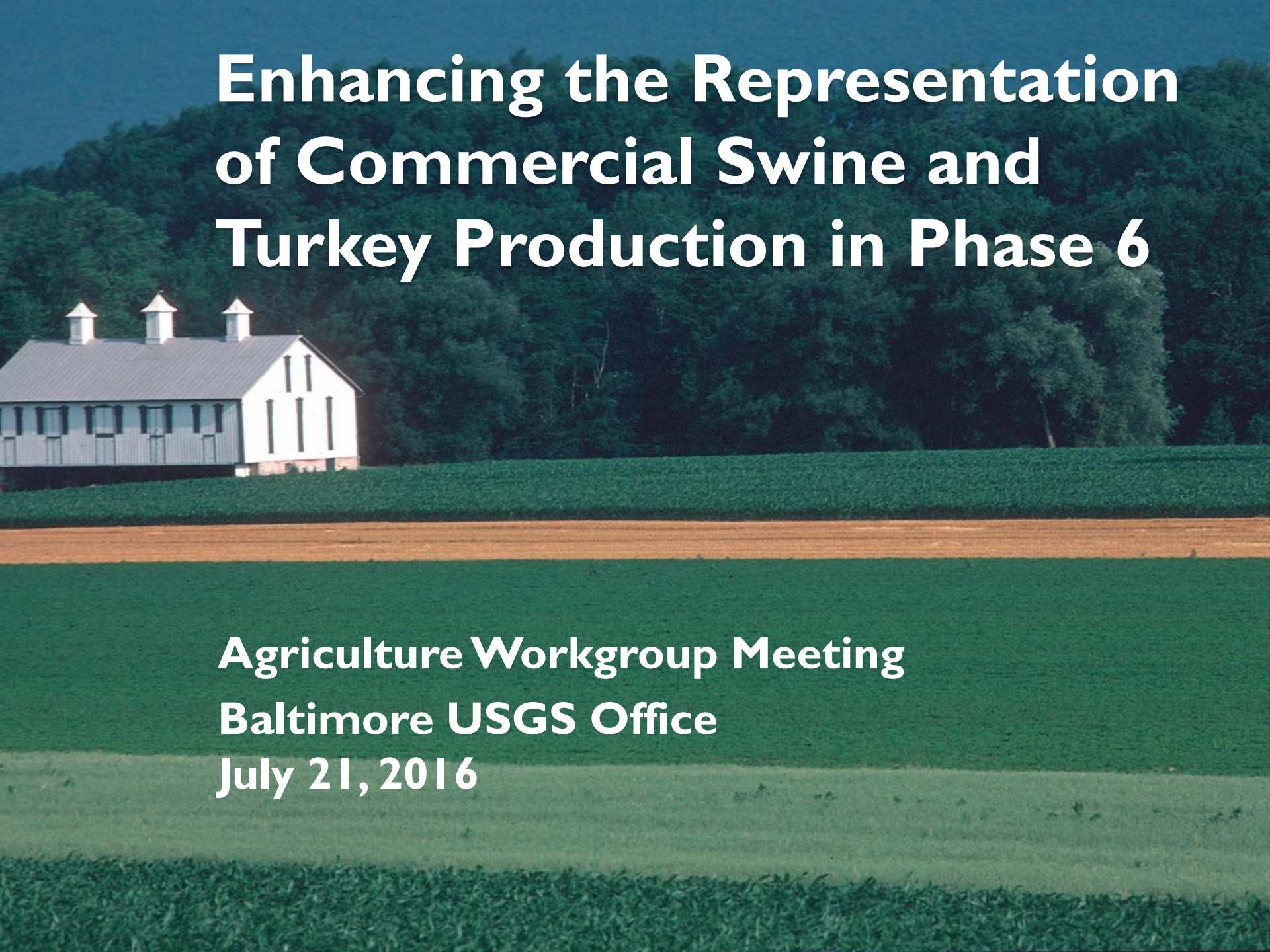


Enhancing the Representation of Commercial Swine and Turkey Production in Phase 6

