Chesapeake Bay Agricultural Modeling Team (AMT)

Use of Agricultural Industry Data in Phase 7 Modeling Tools

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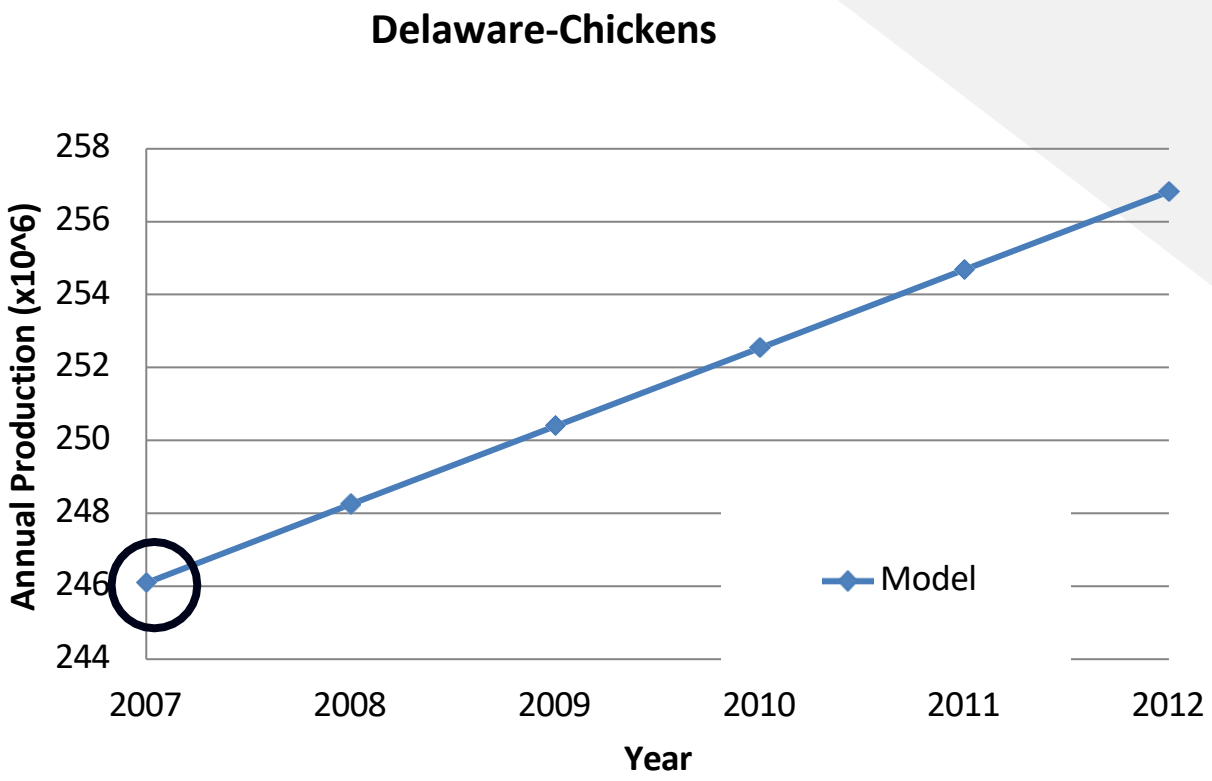
MEMORY LANE

Early Approach to Estimate Poultry Populations

Watershed Population Based on the 5-year Ag Census data.

For 2007, the population shown is the 2007 census number.

Apply an escalation factor, *f*, to estimate subsequent years.



How Many Birds Are There?

Poultry Litter Subcommittee Report

January 2014 Report – Use of 2003 ASAE Standard seriously overestimates manure generation volume.

