Accounting for Swine

Chesapeake Bay Program Agricultural Workgroup's
Building a Better Bay Model Workshop
05/23/2013

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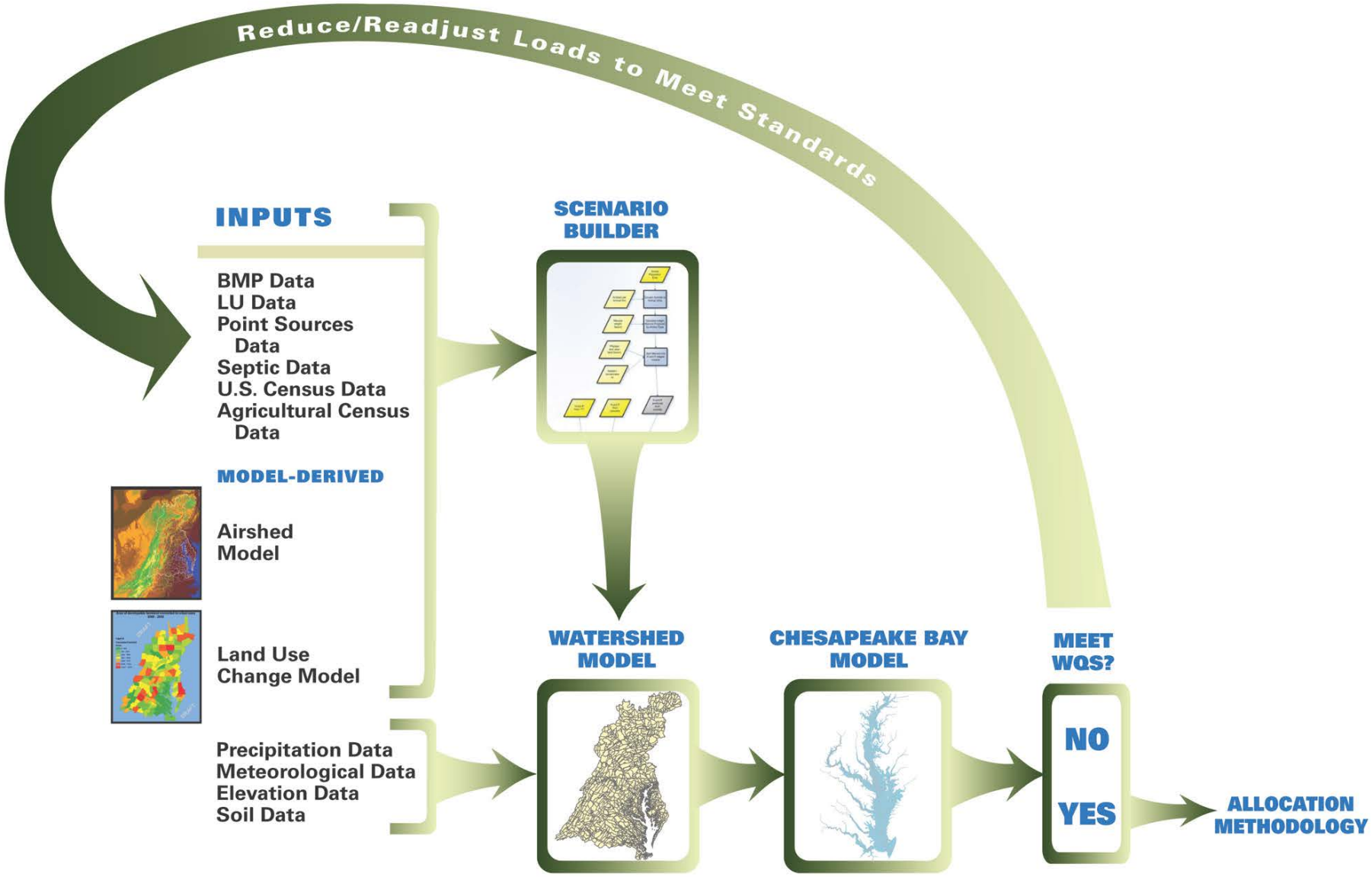
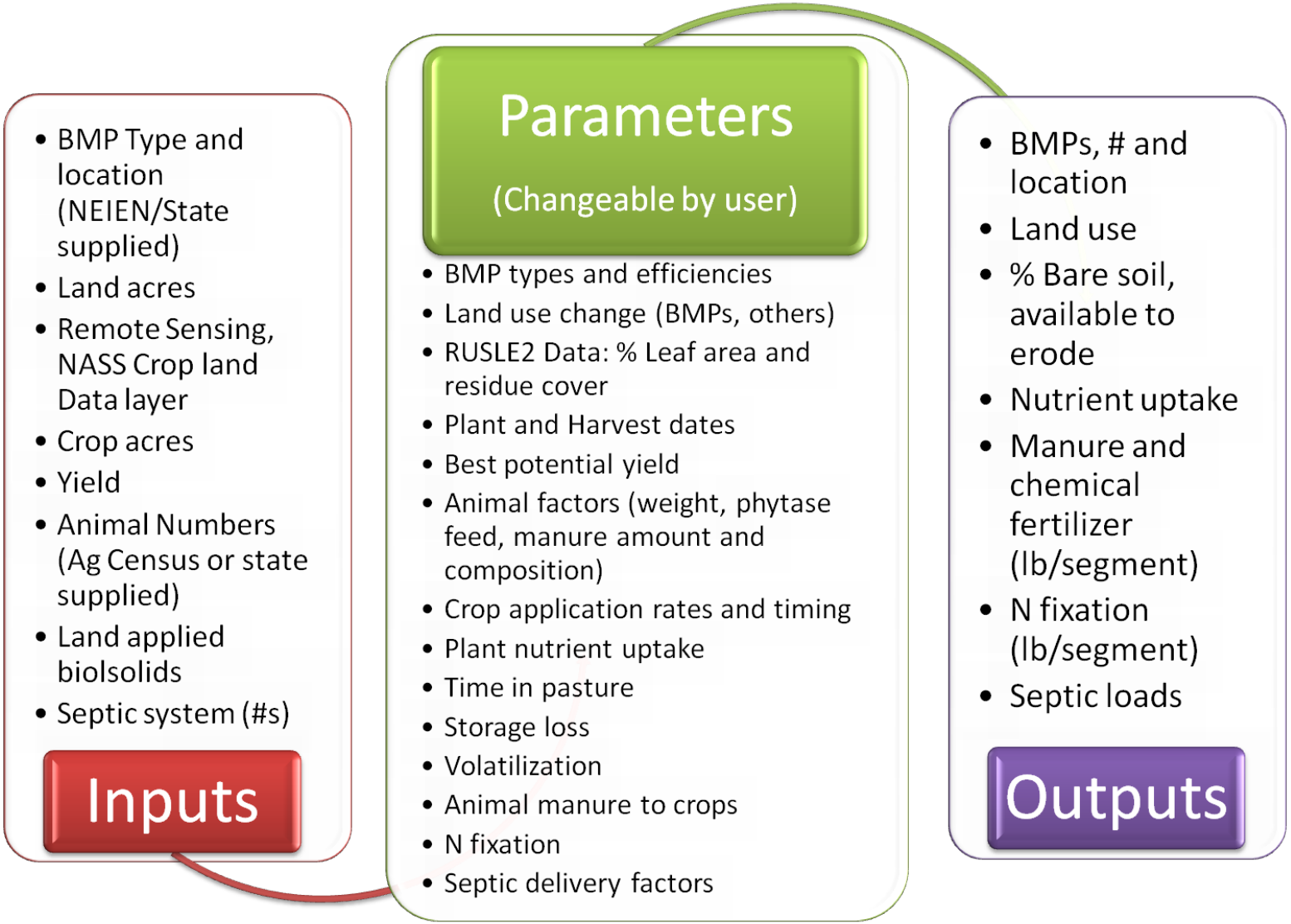
Photos and graphics courtesy of USDA Image Gallery and CBP