Agriculture Workgroup Meeting

Baltimore USGS Office

July 21, 2016

Mark Dubin
Agricultural Technical Coordinator

University of Maryland Extension-College Park
College of Agriculture and Natural Resources

Department of Environmental Science & Technology
mdubin06@umd.edu

EPA Chesapeake Bay Program Office
mdubin@chesapeakebay.net

Virginia Tech

Tim P. Sexton, LPSS
Virginia Tech Contractor

CBP Swine and Turkey Project Proposals

- To more accurately represent commercial swine and turkey production in the Chesapeake Bay Watershed and the region in the Phase 6 Chesapeake Bay Program models currently under development.

- To better ensure that the modeling tools reflect the regional industry as a whole, and portray production advancements such as improved genetics, feed management, facility management and nutrient reduction practices.

CBP Swine Production Now

- The CBP modeling tools currently represent swine nutrient generation using the following data sources:
  - USDA-NASS - populations by state and/or county (if available)
  - ASAE 2005 National Report - as excreted nutrient data (national average)
  - NRCS/State Implementation Data - waste management systems (if available)

Difference between As-Excreted Manure and Poultry Litter

- "…Recoverability can be interpreted as the amount of as-excreted manure or nutrients left in litter to be made available to crops after all storage and handling losses and volatilization has occurred. As-excreted manure values cannot be compared to litter values without first applying estimates of recoverability…"

