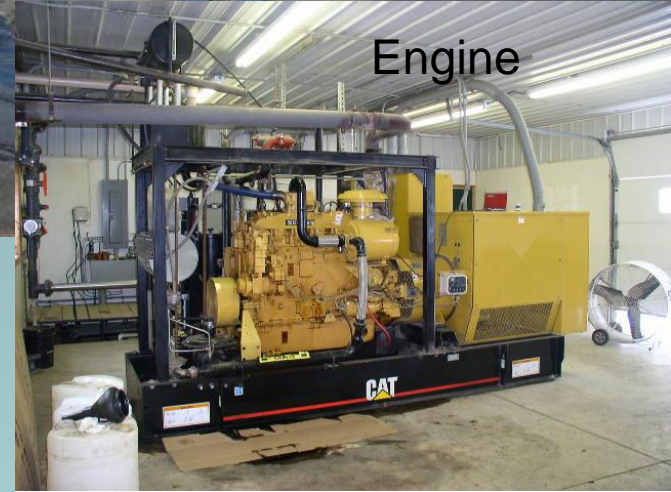
Covered Lagoon



Plug Flow



Engine



Boiler



Lagoon



Dual System



Windrow



Rotary Drum



Marketable Product



Passive Aeration

08 8 30

Chemical

- Coagulation/Flocculation
- Manure Amendments
- Thermo-chemical



Polymer

Kemira
SUPERFLOC® 4512 Flocculant

169425217

WARNING!
 CAUSES SKIN IRRITATION
 MAY CAUSE EYE IRRITATION

Colorless polyacrylamide in water and emulsion

AMERICAN WATER
 17TH AARON VOSS
 3100 SOUTH LEWIS BLVD
 SIOUX CITY IA 51108 USA
 234005-1

PO# 50109

Avoid contact with eyes. Remove clothing. Wash thoroughly with soap.

19337-333

First Aid: If involved, get a physician immediately. Only those familiar with the instructions of the physician should give anything by mouth to an unconscious person.
 Skin Contact: Wash with copious amounts of water. Wash immediately with plenty of water. Do not breathe vapors or dust.
 Eye Contact: Flush immediately with plenty of water for at least 15 minutes. Remove contact lenses, if available. Do not rub the eyes. Get medical attention if irritation persists.

Precautions: Spills of this product are very slippery. Spills should be soaked up or wiped up immediately with a spill area treated with water.

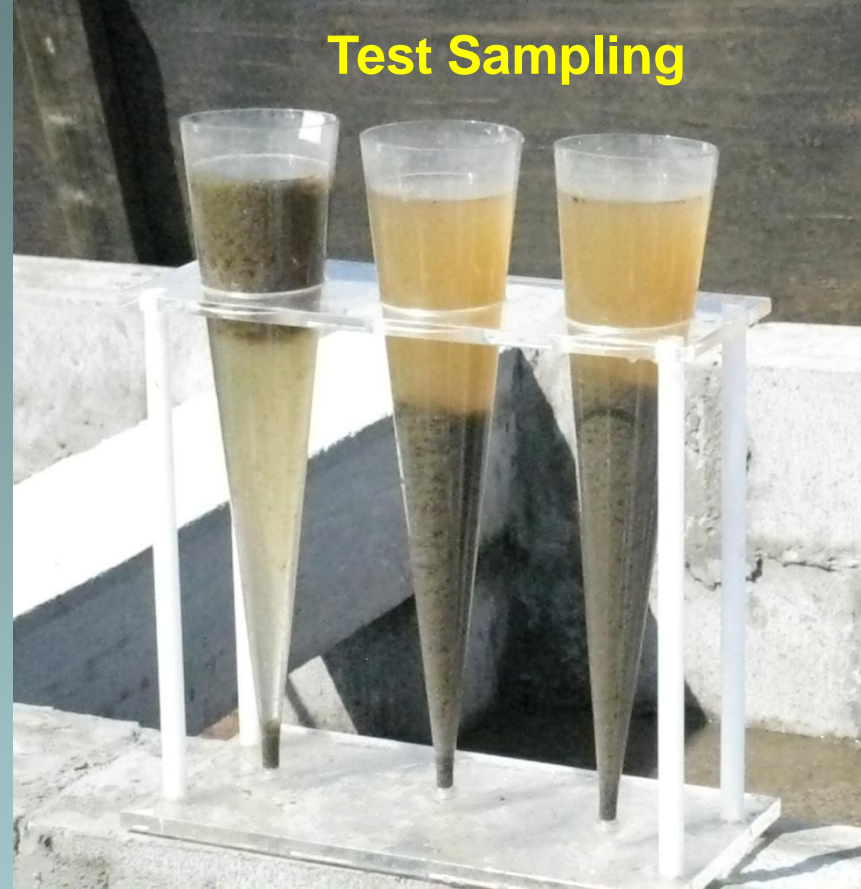
The following components of this product are listed in accordance with RCRA-Subpart I

