



Commercial Poultry Production Data Research



UNIVERSITY OF
MARYLAND

EXTENSION

Solutions in your community



Chesapeake Bay Program

A Watershed Partnership

Mark Dubin

Senior Agricultural Advisor

**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**



A Review of Commercial Poultry Production Research in the Bay Watershed

Commercial Poultry Production Data Research

- ▶ Table of Contents
 - ▶ Poultry Litter Subcommittee (PLS) – (2011-2014)
 - ▶ Agricultural Modeling Subcommittee (AMS) – 2015
 - ▶ Virginia Tech Turkey Litter Manure Nutrient Generation Research Project – 2016
 - ▶ University of Maryland/CBPO Commercial Layer Production Research – 2021
 - ▶ Virginia Tech Chesapeake Bay Commercial Poultry Production Research Project – 2022
 - ▶ Summary



Poultry Litter Subcommittee (PLS)

Commercial Poultry Production Data Research

- ▶ Poultry Litter Subcommittee (PLS) –
 - ▶ In 2011, the Ag Workgroup determined that a subcommittee was needed to review modeling assumptions in the Phase 5.3.2 Watershed Model for nutrient generation by poultry.
 - ▶ This decision was made in response to Partnership concerns that poultry nutrient generation in the Model did not adequately reflect nutrient generation across the watershed.
 - ▶ The AgWG charged the Poultry Litter Subcommittee (PLS) to review the current methods and develop new methods for estimating nutrient generation by poultry across the watershed.

Commercial Poultry Production Data Research

- ▶ Poultry Litter Subcommittee (PLS) –
 - ▶ The PLS was charged with the following tasks:
 - ▶ Collect data that better reflect modern (and historical) N and P concentrations in poultry litter for each of the poultry types present within the watershed.
 - ▶ Develop poultry litter generation quantities for each poultry type, both modern and historic.
 - ▶ Develop alternate methods to estimate poultry population numbers across the watershed and compare to current methods used in the model.

Commercial Poultry Production Data Research

- ▶ Poultry Litter Subcommittee (PLS) –
 - ▶ The PLS summarized over a decade of litter sample data collected mainly from broilers and turkeys, with very small amounts of data from pullets and layers.
 - ▶ Broiler litter manure analysis data collected from State/ LGU labs, NMP, and permit databases from DE/MD/VA/WV. (~9,800 data points)
 - ▶ Broiler litter manure bulk generation data collected from NMP planners, growers, and manure haulers/brokers from DE/MD/VA. (Expansive)
 - ▶ Sufficient broiler data collected to develop statistical estimates of annual N and P generation per lb. of bird over time for replacing American Society of Agricultural and Biological Engineers (ASABE) data.

Commercial Poultry Production Data Research

- ▶ Poultry Litter Subcommittee (PLS) –
 - ▶ Turkey litter manure analysis data collected from State/ LGU labs and NMP and permit databases from VA/WV. (~ 2,000 data points)
 - ▶ Turkey litter manure bulk generation data collected from NMP planners, growers, and manure haulers/brokers from VA only. (Limited)
 - ▶ Insufficient turkey data collected to develop statistical estimates of annual N and P generation per lb. of bird over time for replacing ASABE data.

Commercial Poultry Production Data Research

- ▶ Poultry Litter Subcommittee (PLS) –
 - ▶ Layer/breeder manure analysis data collected from State/LGU labs and NMP and permit databases from VA/WV. (~ 1,900 data points) Very limited data on pullets.
 - ▶ Very limited layer/breeder manure analysis data collected from PA for most recent years only.
 - ▶ No layer/breeder or pullet manure bulk generation data collected from NMP planners, growers, and manure haulers/brokers. (None)
 - ▶ Insufficient layer/breeder or pullet data collected to develop statistical estimates of annual N and P generation per lb. of bird over time for replacing ASABE data.