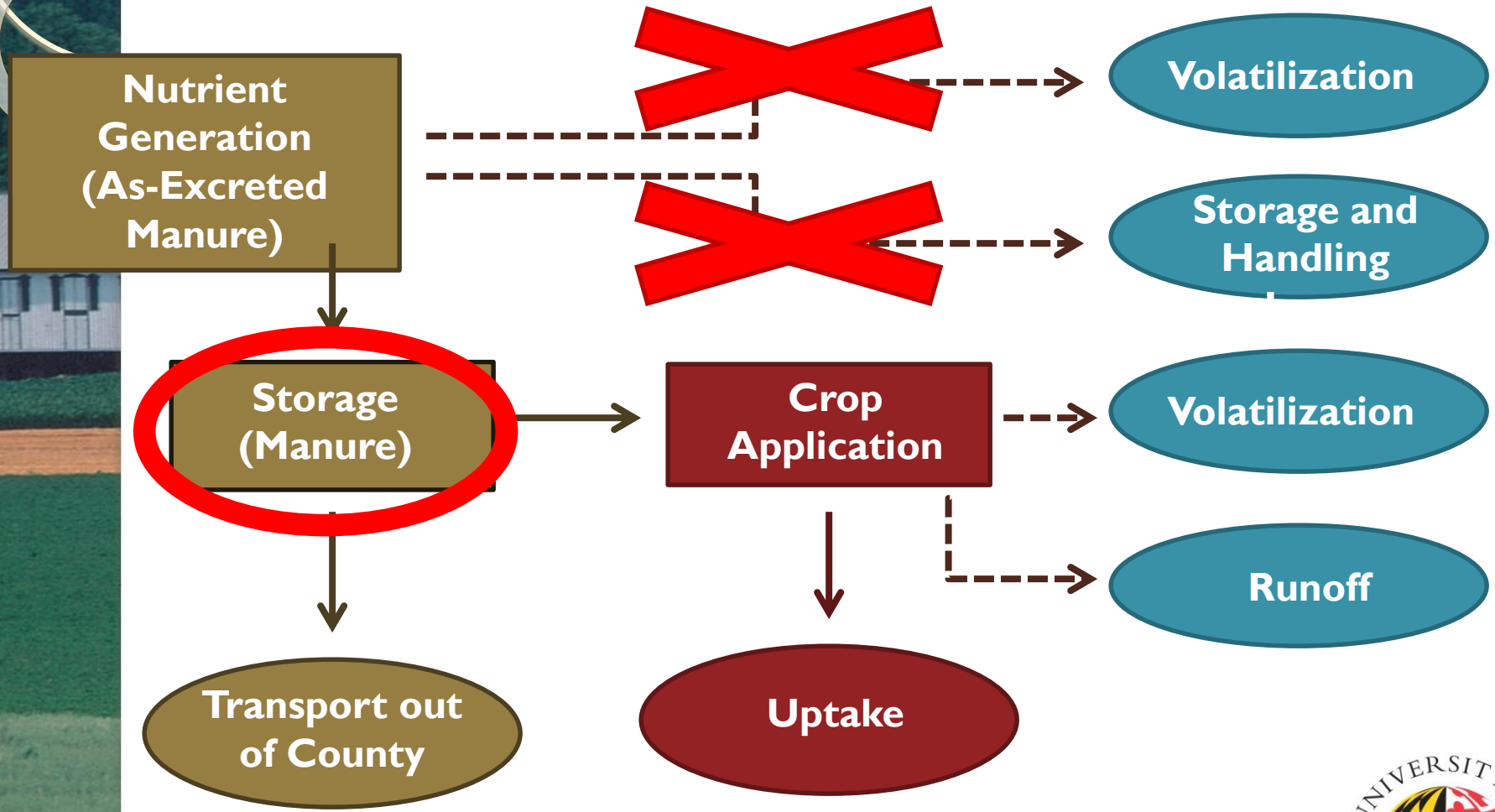
Submitting New Data

- "… The AMS recommends that raw sample data for each parameter be submitted to the Bay Program using standardized templates… Ultimately, the Partnership will need to determine both the method and frequency of collecting and updating these values…"

- These standardized templates should be provided by Ag Workgroup.

Animal Type	Manure Source	Lbs. Dry Manure/Animal/Yr.	Lbs. TN/Lb. Dry Manure	Lbs.TP/Lb. Dry Manure
Beef	Use Beef - Cow (confinement) from ASAE 2005 for manure values	5,475.00	0.028788	0.006467
Dairy	Use Lactating Cow, Dry Cow and Heifer from ASAE 2005 for manure values	4,404.33	0.042221	0.006764
Other Cattle	Use average of Beef and Dairy from above to estimate manure values	4,939.67	0.035504	0.006616
Horses	Use average of Horse- Sedentary and Horse - Intense Exercise from ASAE 2005 for manure values	3,102.50	0.031672	0.005941
Hogs for Breeding	Use Gestating Sow and Lactating Sow ASAE 2005 for manure values	657	0.070273	0.019417
Hogs for Slaughter	Use Grow-Finish from ASAE 2005 for manure values	120	0.083333	0.014167
Sheep and Lambs	Use ASAE 2003 for manure values	240.9	0.038182	0.007909
Goats	Use ASAE 2003 for manure values	680.91	0.034615	0.008462

Estimating Swine Nutrients



CBP Swine Production Proposed

- The following basic data would be need to implement the proposed representation on an annual basis:
  - Populations by production type and county
  - Lab analysis manure nutrient data
  - Manure volumes produced annually

CBP Swine Production Proposed

- The CBP modeling tools could represent swine production and nutrient generation using the following data sources:
  - Commercial Integrator Data – annual populations by production type and county
  - Contract Grower Data - waste storage sampled nutrient data and manure volumes
  - Manure Haulers/Brokers – nutrient data and manure volumes

Commercial Swine Pilot Project

- PSU PI: Robb Meinen
- VT Field Interns: Jordon Kristoff
  Austin Shifflett
- VT Field Intern Supervisor: Tim Sexton
- VT Data Management: VT Computers
  VT Email

