Recommendations to Estimate Poultry Nutrient Production in the Phase 6 Watershed Model

Report of the Agricultural Modeling Subcommittee to the Poultry Litter Subcommittee and Agriculture Workgroup

March, 2015

Contents

Introduction

The Poultry Litter Subcommittee (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. In October, 2014, the Agriculture Workgroup asked the Agricultural Modeling Subcommittee (AMS) to review the PLS records (found in Appendix C) and report (found in Appendix A), and provide recommendations for incorporating the data into poultry nutrient production estimates for the Phase 6 Watershed Model. This report 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.

Basic Recommendation

Where possible, the AMS recommends a simple approach to estimating poultry nutrient production. That approach combines bird population estimates with estimates of: 1) mass of litter or manure produced; 2) litter or manure dry solids content; 3) litter or manure nutrient concentrations; 4) recoverability of manure; and 5) nutrients in recoverable manure. The last two parameters account for any losses that are estimated to occur between excretion and application, and are only needed if estimating available nutrients from as-excreted manure. There is no need to include these recoverability factors if estimating available nutrients from litter because litter values are assumed to represent litter that is ready to be field applied after any losses occur. These parameters can be combined using the following basic equations:

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)

Equation 2. Poultry Phosphorus Production Based on As-Excreted Manure (Used for Pullets)

Lbs of Recoverable 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 (Lbs of Recoverable P/Lb of P) X (Birds Produced/Year)

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)

Note that the same equations can be used to estimate nitrogen production.

Nutrient Concentration Data Availability

The AMS finds that enough quality data was reported by DE, MD, VA and WV for broilers to calculate each of the parameters in the litter equation. Additionally, VA and WV provided multiple years of concentration data for turkeys and layers. Where data is sufficient to establish state-wide

concentrations, the AMS recommends the state-specific values be used. For states and animal types with no data, or limited data, the AMS recommends Bay-wide values be used. Finally, no data was collected for pullets, so the AMS recommends the use of manure nutrient concentration values reported by the American Society of Agricultural and Biological Engineers (ASABE). ASABE last released updated manure production, moisture and nutrient concentration values in a 2005 report (ASABE, 2005). These values represent as-excreted manure rather than litter. Detailed descriptions of how nutrient concentration data is combined with other parameters in the equations for each state and bird type are included in the following sections.

Note about Significant Digits: Values throughout the report will be listed using six significant digits. While the originally collected data was not reported to this level of specificity, the use of equations to estimate changes in the small values, such as nutrient concentrations, requires six significant digits. Any fewer would result in inaccurate assessments of trends in these small values.

Recoverability of As-Excreted Manure

Equations 2 and 3 require the use of "recoverability factors." 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. USDA provided the AMS a list of recoverability estimates based upon survey data from poultry operations (Gollehon, 2014). USDA estimates that recoverability has improved over time due to better manure management through comprehensive nutrient management planning efforts and implementation of better storage systems. The AMS recommends using USDA's 1985 estimates for manure recoverability as those estimates very closely represent operations with zero or limited implementation of best manure management practices. The AMS acknowledges that BMPs may be recommended by the Partnership that improve the recoverability factors over time, which will ultimately change the estimates for pounds of nutrients available to crops. However, the objective of this report is to represent an estimate of nutrients available to crops without taking BMP implementation into account.

Broilers

The PLS summarized over 9,800 laboratory records describing moisture and nutrient content of poultry litter from DE, MD, VA and WV. These states provided both ranges and mean values for moisture content and nutrient concentration by a given sample type (in-house, uncovered stack, covered stack, roofed storage or other) for each year. These yearly mean values were then combined across sample types to create a single, weighted mean value by state by year.

MD and VA also provided yearly mean values for litter production. It is not known how many samples were taken from manure haulers, planners and farmers, but the PLS recommended using these values to estimate the average litter production per bird in any given year.

The combination of these data allows for the use of Equation 1. This means that collected litter values can be directly estimated and no as-excreted values or recoverability factors from other literature sources are needed to estimate broiler nutrient production.

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)

Mass of Litter Produced

The litter mass production data provided by the PLS indicates a strong relationship between litter production and average bird market weight (also occasionally reported as slaughter weight or produced weight) as shown in Figure 1. It should be pointed out that some of the values reported in Figure 1 were interpolated by states between two years with collected manure hauler information, and some VA data was based upon book values when other information was not available for a year. These sources combined represent the best estimates of manure generation data available in VA and DE. The AMS notes that the relationship between these values and average bird market weight is very similar to a relationship described by the University of Delaware Extension in a 2007 broiler litter estimation tool (Malone, 2007). Due to the similarities, and without additional data, the AMS recommends using the relationship found in the PLS data, and described in Equation 4 to estimate broiler litter production per bird.

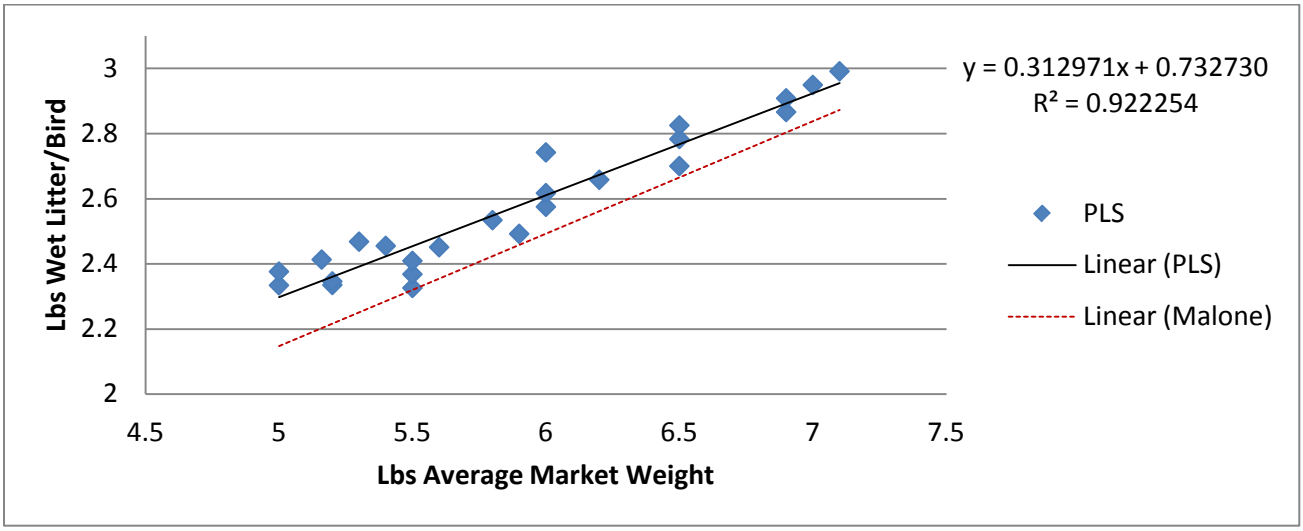
Equation 4. Broiler Litter Production

Lbs of Litter/Bird Produced = 0.312971 X (Average Bird Market Weight) + 0.732730

Source: Average Bird Market Weight can be calculated as Total Pounds Produced from Census of Agriculture/Total Birds Produced from Census of Agriculture

The AMS recommends using this equation to estimate broiler litter production each year from 1985 through the present. For all future years in which slaughter weights are not yet available, the AMS recommends keeping the value constant. For example, if the 2014 estimate is 3 lbs of litter per broiler, then the 2015 estimate should also be 3 lbs of litter per broiler until such time as 2015 values become available.

Figure 1. Broiler Litter Production and Average Market Weight



Moisture Content

The nutrient concentrations submitted are assumed to represent "as-is" litter. This means that moisture content can vary across samples. This variability requires nutrient concentrations be standardized based upon moisture content before they can be compared across sample years. While litter moisture content may vary across houses and across years, the standard deviation of the annual average moisture content across more than 9,800 broiler sample was relatively small (less than 5%). For this reason the AMS elected to use the average moisture content of all the annual average values. This value was 0.286500. The inverse of moisture content is solids content, or for our purposes, Lbs of Dry Matter/Lb of Litter. The inverse of the average moisture content was **0.713500**. This value should be used for each year from 1985 through the present (and all future years). This value could be updated by new moisture content data collected in subsequent years.

Nutrient Concentrations

All nutrient concentrations were converted from "as-is" litter nutrient concentrations to dry weight nutrient concentrations. Again, the nutrient concentration values provided by the PLS represent average, annual concentrations. The PLS records indicate a downward trend in phosphorus concentrations from the mid- 1990s through the present. This seems to confirm that changes in feed formulas, genetics and the phytase amendment to feed contributed to reductions in phosphorus concentrations in litter. In fact, the overall decrease in phosphorus concentration across the watershed is estimated to be 16.5% from 1995 through 2013. This is very close to the 16% decrease in phosphorus concentrations credited in the current Phase 5.3.2 Watershed Model to mimic the changes in feed formulas, genetics and the phytase amendment.

However, the majority of these decreases appear to have occurred in the early 2000s, and there is a general increase of P concentrations across the watershed since 2005. Additionally, average market weights and PLS estimates of litter production indicate that producers are growing larger birds in some areas of the watershed, and with them, creating larger quantities of poultry litter. The AMS also acknowledges that changes in nutrient concentrations could be related to changes in management

techniques within houses, including decreasing clean-out frequencies and changes to in-house composting techniques (among other contributing factors). Because of these dynamic changes in litter nutrient concentrations, the AMS recommends estimating each year's nutrient concentration value (N or P) by calculating a three-year moving average based upon previous years' data. The moving average results by state and across the watershed are provided in the figures below. The AMS recommends the following rules for applying these three-year moving averages in the Phase 6 modeling tools:

- Apply a three-year moving average to state-specific nutrient concentrations. If state has submitted no data, then apply Bay-wide three-year moving average.
- In past years where a moving average is not available, assume the concentration is equal to the first available moving average value.
    - Ex: Data collection begins in 2003. First three-year moving average value is available in 2005. Assume the 2005 value remained constant from 1985 through 2005.
- In future years where data is not available, assume the concentration is equal to the last available moving average value.
    - Ex: Data collection ends in 2012. Last three-year moving average value is available in 2012. Assume the 2012 value remains constant from 2012 into all future years.
- In future years where data is available, re-calculate three-year moving average, and update concentration values accordingly if approved by Partnership.
    - Ex: Additional data is reported for 2013, 2014 and 2015 that was not previously reported. Last three-year moving average value is available in 2012. Assign new three-year moving average values to 2013, 2014 and 2015 and update values in the Phase 6 Model if approved by Partnership.