Commercial Poultry Production Data Research

- ▶ Poultry Litter Subcommittee (PLS) –
 - ▶ The PLS completed a draft recommendation report in 2014 entitled “**Redefinition Of Poultry Litter Nutrient Generation, Litter Volume Generation And Poultry Population Datasets**”
 - ▶ The draft report and associated data required additional statistical analysis and a defined method for incorporating the recommendations into the Phase 6 modeling tools.
 - ▶ A copy of the PLS report is available in Appendix A of the Agricultural Modeling Subcommittee report located at:
[Recommendations to estimate poultry nutrients for phase 6 model 03062015 \(1\).pdf](#)



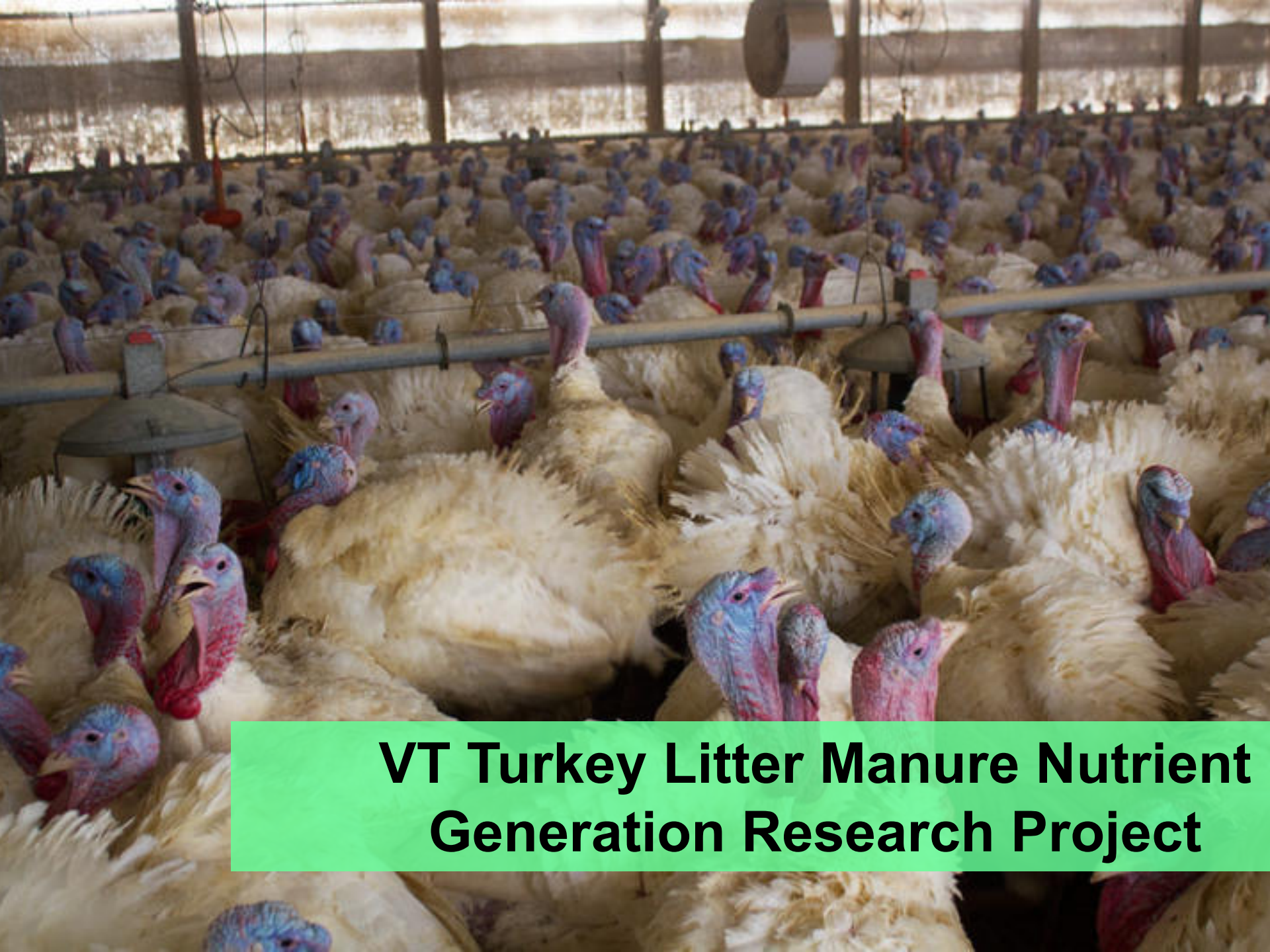
**Agricultural Modeling Subcommittee
(AMS)**