Commercial Swine Pilot Project

- Commercial Data Collection
  - Farm Identification
  - Swine Production Type Identification
  - Total Number of Swine Produced Annually
  - Date and Number of Growers/Finishers Placed
  - Date and Number of Growers/Finishers Removed
  - Total Live Weight Produced per Animal per Production Group
  - Total Number of Boars Annually
  - Average Live Weight of Boars Annually
  - Total Number of Sows Annually
  - Average Live Weight of Sows Annually
  - Manure Nutrient Analysis Records
  - Total Volume of Manure Storage(s)
  - Number of Months of Storage Capacity

Characterization Traits

- Swine Production Types
- Boars
- Sows
- Nurseries
- Farrow to Finish

- Finish Weight 2012-2016
- Production Numbers on Annual Basis 2012-2016
- Current and Historical Manure Analysis
  - 2012-2016 if possible.

Statistics

- Minimum number of growers consulted and sampled = 30 for each type
- Represent Industry as a whole not just one Integrator
- Information proposed to be collected by collaborative effort between Penn State University and Virginia Tech.

Historical Data
Finishers Smithfield-Gwaltney

- 1995-2000 Lagoon Mixture Samples (75 samples)
  - TKN 11.08 lb./1000 gal
  - NH4 8.01 lb./1000 gal
  - P2O5 5.32 lb./1000 gal
  - K2O 14.02 lb./ 1000 gal

- Avg. 2001-2004 Lagoon Mixture Samples (250 samples)

TKN	7.20 lb./ 1000 gal	
NH4	5.66 lb./ 1000 gal	
P2O5	2.81 lb. / 1000 gal	47.2 % Reduction
K2O	12.23 lb./1000 gal	

Virginia Contract Grower Info

- Finishers 42
- Sows 4
- Nursery 3
- Boars 2

- Minimum of 30 samples/year for each type.

- Only have more than 30 samples/year for finishers.

