

AGRICULTURAL BEST MANAGEMENT PRACTICES

INTRODUCTION

A Total Maximum Daily Load (TMDL) analysis for the Broadkill Watershed will be completed in 2005 to assess the nonpoint source nitrogen loads to surface waters. Nitrogen loads in this watershed are similar to other watersheds but not as high as inland bays. Agriculture is one of the three major nonpoint sources that will be targeted for reductions. 41% of the Broadkill Watershed total acreage is used for agriculture.

The growth in the size and number of agricultural operations over the past decades, combined with increasing development in the form of urban sprawl, largely unplanned, in areas closest to wetlands, inland bays and rivers, has created an overabundance of nutrients leaching into Delaware's waterways. The nutrients are primarily in the form of non-point source phosphorus and nitrogen from historic over-application of organic fertilizer to cropland, septic system leachate and atmospheric deposition. However, point sources, such as effluent from industrial and municipal wastewater, have contributed as well.

The phosphorus content of manure exceeds the amount required by crops when applied to land to meet plant nitrogen needs. Consequently, even if poultry manure is land applied according to current recommended practice, over time phosphorus will build up in soils increasing the potential for its transport from fields to surface waters primarily by erosion and, in extreme cases, by subsurface flow.

MANAGEMENT TECHNIQUES:

Farm-level management considerations:

- Mass balance of nutrient inputs and outputs,
- Proper handling, storage, and application of fertilizers and manure, and
- Proper field conservation practices to reduce transport of nutrients offsite.

Regional management considerations:

- Mass balance of nutrient inputs and outputs through transport and development of alternative uses:
- Transport from areas of excess manure to areas low in nutrients
- Expansion of markets other than agronomic fields- nurseries, turf, roadside plantings, etc., using raw material, compost, or enhanced-value products
- Waste to energy
- Transport of excess manure off the peninsula—for example, pelletization and rail transport to the Midwest.

FARM-LEVEL MANAGEMENT OPTIONS

Accurate nutrient loading reduction values resulting from implementation of best management practices do not exist. The Natural Resources Conservation Service does have values that are used for national reporting but those values should be used cautiously, considering the meaning of those values. A number of management, weather, and geographic variables can dramatically affect values. Also, evaluating individual management practices may not accurately portray overall reductions. For instance, storing manure in a shed is important to reducing nutrient pollution and some loading reduction estimates have been developed; however, if the stored manure is then improperly land applied, no pollution reductions have actually occurred. Storage, by itself,

does not remove nutrients, it simply prevents the transport. Improper land application then allows for that transport to occur.

Material removed from the house will be different if it is from a total house clean-out (all manure and litter removed, done once every 2 – 4 years) or a crust-out (removal of the top several inches of manure and litter, done at least once per year between flocks). Manure and litter removed from the house is the material that will be stored and utilized. Manure storage sheds are designed to contain the volume of litter from a crust-out only since storage for a total clean-out is impractical.

One exception may be for pre-sidedress soil nitrate tests (PSNT's). PSNT's are an in-season test that will help a farmer evaluate a crop's actual need for nitrogen. A reasonable assumption of nutrient reductions per acre can be calculated by comparing the amount of fertilizer applied according to PSNT data to what the farmer would have applied, perhaps in excess, as a precaution.

REGIONAL MANAGEMENT OPTIONS

Approximately 750,000 tons of manure are generated on the Delmarva Peninsula each year. In addition to ensuring good environmental practices on individual farms, regional excesses of manure require a comprehensive regional management strategy. The current status of existing options is discussed here.

Transport: State funds were budgeted by the Governor's Office for the Nutrient Management Commission to establish a manure transport program. The funds will primarily assist manure transport to alternative use facilities with some additional funds going to transport manure from areas of excess to areas of low nutrients. The cost to transport manure within a 15-mile radius of generation is about \$13.38/ton. In 2004, the program recorded that 35,341 tons of manure were transported. The cumulative load reductions resulting from the removal of this manure is approximately 2,438,000 pounds of nitrogen and 2,238,000 pounds of phosphorus. The majority of the manure originated in the Nanticoke River and Inland Bays priority watershed areas.