EPA/ASAE

	Approach	units
Bird Inventory	43,620,576	# of birds on any given day (2007 Census)
Animal Unit Definition	455	# of birds per 1000 lbs of animal mass
Total Animal Unit Inventory	95,869	animal units on any given day
Manure Production	85	lbs of manure per animal unit per day
Total Manure Produced	1,487,174	tons wet excretion per year
Nitrogen Concentration	0.0129	lbs TKN per lb of manure
Phosphorous Concentration	0.0035	lbs Total P per lb of manure
Total Nitrogen Produced	38,491,563	lbs Total N per year
Total Nitrogen Not Volatized	35,332,221	lbs Total N per year
Total Phosphorous Produced	10,497,699	lbs Total P per year
Total Phosphorous Produced with 16% phytase credit	8,818,067	lbs Total P per year

(b)

UD/DDA/UMD

	Approach	units
No of Birds	43,620,576	# of birds
No of Flocks per Year	4.8	flock per year
Total Number of Birds Produced	209,378,765	birds per year
Manure Production	1.25	tons per 1000 birds
Total Manure Produced	261,723	tons per year
Nitrogen Concentration	56.80	lbs Total N per ton
Phosphorous Concentration	19.50	lbs Total P per ton
Total Nitrogen Produced	14,839,720	lbs Total N per year
Total Phosphorous Produced	5,103,607	lbs Total P per year

	EPA/ASAE	U of DEL
Tons litter	**1.5 million tons**	**0.26 million tons**
Tot N prod	**38.5 million lb.**	**14.8 million lb.**
Tot P prod	**10.5 million lb.**	**5.1 million lb.**

2011 – Poultry Litter Subcommittee (PLS) formed by the Ag Workgroup to review modeling assumptions in the Phase 5.3.2 Watershed Model for nutrient generation by poultry.

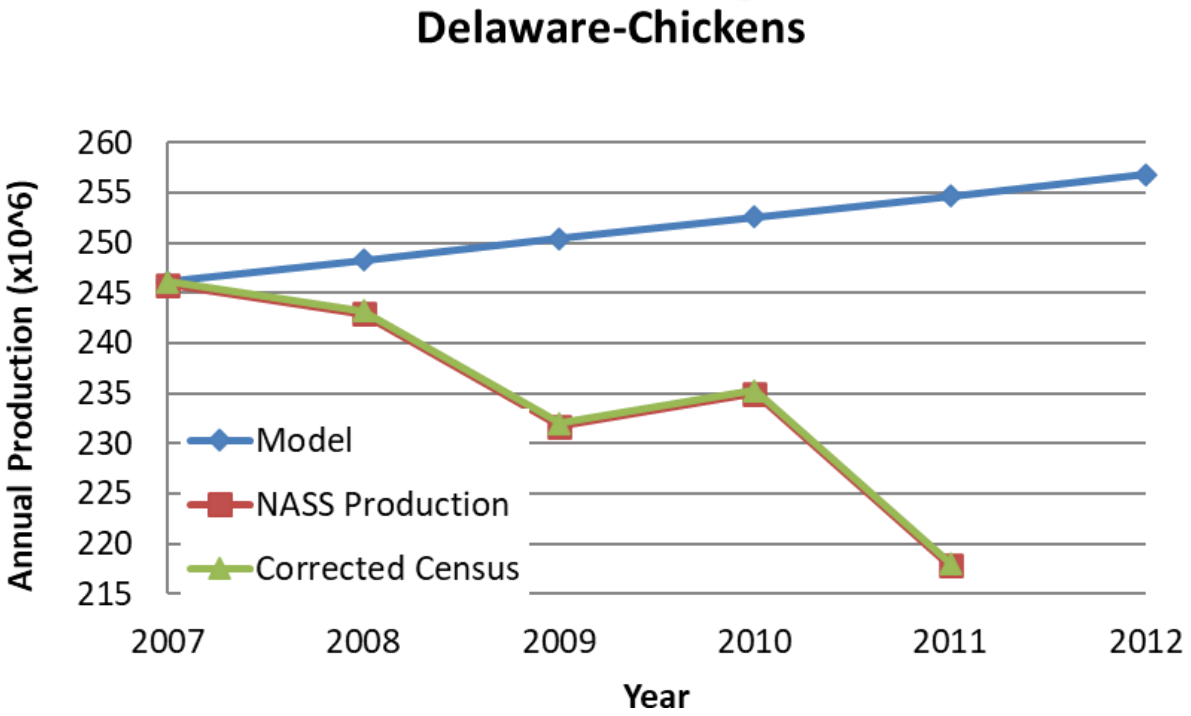
Decision made in response to Partnership concerns that poultry nutrient generation in the Model did not adequately reflect nutrient generation across the watershed.

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.