Chesapeake Bay Program Modeling Tools

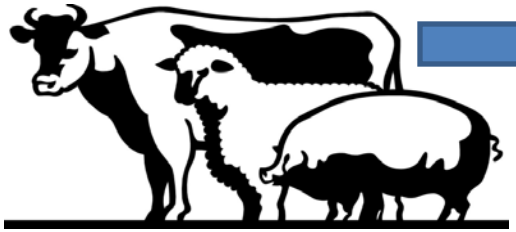


Scenario Builder Data Inputs and Outputs



Scenario Builder

Livestock



BMPs

Manure storage practice

BMPs

Fertilizer

Crops

Pasture

Image Credits
https://utextension.tennessee.edu/lincoln/4-H/Pages/Livestock-Skillathons-%28Beef,-Sheep-and-Swine%29.aspx
Rebelwoodsranch.com
Seaburst.com
http://pubs.ext.vt.edu/442/442-308/442-308.html

Nutrient Generation by Swine

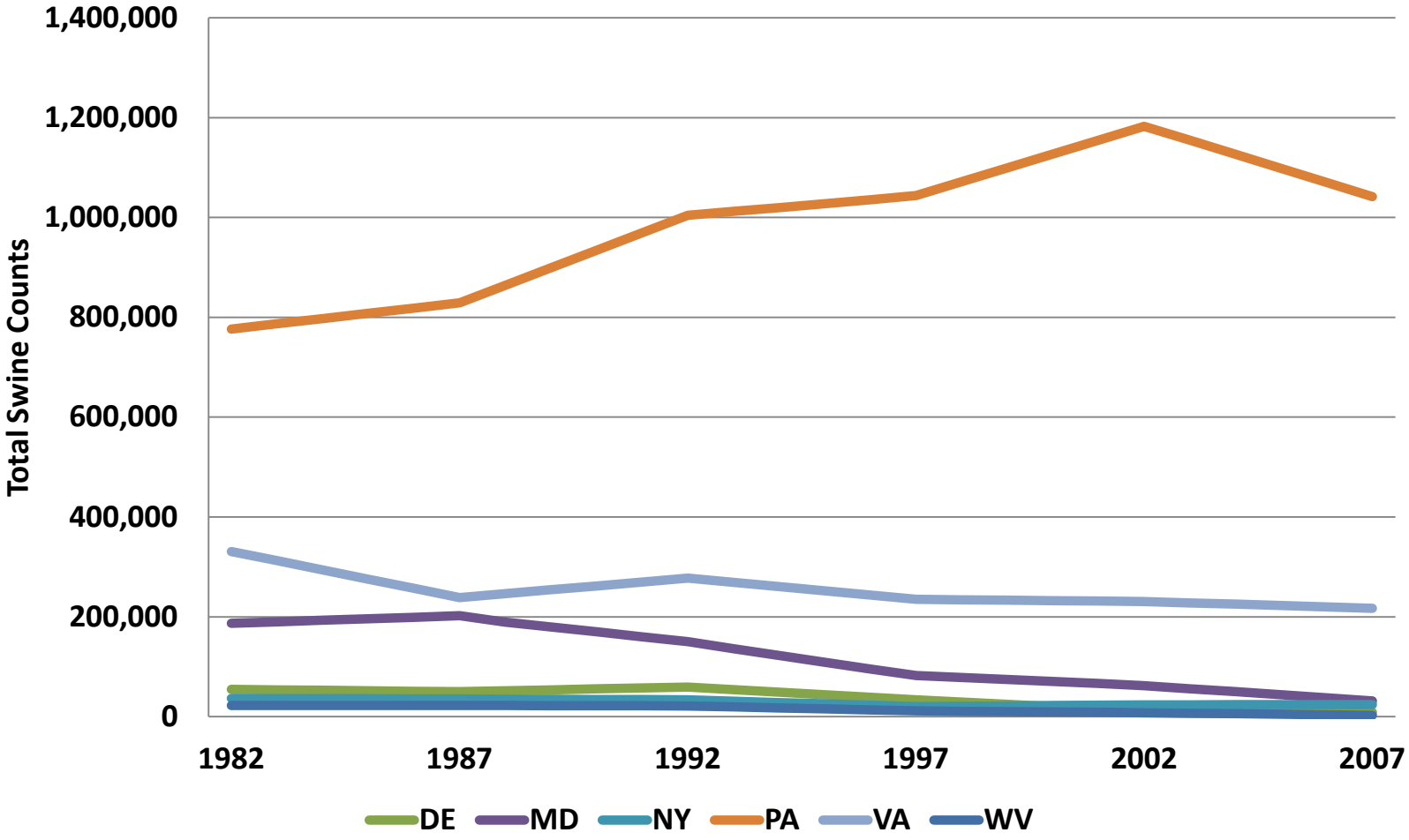
Number of Birds in County

- Lbs Live Weight of Animals
- Lbs Manure Produced/Animal/Day
- Days of Manure Production
- Lbs of Nutrient Species/lb of Manure
- Swine Phytase Reductions to Nutrients
- Moisture Content
- Ammonia Volatilization Rate
- Storage and Handling Loss
- Animal Waste Management Practices
- Manure Transport