Commercial Poultry Production Data Research

- ▶ Agricultural Modeling Subcommittee (AMS) –
 - ▶ In October 2014, the AgWG asked the Agricultural Modeling Subcommittee (AMS) to review the PLS records and report (found in Appendix A).
 - ▶ The AMS was asked to provide recommendations for incorporating the data into poultry nutrient production estimates for the Phase 6 Watershed Model.
 - ▶ The AMS report of March 2015 describes processes to estimate poultry litter production by year for each state and type of bird.
 - ▶ Many of the recommendations in this report were originally suggested by the PLS. Some other recommendations are based on analysis of the submitted data and other data sources available.

Commercial Poultry Production Data Research

- ▶ Agricultural Modeling Subcommittee (AMS) –
 - ▶ The CBP approved AMS Report :
“Recommendations to Estimate Poultry Nutrient Production in the Phase 6 Watershed Model”
 - ▶ The report established standards for statistical analysis methods, data quantity (30 data points min), and equations for developing manure nutrient generation for model inputs for Phase 6.
 - ▶ A copy of the AMS report is available at:
[Recommendations to estimate poultry nutrients for phase 6 model 03062015 \(1\).pdf](#)



**VT Turkey Litter Manure Nutrient
Generation Research Project**

Commercial Poultry Production Data Research

- ▶ VT Turkey Manure Nutrient Generation Research Project –
 - ▶ The CBP approved PLS and AMS reports of 2014 and 2015 demonstrated the lack of available data for turkey litter manure nutrient generation for Phase 6 model inputs.
 - ▶ A commercial turkey research project was developed between the CBPO and Virginia Tech (VT) in 2015.
 - ▶ The research project obtained turkey production data from state agency databases, companies, and growers in VA and WV.

Commercial Poultry Production Data Research

- ▶ VT Turkey Manure Nutrient Generation Research Project –
 - ▶ Turkey litter manure analysis data collected from State/ LGU labs, NMP, and permit databases from VA. (Expansive)
 - ▶ Turkey litter manure bulk generation data collected from NMP planners, growers, and manure haulers/brokers from VA. (Expansive)
 - ▶ Commercial turkey population data by bird production type collected from state NMP planners, companies, and growers and compared to USDA-NASS data.
 - ▶ Sufficient turkey data collected to develop statistical estimates of annual N and P generation per lb. of bird by type of production over time for replacing ASABE data.

Commercial Poultry Production Data Research

- ▶ VT Turkey Manure Nutrient Generation Research Project –
 - ▶ Turkey research project recommendation report published in December 2016: **“Final Report for Turkey Litter Generation and Nutrient Content for use in Phase 6.0 Chesapeake Bay Program Watershed Model”**
 - ▶ After AgWG, WTWG, CBPO review and approval, the report recommendations were incorporated into the development of the Phase 6 modeling tools to replace ASABE annual N and P generation per lb. of bird for all 6 Bay states.
 - ▶ A copy of the VT report is available at [Phase 6 Turkey Litter Nutrients Characterization for the Phase 6 Watershed Model Draft Final Report 121416.1.pdf](#) (chesapeakebay.net)



**UM/CBPO Commercial Layer
Production Research Project**

Commercial Poultry Production Data Research

- ▶ UM/CBPO Commercial Layer Production Research Project –
 - ▶ The PA Department of Environmental Protection (PADEP) requested assistance from the CBPO due to the limited available layer production data (populations) for Adams and York Counties in the Phase 6 model inputs.
 - ▶ A commercial layer research project was developed between the CBPO, PADEP, and the University of Maryland (UM) in 2020.
 - ▶ The research project obtained commercial layer production data from state and county agency databases, companies and growers in PA.

Commercial Poultry Production Data Research

- ▶ UM/CBPO Commercial Layer Production Research Project –
 - ▶ Commercial layer population data by bird production type collected from state and county NMPs, Manure Management Plans (MMPs), CAFO permits, companies and growers. (Extensive)
 - ▶ Sufficient commercial layer data collected to develop annual county-scale estimates of layer populations for Adams and York Counties. (1995 – 2021)
 - ▶ State and county agency public data used as QA/QC for company/grower data.
 - ▶ Commercial layer populations compared to existing USDA-NASS and Phase 6 model data.