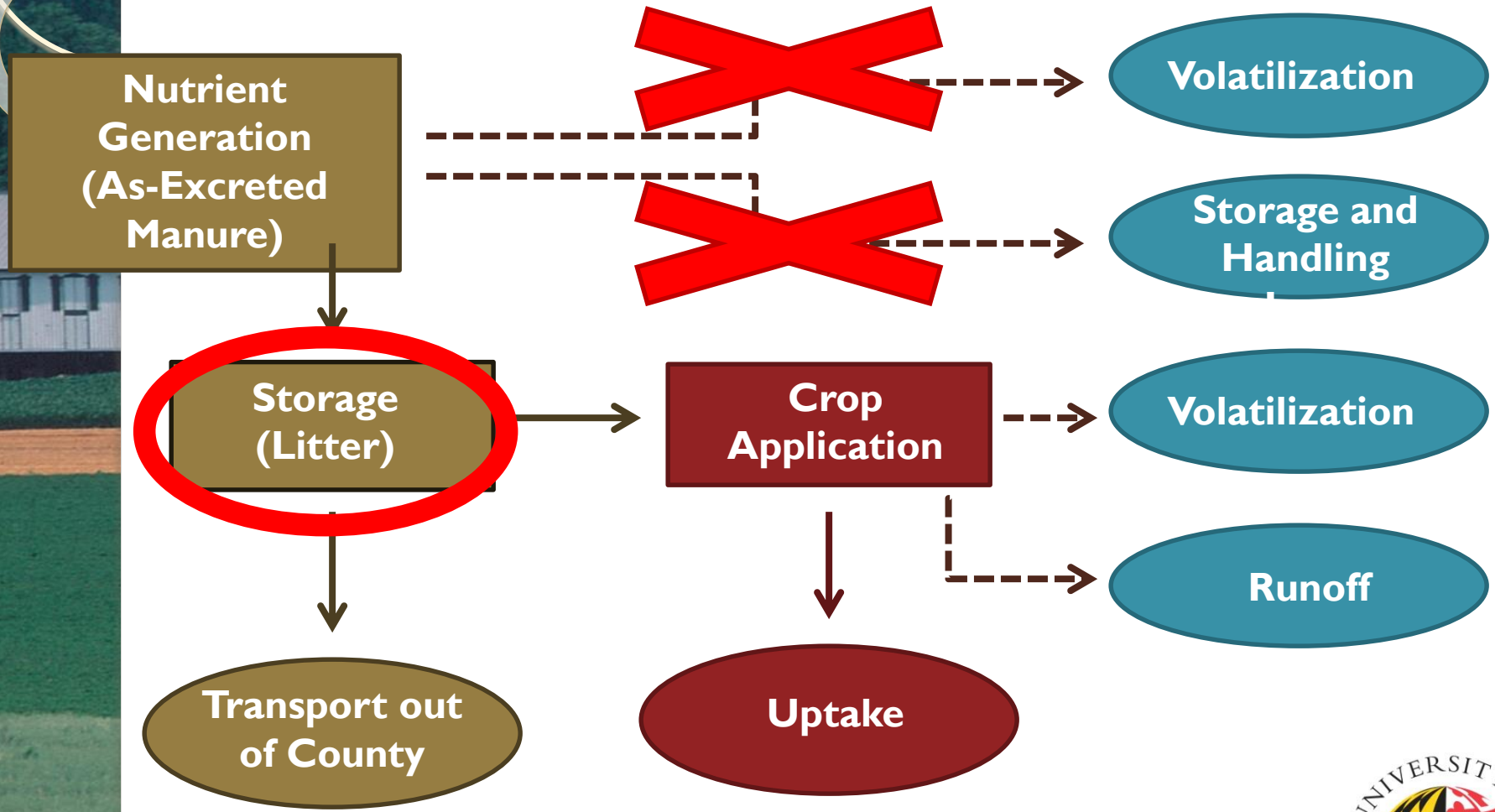
Data Management and Reporting

- Grower information protected from FOIA by research at PSU/VT. Identification coding used instead of names. Ex: Pa-07-03-16-34
- Survey information entered into Excel and provided to PI on weekly basis.
- PI will summarize and create draft report for Ag Workgroup review and comment.
- PI will create final report for approval by Ag Workgroup for Phase 6 modeling tools.

Commercial Turkey Pilot Project

- VT PI: Jactone Ogejo
- VT Field Interns: Jordon Kristoff
  Austin Shifflett
- VT Field Intern Supervisor: Tim Sexton
- VT Data Management: VT Computers
  VT Email

Estimating Poultry Nutrients



Commercial Turkey Pilot Project

- Commercial Data Collection
  - Farm Identification
  - Bird Production Type Identification
  - Total Number of Birds Grown Annually
  - Date and Number of Birds Placed (Flocks)
  - Date and Number of Birds Harvested (Flocks)
  - Total Live Weight Harvested per Bird per Production Group
  - Manure Nutrient Analysis Records
  - Total Volume of Litter Generated (Crust-outs and Cleanouts)
  - Number of Flocks per Cleanouts

Virginia Contract Grower Info

- One-Stage: (Toms and Hens) 54
- Two-Stage: (Toms and Hens) 170
- Three-Stage: (Hens) 4
- Finishers: 76
- Brooders: 23
- Poults: 19

- Minimum of 30 samples/year for each type.

Virginia Grower Interviews

- One-Stage: Heavy Toms 59
- Two Stage Toms 33
- One-Stage: Hens 38
- Two-Stage: Hens 76
- Three-Stage: Hens 0
- Finishers:
- Breeders 12
- Poults 19

- Minimum of 30 samples/year for each type.

- If can not obtain 30 samples, will combine like types where possible.