Lbs Phosphorus

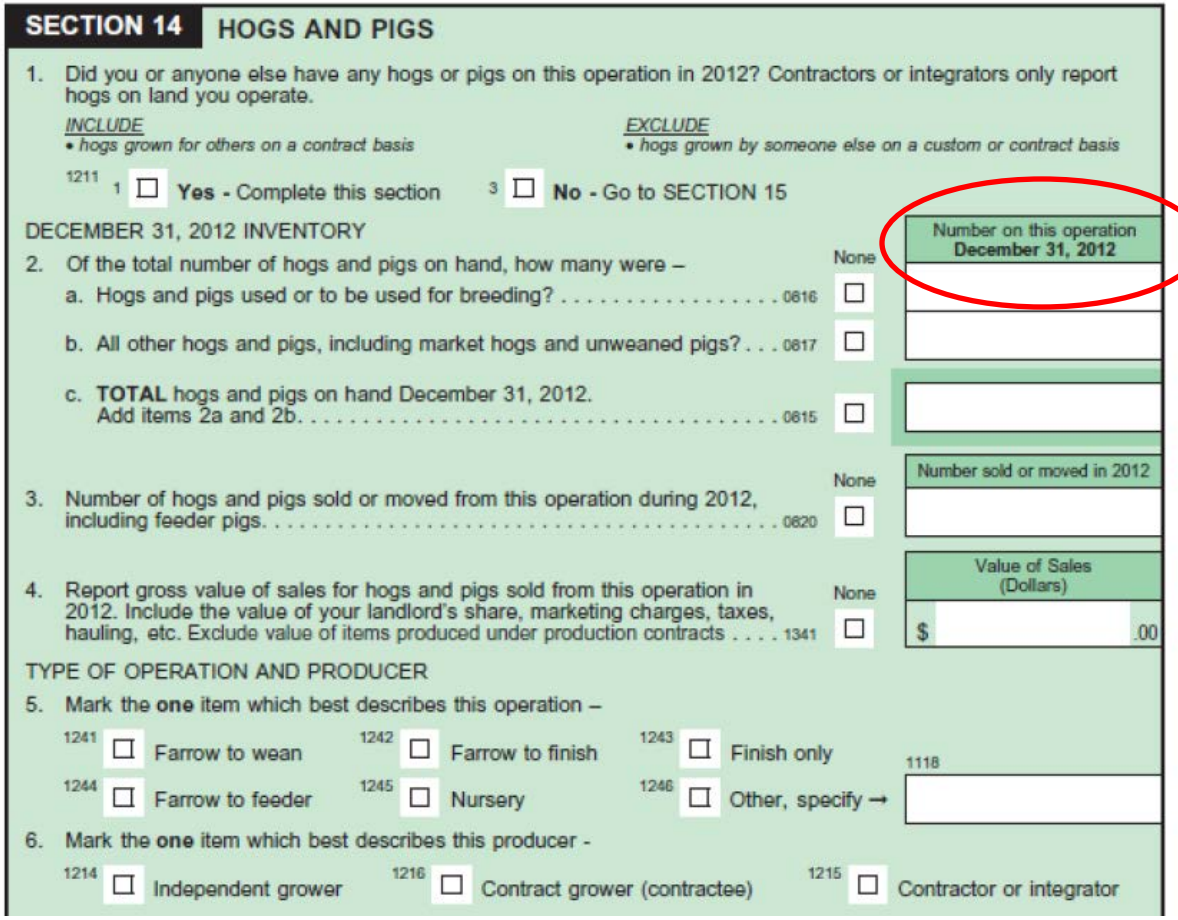
Lbs Nitrogen

Inventoried Swine Counts Through Time



Census of Agriculture Inventory Data

- The guide to the USDA's 2012 Census of Agriculture directs producers to report **"the number of hogs and pigs on this operation on December 31, 2012..."**



SECTION 14 HOGS AND PIGS

1. Did you or anyone else have any hogs or pigs on this operation in 2012? Contractors or integrators only report hogs on land you operate.