Figure 2: Bay-Wide Lbs P/Lb Dry Litter for Broilers (to be used by NY, PA)

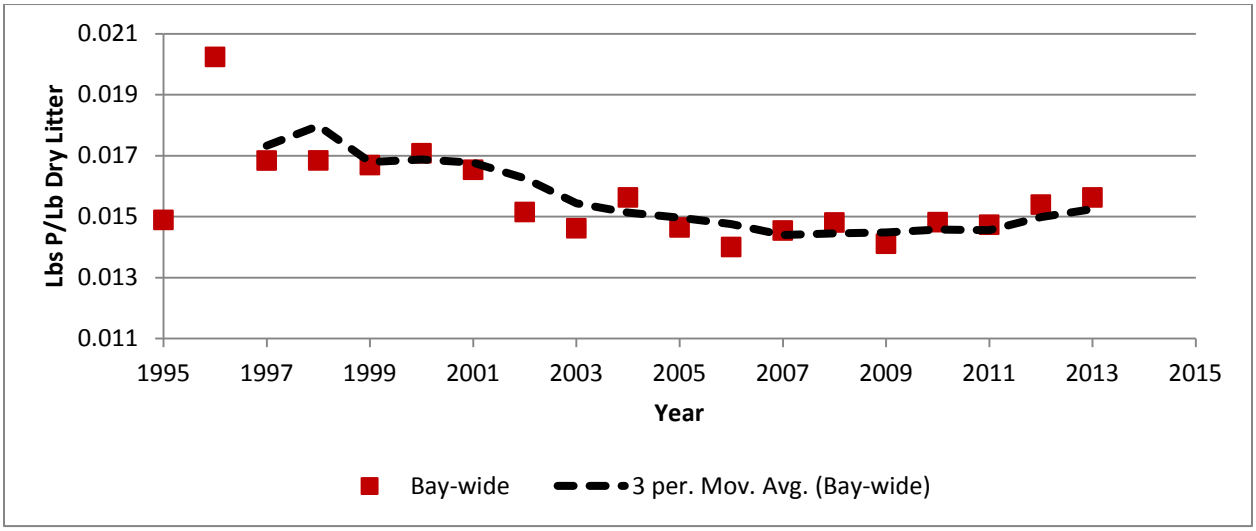


Figure 3: VA Lbs P/Lb Dry Litter for Broilers

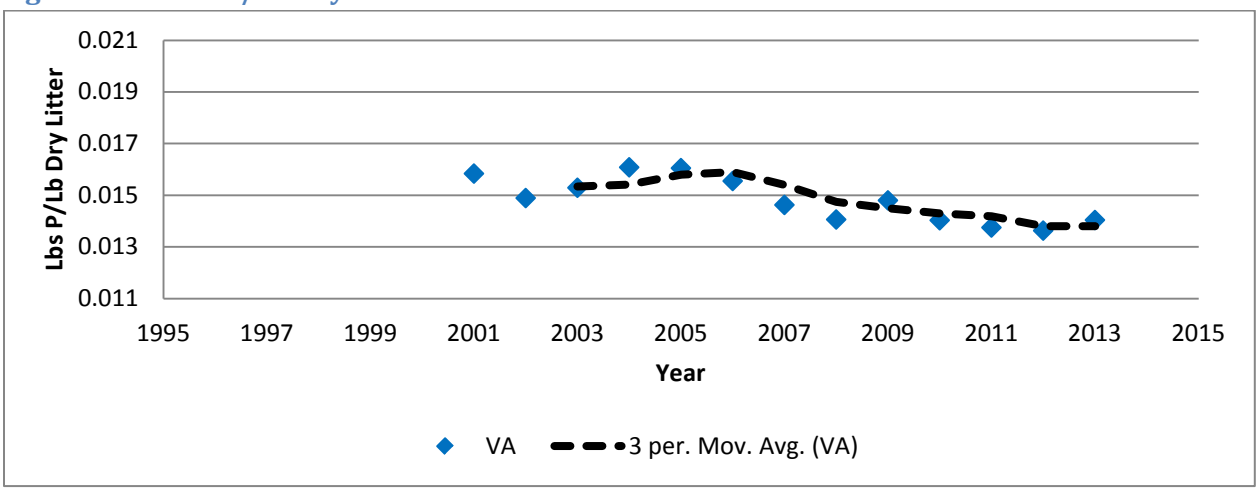


Figure 4: DE/MD Lbs P/Lb Dry Litter for Broilers

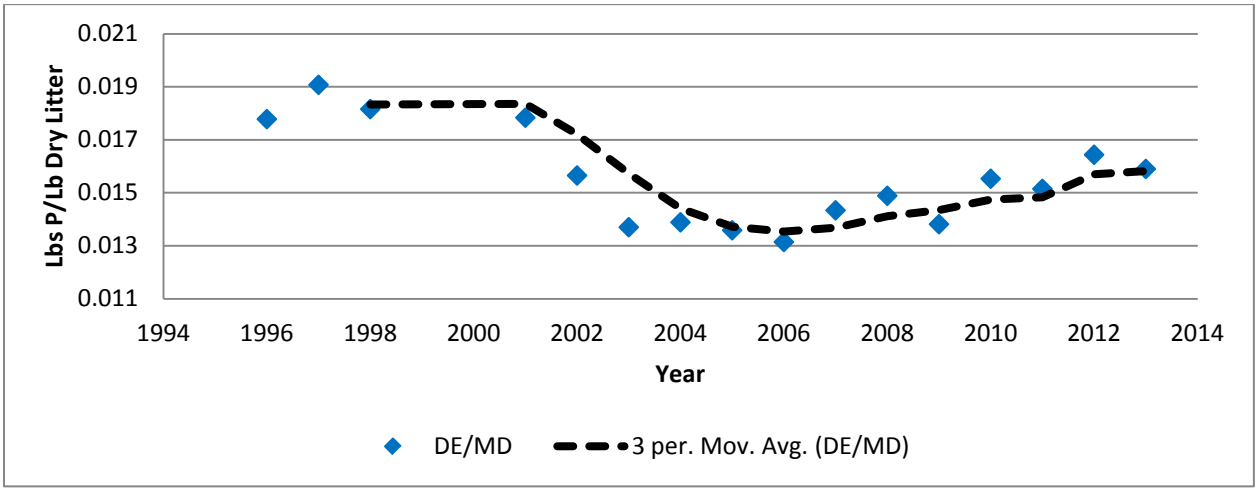


Figure 5: WV Lbs P/Lb Dry Litter for Broilers

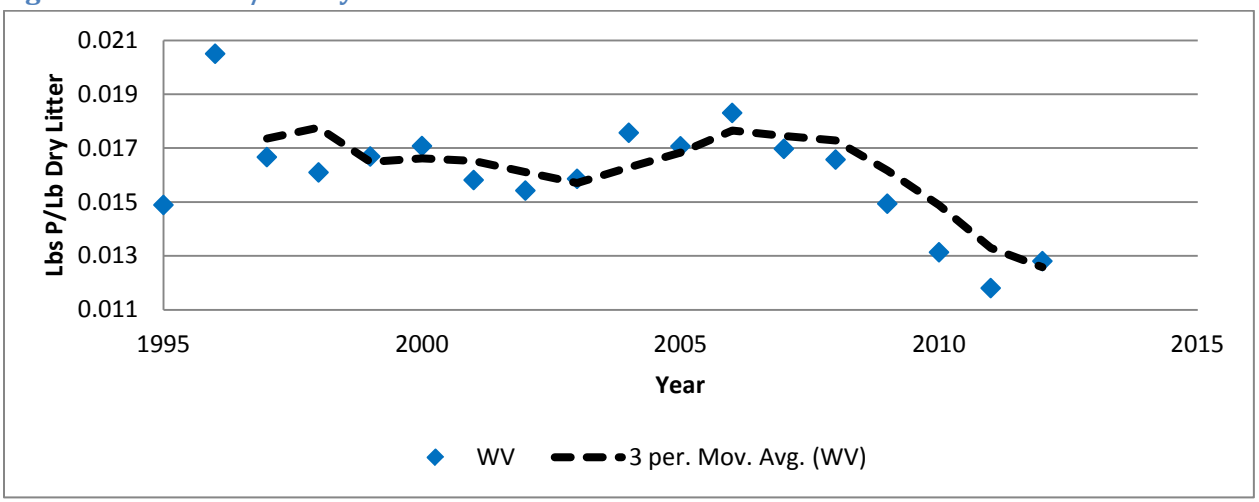


Figure 6: Bay-Wide Lbs N/Lb Dry Litter for Broilers (to be used by NY, PA)