Equation 1. Poultry Phosphorus Production Based on Litter

(Used for Broilers)

Lbs of P/Year = (Lbs of Litter/Bird Produced)
X (Lbs of Dry Matter/Lb of Litter)
X (Lbs of P/Lb of Dry Matter)
X (Birds Produced/Year)

- Multiply:
  - Litter Production
  - Dry Matter Fraction
  - Litter Nutrient Concentration
  - Birds Produced

UNIVERSITY OF MARYLAND 18 56

Equation 2. Poultry Phosphorus Production Based on As-Excreted Manure

(Used for Pullets)

Lbs of P/Year = (Lbs of As-Excreted Manure/Bird Produced)
X (Lbs of Manure Recovered/Lbs of As-Excreted Manure)
X (Lbs of Dry Matter/Lb of Manure Recovered)
X (Lbs of P/Lb of Dry Matter Manure)
X (Lbs of Recoverable P/Lb of P)
X (Birds Produced/Year)

- Multiply:
  - ~~Litter Production~~ **As-Excreted Manure**
  - **Manure Recoverability Fraction**
  - Dry Matter Fraction
  - ~~Litter Nutrient Concentration Manure~~ **Nutrient Concentration**
  - **Nutrient Recoverability Fraction**
  - Birds Produced

UNIVERSITY OF MARYLAND 18 56

Equation 3. Poultry Phosphorus Production Based on As-Excreted Manure with Litter Concentrations

(Used for Turkeys and Layers)

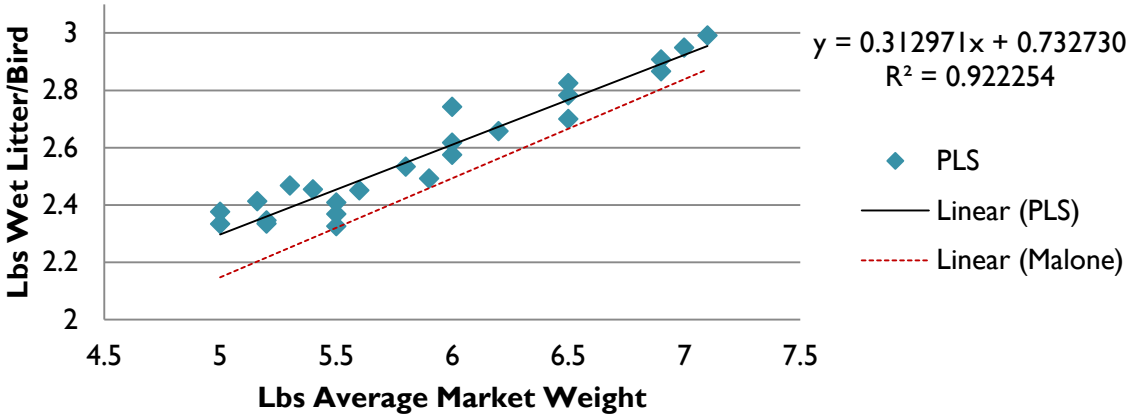
Lbs of P/Year = (Lbs of As-Excreted Manure/Bird Produced)
X (Lbs of Manure Recovered/Lbs of As-Excreted Manure)
X (Lbs of Dry Matter/Lb of Manure Recovered)
X (Lbs of P/Lb of Dry Matter)
X (Birds Produced/Year)

- Multiply:
  - ~~Litter Production~~ **As-Excreted Manure**
  - **Manure Recoverability Fraction**
  - Dry Matter Fractions
  - Litter Nutrient Concentration
  - Birds Produced

UNIVERSITY OF MARYLAND 18 56

Litter (or Manure) Produced

Relationship of Broiler Litter Production to Average Market Weight



- Broiler litter production can be estimated based upon average market weight.