Commercial Poultry Production Data Research

- ▶ UM/CBPO Commercial Layer Production Research Project –
 - ▶ Layer production research recommendations published in 2021 for review by the CBP AgWG and WTWG.
 - ▶ The findings of the research study statistically confirmed the absence of the majority of layer bird populations within the two counties by the USDA-NASS reports.
 - ▶ The CBPO recommendations stemming from the research study findings is to supplement the existing USDA-NASS with commercial layer population data to correct the absence.
 - ▶ A copy of the CBPO recommendations is available at the CBP Agriculture WG and Watershed Technical WG sector workgroup webpages.



**VT Chesapeake Bay Commercial
Poultry Production Research Project**

Commercial Poultry Production Data Research

- ▶ VT Chesapeake Bay Commercial Poultry Production Research Project –
 - ▶ The CBP approved VT turkey litter manure nutrient generation pilot project of 2016 demonstrated that collecting verifiable data for commercial poultry production was feasible.
 - ▶ A full-scale VT research project was developed in 2019 for developing new commercial broiler and turkey production data for VA and WV.
 - ▶ The new research project is following the previous pilot by obtaining data from state agency databases, companies, and growers in VA and now WV.

Commercial Poultry Production Data Research



Department of Biological Systems
Engineering
302E HAD81 (MC2554)
1230 Washington St., Virginia Tech
Blacksburg, Virginia 24061
P: (540) 231-6815 F: (540) 231-3199
arogo@vt.edu

Chesapeake Bay Commercial Poultry Production Research Project

Generating Local-Scale Commercial Poultry Production Data

Virginia Polytechnic Institute and State University (Virginia Tech) in cooperation with the regional commercial poultry industry are committed to a locally based database of poultry production to be used in place of currently published national-scale commercial production data. The Virginia Tech research initiative replaces or supplements other sources of national-scale data for more accurate representation of county, state, and regional-scale poultry production and management systems for a variety of purposes, including more accurately informing decision support modeling tools, nutrient management planning, and engineering or designing improved and cost effective best management practices. The improved accuracy of localized production and management data provide added value to the poultry industry and poultry growers.

University Research Project Objectives

The Virginia Tech research project's objective is to improve the accuracy of estimated annual bird populations, number of production operations, and the mass and movement of poultry litter nutrients (nitrogen and phosphorus) generated by poultry production facilities in the Chesapeake Bay region on a county level. The project objectives will be achieved by Virginia Tech cooperatively working with poultry growers, integrator companies, poultry associations, and relevant partners to collect, analyze, and scientifically validate commercial poultry production data in the Commonwealth of Virginia and the State of West Virginia to provide a local and/or regional-scale data source as an alternative to existing national-scale poultry data.

A Cooperative Commitment

A cooperative commitment has been formed between Virginia Tech and the poultry integrator companies in the region for data sharing and project support. The mutual agreements include the identification of company owned and contracted production facilities, and to allow for Virginia Tech research staff to collect live production data from each cooperating integrator company and randomly selected production facilities operating in the region to obtain annual production data starting in calendar year 2016 to present. The new data will supplement existing poultry production data previously collected in 2012 and 2016.

Poultry Grower Collaboration

Poultry production data for the Virginia Tech research project will be obtained from the cooperating poultry integrator companies and randomly selected company growers. Virginia Tech research staff will collaborate with company representatives to schedule conference call

and/or on-farm appointments with the selected company growers in the Commonwealth of Virginia and the State of West Virginia. During the appointments the research staff will conduct personal interviews and collect poultry production facility data.

The poultry production data provided by the company growers will assist Virginia Tech in validating integrator company data as well as informing the research project on the actual management of litter at the production facilities, such as frequency of litter cleanouts, litter transport, manure litter storage, management and use, etc. The grower survey questionnaire will include the following items:

- Poultry production type(s) grown, and number of birds grown annually
- Date and number of birds placed by flock
- Date and number of birds harvested by flock
- Total and average live weight by bird harvested by flock
- Litter nutrient analysis records
- Number of flocks between cleanouts
- Total volume of litter generated (partial and cleanouts)
- Manure management systems implemented
- Mortality management systems implemented

Project Biosecurity

Virginia Tech research staff conducting on-farm visits with poultry growers will follow strict biosecurity protocols designated by Virginia Tech which have been reviewed and approved by the poultry integrator companies and by the Virginia Department of Agriculture State Veterinarian. As per the protocol, the research staff will never enter any poultry production operation without adequate biosecurity protection, nor enter any bird production facility building for any reason.