Pelletization: Perdue AgriRecycle has developed a large scale litter-pelletizing operation in Sussex County. Plant construction is subsidized with \$1 million in state funds, and a \$12 million low interest loan. The plant is able to process approximately 94,000 tons of manure each year. The product would be used as an organic fertilizer and sold to local fertilizer dealers, existing accounts in the Midwest, and planned expansions into the southeast and northeast. There has been discussion of a second plant if the first is successful.

Composting: Composting facilities are available in Maryland for regional use. The most active facility processes 5,000 tons of manure per year. Development of product marketing has been subsidized with federal grant funds through Delaware's Nonpoint Source Program. A site is located in Delaware near Milton and processes approximately 10 – 20 tons of manure per year. A business proposal is on the table for a second Delaware facility to process 50,000 tons. A location has not been chosen.

Waste to Energy: Allen's Family Foods intends to install a unit that generates 3.9 megawatts of energy from a litter gasification

recovery system. Half of the electricity will be used to power Allen's processing plant and the rest will be sold to a local power grid. Allen's will supply half of the manure required and the other half local growers will supply.

Incinerator projects for generating electricity from burning manure have been proposed for Sussex County. A recent law banning incinerators would have to be amended to allow a waste-to-energy incinerator to be built. State agencies are pursuing that amendment.

FUNDING SOURCES

State Funds available to farmers: Farmers installing many of the BMP's above are eligible for state and federal cost share funds for up to 65% of the total cost. Farmers can apply for low interest (3%) loans through the State Revolving Loan Fund (SRF) to finance the remaining cost of the following practices:

- Manure storage sheds
- Dairy waste systems (includes lagoons, storage tanks, liquid spreaders, runoff management practices, i.e. rainwater separation, augers, pumps, holding tanks, skid loaders, spray irrigation systems)
- Dead Bird Composters (also front end loaders)
- Manure Spreaders
- Composting equipment for Manure Composting Operations

Planned future expansions of the SRF Program will fund any BMP approved in Delaware's Natural Resources Conservation Service Technical Guide, including terracing, filter strips, and buffers.

- Average annual state cost share funds available: \$1.2 million statewide, \$300,000 to Sussex County for FY00 In 2004, the Sussex County Conservation District expended over \$779,985 in conservation cost-share funds.
- Average annual federal cost share funds available: (EQIP) \$100,000 - \$200,000 per year for the Inland Bays
- Average annual SRF funds available: \$500,000 dedicated to agriculture statewide, though more is potentially available

In addition, the Delaware Nonpoint Source Program, within the Department of Natural Resources and Environmental Control, is currently provided \$1.5 million/year in federal grant funds from the Environmental Protection Agency. Funding is also available for installation of best management practices on farms.

Conservation Reserve Enhancement Program (CREP):

To improve the water quality of streams and increase wildlife habitat, the Delaware State Enhancement Program is authorized to enroll up to 6,000 acres statewide to the following CREP practices and acreages:

- Hardwood trees: 191.5 acres
- Wildlife Habitat: 8.2 acres
- Grassed Filter Strips: 13.8 acres
- Riparian Buffers: 4.8 acres
- Wetland Restoration: 0 acres

Placement of practices must adjoin impaired streams or contributing drainage ditches in designated project areas.

IMPLEMENTATION ISSUES

- ☞ Farmers are sometimes reluctant to install Best Management Practices (BMP's), such as buffers, which take cropland out of production.
- ☞ All practices on a farm must be evaluated as a whole; proper storage means nothing without proper field application or conservation practices.
- ☞ We can track the number of nutrient management plans. How do we ensure that the nutrient management plans are followed?
- ☞ The need to track implementation and report progress conflicts with long-held policies regarding the farmers' rights to privacy.
- ☞ All implementation is voluntary and incentive based; there will always be a percentage of individuals not wishing to participate.
- ☞ Ensuring proper on-farm mass balances means excesses would become apparent; we must be prepared to then deal with regional excess.
- ☞ Poultry production is most concentrated in the Laurel area, so regional manure utilization facilities will likely locate there to minimize transport costs.