PLS recommends a new approach for modeling nutrient generation from poultry based on state-specific litter data, rather than litter estimates taken from the 2003 ASABE Standard.

How Many Birds Are There?



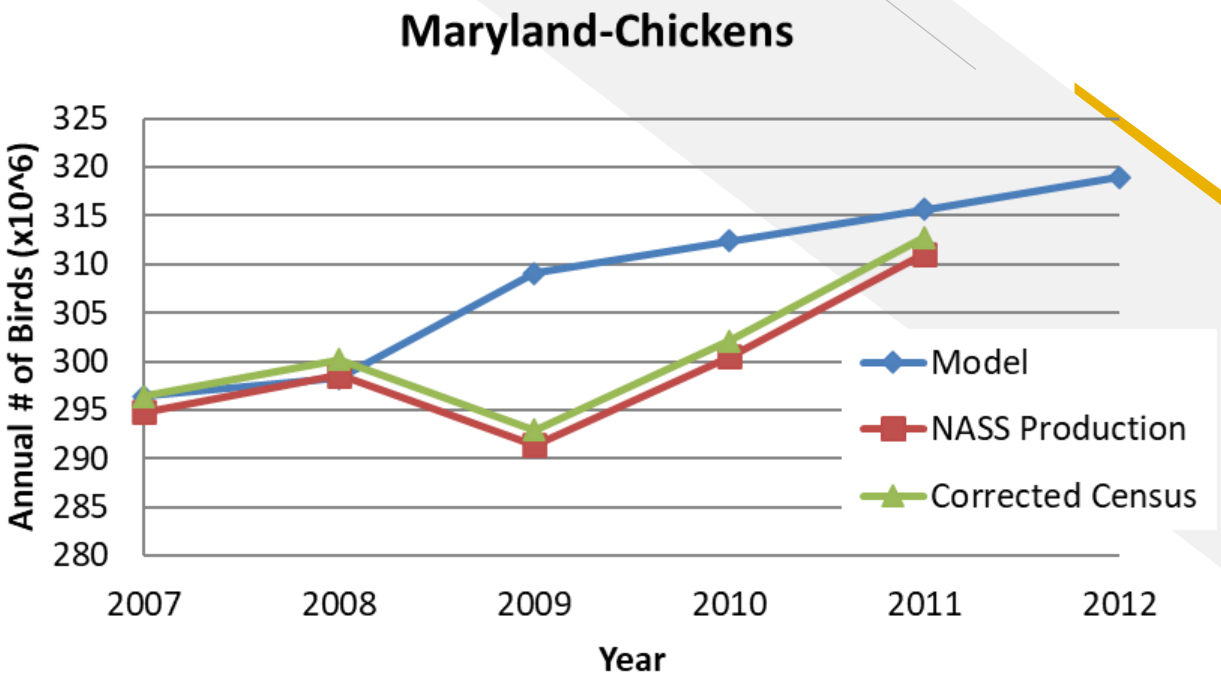


Table 4. Comparison of the 2007 Census of Agriculture Inventory data and NASS placement, production, and slaughter data for broiler production in Delaware. NASS units are broilers per year.

Year	Census Inventory	NASS Placements	NASS Production	NASS Slaughter
2012	Pending	215,987,000	212,000,000	309,147,000
2011	N/A	223,589,000	217,800,000	302,305,000
2010	N/A	243,035,000	235,000,000	304,471,000
2009	N/A	243,572,000	231,700,000	296,595,000
2008	N/A	245,505,000	242,900,000	304,657,000
2007	51,092,4955	257,973,000	245,800,000	306,875,000

"The PLS recommends that broiler and turkey annual production numbers reported by NASS be used to estimate annual population numbers in the Phase 6 Model for each state. "

"It is evident that the slaughter number is not an accurate estimate of broiler population in Delaware because some broilers grown in Maryland are slaughtered in Delaware. Additionally, the placement numbers are not as accurate due to mortalities during the growout period. Overall, the production data set provides the most accurate picture of bird numbers."

