

# Innovative BMP's: Manure Incorporation

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# Dairy and Swine Slurry Injection

## Shallow Disk Injection



1. Commercially available
2. Limited soil and residue disruption
3. Greatly reduces  $\text{NH}_3$  volatilization, odor emissions, and nutrient and sediment runoff

# Dairy and Swine Slurry Injection

## Sweep injector



1. Benefits similar to shallow disk injection
2. Provides subsurface mixing of manure and soil to reduce N leaching potential

# Other Slurry Application Methods

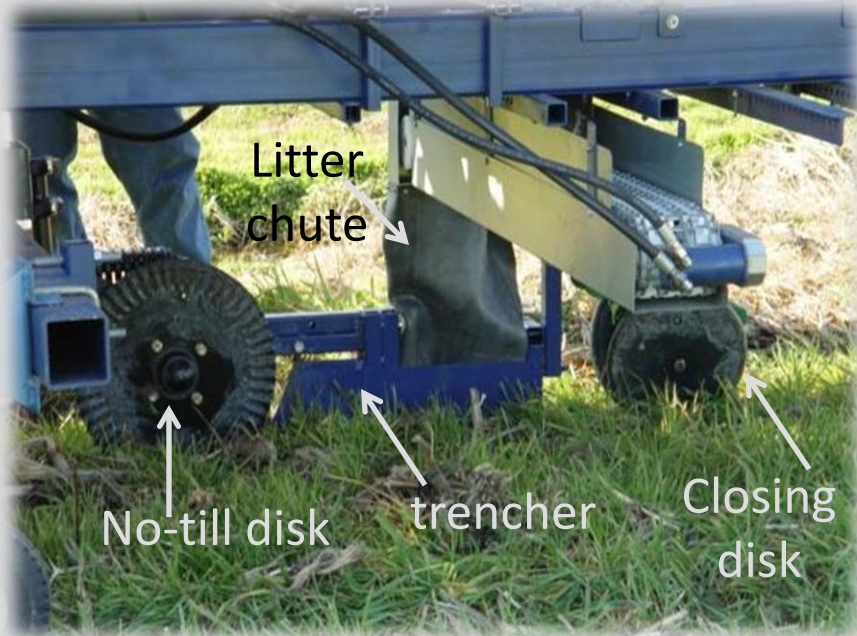
## Soil Aerator



1. Improves manure infiltration, but not injection
2. Greatly reduces nutrient and sediment runoff
3. Inconsistent impacts on  $\text{NH}_3$  and odor emissions

# Poultry Litter Incorporation

## “Subsurfer”



1. Generation One developed by Tom Way, USDA-ARS, Auburn, AL
2. 1-8 tons/acre
3. Variable row spacing: 10-40 in
4. 4 -10 injectors

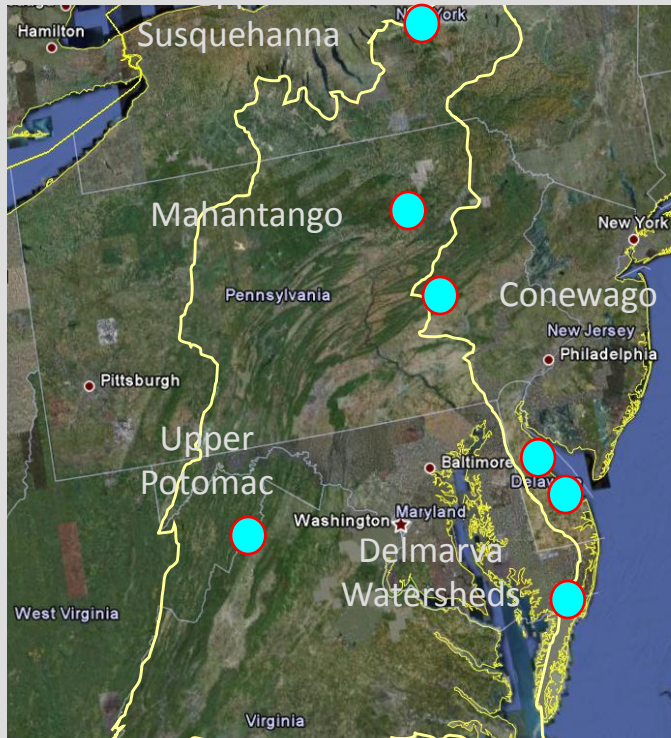
# Poultry Litter Incorporation

## “Subsurfer”

1. Generation Two developed by Dan Pote, USDA-ARS, Booneville, AR
2. Fixed row spacing
3. More refined litter grinding and delivery systems
4. Commercially available in near future



# Adapting ARS's "Subsurfer" to the conditions of the Chesapeake Watershed



1. Chesapeake Stewardship Fund Grant
2. Peter Kleinman and Doug Beegle: project coordinators
3. USDA-ARS, Penn State, Univ. Maryland, Univ. Delaware, Virginia Tech, and Cornell
4. Build 4 Subsurfers
5. Assess agronomic and environmental performance

# Other Emerging Technologies



## Semi-Solid Manure Injection

1. Prairie Ag Machinery Institute, Univ. of Manitoba
2. Not yet tested in the US