NUTRIENT MANAGEMENT LAW

Delaware Code, Title 3, Chapter 22: The nutrient management law is in place. Soon to follow are state regulations and submission for approval to the Environmental Protection Agency of a state National Pollution Discharge Elimination System (NPDES) program for confined animal feeding operations (CAFO's). As regulations are developed and the law implemented, the following key factors should be carefully tracked:

- How will the Phosphorus Index be used? The P Index is a valuable tool in managing soil phosphorus accumulation resulting from poultry manure use.
- What will nutrient management plans include and how will implementation be tracked?
- Availability of conservation planners: Will funding be made available for planners through the Conservation District (maintaining the existing 5 and/or adding additional planners?) or will funding be directed mainly toward private consultants through the \$5/acre refund to farmers? How many planners are needed and do we prefer conservation planners or private consultants to be the primary mechanism? If planners write comprehensive plans that include structural components as needed (manure storage structures, dead bird composters, etc.), each planner can write plans for about 6,000 acres per year. Writing simplified nutrient management plans without the structural component would allow them to write plans for 15,000 acres per year. There are about 28,000 acres of farmland in the Broadkill watershed.
- District planners provide an additional service of designing structural components that are not strictly part of writing a nutrient management plan. They also provide free in-season nutrient testing, manure spreader calibration, and technical advice. Who will provide these services if the State drops conservation planners?
- Any facilities covered by a CAFO (NPDES) permit are not eligible for federal sources of money (319 Nonpoint Source Program, SRF). Access to Farm Services Agency funding could be limited.

TYPICAL ON-FARM BEST MANAGEMENT PRACTICES (BMP'S) AND AVERAGE COSTS (02/06):

BEST MANAGEMENT PRACTICES (BMPs)	TOTAL ACRES/FACILITIES EXISTING	NUMBER OF BMPs INSTALLED OR ACRES PLANNED TO DATE	AVERAGE COST PER UNIT
Nutrient Management Plans	28,003 acres of agricultural land	To be determined: nutrient management plans (not including plans by private contractors) The Nutrient Management Act requires that all farms implement NMPs by 2007	Must consider depth of plan and whether it includes design of structural components
CRP: Ponds Grass Filter Strips Wildlife Habitat	69.45 total acres 0 6.6 62.85		
CREP: Grass Filter Strips Riparian Buffers Wetland Restoration Wildlife Habitat Hardwood Trees	218.3 total acres 13.8 4.8 0.0 8.2 191.5		Cool season grasses: \$200 – 250/acre Warm season grasses: \$300 - \$400/acre Tree and shrub establishment: \$500/acre
Poultry BMPs:	16 total BMPs		For 40 x 80 structure: \$22,000 Free standing: \$6,636; Lean-to: \$5,895
Livestock BMPs:	4 total BMPs		
Manure Relocation	3172.3 tons transported out of the watershed in 2004		\$13.38 per ton
Animal Waste Systems	Dairy: Hog: Beef:	Dairy: Hog: Beef:	Dairy: \$125,000 - \$150,000 Hog: \$75,000 - \$150,000
Manure Storage Structures	Total number of poultry operations = 29 (each operation may have more than one storage structure)	Number of structures built = Number of structures planned =	
Dead Bird Composters	Total number of poultry operations = (each operation may have more than one structure)	Number of structures built = Number of structures planned =	
Fencing		Installed =	\$6/foot
Grassed waterways		Installed = Planned =	Excavation: \$2/foot ² Seeding: \$800/acre Curlex: \$.13/foot ² Rock at end of waterway: \$60/ton
PSNT Tests	Average number of acres planted in corn =	Total number of tests = Total number of acres =	Cost per test = free to farmer through conservation planners Average number of acres evaluated with one test = 40 (should be done for each crop. Nutrient load reductions calculated based on what farmer would have applied without test data)
Soil Testing			Cost per test = \$7.50 for U of D * should be done seasonally as part of a comprehensive nutrient management plan.
Manure analysis	Total number of producers = 29	_____	Cost per test = \$20
Water Control Structures	Number of structures installed = Structures planned =		Average cost per structure = \$5,000
Manure Spreader calibration		Should be 1 time/yr. per land owner	Provided by conservation planners free to farmer

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BROADKILL WATERSHED

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