INCLUDE
- *hogs grown for others on a contract basis*

EXCLUDE
- *hogs grown by someone else on a custom or contract basis*

1211 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 15

DECEMBER 31, 2012 INVENTORY

	None	Number on this operation December 31, 2012
2. Of the total number of hogs and pigs on hand, how many were –		
a. Hogs and pigs used or to be used for breeding? 0616	☐	
b. All other hogs and pigs, including market hogs and unweaned pigs? 0617	☐	
c. **TOTAL** hogs and pigs on hand December 31, 2012. Add items 2a and 2b. 0615	☐	

	None	Number sold or moved in 2012
3. Number of hogs and pigs sold or moved from this operation during 2012, including feeder pigs. 0620	☐	

	None	Value of Sales (Dollars)
4. Report gross value of sales for hogs and pigs sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts 1341	☐	$ .00

TYPE OF OPERATION AND PRODUCER

5. Mark the **one** item which best describes this operation –

1241 ☐ Farrow to wean 1242 ☐ Farrow to finish 1243 ☐ Finish only

1244 ☐ Farrow to feeder 1245 ☐ Nursery 1246 ☐ Other, specify → 1118

6. Mark the **one** item which best describes this producer -

1214 ☐ Independent grower 1216 ☐ Contract grower (contractee) 1215 ☐ Contractor or integrator

Kellogg et. al (2000) and ASAE (2003)

- Average Lbs Manure Excreted/AU/Day
- Average Lbs Live Weight
- Average Lbs Solids Excreted/AU/Day
- Average Lbs Total Phosphorus Excreted/AU/Day
- Average Lbs Total Nitrogen Excreted/AU/Day
- Average Lbs Ammonia Excreted/AU/Day

- ASAE. 2003. Manure Production and Characteristics In ASAE Standards. D384.1. St. Joseph, MI. pp. 683-685
- Kellogg, R.L. et al., 2000. Manure nutrients relative to the capacity of cropland and pastureland to assimilate nutrients: Spatial and temporal trends for the United States. Proceedings of the Water Environment Federation, 2000 (16), 19-157.

Swine Manure Nutrient Concentration Data

Animal Type	Lbs manure/day/AU	Lbs TN/lb manure	Lbs TP/lb Manure
Hogs and pigs for Breeding	33.46	0.0066	0.0021
Hogs for Slaughter	84	0.0062	0.0021

Swine BMPs

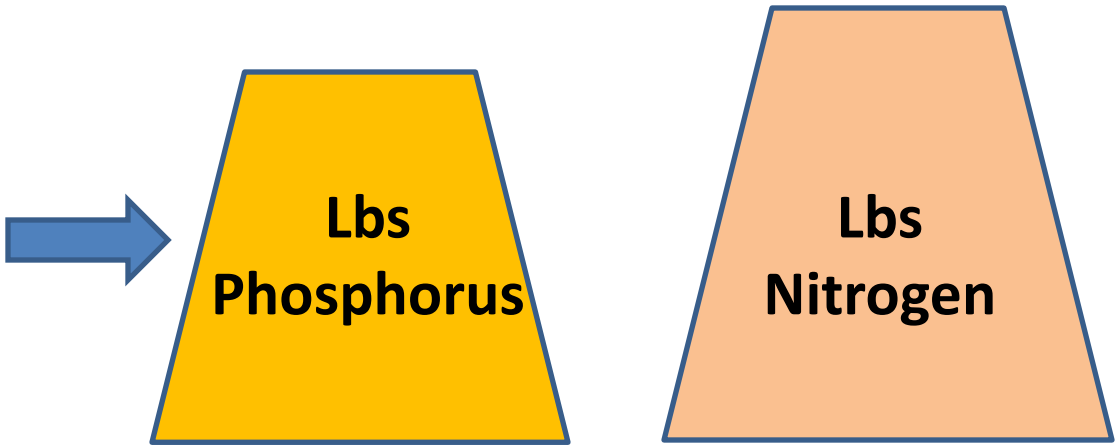
- Swine Phytase
- Mortality Composting
- Lagoon Covers
- Barnyard Runoff Control
- Loafing Lot Management
- Animal Waste Management Systems

Generating the Piles

1) Convert Inventory to Animal Units (1,000 lbs)