443-90-1 Component
 8412-41-8 Polystyrene chloride butadiene copolymer
 8412-41-9 Chloroacrylonitrile butadiene copolymer
 712-74-0 Hexane
 7198-82-9 Polyacrylamide
 801-48-1 Methyl alcohol
 8002-63-5 Sodium Chloride
 8412-26-4 Acrylamide EW 50

When handling this material, wash thoroughly with soap and water. Wash immediately with plenty of water. Do not breathe vapors or dust.

Superfloc 4512 is a polyacrylamide derivative. It is a white powder. It is a non-toxic, non-hazardous material. It is a non-toxic, non-hazardous material. It is a non-toxic, non-hazardous material.

Test Sampling



Treated Dairy Manure

Ferric Sulfate

KEMIRA WATER
 316 BARTOW MUNICIPAL AIRPORT
 BARTOW, FL 33830
 (800)879-6353 Fax: (785)842-3150

HAZARDOUS
 CAUSES EYE BURNS, MAY CAUSE
 AND GASTROINTESTINAL IRRITATION.
 HARMFUL IF SWALLOWED.

Do not swallow.
 Avoid contact with skin, eyes and clothing.
 Do not breathe product mist.
 Do not inhale dust.
 Wash thoroughly after handling.
First Aid:
 In case of contact:
 Skin: Flush with water for 15 minutes.
 Contact physician if irritation occurs.
 Eyes: Immediately flush with running water for at least 15 minutes. Hold eyelids apart during washing. Contact physician immediately.
 If swallowed:
 Treat as a corrosive liquid. Do not induce vomiting; drink large quantities of milk or water. Get immediate medical attention.
 If inhaled:
 Remove to fresh air. If not breathing apply artificial respiration. Get medical attention for irritation or other symptoms.
 In case of fire:
 Never use self-contained positive pressure breathing apparatus. Product does not burn, but may decompose at 500 degrees Fahrenheit releasing toxic sulfur oxides.
 In case of spill:
 Wear proper protective equipment. Do not allow material into streams or other bodies of water. (See Spill/Leak/Spill or Spill and Response with time, spill kit or Calcium bicarbonate. Remove to approved facility).
 AVOID CONTACT WITH METAL.
 24 HR EMERGENCY CHEMTRAC 800-424-9300