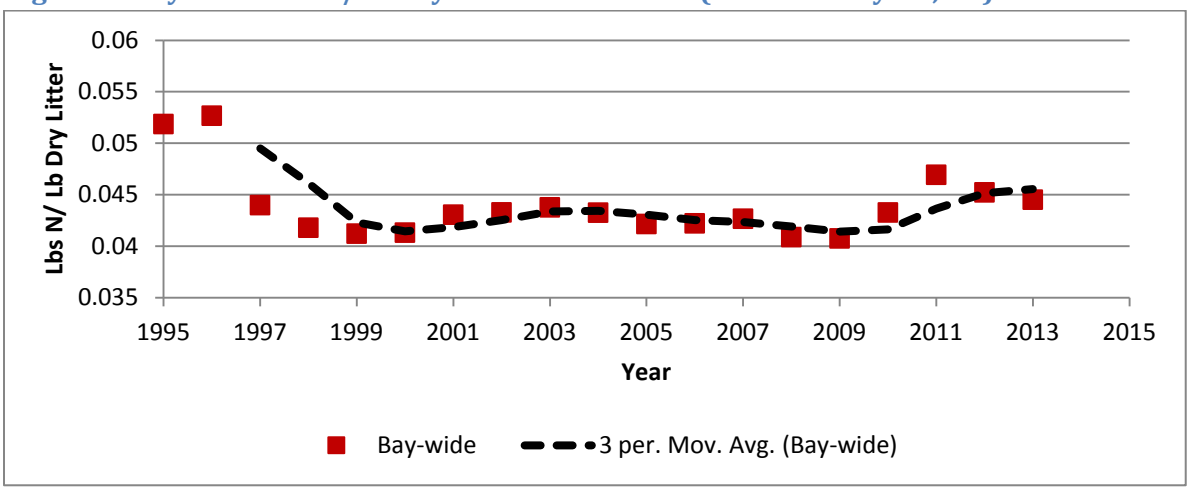


Figure 7: VA Lbs N/Lb Dry Litter for Broilers

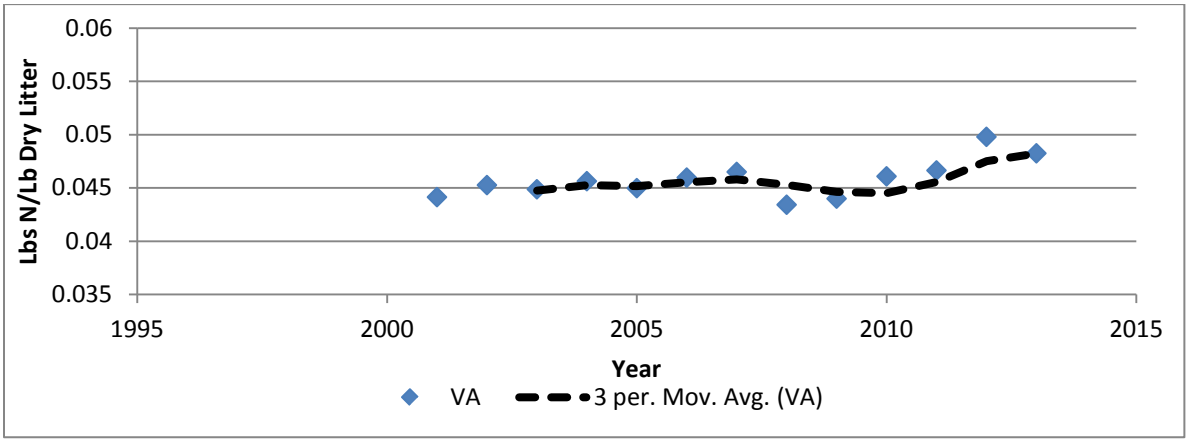


Figure 8: DE/MD Lbs N/Lb Dry Litter for Broilers

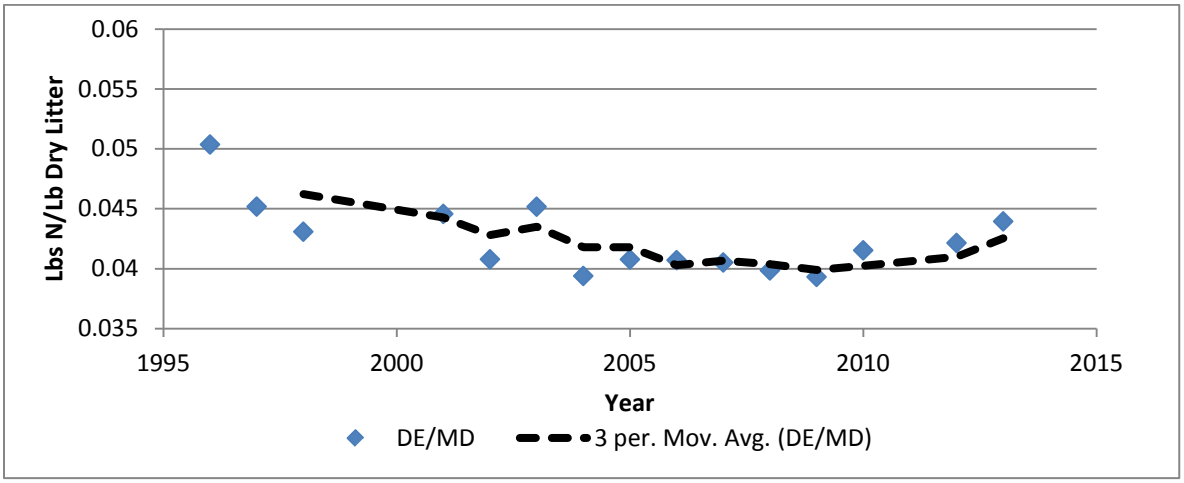
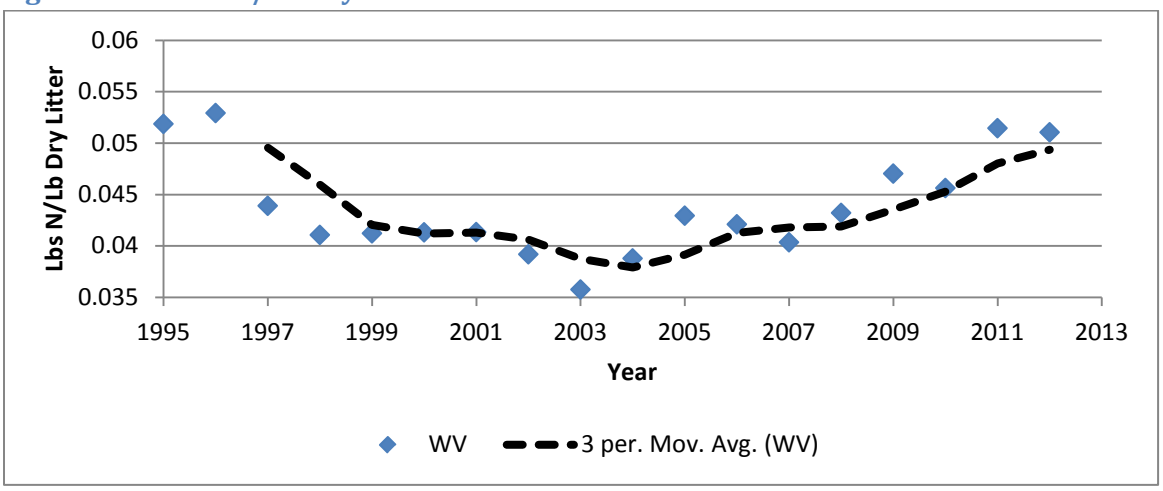


Figure 9: WV Lbs N/Lb Dry Litter for Broilers



Populations

The National Agricultural Statistics Service (NASS) provides statewide annual broiler production numbers at the following website: http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1130. The AMS agrees with the PLS recommendation of using these annual production numbers and the annual inventory numbers provided in the Census of Agriculture to estimate countywide broiler production from 1985 through the present. Census of Agriculture inventory numbers are needed to determine the fraction of birds produced in each county because annual production numbers are only released at the statewide level. The two values can be combined using Equation 5 below, and an example of this calculation for DE is provided in Table 1.

Equation 5. Estimating Countywide Populations

Countywide Birds Produced/Year = Statewide Birds Produced/Year X (Countywide Ag Census Inventoried Birds/Ag Census Statewide Birds Produced)

Table 1. Broiler Population Estimates for DE

County	2012 Ag Census Inventory	2012 Ag Census Fraction	2013 NASS Production	Final 2013 Production Estimate
Kent	7,708,825	0.178418	-	37,824,641
New Castle	-	-	-	-
Sussex	35,497,689	0.821582	-	174,175,359
Statewide	43,206,514	-	212,000,000.00	212,000,000

This method should be used for all years for which there are NASS annual bird production data. Production numbers for any future years should be estimated according to the agricultural projection

methods approved by the Partnership. These methods estimate future animal populations based upon trends in historic populations.

The resulting pounds of nutrients produced per broiler per year and per state can be found in Appendix C.

Turkeys

Together, VA and WV collected and summarized almost 2,000 samples of turkey litter with nutrient concentrations and moisture content. The concentrations again represented the annual mean concentration of all samples collected within a single year. The AMS recommends using this data to estimate nutrient concentrations in turkey litter across the watershed using the same method described in the broiler section. However, VA acknowledged a lack of confidence in litter mass production data collected from planners, farmers, and manure haulers, and WV did not collect litter mass production data. For this reason, the AMS recommends using ASABE values to estimate the mass of as-excreted manure produced by turkeys. This as-excreted number can then be multiplied by a recoverability factor to account for loss of manure between excretion and hauling to a field, and combined with nutrient concentration information collected by the PLS using Equation 3.

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)

Mass of As-Excreted Manure

ASABE, 2005 reports that 78 lbs of as-excreted manure are produced per finished turkey tom, while 38 lbs of as-excreted manure are produced per finished turkey hen. Both of these values are reported on a wet basis with 74% moisture content. NASS only reports the number of turkeys sold, but reports no breakdown between turkey toms and turkey hens. For this reason, the AMS recommends averaging these two manure numbers together to represent the average manure production from a turkey until more detailed data on the breakdown between turkey toms and hens becomes available. The average of these two values is **58 lbs of As-Excreted Manure/Turkey Produced.** Based upon the reported moisture content, we can assume that there is **0.26 Lbs of Dry Matter/Lb of Manure**.

USDA estimates that approximately 72% of manure excreted on turkey operations in 1985 were recovered and made available to crops (Gollehon, 2014). They also estimate that the recoverability of manure has increased through time due to better manure management through various best management practices. The AMS recommends assuming that with no animal waste management system BMP in place, only 72% of as-excreted turkey manure is available for application. This results in approximately **41.76 lbs of Recoverable Manure/Turkey Produced**. After accounting for the fraction of dry matter in the recoverable manure, this value drops to **10.8576 lbs of Dry Recoverable Manure/Turkey Produced**.

Because the PLS provided dry weight concentrations for turkey litter which are meant to represent concentrations in the litter after any manure has been lost in the production area, there is no need to apply any further loss factors to the turkey manure. We can assume that each remaining pound of manure has a nutrient concentration similar to that of the turkey litter sampled by the PLS.

Nutrient Concentrations

All nutrient concentrations were converted from "as-is" litter nutrient concentrations to dry weight nutrient concentrations. Again, the nutrient concentration values provided by the PLS represent average, annual concentrations. As shown in the figures below, while P has fluctuated over time within turkey litter sampled by VA and WV, the same decrease in P seen in broilers is not shown in the turkey data. However, there appears to be a decrease in P values in both states in recent years. Concentrations of N in turkey litter from both states appear to be steadily increasing through the sample period.

The AMS again recommends the following rules for applying these three-year moving averages of nutrient concentrations in the Phase 6 modeling tools:

- Apply a three-year moving average to state-specific nutrient concentrations. If state has submitted no data, then apply Bay-wide three-year moving average.
- In past years where a moving average is not available, assume the concentration is equal to the first available moving average value.
    - Ex: Data collection begins in 2003. First three-year moving average value is available in 2005. Assume the 2005 value remained constant from 1985 through 2005.
- In future years where data is not available, assume the concentration is equal to the last available moving average value.
    - Ex: Data collection ends in 2012. Last three-year moving average value is available in 2012. Assume the 2012 value remains constant from 2012 into all future years.
- In future years where data is available, re-calculate three-year moving average, and update concentration values according if approved by Partnership.
    - Ex: Additional data is reported for 2013, 2014 and 2015 that was not previously reported. Last three-year moving average value is available in 2012. Assign new three-year moving average values to 2013, 2014 and 2015 and update values in the Phase 6 Model if approved by Partnership.

Figure 10: Bay-wide P/Lb Dry Litter for Turkeys (to be used by NY, PA, MD, DE)

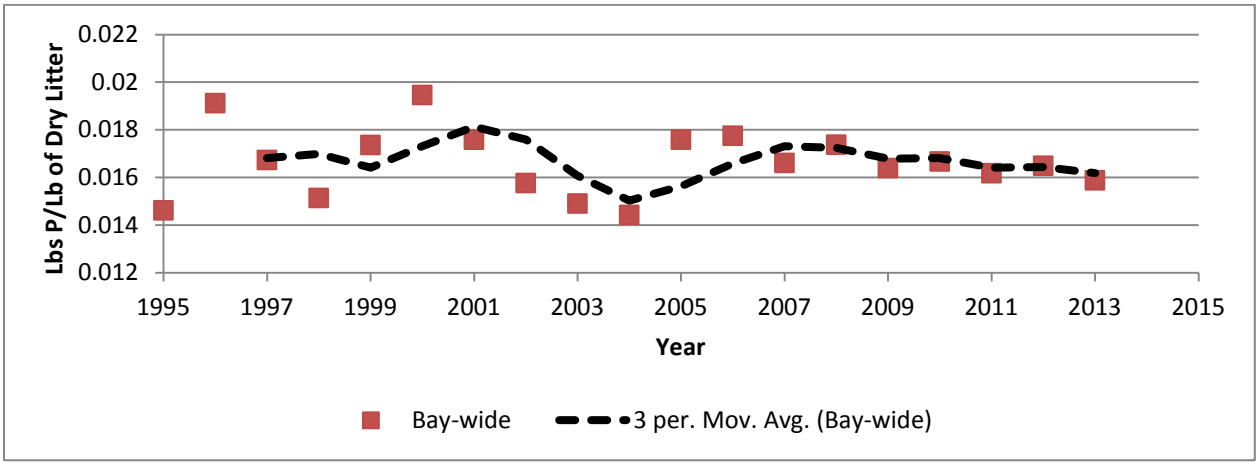


Figure 11: VA P/Lb Dry Litter for Turkeys

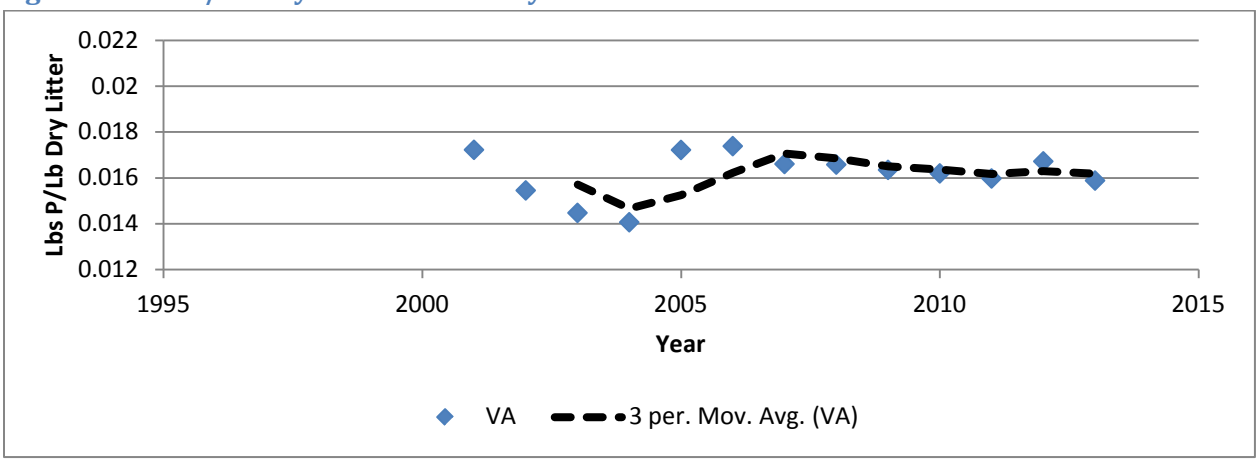


Figure 12: WV P/Lb Dry Litter for Turkeys

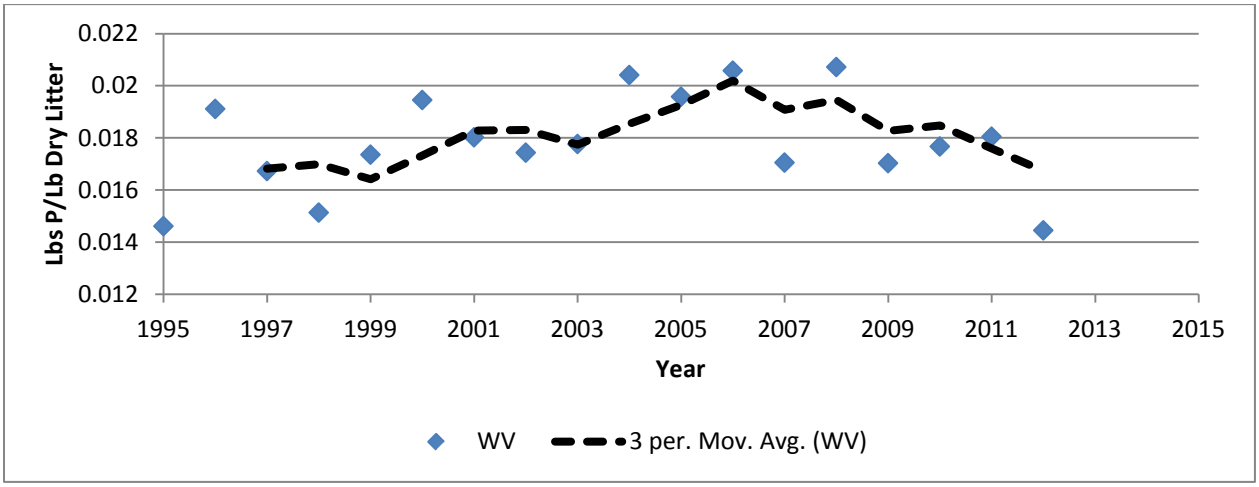


Figure 13: Bay-wide N/Lb Dry Litter for Turkeys (to be used by NY, PA, MD, DE)

