Today

- About dozen farms have or currently use irrigation equipment to land apply liquid manure
- Most are CAFOs; only few fields used
- Most apply ‘treated’ manure (digested or separated)
- Most use center pivots (with drop nozzles)
- More CAFO’s want to use manure irrigation on more fields

Manure Irrigation Methods

- Center Pivots
- Traveling Guns

Regulatory Requirements - Setbacks

- CAFO’s must comply with NR 243 and NR 214 setback requirements:
  - 25-100 feet from navigable waters and conduits - NR 243
  - 500 feet ** from homes - NR 214
  - 250 feet from drinking water wells - NR 214
  - 1000 feet from municipal wells - NR 214
  - 5 feet separation from bedrock and groundwater - NR 214
  - 100 feet from direct conduits to groundwater - NR 243

  ** = From nearest edge of application. Greater distance may be required depending on distribution system and potential for public health impacts.

Regulatory Requirements

- CAFO’s must comply with NR 214 Land Application Practices:
  - Department approved Management Plan for:
    - Optimizing treatment system performance
    - Annual soil testing
    - Load and Rest schedules
    - Scheduled Maintenance
    - Operational strategies for periods of adverse weather (e.g., rain, wind, etc.)
    - Monitoring procedures and other pertinent information
    - Other practices (next slide)
Regulatory Requirements

CAFO’s must comply with NR 214 Land Application Practices:

- Wastewater application shall be limited to rate that can infiltrate into the soil surface and prevent ponding and runoff
- Spray nozzles shall be arranged so wastewater is evenly distributed over acreage applied
- Spray nozzles shall be sized to prevent plugging and located as near to the ground surface as practicable to minimize wind drift of wastewater
- Average hydraulic application rate may not exceed 10,000 gal/acre per day

Smaller size farms do not have to meet NR 243 and NR 214 requirements

- Towns and County Concerns
  - Increased Odors and Possible Public Health Impacts
  - Prohibition on Irrigation (temporary or permanent)
  - Impacts CAFO and smaller size farms
  - Road Weight Limits for trucks/tankers

Manure’s Double-Edged Sword

Manure as Asset: Manure field-application is a cost-effective and sustainable approach for optimal soil tilth and fertility

Manure may contain pathogens harmful to both humans and livestock

DNR Goal: Maximize beneficial uses of manure while minimizing environmental and public health risks

Manure as Liability: Pathogens in Cattle Manure

Bacteria (e.g., Campylobacter, Salmonella, E. coli [O157:H7])

Protozoa (e.g., Cryptosporidium, Giardia, Eimeria)

Viruses (e.g., adenovirus, enterovirus, rotavirus)

Manure as Asset

Manure Irrigation - Pros

- Reduce hauling costs and road damage/impacts
- More flexibility/time to apply manure
- More Precise Nutrient Management
  - Sources (N and P), timing, amounts
- Better surface and ground water protection
  - Less risk for manure surface runoff
  - Reduce leaching below root zone
  - Reduce entry into drain tiles
  - Fewer spills

Manure as Liability

Manure Irrigation - Cons

- Increased odors and air emissions
- Increased drift risk compared to other manure application methods
- Possible health risk from air pathogens
  - Inhalation
  - Deposition on surfaces
Reducing Manure Irrigation Risks

- DNR approval of manure irrigation fields – via NM plan and Plans and Specs
- Operate in appropriate locations
- Management plans to minimize drift and pathogen survival
- Setbacks
- Equipment types and operational methods
- Weather and other high risk conditions
- Monitor applications for drift
- Calibrate equipment
- Treatment via Digesters/Separation
- RESEARCH

UW Manure Irrigation Research - 2 yr DNR funded study – $338,000

- Two different application systems
  - Traveling gun (2012-2013)
  - Center pivot (w/drop nozzles) (spring/summer 2013)
- Assess pathogen drift impacts from:
  - Wind velocity and direction
  - Solar intensity
  - Temperature/relative humidity
- Model drift factors; evaluate setback distances
- QMRA – Quantitative Microbial Risk Assessment

Manure Irrigation items to address

- Drop nozzles and other equipment
- Droplet size
- Wind breaks
- Irrigation rates, pressures
- Pathogen content and fate
- Alternative inexpensive monitoring
- Drift modeling and Risk Assessment
- Manure Treatment
  - Anaerobic digestion
  - Dilution or separation

Develop and evaluate models to create a SCIENCE based assessment