Poultry Litter Subcommittee Update

Updated Summary & Draft Recommendations

Agriculture Workgroup Meeting
May 9, 2013
Annapolis, Maryland

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Draft Recommendations

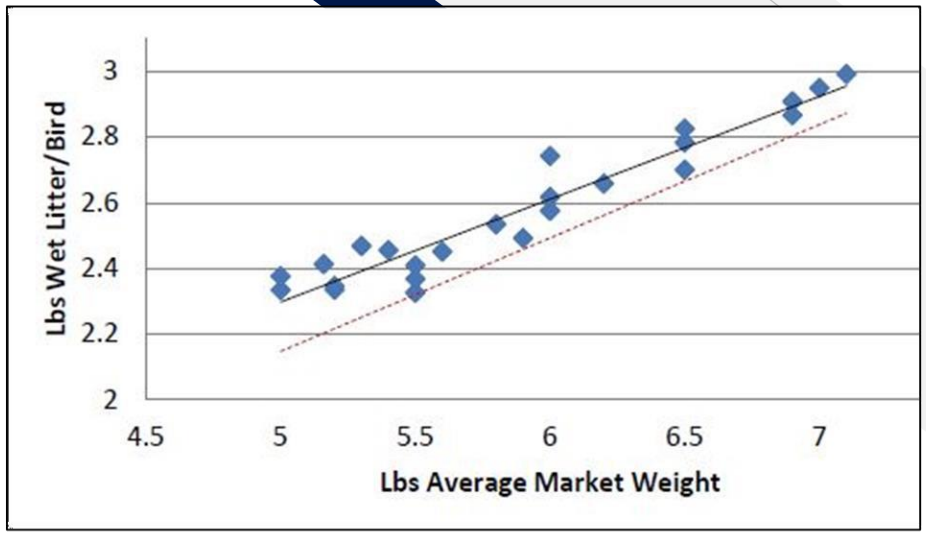
For the Current Model

- Data suggests a state/regional approach.
- All states excepting PA and NY have databases in place to track and report average N and P concentration data by bird type on an annual basis. PA is investigating data sources.
- PLS recommends to allow each state to report annual average N and P manure concentrations and manure generation volumes for their state/region.

Virginia Commercial Turkey Production Research Study

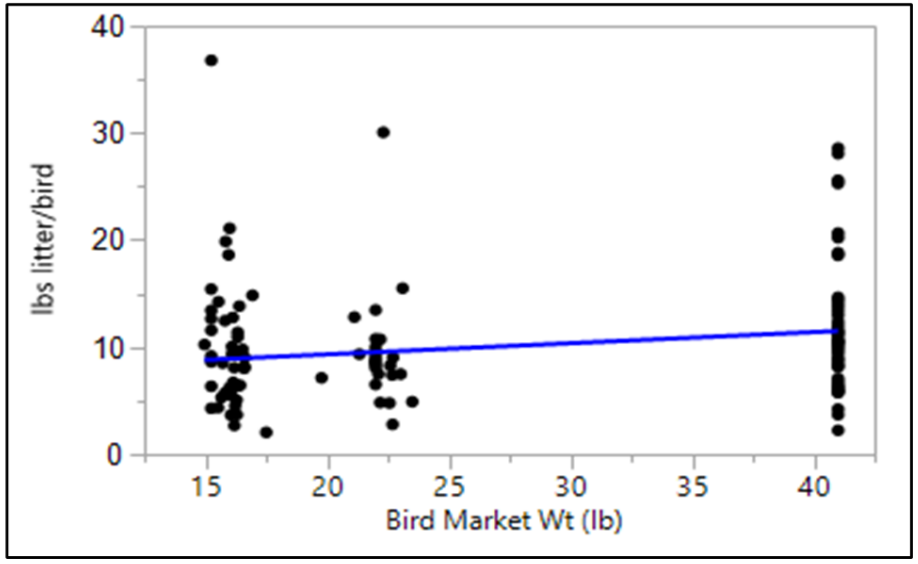
- Much of the Bay regional agricultural industry represented in Phase 5.3.2 relied upon updated national reports based on research information up to 35 years old, e.g. livestock as excreted manure nutrient data from ASABE creating unreliable estimates of locally produced litter nutrients generated
- National scale data did not reflect regional industry production or trends accurately in terms of management, populations, nutrient contents and a host of other issues.
- Production categories of total turkey population was unknown (1- stage, 2-stage, brooder, etc.)