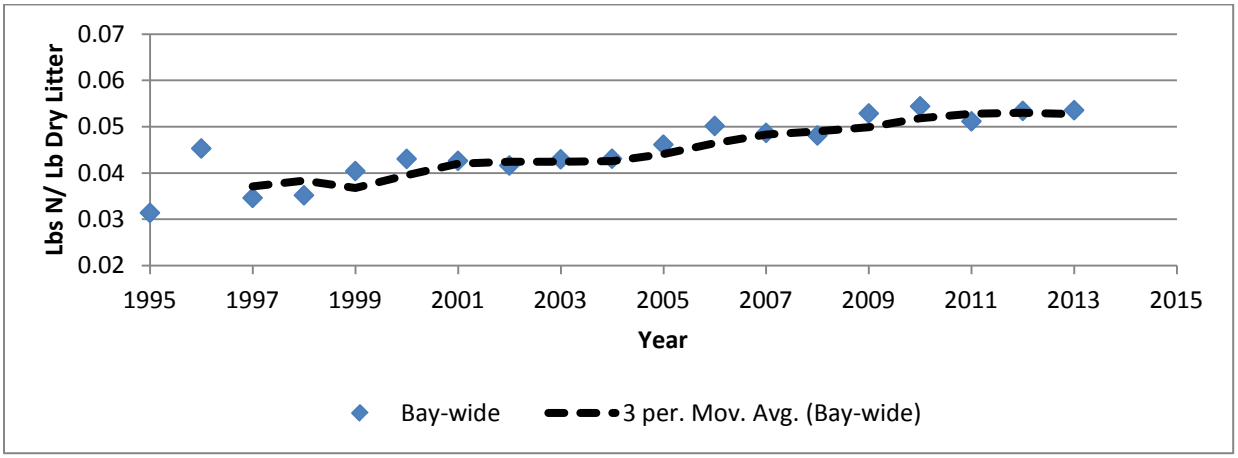


Figure 14: VA N/Lb Dry Litter for Turkeys

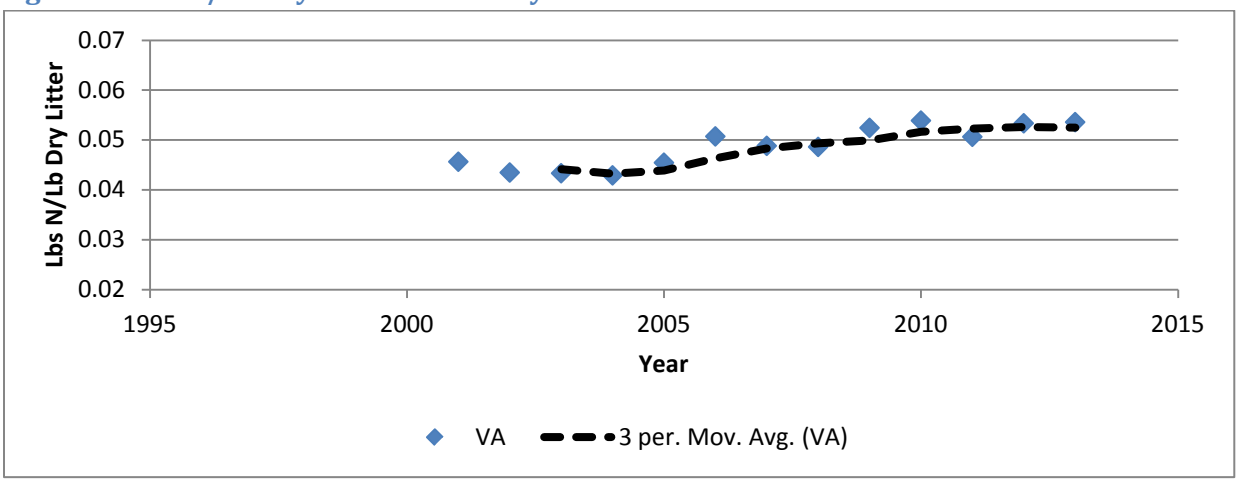
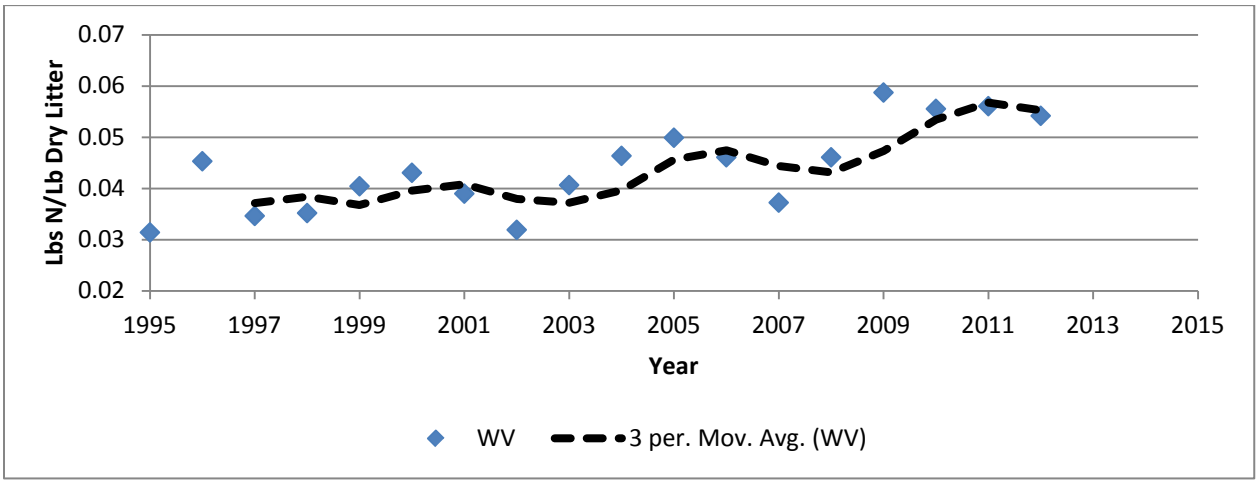


Figure 15: WV N/Lb Dry Litter for Turkeys



Populations

The National Agricultural Statistics Service (NASS) provides annual turkey production numbers by state at the following website: http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1130. The AMS agrees with the PLS recommendation of using these annual production numbers and the annual inventory numbers provided in the Census of Agriculture to estimate countywide turkey production from 1985 through the present. This can be done by calculating the fraction of inventoried turkeys within each county as reported by the Census of Agriculture, and multiplying the county fraction by the total statewide NASS production value. An example of this method is shown in Table 1.

The resulting pounds of nutrients produced per turkey per year and per state can be found in Appendix C.

Layers

The Ag Census defines layers as "table-egg type layers, hatching layers for meat-types, hatching layers for table egg types, and reported bantams." With this definition in mind, VA and WV summarized over 1,100 nutrient concentration records for "layer/breeders" with no breakdown between the two bird types. The majority of egg laying hens in the watershed are raised in PA. However, PA provided only a very small number of data points for the most recent years. Given the availability of data, the AMS recommends using the litter concentration data provided by VA and WV until more samples are collected and reported by PA and other states. No states collected data to accurately estimate mass of litter produced. For this reason, the AMS again recommends using ASABE values to estimate the mass of as-excreted manure produced by layers. This as-excreted number can then be multiplied by a recoverability factor to account for loss of manure between excretion and hauling to a field, and combined with nutrient concentration information collected by the PLS using Equation 3.

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)

Mass of As-Excreted Manure

ASABE, 2005 estimates each layer excretes **69.35 lbs of manure**. This manure is assumed to have a 74.21% moisture content, or **0.2579 lbs of dry matter/lb wet manure**.

USDA estimates that approximately 82% of manure excreted on layer operations in 1985 were recovered and made available to crops (Gollehon, 2014). They also estimate that the recoverability of manure has increased through time due to better manure management through various best management practices. The AMS recommends assuming that with no animal waste management system BMP in place, only 82% of as-excreted turkey manure is available for application. This results in approximately **56.8670 lbs of Wet Recoverable Manure/Layer**. After accounting for the fraction of dry matter in the recoverable manure, this value drops to **14.6667 lbs of Dry Recoverable Manure/Layer Produced**.

Because the PLS provided dry weight concentrations for layer litter which are meant to represent concentrations in the litter after any manure has been lost in the production area, there is no need to apply any further loss factors to the turkey manure. We can assume that each remaining pound of manure has a nutrient concentration similar to that of the layer litter sampled by the PLS.

Nutrient Concentrations

The figures below show the concentrations collected by VA and WV, and combined across both states for a Bay-wide average. Concentrations of P within layer litter in these two states appear to be decreasing over the long-term, but increasing slightly in the short-term, particularly in WV. However, WV's P concentration data varies significantly from year-to-year. Concentrations of N appear to remain fairly constant throughout the time period of collection.

The AMS again recommends the following rules for applying these three-year moving averages of nutrient concentrations in the Phase 6 modeling tools:

- Apply a three-year moving average to state-specific nutrient concentrations. If state has submitted no data, then apply Bay-wide three-year moving average.
- In past years where a moving average is not available, assume the concentration is equal to the first available moving average value.
    - Ex: Data collection begins in 2003. First three-year moving average value is available in 2005. Assume the 2005 value remained constant from 1985 through 2005.
- In future years where data is not available, assume the concentration is equal to the last available moving average value.
    - Ex: Data collection ends in 2012. Last three-year moving average value is available in 2012. Assume the 2012 value remains constant from 2012 into all future years.
- In future years where data is available, re-calculate three-year moving average, and update concentration values according if approved by Partnership.
    - Ex: Additional data is reported for 2013, 2014 and 2015 that was not previously reported. Last three-year moving average value is available in 2012. Assign new three-year moving average values to 2013, 2014 and 2015 and update values in the Phase 6 Model if approved by Partnership.