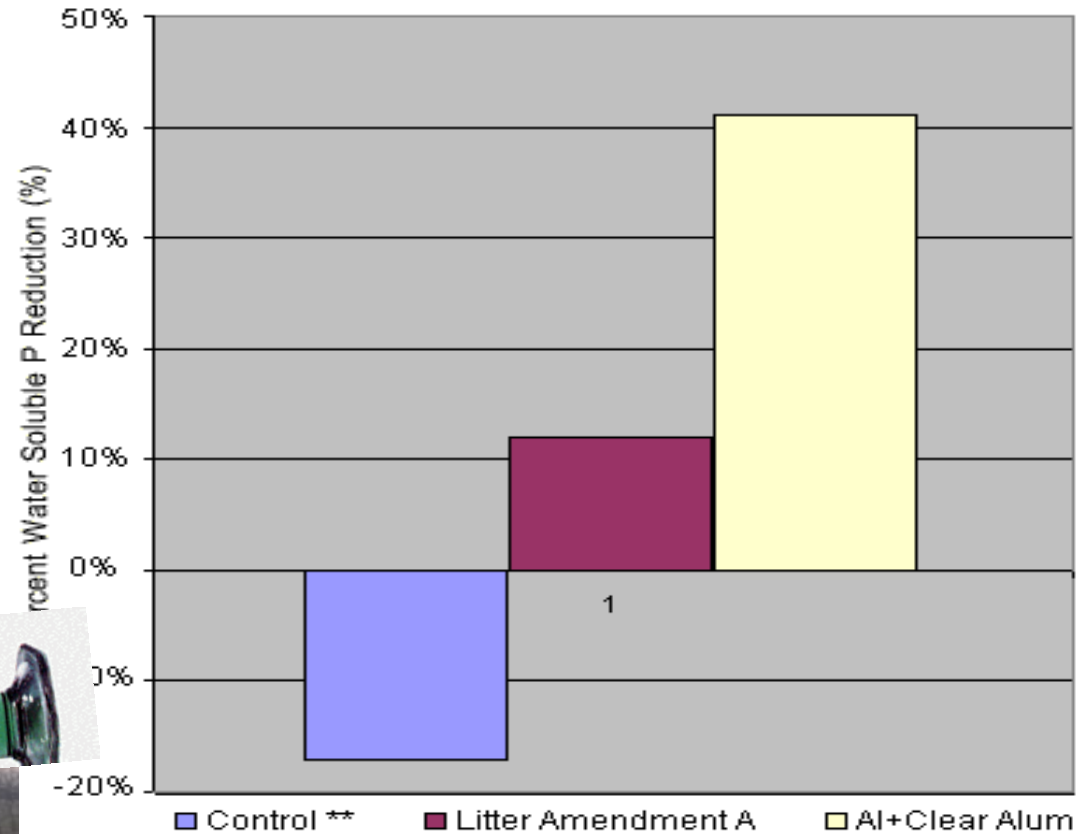
CORROSIVE

**CORROSIVE MATERIAL
 CORROSIVE LIQUID, N.O.S.**

Metal Salt

Manure Amendments

Figure 1: Phosphorus Reduction with
Al+Clear Alum*2



Thermo - Chemical

- Incineration

- Fuel + Oxygen \rightarrow Heat ($\sim 3,600$ F)

- Gasification

- Fuel + Limited Oxygen \rightarrow Fuel Gas (syngas)
+ Heat + Char + Tar ($1,100 - 1,800$ F)

- Pyrolysis

- Fuel + Heat \rightarrow Fuel Gas (oil products) + Char
+ Tar ($390 - 1,100$ F)

Burner and Boiler



Electricity
generating turbine



4,500 Tank Trucks of
Manure/Year; Reduced to
90 Trailers of Ash





Mortality Gasification
(North Carolina)



Gasification Unit in California



Gasification Unit in West Virginia



Ash



Syngas



Biochar



Bio-oil



Pyrolysis Unit

Physical

- Solid – Liquid Separation
- Pelletizing



Inclined Screen



Gravity Settling Basin

Non-Enhanced Separation



Screw Press

Settling Basins



Enhanced Separation

Bio-bag



Rotary Press



Belt Press





Organic Fertilizer



Swine Pellets



Poultry Pellets



Pellet Mill

Other Options

- Feed Management
- Early Slaughter
- Manure Transfer
- Animal Transfer
- Other products