Project Data Security

The poultry production data obtained by this study is proprietary information for the purposes of research and are governed by Virginia Tech's policies on the Freedom of Information Act (FOIA). Once the analysis of the collected data is completed by Virginia Tech and the final report developed, the compiled and aggregated data will be reviewed to ensure that all personal identifying information (PII) and integrator company information has been removed and destroyed. These steps are imperative to ensure the privacy and safety of poultry growers and the cooperating integrator companies, as well as maintain security of a primary food production system Americans rely on.

Project Research Staff

Dr. Jactone Ogejo – Project PI, Virginia Tech Department of Biological Systems Engineering
Mr. Mark Dubin – Project Coordinator, University of Maryland Extension College Park
Mr. Tim Sexton – Virginia Tech Research Intern
Ms. Jordan Kristoff – Virginia Tech Research Intern

Commercial Poultry Production Data Research

- ▶ VT Chesapeake Bay Commercial Poultry Production Research Project –
 - ▶ Production data is obtained through the companies through a data sharing agreement with VT, including bird placement, bird harvesting, average harvest weights, and bird type for every facility for multiple years.
 - ▶ Contracted and company owned facility contact and location data is also provided by the companies, and VT randomly selects a minimum of 30 producers to survey by bird and production type per company.
 - ▶ Historic litter manure analysis reports and NMP's are accessed through the respective state agency for each facility grower. New litter manure samples are obtained by the project staff when the last analysis is over 1 year past.

Commercial Poultry Production Data Research

- ▶ VT Chesapeake Bay Commercial Poultry Production Research Project –
 - ▶ Multiple sources of data are combined to develop annual estimates of commercial production data, including litter manure nutrient generation, bird populations, and litter management over time.
 - ▶ Public agency data sources are used to supplement company and grower data, as well as provide a QA/QC.
 - ▶ Grower surveys and onsite litter sampling provide critical information on facility specific management, including the frequency of crust-out and whole-house cleanouts.

Commercial Poultry Production Data Research

Broiler and Turkey Litter Characterization Questionnaire and Mortality Management Survey Version 08-26-2021

Name of Project Personnel: _____

Date _____

Farmer ID _____ (Ex: CAVA000) County _____

Type of Production System:

- Turkey: Yes: No:

Stage One:	Finisher:	Light Hens:
Stage Two:	All In/All Out:	Heavy Toms:
Stage Three:	Layer:	Light Toms:
Brooder:	Heavy Hens:	Other:

- Broilers: Yes: No:

All In/All Out:	Cornish Hens (Wt.):
Brooder:	Light Broilers (Wt.):
Layer:	Standard Broilers (Wt.):
Other:	Heavy Broilers (Wt.):

- Layers: Yes: No:
- Ducks: Yes: No:
- Other: (Describe): _____
- Comments: _____

Production Type:

- Conventional: Yes: No:
- Antibiotic Free: Yes: No:
- Organic: Yes: No:
- Other: (Describe): _____
- Comments: _____

Housing:

Houses (No.)	Length (Ft.)	Width (Ft.)	Type
1			
2			
3			
4			

HISTORY: Type of Bird Number etc. (If Farmer doesn't have complete info ok, go to next)

Year	Flock Size	Bird Size	Average Weeks per Cycle	Cycles per Year
2016				
2017				
2018				
2019				
2020				
2021				

Bedding

Year	Bedding Material	Depth of New Bedding	Season Litter Removed	Litter amendment Product Used
2016				
2017				
2018				
2019				
2020				
2021				

Commercial Poultry Production Data Research

Crust/Cake Out and Total Cleanout

Crust/Cake Out

- Frequency of crust/cake out cleanouts per year: _____
- Weight of litter removed (tons): _____
- Weight of bedding added (tons): _____
- Cake/Crust Removed (tons): _____
- Comments: _____