Figure 16: Bay-wide P/Lb Dry Litter for Layers (to be used for NY, PA, MD, DE)

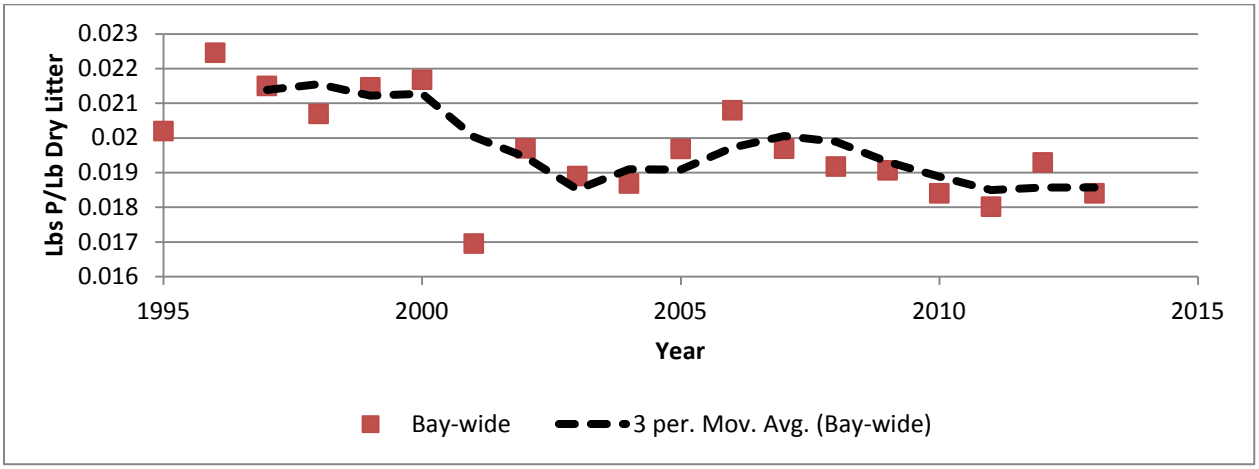


Figure 17: VA P/Lb Dry Litter for Layers

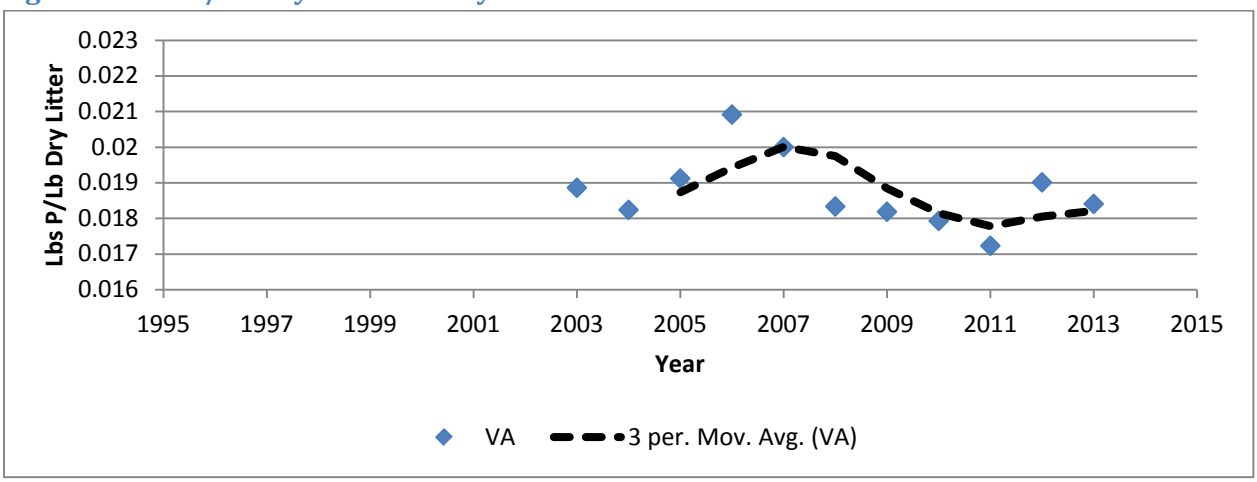


Figure 18: WV P/Lb Dry Litter for Layers

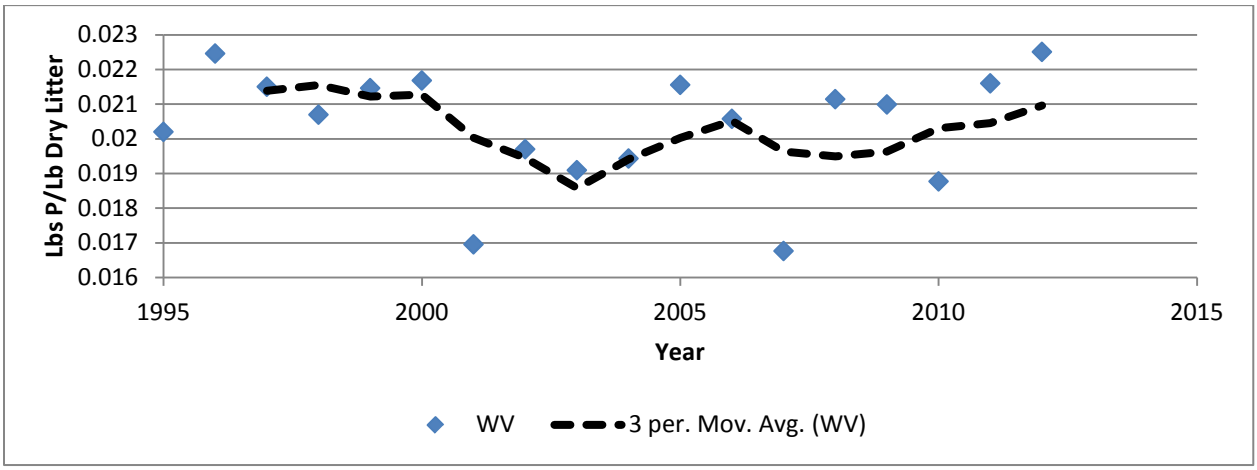


Figure 19: Bay-wide N/Lb Dry Litter for Layers (NY, PA, MD, DE)

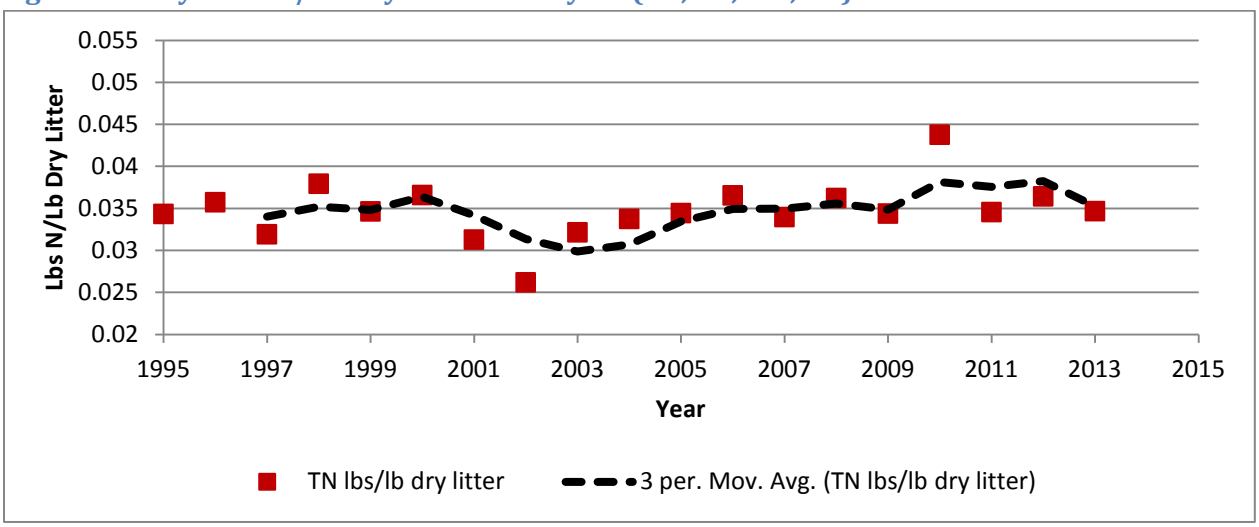


Figure 20: VA N/Lb Dry Litter for Layers

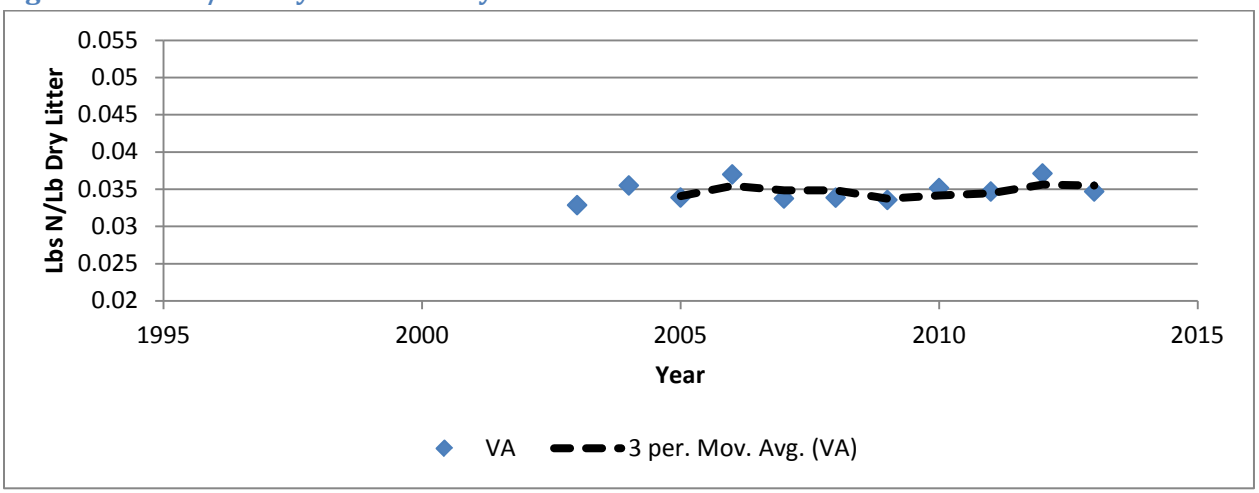
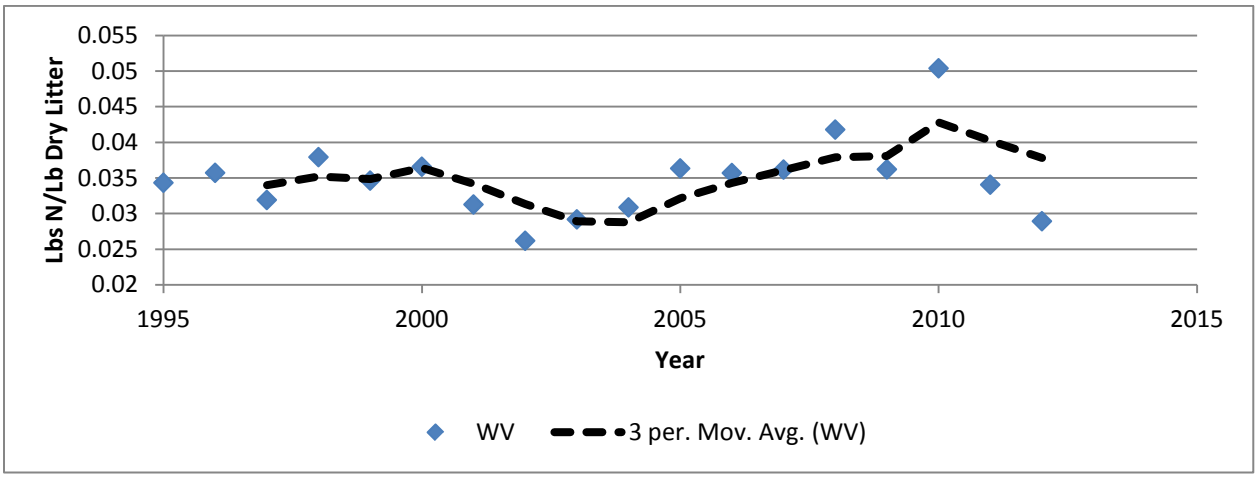


Figure 21: WV N/Lb Dry Litter for Layers



Populations

USDA estimates poultry (and other livestock) populations by combining both year-end inventory[1] and sales data reported in the Census of Agriculture. This is done by deflating both values by the number of typical cycles (flocks) for a bird type in a year. Equation 5 below shows how inventories, sales and cycles are combined to estimate an overall population in the absence of annual production statistics reported for broilers and turkeys.

Equation 5. 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)]

The USDA estimates that, on average, layer operations only have one cycle (flock) per year. Because of this, the resulting production estimate from Equation 5 is equivalent to the number of inventoried birds.

[1] Census of Agriculture reports a year-end inventory value which represents the number of animals on the operation on December 31, 2012.

Inventoried birds should be used to estimate layer production until annual production data is made available.

The resulting pounds of nutrients produced per layer per year and per state can be found in Appendix C.

