The Economics of Manure Management

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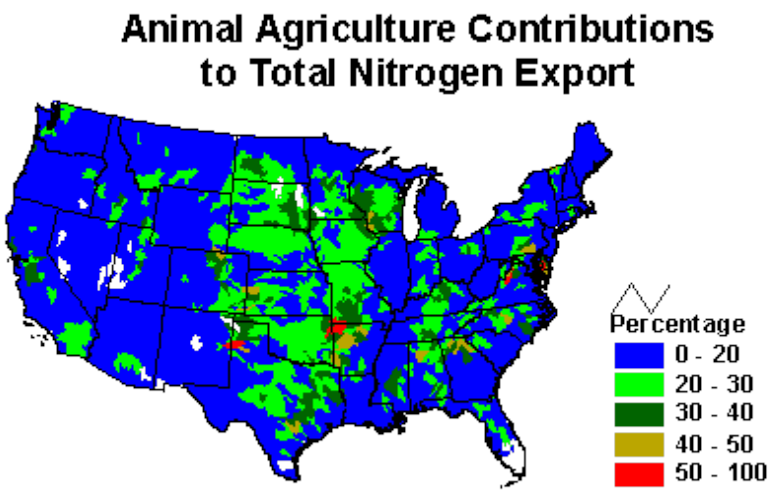
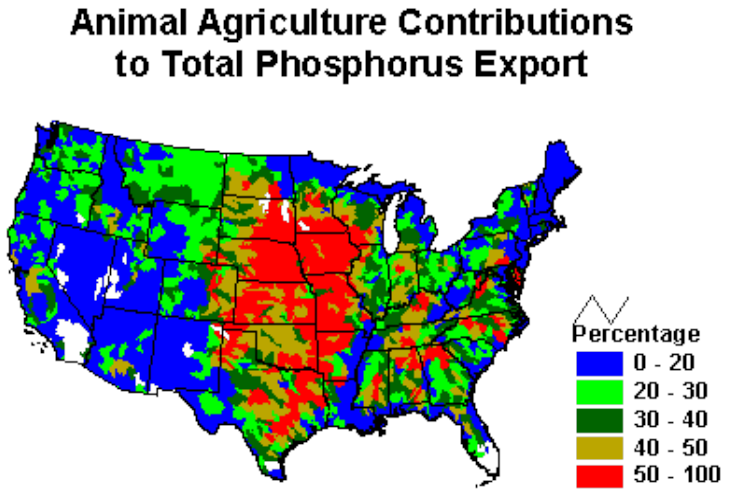
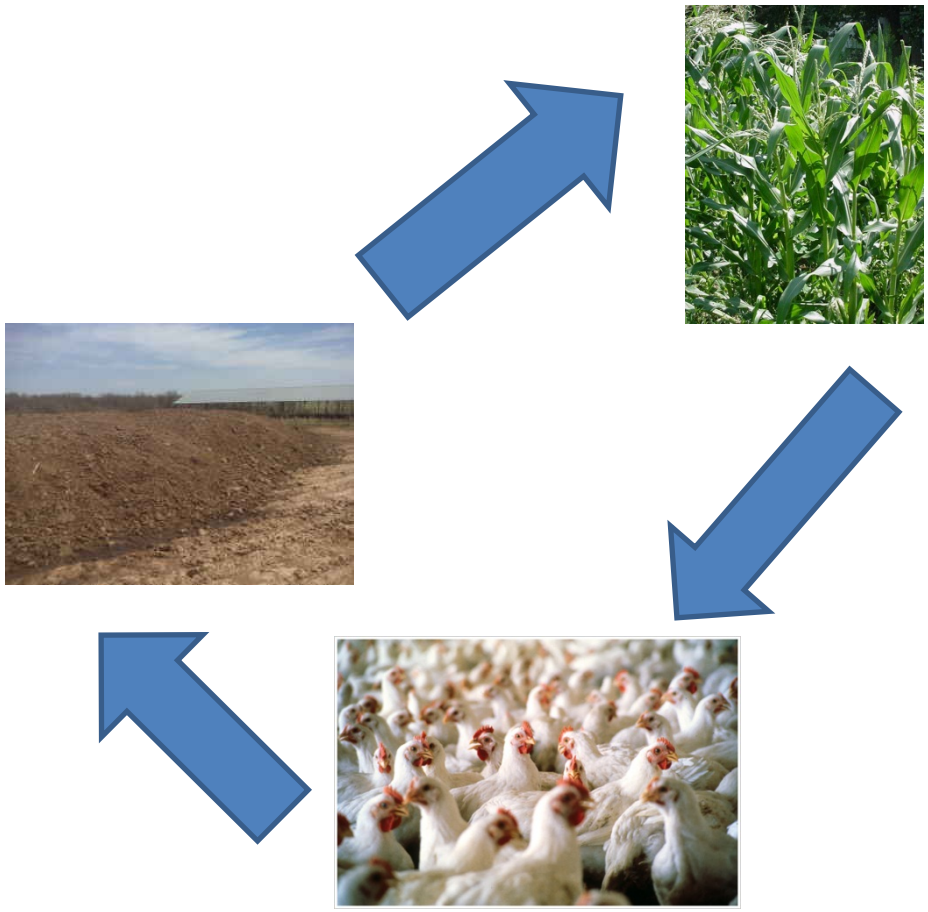
Livestock Production and Water Quality Problems Nationwide





Source: Smith and Alexander, Sources of Nutrients in the Nation's Watersheds, 2000.

