



**Commercial Poultry  
Production Management  
Research in the Bay Watershed**



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*A Watershed Partnership*

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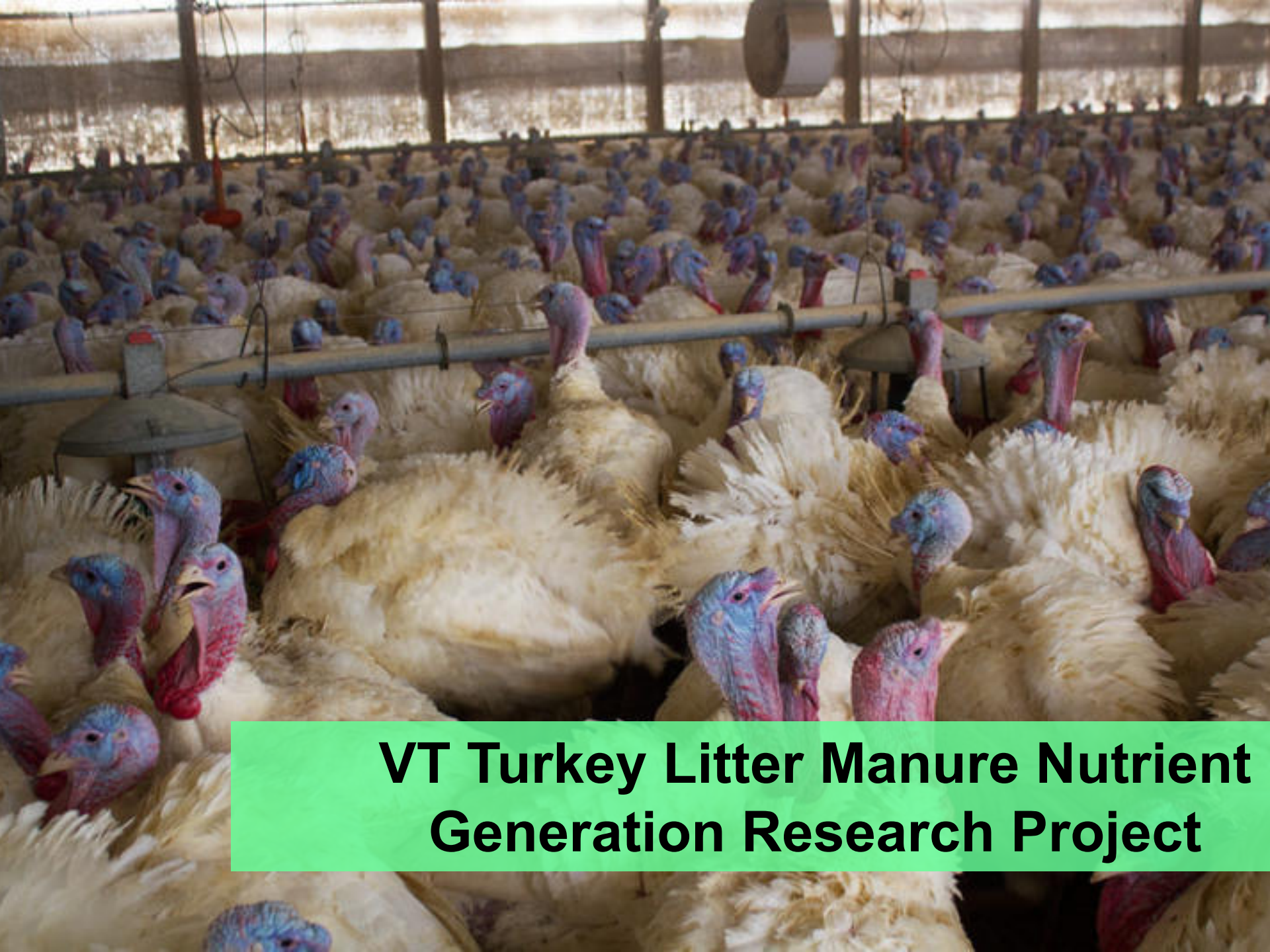
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# Commercial Poultry Production Management Research

- ▶ Table of Contents
  - ▶ 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
  - ▶ Virginia Tech Research Project Challenges
  - ▶ Summary





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



# Commercial Poultry Production Management Research

- ▶ VT Turkey Manure Nutrient Generation Research Project –
  - ▶ A Chesapeake Bay Program (CBP) Partnership review of publically available poultry nutrient generation data demonstrated the lack of available data for turkey litter manure nutrient generation for Phase 6 Chesapeake Bay Watershed Model inputs.
  - ▶ In response, a commercial turkey research project was developed between the CBP Office and Virginia Tech (VT) in 2015.
  - ▶ The research project obtained turkey production data from state agency databases, companies, and contract growers in VA and WV.