Other Products

Fiber board



Manure Dried Solids



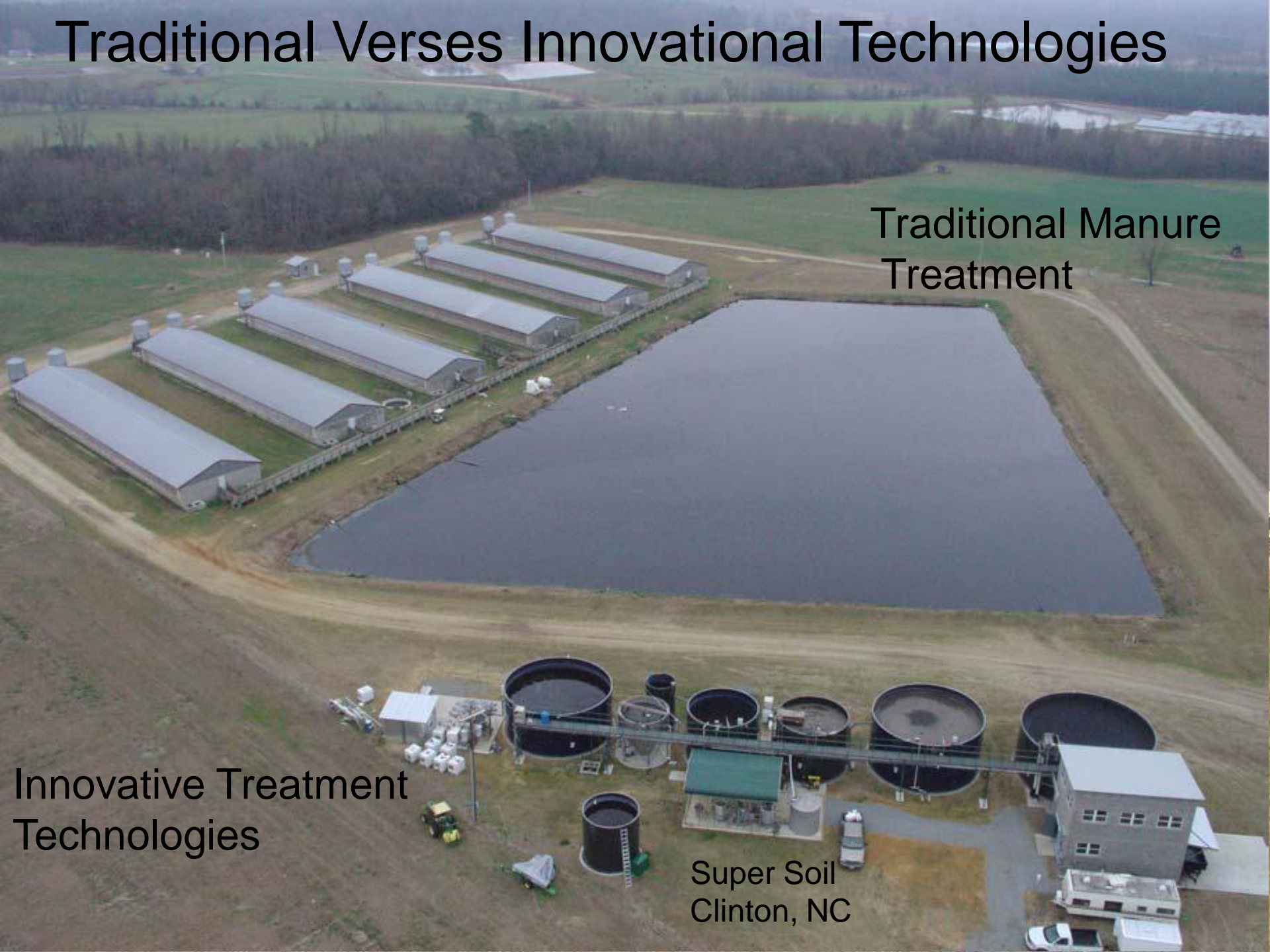
Glue
Plastic
Paint
Etc.

Traditional Verses Innovative Technologies

Traditional Manure
Treatment

Innovative Treatment
Technologies

Super Soil
Clinton, NC



Conclusions

- There are several options for addressing manure distribution and application management issues
- There is no silver bullet to address manure issues
- Option selections are dependent on a number of factors such as: objectives, land availability, nutrient loads, available markets
- Several alternatives may need to be combined to meet the desired outcome
- Water and air quality concerns also need to be addressed when dealing with manure management issues
- Most options require significant financial investment

The End



Questions ?