Manure Injection/Incorporation Expert Panel Report

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USDA-ARS

Panel Members

Name	Affiliation	Role
Curt Dell	USDA-Agriculture Research Service	Panel Chair
Art Allen	University of Maryland – Eastern Shore	Panel Member
Dan Dostie	USDA-Natural Resources Conservation Service	Panel Member
Robb Meinen	Penn State University	Panel Member
Rory Maguire	Virginia Tech	Panel Member
Chris Brosch	Delaware Department of Agriculture	Watershed Technical Workgroup representative
Jeff Sweeney	CBPO	Modeling Team representative

Technical support provided by Mark Dubin (University of Maryland), Lindsey Gordon (CRC Staffer), and Don Meals (Tetra Tech).

Practice Categories

- Manure Injection
  - Low disturbance
  - Immediate incorporation
  - Slot closure

Practice Categories

- Manure Incorporation: Low Disturbance
  - <40% soil surface disruption
  - Several tools possible, aerators probably most likely
  - Incorporation within 24 hr of manure application for full N credit

Practice Categories

- Manure Incorporation: High Disturbance
  - >40 soil surface disruption
  - Full width tillage
  - Incorporation with 24 hr of manure application for full N credit

Considerations

- N and P reductions considered separately
- No sediment reduction factors considered (handled through Conservation Tillage Panel)
- Full credit for N reduction requires manure incorporation within 24 hr. Lower credit values provided for longer delays in incorporation.
- Time until incorporation requirement for P credit to be determined.
- Two sets of factors due to differences in contribution of subsurface flow to over nutrient losses
  - Coastal Plain
  - Upland regions (Piedmont, Ridge and Valley, and Alleghany Plateau) considered

Considerations

- Consider N and P losses relative to unincorporated, broadcast application.
  - Data from the watershed and more recent data given strongest weight
  - Unpublished data and best professional judgment used as needed
- Leaching losses not considered in reduction factors
  - Limited data, but no evidence to suggested reductions
- N reduction factor = ammonia reduction factor x portion of total N lost as ammonia
- P reduction factor = run off P reduction factor x portion of total P lost in runoff (run off load includes dissolved and sediment bound P)
- Portion of P lost with runoff differs greatly between Coastal Plain and upland regions (~10 vs ~80%)

Preliminary Reduction Factors for Upland Regions

Category	Time to incorp.	NH_3 Reduction	Fraction of total loss	N Factor	Time to incorp.	Runoff P reduction	Fraction of total loss	P Factor
Injection	Immediate	85%	60%	51%	≤7 days	45%	80%	36%
Low-disturbance incorporation	<1 day	50%	60%	30%	≤7 days	40%	80%	32%
	1-2 days	37%	60%	22%				
	2-3 days	34%	60%	20%				
	3-5 days	25%	60%	15%				
	5-7 days	13%	60%	8%				
	>7 days	0%	60%	0%				
High-disturbance incorporation	<1 day	75%	60%	45%	≤7 days	0%	80%	0%
	1-2 days	55%	60%	33%				
	2-3 days	50%	60%	30%				
	3-5 days	40%	60%	24%				
	5-7 days	20%	60%	12%				
	>7 days	0%	60%	0%				

Values highlighted in green have been approved by the Panel, and values in yellow are preliminary.

Preliminary Reduction Factors for the Coastal Plain

Category	Time to incorp.	NH_3 Reduction	Fraction of total loss	N Factor	Time to incorp.	Runoff P reduction	Fraction of total loss	P Factor
Injection	Immediate	85%	50%	51%	≤7 days	45%	10%	5%
Low-disturbance incorporation	<1 day	50%	50%	25%	≤7 days	40%	10%	4%
	1-2 days	37%	50%	19%				
	2-3 days	34%	50%	17%				
	3-5 days	25%	50%	13%				
	5-7 days	13%	50%	7%				
	>7 days	0%	50%	0%				
High-disturbance incorporation	<1 day	75%	50%	38%	≤7 days	0%	10%	0%
	1-2 days	55%	50%	28%				
	2-3 days	50%	50%	25%				
	3-5 days	40%	50%	20%				
	5-7 days	20%	50%	10%				
	>7 days	0%	50%	0%				

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Timeline

- Panel meets next week to finalizes values
- Report will should be ready to post for public comment in early October