Pullets

Unfortunately, very little pullet litter nutrient data is available. Additionally, ASABE has not historically estimated pullet litter nutrients. However, USDA does estimate pullet nutrient production based upon as-excreted manure. The AMS recommends using these estimates in the absence of other data until better data on pullet litter production can be collected. Calculating recoverability of as-excreted nutrients for pullet requires a unique equation because the PLS collected no litter nutrient concentrations as it did for the other bird types. Because it is not known how much N and P that is excreted is lost between excretion and application, we must use a set of recoverability factors to estimate available nutrients for application. These recoverability factors provided by USDA are described in greater detail below.

Equation 2. Poultry Phosphorus Production Based on As-Excreted Manure (Used for Pullets)

Lbs of Recoverable 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 (Lbs of Recoverable P/Lb of P) X (Birds Produced/Year)

Mass of As-Excreted Manure

USDA estimates each pullet excretes **49.91 lbs of manure**. This manure is assumed to have a 74.06% moisture content, or **0.2594 lbs of dry matter/lb wet manure**.

USDA estimates that approximately 82% of manure excreted on pullet operations in 1985 were recovered and made available to crops (Gollehon, 2014). They also estimate that the recoverability of manure has increased through time due to better manure management through various best management practices. The AMS recommends assuming that with no animal waste management system BMP in place, only 82% of as-excreted turkey manure is available for application. This results in approximately **40.9262 lbs of Wet Recoverable Manure/Pullet**. After accounting for the fraction of dry matter in the recoverable manure, this value drops to **10.6163 lbs of Dry Recoverable Manure/Pullet Produced**.

Nutrient Concentrations

USDA estimates that each pound of recoverable, dry pullet manure has 0.0203 lbs P and 0.0524 lbs N. However, only 95 percent of that P is considered recoverable and only 50 percent of that N is considered recoverable due to volatilization losses and other pathways. After applying these recoverability factors, we find that each pound of recoverable, dry pullet manure has **0.019285 lbs of recoverable P and .026200 lbs of recoverable N.**

The AMS recommends that these two nutrient values represent typical operations in the year 2002 (USDA estimates these represent typical pullets from 2002 through 2007). After contacting a regional feed manufacturer, the AMS feels that layer and pullet feed are related to such an extent that it would be appropriate to apply the trends in P concentrations seen in layer feed to the pullet data as well. The percent change in P concentrations shown in the Bay-wide layer data from 2002 through 2013 will be applied to estimate trends in pullet P concentrations in all states over this time period. Table 2 below shows this change.

Table 2. Pullet P Concentrations in Recoverable Manure

Year	Original Pullet P Concentration	Percent Change in Bay-wide Layer P	Final Pullet P Concentration
2002	0.019285	NA	0.019285
2003	0.019285	-4.76287%	0.018366
2004	0.019285	3.11706%	0.018939
2005	0.019285	-0.02386%	0.018934
2006	0.019285	3.31276%	0.019562
2007	0.019285	1.69592%	0.019893
2008	0.019285	-0.84711%	0.019725
2009	0.019285	-2.90331%	0.019152
2010	0.019285	-2.22071%	0.018727
2011	0.019285	-2.04213%	0.018345
2012	0.019285	0.41046%	0.018420
2013	0.019285	0.00124%	0.018420

Populations

USDA estimates poultry (and other livestock) populations by combining both year-end inventories[2] and sales data reported in the Census of Agriculture. This is done by deflating both values by the number of typical cycles (flocks) for a bird type in a year. USDA estimates producers grow approximately 2.25 cycles of pullets per year. Equation 5 shows how Census of Agriculture numbers are combined with cycles to produce a yearly production estimate.

Equation 5. 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)]

With no other pullet population data available, the AMS recommends using this method to estimate yearly production for each county during years in which the Census of Agriculture was released. Production values for all other years (including future years) should be estimated using the agricultural projection methods already approved by the Partnership.

The resulting pounds of nutrients produced per pullet per year and per state can be found in Appendix C.

[2] Census of Agriculture reports a year-end inventory value which represents the number of animals on the operation on December 31, 2012.

Future Data Collection and Submissions

The PLS established a clear process for collecting and summarizing laboratory analyses of poultry litter and litter production data. This process provided enough information to improve estimates of broiler, turkey and layer nutrient information. However, data gaps still exist, particularly for pullets and layers, and for turkey litter production estimates. The AMS recommends that all states begin regularly reporting laboratory analyses of poultry litter and litter production data on a yearly basis to the Chesapeake Bay Program. On a semi-regular basis (perhaps at the beginning of each Milestone period - 2 years - or more or less frequently), the estimates for poultry litter nutrient production should be updated in the Watershed Model to represent how values have changed since the calibration of the new model. These reported values should be used to update the key parameters in the basic equation: 1) mass of litter produced; 2) litter dry solids content; and 3) litter nutrient concentrations. Absent these values, the Partnership must rely on other widely published values such as those reported in the ASABE, 2005 report. Where possible, future data collection efforts should also focus on the correlation of these key parameters at the farm level, to quantify the effects and extent of various litter management scenarios. A dataset for broilers, for example, might include for each record the volume of litter removed (including total cleanout and removal of crust between flocks) in a cleanout period, the number of flocks and number of birds produced during that cleanout period and their finish weight, and a manure analyses showing the N, P and moisture content of that litter. This would allow the states to determine the amount of N and P produced per bird on a farm level, which can then be aggregated into an average.

The AMS recommends that raw sample data for each parameter be submitted to the Bay Program using standardized templates. This would allow the Partnership to conduct more thorough statistical analyses of the data which in turn would result in better litter estimates for the modeling tools. Ultimately, the Partnership will need to determine both the method and frequency of collecting and updating these values.

Additionally, there is still an opportunity for the Partnership to collect historical data on all bird types prior to final calibration of the Phase 6 Watershed Model. Calibration will occur in October, 2015, so states wishing to provide historic litter production and/or nutrient concentration data should submit the data to the Chesapeake Bay Program by September, 2015. The data can then be analyzed and potentially approved by the Partnership for use in the Phase 6 Watershed Model.

To address the further need for poultry production data, representatives of the commercial poultry industries and land grant universities in the region are currently working cooperatively with the Chesapeake Bay Program partnership to develop and implement a process whereby a more accurate understanding of the annual generation of nutrients by regional commercial poultry production can be realized. USDA National Agricultural Statistics Service (NASS) is recognized by the project partners as the primary source of validated agricultural production data in the region, and representing the optimal path forward to forming the critical data exchange linkage between the regional integrators and the CBP partnership. The PLS has identified the critical data gaps as well as the existing potential options to resolve them. In response to the finding of the PLS, the project partners have identified the implementation of an annual NASS integrator survey as the potential solution to address several existing data limitations. Expectations are for the new NASS survey to be implemented in late 2015, and the resulting data to be made publically available in 2016 for use in the final version of the partnership's Phase 6.0 modeling tools.

Comparing Methods

All nutrient balance analyses require assumptions about nutrient concentrations and manure or litter production. The AMS chose to compare the assumptions described in this document (using Delaware broilers as an example) to assumptions in the current Phase 5.3.2 Watershed Model and assumptions in ASABE's 2005 report. Table 3 shows how differences in population, litter/manure production and nutrient concentrations across these three methods impact final nutrient production estimates. As mentioned previously, both Phase 5.3.2 and ASABE, 2005 estimate as-excreted manure, while the Phase 6 method estimates litter directly. This means that estimates of storage and handling loss and volatilization must be applied to any as-excreted values in both the Phase 5.3.2 and ASABE, 2005 methods. No such estimates are needed in the Phase 6 method because litter values collected by the states are assumed to inherently reflect the losses which occurred after excretion.

This comparison shows that the Phase 5.3.2 method estimates more nutrients available to crops after losses than the other two methods. One main reason for this difference is the assumption that the Census of Agriculture's bird inventory number represents the average population of birds in county on any given day during the year. That assumption does not take into account the number of flocks or cycles of birds grown at a typical house within the county. If for example, the number of days of manure production were reduced from 365 to 300 to account for flock turnover and house cleanout throughout the year, then the Phase 5.3.2 method's estimates of nutrients would be in line with the other two methods. For this reason, the AMS strongly recommends deflating inventory numbers for layers and pullets using the USDA population method described earlier in the report.

The comparison also illustrates that estimates from the ASABE, 2005 method and the Phase 6 method are very similar once estimates of storage and handling loss and volatilization are applied to the ASABE as-excreted values. This comparison provides evidence that the ASABE, 2005 values match closely with estimates collected by the PLS, strengthening the confidence in the use of ASABE, 2005 values for pullets, layers and turkeys. While the AMS does recommend using ASABE, 2005 to estimate nutrient production for pullets and layers (and to a lesser extent for turkeys), the group strongly encourages states to collect sufficient litter data that will allow for direct estimates of litter rather than as-excreted manure for these bird types in the future.

Table 3. Estimates of Nutrients Produced by DE Broilers in 2012

Parameter	Phase 5.3.2 Method	ASABE 2005 Method	Phase 6 Method
Produced Birds	NA	212,000,000	212,000,000
Inventoried Birds	43,206,514	-	-
Days of Manure Production	365	-	-
Lbs of Manure Excreted/Bird/Day (Wet Basis)	0.186813	-	-
Lbs of Manure Excreted/Finished Bird (Wet Basis)	-	11	-
Lbs of Litter/Finished Bird (Wet Basis)	-	-	2.955
Lbs of Dry Matter/Lb of Manure Excreted	0.26	0.26	-

Lbs of Dry Matter/Lbs of Litter	-	-	0.7135
Lbs P/Lb of Manure Excreted (Dry Basis)	*0.011400	0.012500	-
Lbs P/Lb of Litter (Dry Basis)	-	-	0.014397
Lbs N/Lb of Manure Excreted (Dry Basis)	0.049800	0.042857	-
Lbs N/Lb of Litter (Dry Basis)	-	-	0.043065
Total Lbs of Manure Excreted (Wet Basis)	2,946,111,552	2,332,000,000	-
Total Lbs of Litter (Wet Basis)	-	-	626,460,000
Total Lbs of Manure Excreted (Dry Basis)	765,989,004	606,320,000	-
Total Lbs of Litter (Dry Basis)	-	-	446,979,210
Total Tons of Manure Excreted (Wet Basis)	1,473,056	1,166,000	-
Total Tons of Litter (Wet Basis)	-	-	313,230
Total Tons of Manure Excreted (Dry Basis)	382,995	303,160	-
Total Tons of Litter (Dry Basis)	-	-	223,490
Total Lbs of P Excreted	8,732,275	7,579,000	-
Total Lbs of N Excreted	38,146,252	25,985,056	-
Total Lbs of P After Storage and Handling Loss	**7,422,433	**6,442,150	**6,435,160
Total Lbs of N After Storage and Handling Loss and Volatilization	**27,083,839	**18,449,390	**19,249,160

*The Phase 5.3.2 Watershed Model assumes that phytase amendments to feed combined with changes to broiler diets and genetics results in the production of 16% less phosphorus. No such assumption was made for the ASABE 2005 or Phase 6 methods.

**The Phase 5.3.2 Watershed Model assumes that 15% of excreted manure is lost to the nearby environment prior to application on crops. It also estimates that approximately 15% of TN is lost due to volatilization between excretion and application. These same assumptions were applied to the ASABE 2005 Method. However, the Phase 6 Method estimates litter directly, and thus inherently includes any loss of nutrients that may have occurred through storage and handling or volatilization of nitrogen. There has been concern over the Phase 5.3.2 Model's use of this 15% loss factor. This loss only occurs on operations with no animal waste storage BMPs. This loss factor decreases when animal waste storage systems are applied.

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Appendix A.REDEFINITION OF POULTRY LITTER NUTRIENT GENERATION, LITTER VOLUME GENERATION AND POULTRY POPULATION DATASETS

Recommendations of the Poultry Litter Sub-Committee for Use in Phase 6.0 of the Chesapeake Bay Program Watershed Model

Introduction

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 Ag Workgroup charged the newly formed Poultry Litter Subcommittee (PLS) to review the current methods and develop new methods for estimating nutrient generation by poultry across the watershed. Specifically, 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.