The “Manure Cycle” on a Self-Sufficient Farm



The “Manure Cycle” with Specialization

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The "Manure Cycle" with Specialization and a Complete Set of Markets

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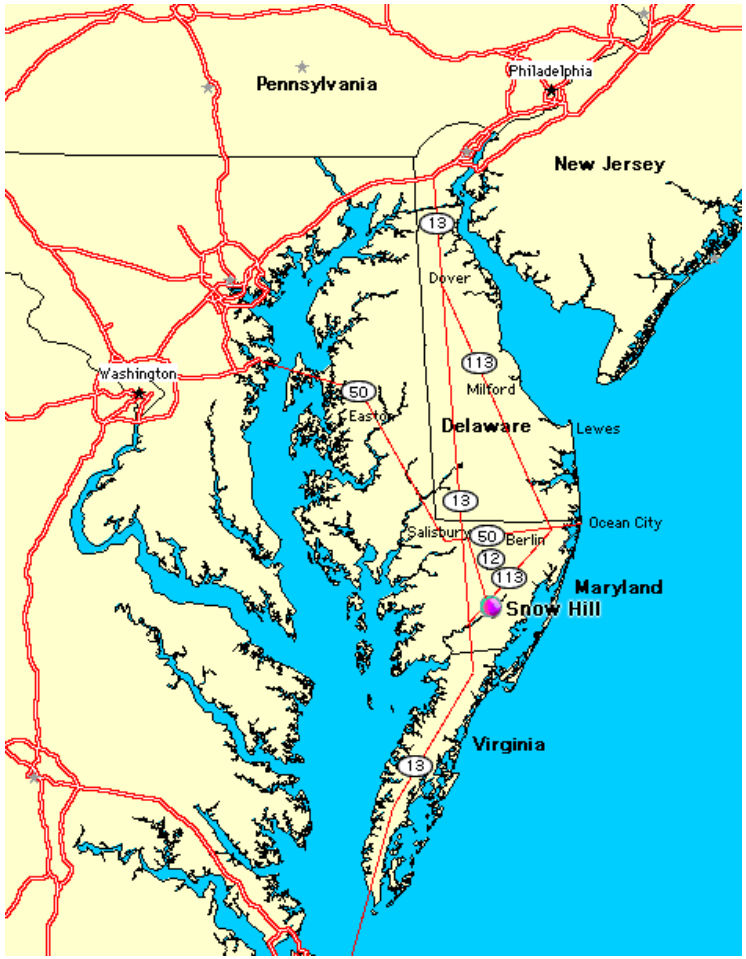
Making Manure Nutrients Cost Competitive

- Lower the cost of substituting manure for chemical fertilizers by
  - Making nutrient content testing cheaper and more widely available.
  - Making nutrient management planning services cheaper and more widely available.
- Reducing transaction costs of buying and selling manure by setting up exchanges to help match buyers and sellers.

Making Manure Disposal More Costly

- Tax chemical fertilizers.
- Direct regulation of manure disposal, e.g.,
  - Government collection and distribution/disposal of manure.

The Delmarva Experience



- 1998—recognition of phosphorus levels in Chesapeake Bay lead to new water quality regulations.
- Water quality regulations require nutrient management planning with soil testing and revisions every 3 years, limits on manure application per acre in accordance with soil P-index.
- State of Maryland sets up clearinghouse, transport services.

What Works When Cropland is Abundant? The Delmarva Experience

- Delmarva as an integrated poultry production system—crop producers grow corn and soybeans, sell to integrators for poultry feed.
- Abundant cropland nearby suitable for sustainable manure application.
  - Delmarva average (2010): 1.24-1.38 tons/planted corn acre.
  - Average Delmarva application rate: about 2 tons/corn acre.
- Crop application is the highest value use by far—$30-60/ton @ current N, P, K prices.
  - Actual price $15-25/ton delivered.
  - Farmers complain of shortages.
- Transportation distance/cost negligible.
  - High litter/corn acre "hot spots" close to low litter/corn acre locations.

Jurisdiction	Corn Acres Planted, 2010	No. of Broilers, 2010	Estimated Litter	Litter per Corn Acre
Total Maryland Eastern Shore	294,800	300,024,446	360,029	1.22
Caroline	28,500	51,228,507	61,474	2.16
Cecil	20,300	-	-	
Kent	50,000	5,001,690	6,002	0.12
Queen Anne's	55,000	22,696,719	27,236	0.50
Talbot	32,000	9,151,373	10,982	0.34
Upper Eastern Shore	185,800	88,078,289	105,694	0.57
Dorchester	28,500	40,410,306	48,492	1.70
Somerset	18,000	58,953,179	70,744	3.93
Wicomico	26,500	53,838,002	64,606	2.44
Worcester	36,000	58,744,670	70,494	1.96
Lower Eastern Shore	109,000	211,946,157	254,335	2.33
State of Delaware	180,000	235,000,000	282,000	1.57
New Castle	23,000		-	
Kent*	56,000	32,961,409	39,554	0.71
Sussex	101,000	202,038,593	242,446	2.40
State of Virginia				
Accomack	25,000	38,235,020	45,659	1.83
Delmarva	499,800	573,259,466.04	687,689	1.38

What to Do When Cropland is Not Abundant?

- Short run: Composting, transport, etc. may be needed to reduce environmental damage.
- Long run: Livestock production location decisions influenced by implicit waste disposal subsidy, may exhibit “false economy”.

Conclusions

- Specialization/coordination through markets increases productivity.
- But government needed to ensure that there are no "missing markets".
  - Waste disposal a prime example.
- Information about nutrient management, clearinghouses to reduce transaction costs, etc. are fundamental to creating those missing markets.
- Regulations, taxes may also be needed to ensure proper incentive structures for efficient manure management.