Broilers



$y = 0.3130x + 0.7327$; $R^2=0.9225$

Turkey



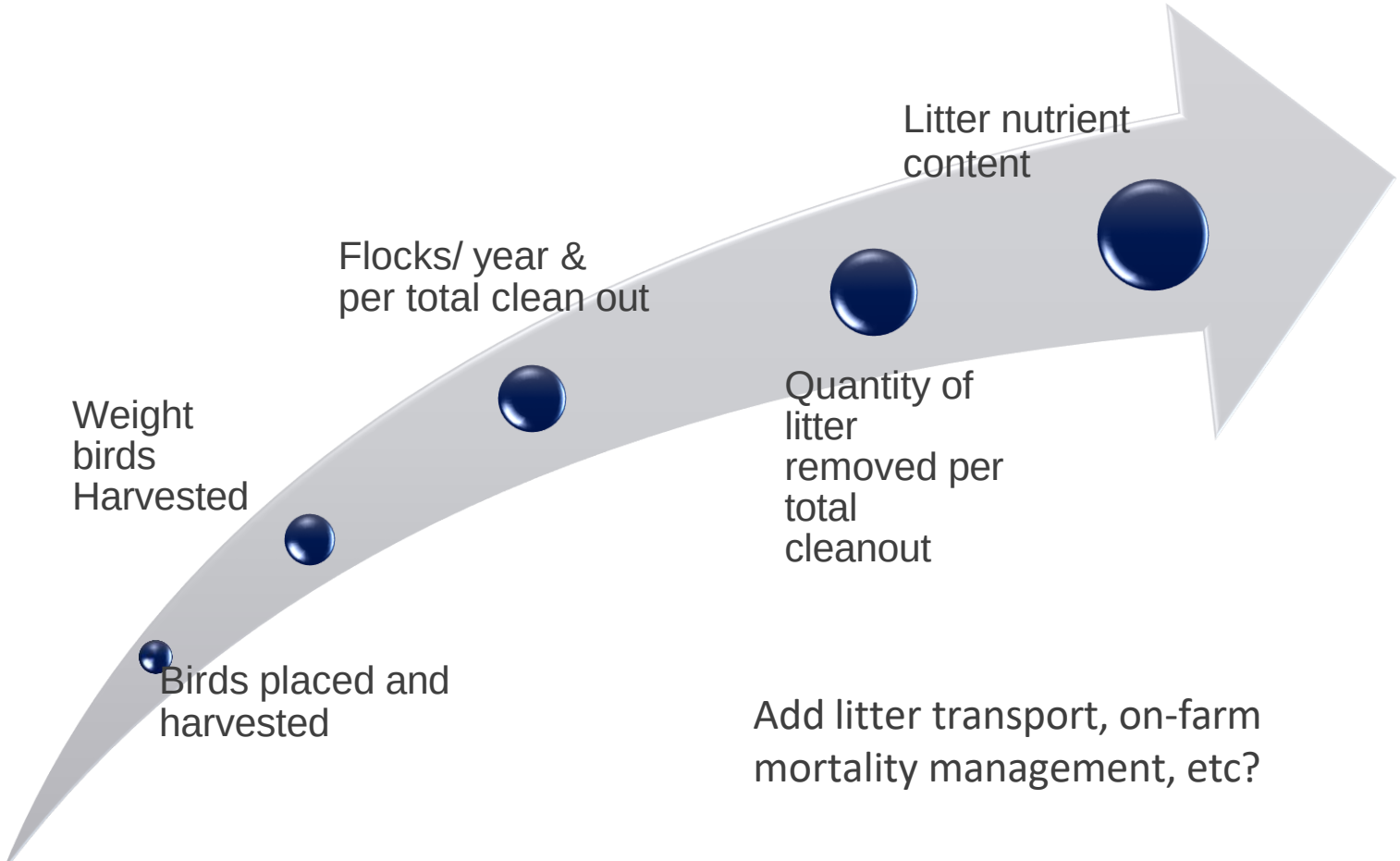
$y = 0.1036x + 7.270$; $R^2=0.0542$

Data Gathering and Management Process

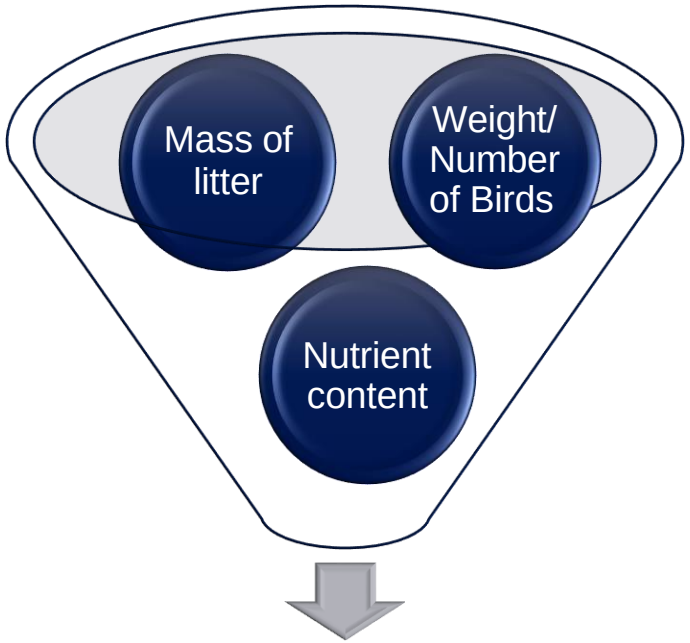
FR

- Identified production and bird types
- Collected farm level & historical nutrient data
- Processed & analyzed data (statistics)

Estimate litter generation rate and nutrient content by production and bird type



Add litter transport, on-farm mortality management, etc?



Annual nutrient loading equation for the Bay model

Litter generation and TN and TP concentrations for calculating annual nutrient loading.

Production and Bird Type	LGB (lbs/bird)	TN (lbs/ton)	TP (lbs/ton)
1SH	9.05	74.64	59.19
2SH	9.05	82.57	66.29
2SHH	9.05	82.57	69.36
FHH	9.05	74.64	66.29
1SHT	11.67	89.09	79.26
2SHT	11.67	82.57	69.36
FHT	11.67	82.57	59.19
BRE	tbd	63.91	79.26
B/P	tbd	63.91	41.62

Production and Bird Types	Litter generated per bird	Litter generated per lb. of bird
1 Stage Hen	8.45 ± 3.85 ^{A,B}	0.52 ± 0.24 ^{A,B}
2 Stage Hen	10.99 ± 4.75 ^{A,B}	0.68 ± 0.30 ^{A}
2 Stage Heavy Hen	7.39 ± 2.45 ^{B}	0.35 ± 0.14 ^{B,C}
Finisher Heavy Hen	8.95 ± 3.32 ^{A,B}	0.38 ± 0.14 ^{B,C}
1 Stage Heavy Tom	9.65 ± 2.16 ^{A,B}	0.24± 0.05 ^{C}
2 Stage Heavy Tom	11.73 ± 7.45 ^{A,B}	0.29 ± 0.18 ^{C}
Finisher Heavy Tom	12.82 ± 5.80 ^{A}	0.31 ± 0.14 ^{C}
Brooder/Poult	-	-
Breeder	-	-

Litter generation rates per bird are about 48 to 77 % less than ASABE 2005 tabulated values.

- The Turkey and Swine characterization projects:

- Generated new regionally specific data for use in the Bay model on current and historical information on two livestock segments of the agricultural industry.

- Created new data-sharing partnerships between the agricultural industry, LGU's, and the State agencies.
- Working with LGU's provided protection of privacy.

- Laid the foundation for greater Bay model confidence by the agricultural sector, and for future data collection efforts.

- Identified opportunities for future improvements and agricultural partnerships.

- Regional meetings were held in October of 2023. Invitations to attend the meetings were extended to key EPA Chesapeake Bay Partnership personnel to better inform the discussions.

- Can states or non-governmental organizations supply needed data from existing data sets?

- Are poultry companies open to providing flock data and assisting with collection of on-farm data?

- Pursuit of greater accuracy and the comfort that provides to stakeholders.

- Provides the ability to obtain data that is required at a finer scale – county level.
- USPOULTRY and a few state poultry associations recently endorsed EPA's new initiative to sample surface waters and collect BMP information in small drainage basins

Questions/Discussion

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