MANURE INJECTION/INCORPORATION EXPERT PANEL REPORT

AGRICULTURE WORKGROUP UPDATE

NOVEMBER 21, 2016

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

- Incorporation: Low Disturbance
  - ≥30% residue retention (to be consistent with Conservation Tillage BMP)
  - Several tools possible, aerators and vertical tillage most likely
  - Incorporation within 24 hr of manure application for full N credit, 1-3d for a smaller credit

Practice Categories

- Manure Incorporation: High Disturbance
  - <30% residue retention
  - Full width tillage
  - Incorporation within 24 hr of manure application for full N credit, 1-3d for a smaller credit

PRIMARY BENEFITS

- GREATLY REDUCES N LOST AS AMMONIA
- REDUCED P AND N LOSSES WITH RUNOFF (BOTH DISSOLVED AND SEDIMENT BOUND P)
- LEACHING LOSSES OF N AND P NOT TYPICALLY REDUCED BY INJECTION OR INCORPORATION

CONSIDERATIONS

- AMMONIA LOSS REDUCTION FACTOR SEPARATE FROM N LOADING REDUCTION FACTOR FOR WATERSHED MODEL. AMMONIA FACTOR DIRECTLY IMPACTS EMISSIONS IN AIRSHED MODEL, AND INDIRECTLY INFLUENCES N INPUTS TO WATERSHED MODEL BY INCREASING PLANT AVAILABLE N CONTENT OF MANURE AND REDUCING NEED FOR SUPPLEMENTAL INORGANIC N FERTILIZERS.
- N AND P LOSS REDUCTION FACTORS RELATIVE TO UNINCORPORATED, BROADCAST APPLICATION.
- N AND P LOSS REDUCTION FACTORS REPRESENT ONLY THE FRACTION OF TOTAL NUTRIENT LOSSES WITH SURFACE RUNOFF (NO IMPACT OF PRACTICES ON LEACHING LOSSES IS ASSUMED)

CONSIDERATIONS

- NO SEDIMENT REDUCTION FACTORS CONSIDERED (HANDLED THROUGH CONSERVATION TILLAGE PANEL)
- FULL CREDIT FOR AMMONIA VOLATILIZATION REDUCTION REQUIRES MANURE INCORPORATION WITHIN 24 HR. LOWER CREDIT VALUES PROVIDED FOR INCORPORATION WITHIN 1-3 DAYS (CONSISTENT WITH LGU GUIDELINES FOR N CONSERVATION CREDITS).
- INCORPORATION WITHIN 3 DAYS FOR P REDUCTION CREDIT

REGIONAL DIFFERENCES

- RUNOFF REDUCTION FACTOR = (RUNOFF P OR N REDUCTION FACTOR) X (PORTION OF TOTAL P OR N LOSSES WITH RUNOFF)
- TWO SETS OF P FACTORS DUE TO DIFFERENCES IN CONTRIBUTION OF RUNOFF TO TOTAL P LOSSES
  - UPLAND REGIONS (PIEDMONT, RIDGE AND VALLEY, AND ALLEGHANY PLATEAU): ASSUMING 80% OF LOSSES WITH RUNOFF
  - COASTAL PLAIN : ASSUMING 48% OF LOSSES WITH RUNOFF
    - ASSUMING 60% OF LOSSES WITH RUNOFF ON WELL DRAINED SOILS (TYPICALLY NATURALLY DRAINED) (~75% OF CROPLAND)
    - ASSUMING 10% OF LOSSES WITH RUNOFF ON POORLY DRAINED SOILS (TYPICALLY DITCH OR TILE DRAINED) (~25 OF CROPLAND)
- SINGLE N FACTOR FOR ENTIRE WATERSHED: ASSUMING 25% OF N LOSSES AS RUNOFF

REDUCTION FACTORS FOR UPLAND REGIONS

	Nitrogen			Phosphorus	
Category	Time to incorp.	Ammonia emission reduction	Reduction in N loading	Time to incorp.	Reduction in P loading
Injection	0	85%	12%	0	36%
Low Disturb. Incorp.	≤24 hr 24-72 hr	50% 34%	8% 8%	≤72 hr	24%
High Disturb. Incorp.	≤24 hr 24-72 hr	75% 50%	8% 8%	≤72 hr	0%[1]

[1]12% reduction recommended by NY during public comment period

REDUCTION FACTORS FOR COASTAL PLAIN

	Nitrogen			Phosphorus	
Category	Time to incorp.	Ammonia emission reduction	Reduction in N loading[1]	Time to incorp	Reduction in P loading[2]
Injection	0	85%	12%	0	22%
Low Disturb. Incorp.	≤24 hr 24-72 hr	50% 34%	8% 8%	≤72 hr	14%
High Disturb. Incorp.	≤24 hr 24-72 hr	75% 50%	8% 8%	≤72 hr	14%

POTENTIAL TRADEOFFS

- HIGH DISTURBANCE TILLAGE CAN INCREASE SEDIMENT LOADING
- INJECTION COULD INCREASE LEACHING WHEN TILE DRAINS OR OTHER PREFERENTIAL FLOW PATHS PRESENT
- INJECTION CAN INCREASE NITROUS OXIDE EMISSION (GREENHOUSE GAS)

DATA LIMITATIONS

- RUNOFF DATA LARGELY FROM SIMULATED RAINFALL
  - GOOD RELATIVE COMPARISON BETWEEN PRACTICES
  - INFORMATION ON TOTAL LOSSES LESS PRECISE
  - EVENT-BASED, NOT SEASONAL OR ANNUAL DATA
- EFFECTS OF PRACTICES DEPEND ON SOIL TYPES, TOPOGRAPHY, AND SOIL AND WEATHER CONDITION AT APPLICATION
  - ADDS VARIABILITY TO PERFORMANCE OF PRACTICES IN THE FIELD
- LEACHING STUDIES LIMITED
- MORE INFORMATION OF NEEDED ABOUT INTERACTIONS WITH OTHER MANAGEMENT PRACTICES, SUCH AS COVER CROPS

VERIFICATION AND HISTORICAL RECORDS

- VERIFICATION THROUGH NUTRIENT MANAGEMENT RECORDS FOR DOCUMENTATION OF INCORPORATION TIMING
- INJECTION A RECENT PRACTICE, SO HISTORICAL USE NOT A FACTOR
- TILLAGE INCORPORATION COMMON IN PAST, BUT RECORDS OF INCORPORATION TIMING UNLIKELY BEFORE NUTRIENT MANAGEMENT REQUIREMENTS

RESPONSE TO PUBLIC COMMENTS

- MOST COMMENTS JUST CALLED FOR CLARIFICATION
- 2 GROUPS PROVIDED DETAILED CONCERNS ABOUT 0% P REDUCTION CREDIT FOR HIGH DISTURBANCE INCORPORATION IN UPLAND REGIONS
  - NY PROVIDED JUSTIFICATION TO AMEND TO A 12% P REDUCTION CREDIT (WHICH CAN BE CONSIDERED AT DEC. 15 AGWG MEETING)
- OTHERWISE, NO CALLS TO RECONSIDER OTHER EFFICIENCY VALUES OR PRACTICE DEFINITIONS/REQUIRES

PANEL REPORT TIMELINE

- DECEMBER 15TH: AGWG/WTWG DECISIONAL MEETING
- DECEMBER 19TH: WQGIT DECISIONAL MEETING PROPOSED
- DECEMBER 31ST: RECOMMENDATIONS INCORPORATED IN THE PHASE 6 MODELING TOOLS


Questions?