2) Multiply AU by Lbs Manure/Day

3) Multiply Total Lbs Manure/Day by Nutrient Species



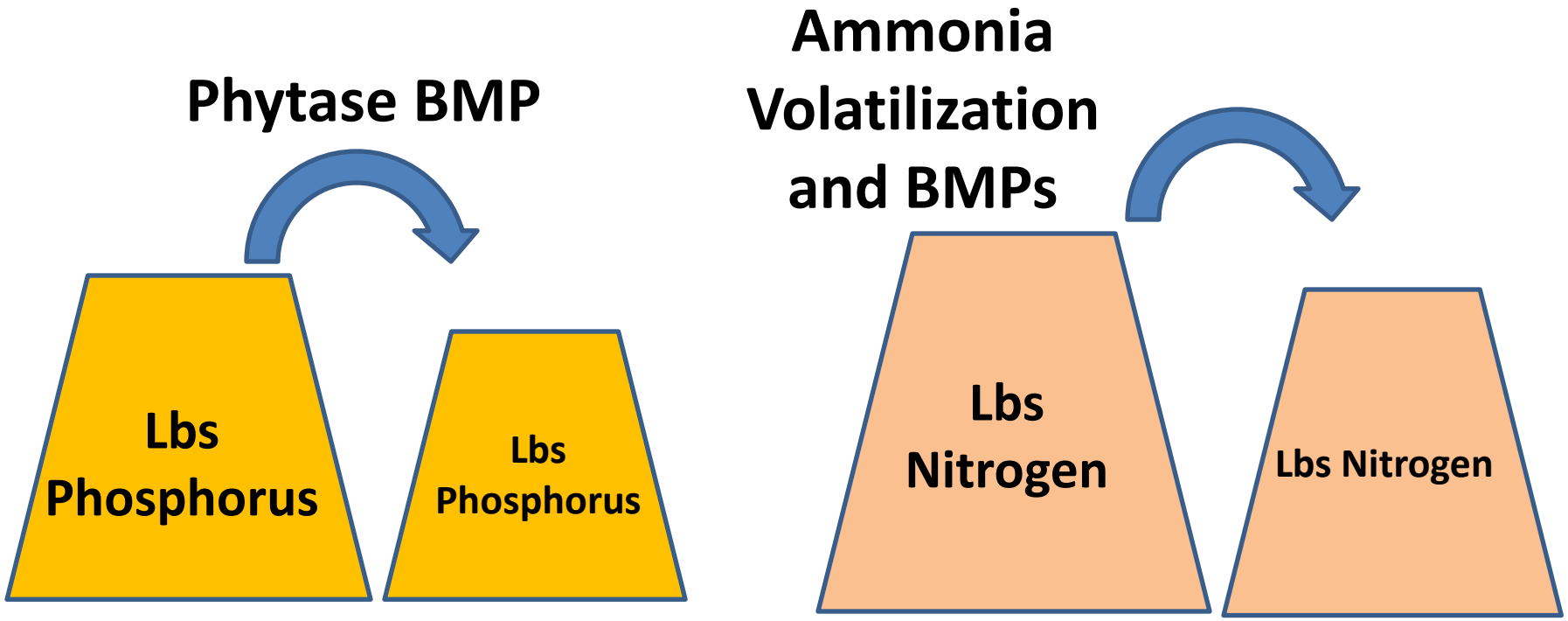
AFO/CAFO Land Uses

Farm Animal Type	Acres per farm
Cattle and Calves	0.5
Total Hogs and Pigs	0.2
Any Poultry	0.25
Sheep and Lambs	0.1
Milk Goats	0.05
Angora Goats	0.05

- AFO/CAFO land uses are meant to simulate production areas upon which stored manure can be lost from storage and transportation.
- Acres are not defined by number of animals. Census of Agriculture farm counts by animal type are multiplied by fractions in table to achieve animal production area acreages.