This report summarizes PLS recommendations for new methodologies and model input data to estimate poultry litter nutrient generation in the Phase 6 version of the Watershed Model. Poultry species included in the state-specific data sets are broilers, layers, pullets, layer breeders, and turkeys. Data including bird populations, nitrogen (N) and phosphorus (P) concentrations, and litter generation are reported for Delaware, Maryland, Pennsylvania, Virginia, and West Virginia. The 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. This recommendation follows a similar recommendation in Kellogg et al (2000), in which USDA scientists recommended updating parameter estimates [of manure] to reflect current practices in the livestock industry.

Definitions of terminology and variables

The following terminology and variables and their units will be used throughout this report:

- **Manure** – the wet waste material excreted by a bird
- **Litter** – a combination of manure and bedding material (typically sawdust)
- **Concentration** – the wet basis concentration of N and P in the manure or litter (lbs of N or P/ton of litter)

- **Litter Generation** – the mass of litter produced over the lifetime of 1000 birds (lbs litter/1000 birds grown)
- **Population** – for broilers and turkeys, this will be the NASS annual production number in millions or thousands of birds per year. For other species, state data and/or typical production practices (e.g. flocks per year x growout period) can be used to estimate annual populations (No. of birds/yr produced within a state or county)
- **Flock** – the number of birds produced from a production facility for one growing cycle. (No. of birds)
- **Flocks per year** – the number of flocks grown in a production facility annually (No. of flocks/yr)
- **Growout Period** – the number of days required to complete one growing cycle in a production facility (days/flock)
- **Bird Market Weight** – pounds per bird at the time of slaughter. State data can be used or the weight can be computed using the annual NASS production weight divided by the annual production number (lbs/bird)
- **Sample Number** – number of samples used for the manure and/or litter analysis (No. of samples)
- **TKN** – Total Kjeldahl Nitrogen concentration (lbs/ton of litter)
- **P_2O_5** - Phosphorus pentoxide concentration in the manure and/or litter (lbs/ton of litter)
- **K_20** - Potassium oxide concentration in the manure and/or litter (lbs/ton of litter)
- **Cu** – Copper concentration in the manure and/or litter (lbs/ton of litter)
- **% Moisture** –Moisture content of the manure and/or litter (%)
- **C:N Ratio** – Carbon to nitrogen ratio in the manure/litter (dimensionless)
- **NH_3** – Ammonia concentration in the manure and/or litter (lbs/ton of litter) - Note that some states have reported this as NH_4^+ (ammonium)
- **Ca** – Calcium concentration in the manure and/or litter (lbs/ton of litter)
- **Mg** – Magnesium concentration in the manure and/or litter (lbs/ton of litter)
- **% H_2O Extract P** – water extractable fraction of phosphorous concentration in the manure and/or litter (lbs/ton of litter)

The Panel's membership was:

Panelist	Jurisdiction	Affiliation
Jim Glancey	Delaware	University of Delaware (Panel Chair)
Mark Davis	Delaware	Delaware Department of Agriculture
Tom Basden	West Virginia	West Virginia University
Bill Brown	Delaware	University of Delaware
Mark Dubin	Maryland	University of Maryland (Panel Coordinator)
Glenn Carpenter	USDA	USDA-NRCS
Frank Coale	Maryland	University of Maryland
Jason Dalrymple	West Virginia	West Virginia Department of Agriculture
Doug Goodlander	Pennsylvania	Pennsylvania Department of Environmental Protection

Bobby Long	Virginia	Virginia Department of Conservation and Recreation
Jennifer Nelson	Maryland	USDA-NRCS (former)
Jerry Ours	West Virginia	West Virginia Department of Agriculture
Paul Patterson	Pennsylvania	Penn State
Jim Pease	Virginia	Virginia Tech
Royden Powell	Maryland	Maryland Department of Agriculture
Tim Sexton	Virginia	Virginia Department of Conservation and Recreation
Kelly Shenk	EPA	EPA Region III
Trish Steinhilber	Maryland	University of Maryland
Jennifer Timmons	Maryland	University of Maryland
Jennifer Weld	Pennsylvania	Penn State
Hank Zygmunt	Pennsylvania	Resource Dynamics
Jon Moyle	Maryland	University of Maryland
John Rhoderick	Maryland	Maryland Department of Agriculture

In addition, technical support was provided by Steve Dressing, Don Meals, Jennifer Ferrando (Tetra Tech), Jeff Sweeney (EPA CBPO), Matt Johnston (UMD CBPO) and Emma Giese (CRC).

Summary of Recommendations

Calculation of poultry litter N and P generation

To estimate N and P generation from the poultry industry within the watershed, three parameters are required: nutrient concentration in the litter, litter generation, and yearly bird population. The expression for N generation is shown in Equation 1; a similar expression for P generation is shown in Equation 2.

Dry Pounds of N/yr = (lbs N/ton litter) x (tons litter/1000 birds) x (1000 birds/yr) (1)

(*concentration)* *(generation)* *(population)*

Dry Pounds of P/yr = (lbs P/ton litter) x (tons litter/1000 birds) x (1000 birds/yr) (2)

(*concentration)* *(generation)* *(population)*

The PLS has focused on quantifying values and developing credible estimates for concentration, generation, and population for each poultry type. The following three sections provide an overview of the methods used to quantify or estimate nutrient concentration, litter generation, and bird population. Subsequent sections in this report provide state-specific methods and data sources for these parameters. Where data gaps exist for any of these parameters in any state, the PLS requests that the Agricultural Modeling Subcommittee (AMS) recommend default values for use in the Phase 6 Model.

Required Parameter: Concentration Estimates

Current and historical litter N and P concentrations for each state were estimated by analyzing litter samples using certified state and private laboratories. Data for each state are provided in the data templates in Attachment 1, and those results are discussed in the state-specific sections provided later in this report.

Required Parameter: Generation Estimates

As an initial benchmark, DDA and UD conducted a nation-wide survey of current and historical litter generation estimates from university recommended values. Table 3 summarizes the results of that survey, which indicate that litter production varies from 1.0 – 1.7 tons/1000 broilers nationwide. Data for broilers as well as other poultry types were subsequently based on state-based research and recommendations.

Table 3. Summary of the average manure generation for several broiler-producing regions of the U.S.

State/region	Manure generation (t/1000 birds)	Reference
Delaware	1.25	UD (Malone et al. 2000)
Maryland	1.0	UMD (Carr et al. 1990)
Virginia	1.1 – 1.4	VT (Collins 2009
Pennsylvania	1.5	PSU (Patterson et al. 1998)
Georgia	1.2	UGA (Vest et al. 1994)
Alabama	1.7 (0.6 lbs/lb meat produced)	(Mitchell and Donald 1995)
Mississippi	1.25	(Chamblee and Todd 2002)
Nationwide	1.25	(NRAES 1999)

Population Estimates

In consultation with the National Agricultural Statistics Service (NASS), the PLS identified three possible data sets that might be used to estimate broiler and turkey populations annually and for each state within the watershed. There are insufficient data for layers, breeders and pullets at this time. These data sets are:

- **Bird placements** – the number of chicks placed in production facilities each year in each state. Note that NASS applies a mortality factor to this placement number to account for early mortalities after placement.
  Bird production – the number of birds harvested from production facilities based on bird placement after removing early mortality in each year in each state. This data is available at: http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1130.
- **Bird slaughter** – the number of birds slaughtered annually in each state.

As an example, numbers from each of these three data sets are compared with the 2007 Census Inventory data for Delaware in Table 4. 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.

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

(Note: The Phase 5.3.2 Watershed Model utilizes census inventory, a 1-day projection converted to year (365 days) for population estimates).

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. The PLS is hopeful that NASS will also be able to provide yearly population estimates for layers and pullets. If yearly population estimates are not available for these two animal types, the PLS requests the AMS recommend alternative methods to estimate populations.

Statewide to County Population Estimate Discussion

Discussions with NASS scientists confirmed that the NASS *production* number was the most appropriate data set to use for estimating poultry populations in the watershed. The use of the single-day bird inventory as a survey of yearly bird population is less accurate than utilizing the NASS production numbers which are adjusted based upon monthly reporting from January to October of each year. The PLS recommends use of the NASS production data set to estimate the annual poultry populations within the watershed. Subsequently, the annual production data from NASS should be projected to the county level – as required by the model – using the relative county-level distribution of broilers and turkeys within the state based on the most recent NASS Census of Agriculture that is conducted every five years.

The PLS recommends that the county-level population data required by the model be determined by using the raking technique employed by NASS to project the annual NASS state-wide numbers to the county level. Table 5 contains an example where this technique is applied to Delaware, however this could also be implemented by other jurisdictions.

Note that the census population reported in Table 5 is a one day snapshot of the population estimate in each county verses the NASS production estimate which reflects total number of birds produced in the state over the course of one year.

Table 5. An example of using the county-level census population data to distribute the NASS annual state-wide population estimates to the county level. The example is for Delaware in 2012 which had two poultry-producing counties and a NASS state-wide annual production estimate of 212,000 $x10^3$ birds.

County	2007 Census Population (No. birds $x10^3$)	Percent Broilers in the County (%)[a]	Projected County-Level Annual Production (No. Birds $x10^3$)[b]
Kent	7,472	14.6	31,004
Sussex	43,621	85.4	180,997

a. Percentage of the total 2007 Census Population in Kent and Sussex counties (7,472 $x10^3$ + 43,621 $x10^3$ = 51,093$x10^3$)
b. Calculated by multiplying the percent broilers in the county by the state-wide annual production estimate of 212,000$x10^3$

Data Collected (This section was left unfinished to be completed by the AMS. The AMS report replaces this section.)

Descriptions of State Model Input Data
Each of the five states represented on the PLS summarized the N and P concentrations, litter generation, and population information in a set of state- and poultry type-specific data templates. The data templates for each state are contained in Attachment 1 of this report. Details and origins for the state-based data are described in the following five sections.

Delaware

Nutrient Concentration Data

The Delaware (DE) poultry industry is exclusive to broiler production; therefore, the DE data template contains one tab that pertains to broiler production from 1996 to 2013. The DE data actually reflect the attributes of broiler litter produced across the Delmarva Peninsula; however the DE template in Attachment 1 contains NASS broiler production data only for DE and not the eastern shore of Virginia (VA) or Maryland (MD).

Manure N and P concentration data are based on a total of 5,569 broiler litter samples representing all types of growing and storage conditions in the region from 1996 to 2013. From 1996 through 2002, samples were analyzed by the Agri-Analysis Laboratory, Inc. in Leola, PA. This laboratory is certified under the Minnesota Department of Agriculture's Manure Testing Laboratory Certification Program (MTLCP). Samples processed from 2003 to 2013 were analyzed by the DDA laboratory in Dover, DE. The DDA lab and the Agri-Analysis Lab are MTLCP-certified.

N and P concentrations over time are provided in appendix 1. There has been a statistically significant decreasing trend (95% confidence) in average annual P_2O_5 concentrations in broiler manure since 1996 (Figure 2). As seen in Figure 2, the annual mean values of P_2O_5 in the litter have declined from about 82 lbs/ton in 1996 to about 73 lbs/ton in 2013. This reduction can be attributed to several factors including broiler genetic enhancements, advanced feed technologies and better growing environments.