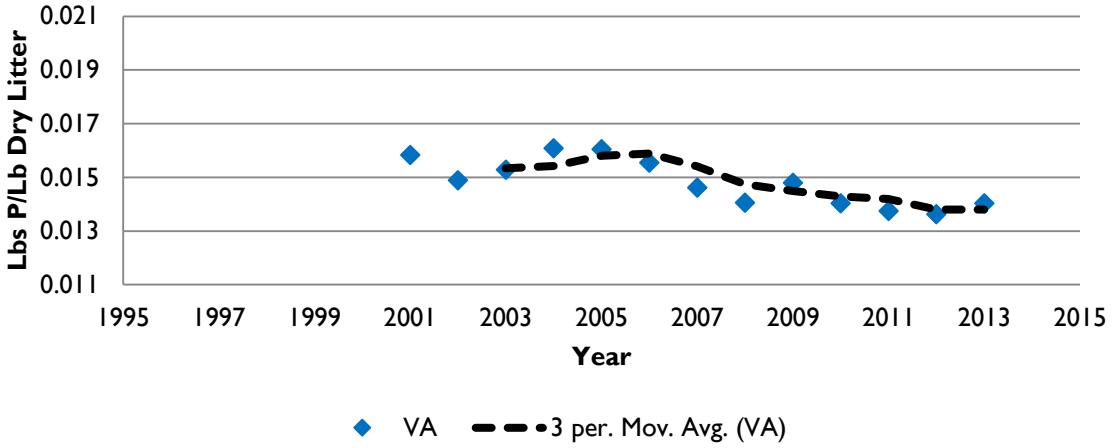
• Turkey, Pullet and Layer as-excreted manure production was taken from ASABE sources.

• These as-excreted values must be combined with estimates of manure lost in the barnyard prior to storage using recoverability factors from USDA.

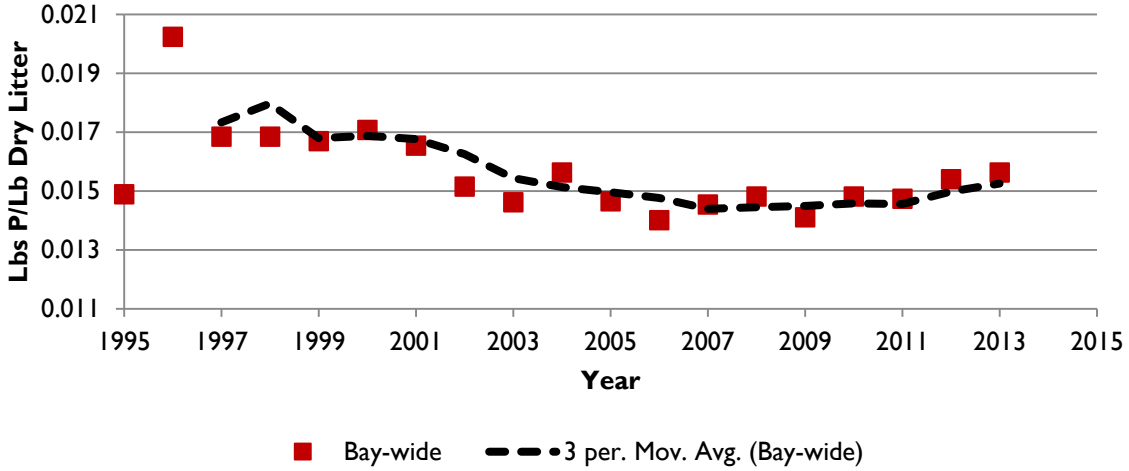
• Recoverability factors will be subject to change for all livestock based upon recommendations from the AMS and the AWMS expert panel.