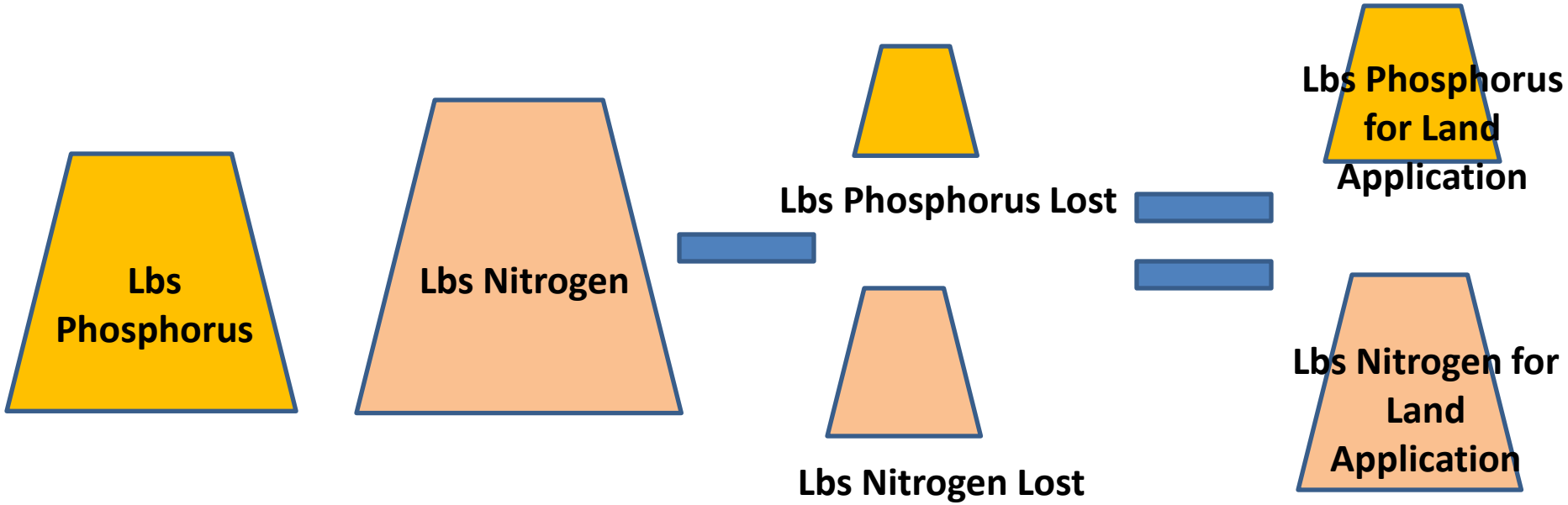
Reducing the Nutrient Piles

- Nutrients generated are reduced through the phytase BMP.
- Nutrient piles are altered through natural ammonia volatilization and lagoon covers.



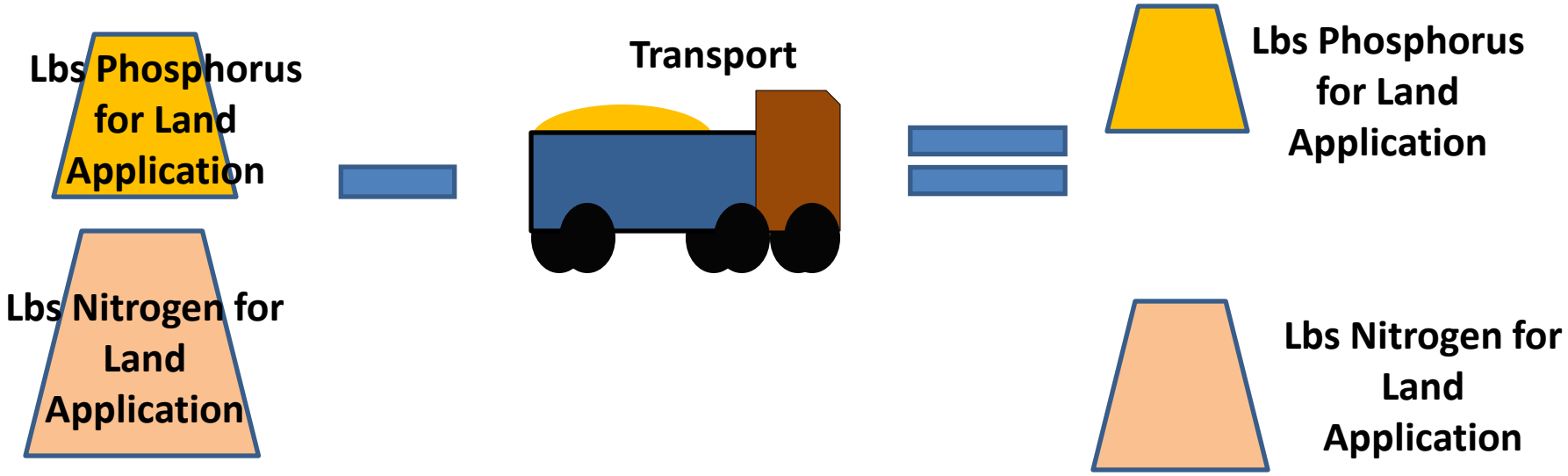
Storage and Handling Loss

- All swine manure piles are assumed to have a 15% loss of manure to the barnyard/production area.
- This becomes the load to the AFO/CAFO land use.
- Loafing lot management, barnyard runoff control, mortality composting and animal waste management systems reduce the amount of manure lost to this land.