# Commercial Poultry Production Management 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 Management 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 CBP Partnership review and approval, the report recommendations were incorporated into the development of the CBP 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](http://chesapeakebay.net))



# Commercial Poultry Production Management Research

## Project Team

<b>NAME</b>	<b>ROLE</b>
<b>Jactone A. Ogejo (VT)</b>	Project lead; data processing, analysis, and interpretation; report compilation and writing
<b>Jordan Kristoff (VT)</b>	Data collection and processing
<b>Timothy Sexton (VA DCR)</b>	Data QA/QC; supervised interns; Data collection and processing
<b>Seth Mullins (VA DCR)</b>	Historical litter characteristics data; data review and interpretation
<b>Mark Dubin (UMD)</b>	Project Coordinator
<b>Paul Bredwell (USP&amp;EA)</b>	Industry Project Advisor





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



# Commercial Poultry Production Management Research

- ▶ UMD/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 (UMD) in 2020.
  - ▶ The research project obtained commercial layer production data from state and county agency databases, companies and growers in PA.



# Commercial Poultry Production Management Research

- ▶ UMD/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 Management Research

- ▶ UMD/CBPO Commercial Layer Production Research Project –
  - ▶ The project also obtained historic layer manure nutrient analysis for comparison with ASABE values over time.
  - ▶ Layer production research recommendations published in 2021 for review by the CBP Partnership.
  - ▶ 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.
  - ▶ A copy of the CBPO findings and recommendations available at the CBP Partnership sector workgroup webpages at <https://www.chesapeakebay.net/>



# Commercial Poultry Production Management Research

## Project Team

<b>NAME</b>	<b>ROLE</b>
<b>Mark Dubin (UMD)</b>	Project development, data collection, data QA/QC, and data processing
<b>Vanessa Van Note (CBPO)</b>	Data processing, analysis and interpretation, report compilation and writing
<b>Paul Bredwell (USP&amp;EA)</b>	Industry Project Advisor





**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 Management Research



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## 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 Management 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 Management 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 Management 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 Management 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](mailto: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 Management 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 Management Research

- ▶ VT Chesapeake Bay Commercial Poultry Production Research Project –
  - ▶ The findings are planned to 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.



# Commercial Poultry Production Management Research

## Project Team

<b>NAME</b>	<b>ROLE</b>
<b>Jactone A. Ogejo (VT)</b>	Project lead; data processing, analysis, and interpretation; report compilation and writing
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<b>Paul Bredwell (USP&amp;EA)</b>	Industry Project Advisor





# VT Research Project Challenges



# Commercial Poultry Production Management Research

- ▶ VT Research Project Challenges
  - ▶ Developing data sharing agreements with each individual company is a time-consuming legal process.
  - ▶ Obtaining company data on contract producers and historic production data is a time-consuming administrative process.
  - ▶ Hiring, training, and retaining reliable and dedicated project field staff is a challenge due to frequent turnovers.
  - ▶ Part-time or temporary hire positions may appear to be financially friendly but require increased project supervision and oversight.
  - ▶ Retention of producer records to document management actions can limit data reference sources.

# Commercial Poultry Production Management Research

- ▶ VT Research Project Challenges
  - ▶ Communications between company contract producers and their flock managers can pose challenges in ensuring coordination for field data collection.
  - ▶ External influences such as the COVID-19 pandemic and bird disease outbreaks such as Avian Influenza have significant project impacts.
  - ▶ Short-term project funding with two-year grants and utilizing private funding sources can be administratively challenging.
  - ▶ Commercial poultry production management continues to adapt and evolve, requiring data updates over time.





**Summary**

# Commercial Poultry Production Management 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 Management Research

## ▶ Summary

- ▶ There are multiple factors which effect ammonia emissions and N deposition from commercial poultry production which require a systems approach – not just one action.
  - ▶ 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 can provide insight into existing management conditions as a valuable reference point to determining ammonia contributions and mitigation from poultry production.



A scenic view of a rural farmstead. In the foreground, there is a grassy bank with some reeds and fallen leaves. A calm pond reflects the sky and the buildings. In the middle ground, there are several white farm buildings, including a large barn, a smaller barn, and a tall silo. A two-story white house is visible on a slight rise to the left. The background shows a line of trees and a clear blue sky with some light clouds.

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