Nutrient Concentrations

VA Lbs P/Lb Dry Litter for Broilers



Bay-Wide Lbs P/Lb Dry Litter for Broilers (to be used by NY, PA)



- Sample years: Use 3-year moving average
- 1985 through first sample year: Use first moving average point
- Last sample year forward: Use last moving average point
- States should submit sample data each year
- If no sample data is collected, state receives Bay-wide average

Populations

Broiler Production and Value – States, United States, and 19 State Total: 2013

[Annual estimates cover the period December 1 previous year through November 30. Broiler production including other domestic meat-type strains. Excludes States producing less than 500,000 broilers]

State	Number produced	Pounds produced	Value of production
	(1,000 head)	(1,000 pounds)	(1,000 dollars)
Alabama	1,048,600	5,872,200	3,558,553
Arkansas	996,400	5,978,400	3,622,910
Delaware	215,600	1,530,800	927,665
Florida	64,400	392,800	238,037
Georgia	1,334,600	7,607,200	4,609,963
Kentucky	309,000	1,668,600	1,011,172
Maryland	305,200	1,617,600	980,266
Minnesota	48,100	283,800	171,983
Mississippi	734,000	4,477,400	2,713,304
Missouri	277,400	1,331,500	806,889
North Carolina	785,500	5,891,300	3,570,128
Ohio	70,100	406,600	246,400
Oklahoma	206,200	1,360,900	824,705
Pennsylvania	168,800	945,300	572,852
South Carolina	226,500	1,585,500	960,813
Tennessee	172,800	898,600	544,552
Texas	610,100	3,599,600	2,181,358
Virginia	249,600	1,347,800	816,767
West Virginia	96,800	387,200	234,643
Wisconsin	53,100	223,000	135,138
Other States [1]	552,000	3,220,600	1,951,683
United States	8,524,800	50,626,700	30,679,781
19 State Total [2]	8,222,700	49,008,600	29,699,212

[1] California, Illinois, Indiana, Iowa, Louisiana, Michigan, Nebraska, New York, Oregon, and Washington combined to avoid disclosing individual operations.

[2] States in the 19 State Total include Alabama, Arkansas, California, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Missouri, Mississippi, North Carolina, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

- NASS provides yearly production values for turkeys and broilers. Production can be assumed to represent total population.

USDA Bird Production Estimates

Birds Produced/Year = (Year-End Inventoried Birds X 1/Cycles of Birds per Year) + [(Annual Birds Sold/Cycles of Birds per Year) X ((Cycles of Birds per Year-1)/Cycles of Birds per Year)]

- USDA estimates 1 cycle of layers produced per operator per year; this means that inventory from Ag Census can be used to estimate population.
- USDA estimates that 2.25 cycles of pullets are produced per operator per year.

Submitting New Data

- Swine Nutrient Data:
  Pilot project being implemented in PA and VA with PSU and VT, VA State Agency, and Commercial Integrators.

- Turkey Nutrient Data:
  Pilot project being implemented in VA with VT, State Agency, and Commercial Integrators.

Project Staff

- VT Interns (3) - field data collection from contract growers and integrators
- PSU and VT PI's (2) - compile field data and complete statistical analysis
- PSU and VT PI's - aggregate data across growers and integrators into county scale annual production data
- CBP) – integrate aggregated production data into the Phase 6 CBP modeling tools

Bio-Security
Farm Hygiene Program

- Respect All Entrance Prohibitions on Farms and Houses.
- No entrance into Any House During an Outbreak under ANY conditions.
- Upon Arrival, Report to Farm Manager Immediately.
- Use disposable boots and gloves before taking samples.
- Leave Vehicle Outside Production Area- WALK.

Bio-Security

- Wear Boots and Gloves that can be disinfected or disposable and left in proper disposal container at farm.
- Obtain samples from under house storage unless holding pond is in mixture process.
- Put sample into container. Rinse off outside. Spray until moist with Lysol or Virox.
- Put sample into Ziploc Bag. Spray off with Lysol or Virox and put into shipping container and place into truck.

Bio-Security

- All sampling materials must be washed, and disinfected with Clorox or Virox solution.
- Dry with paper towels.
- Paper towels gloves etc. must be placed into plastic bag and sealed for disposal.
- Remove all dirt mud, straw and debris from wheels and wheel wheels. Spray area with Virox or Clorox solution.

Questions?