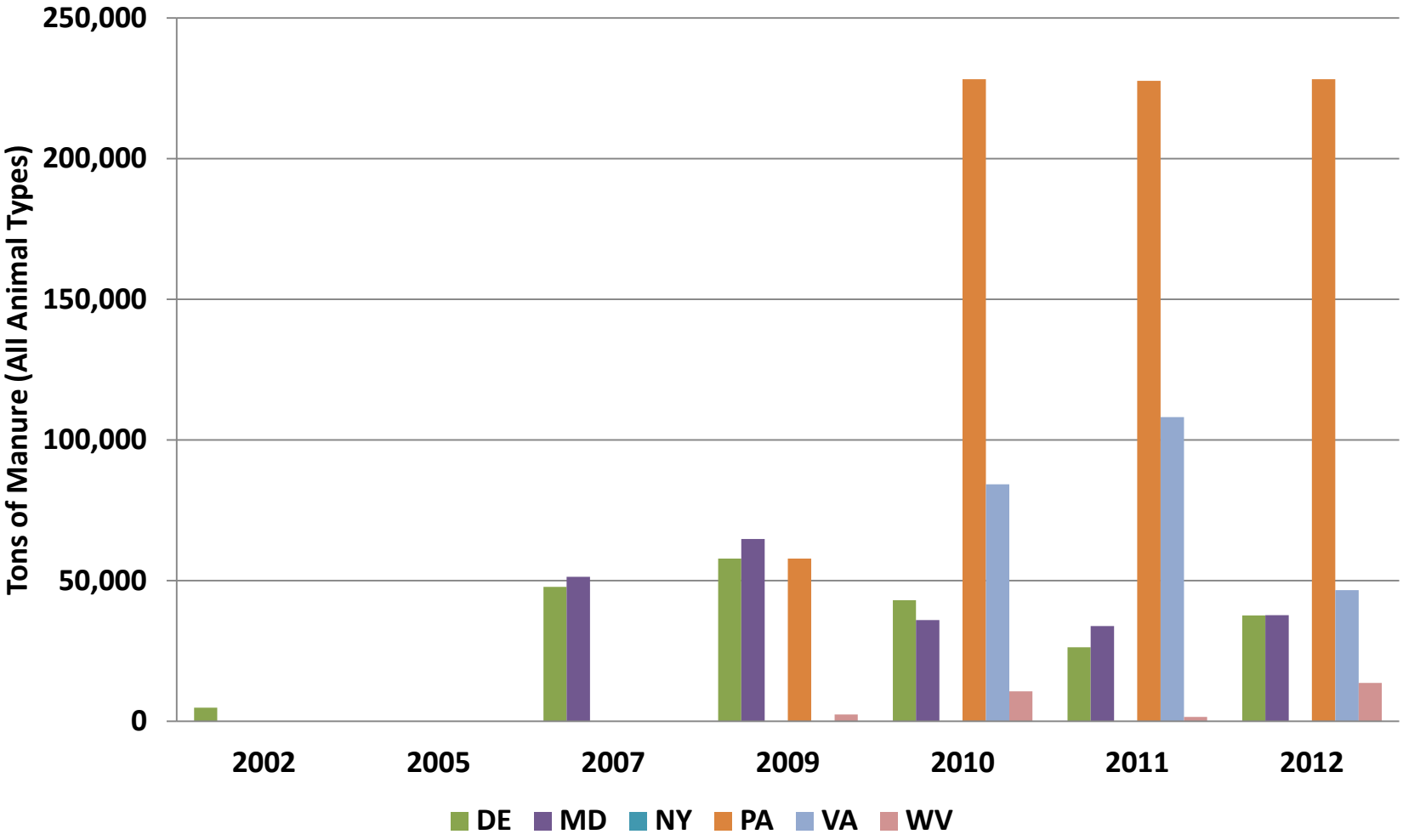


Manure Transport

- Manure generated in a county is assumed to be available for crops in that county and nowhere else.
- Manure Transport reduces the manure available for crops in one county be shipping it to another county.



Manure Transport Through Time



Distributing the Manure

- Nutrient Types include biosolids, manure and fertilizer.
- Manure has nutrients not available for plant need.
- Fertilizer is assumed to be 100% available for plant need
- Order by Nutrient Source
  1. Fertilizer (to fulfill inorganic need as defined by agronomic guides per crop)
  2. Direct excretion
  3. Biosolids (to NM land first if available)
  4. CAFO Manure (to NM land first if available)
  5. AFO manure
  6. Fertilizer (to supplement remaining need)
  7. Disposal sequence