Total Cleanout

- Number flocks between total cleanout: _____
- Litter/manure cleaned or hauled out (tons): _____
- Weight of bedding added (tons): _____
- Comments: _____

Litter Analysis Required (If more than 12 months, new sample)

- Yes
- No

Year	Total N(TKN)	Ammonium	P205	K20	% of Moisture
2016					
2017					
2018					
2019					
2020					
2021					

Verify this information with Seth Mullins 804-517-0726 Seth.Mullins@dcr.virginia.gov

Attach Litter Analysis Reports:

Comments: _____

Litter Movement

- Where does litter go?
 - On-farm Field Application (% of annual total or tons): _____
 - Transferred Off-Farms (% of annual total or tons): _____
- Who Receives Transferred Litter?
 - Tons of litter shipped to this person: _____
 - State/County: _____
- Comments: _____

Litter Amendments

- None: Yes: _____ No: _____
- Alum: Yes: _____ No: _____
- Poultry Guard: Yes: _____ No: _____
- Gypsum: Yes: _____ No: _____
- PLT: Yes: _____ No: _____
- Other (Describe): _____
- How often applied? _____
- How much applied? _____
- Comments: _____

Litter Storage

- Covered/Uncovered: Yes: _____ No: _____
- Stacked: Yes: _____ No: _____
- Shed: Yes: _____ No: _____
- Composting: Yes: _____ No: _____
- Other (Describe): _____
- Comments: _____

USDA-NASS Census of Agriculture

When did the farmer fill out an Ag Census Last?

- 2012: Yes: _____ No: _____
- 2017: Yes: _____ No: _____
- Comments: _____

Commercial Poultry Production Data Research

- ▶ VT Chesapeake Bay Commercial Poultry Production Research Project –
 - ▶ Data is also collected from grower surveys on the use of litter amendments to control ammonia emissions, including type of product and frequency of applications.
 - ▶ In addition to litter manure sampling for analysis, litter density tests are also performed on the stockpiled litter.
 - ▶ VT will be implementing statistical analysis to create aggregated annual estimates by bird and production type at the county-scale.

Commercial Poultry Production Data Research

- ▶ VT Chesapeake Bay Commercial Poultry Production Research Project –
 - ▶ The findings will be published in 2022 in a series of scientific public reports, including ones on:
 - ▶ Poultry populations compared to USDA-NASS Census of Agriculture and Annual State Reports.
 - ▶ Litter manure nutrient generation for N and P on annual basis and compared to ASABE and previous research reports.
 - ▶ Use of litter amendments by type and frequency.
 - ▶ Litter manure analysis and density values for revising poultry facility engineering standards for USDA-NRCS.
 - ▶ Poultry mortality management facilities designs and their operation.



Summary

Commercial Poultry Production Data Research

▶ Summary

- ▶ The use of statistically valid commercial agricultural production data QA/QC with public agency data sources is supported by existing CBP partnership developed and approved data standards and verification protocols.
- ▶ Verified, reviewed, and approved commercial agricultural production data was used in the development of the existing Phase 6 (CAST) modeling tools approved for use by the CBP partnership.
- ▶ Verified, reviewed, and approved commercial agricultural production data is currently being used to represent livestock manure nutrient generation for all 6 Bay states in the existing Phase 6 (CAST) modeling tools.

Commercial Poultry Production Data Research

▶ Summary

- ▶ There are multiple factors which effect ammonia emissions and N deposition from commercial poultry production, including:
 - ▶ Weather conditions.
 - ▶ Wind speed and direction.
 - ▶ House and litter management.
 - ▶ Bird and production type.
 - ▶ Use of litter amendments and frequency.
- ▶ The published results from the VT poultry research project will provide insight into existing management conditions as a valid starting point to determining ammonia contributions from poultry production.

A scenic view of a rural farmstead. In the foreground, there is a grassy bank with some reeds and lily pads near a pond. The pond reflects the sky and the buildings. In the middle ground, there are several white buildings, including a barn and a house, and a tall white silo. The background shows rolling green hills with trees and a blue sky with some clouds.

**For More Information go to
<https://www.chesapeakebay.net/>**