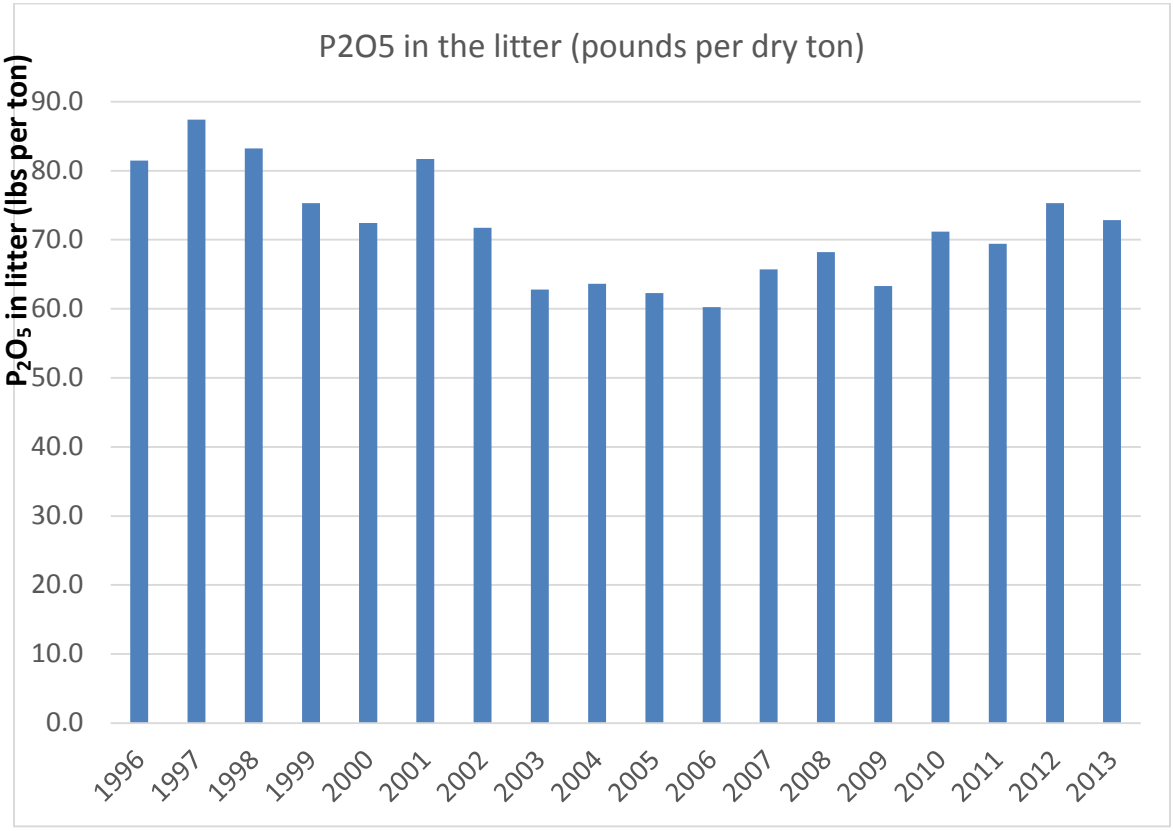

Figure 2. P_2O_5 concentrations in broiler manure samples on the Delmarva Peninsula from 1996 to 2013. Data provided by the DDA certified laboratory.

Litter Generation Estimates

Two recent studies have been conducted in Delaware regarding the mass of litter generation from broiler production. The first, published in 2000 by University of Delaware (Malone, 2000), reported litter generation of 1.25 tons/1000 birds produced. In 2012, a DDA/UD study measured litter generation in 702 broiler houses from 2009 to 2012 and reported an average generation of 1.50 tons/1000 birds produced over that period. Figure 3 plots the available litter generation data on a dry weight basis over the period from 2000 to 2012.

Clearly, litter generation per 1000 birds produced has increased over this period. This 20% increase in litter production is not surprising. Examination of the Delaware NASS poultry production data revealed that average bird size increased 20% from 5.9 lb in 2000 to 7.1 lb in 2012. Bird size was determined by

computing the ratio of total poultry meat produced and the annual poultry population. Therefore, it is possible that bird size can be used as an 'adjustment' parameter that can be used to update litter generation on an annual basis, and it is recommended that this methodology be further studied to validate this approach. -

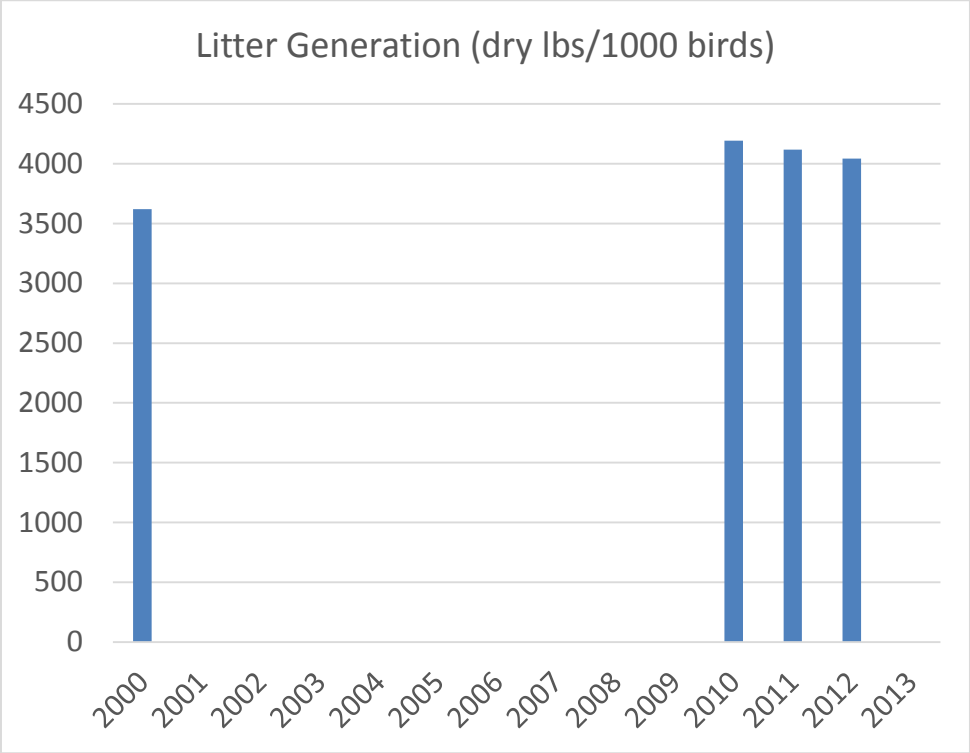

Figure 3. Litter generation measurements for the Delmarva Peninsula from the 2000 and 2012 UD studies.

Summary of DE Data Recommendation

DE only has broiler production in the southern two counties, therefore no data or recommendations are being provided for other poultry species. The data template summarizes the litter generation trends over time as well as the N and P concentrations. Any estimates of generation by other poultry types for DE should be based on default values recommended by the AMS.

DE Data Gaps

DE data gaps include NASS production data for 2013 which should be available in the 2nd quarter of 2014. The N and P concentration data for 2012 and 2013 reflect only a portion of the litter samples analyzed by the DDA – the 2013 data should also be available in the 2nd quarter of 2014. Average growout periods and the number of flocks grown in a poultry house per year were not obtained prior to 2006. However, given that the PLS is recommending the use of the NASS production data to estimate

annual bird populations, the growout data and annual flocks grown per year should no longer be needed for the model to estimate populations.

The average annual NH_3-N concentration in broiler litter was not available prior to 2007. In addition, a typical litter analysis performed by both the Agri Analysis and DDA labs do not measure Cu, Ca, Mg, % H_2O-extractable P, and the C:N ratio. This data requested by the CBP to enhance their manure data set and could help them enhance the Phase 6 Watershed Model; for example, NH_3-N data could allow the model to better account for the volatility of N.

The DDA manure and/or litter sample submission form does not currently request the source of litter (total house cleanout, house crustout or in-house windrow) or the location where the sample was taken (house, manure shed, field pile). Starting in 2014, DDA will use a modified submission form which requests this additional data.

Maryland

Nutrient Concentration Data

The University of Maryland's soil testing lab that was located at College Park, Maryland and used by area farmers to develop soil and manure test reports and recommendations was closed in 2003. Therefore there are no manure test reports for Maryland. Because poultry production nutrition, management, and storage strategies are similar among all poultry operations on the Delmarva Peninsula, manure analyses from Delaware are applicable to Maryland as well. The same integrators operate in Delaware and Maryland and they formulate their chicken feed to include dietary amendments for the purpose of making poultry more P efficient. The feed mills for the integrators are the same for Delaware and Maryland, therefore the manure analysis from Delaware would be the same for Maryland. Below is the information for the location of the feed mills that demonstrates that they service the Delmarva poultry.

<u>Delmarva Feed Mill Locations:</u>

Allen Harim	Seaford, Delaware
Amick Farms, Inc.	Delmar, Delaware
Mountaire Farms	Frankford, Delaware
	Millsboro, Delaware
	Westover, Maryland
Perdue Farms Inc.	Bridgeville, Delaware
	Hurlock, Maryland
	Salisbury, Maryland
Tyson Foods, Inc.	Snow Hill, Maryland

Phytase Amendment

Amendments are added to poultry diets for a variety of reasons, usually to improve either bird health or efficiency in digesting nutrients. The latter has the eventual environmental benefit of reducing the

amount of P in poultry manure, thereby reducing the amount of excess P that might reach surface waters in watersheds with high poultry populations. According to Maryland's Nutrient Management regulations, all poultry integrators were required to have added phytase to poultry diets by December 31, 2000. The years 2000-2002 were transition years to allow for lag time between the introductions of dietary amendments to the time when the reductions would appear in manure being sampled.

Bird Population and Size Data

USDA-NASS annual production data was used for annual broiler, layer, pullet, and turkey population and size. Broiler annual production numbers from 1996-2007 ranged from 284.6 million to 297.5 million with an average of 291.5 million birds per year over the period. Production numbers for 2008-2011 ranged from 291.4 million to 311.1 million with an average of 300.4 million birds per year over the period. Broiler weights were at the lowest in 1996 averaging 4.7 pounds per bird and greatest in 2009 averaging 5.8 pounds per bird. Weights were not available for 2010 and 2011. As was noted in Delaware's current and historic litter data; average bird size has increased by 19% which would affect litter production numbers.

Layer annual production numbers from 1996-2007 ranged from 2.5 million to 3.6 million with an average of 3.2million birds per year over the period, with the high of 3.6 million being in 1998. Production numbers for 2008-2011 ranged from 2.1 million to 2.3 million. The average was 2.2 million per year over the period, with the low of 2.1 million being in 2011. Weight data was not available for any year.

Pullet annual production numbers from 1996-2007 ranged from .34 million to 1.2 million with an average of .90 million birds per year over the period, with the high of 1.2 million being in 2005 and the low of .34 million being in 2007. Production numbers for 2004 were not available. Production numbers for 2008-2011 ranged from .18 million to .45 million with an average of .32 million birds per year over the period. Weight data was not available for any year.

Turkey annual production numbers from 1996-2007 ranged from .36 million to .78 million with an average of .59 million birds per year over the period, with the high of .78 million being in 2006 and the low of .36 million being in 1996. Production numbers for 2008-2011 were not available. Weight data was not available for any year.

MD Data Gaps

Maryland data gaps include NASS production data for 2012 and 2013. Manure analysis is available for 2012 and 2013 from Maryland from the Nutrient Management Program Annual Implementation Reports (AIR). In 2013 MDA required all manure analysis data to be supplied with the AIR. However the Delaware data actually reflects manure attributes produced across the Delmarva Peninsula. Therefore data gaps highlighted in the Delaware section would also apply for Maryland. The manure analysis from Delaware is only for broiler. Manure analyses for turkeys, pullets, and layers are not available at this time, but Maryland continues to look for opportunities to obtain this data. Maryland was only able to

partially complete the poultry litter template with data from the USAD-NASS report. Weight data was unavailable for layer, pullet, and turkey. The manure data portion of the template was not completed as Maryland maintains that the Delaware data is representative for broiler in Maryland and data is unavailable for layer, pullet, and turkey.

Pennsylvania

Nutrient Concentration/Litter Data

Pennsylvania (PA) has limited poultry litter data for consideration in this report. Pennsylvania does not have a manure testing laboratory supported by state or federal funding that provides manure analysis services to farmers for free or even reduced prices. Farmers use various private and university laboratories scattered throughout the region to obtain this information for their farms. Therefore there is no good one-stop location to obtain historical poultry litter information for PA. Even the laboratory at Penn State has only recently been certified for manure testing (2009). Furthermore, the Penn State laboratory has often times not been considered to be the preferred testing site for farmer and farm consultants to use, and therefore the lab has very limited poultry farm litter testing data for consideration.

The PA Department of Agriculture (PDA) requested poultry manure data from private manure testing laboratories that generally service Pennsylvania farms. However, only one laboratory responded to PDA's request and that laboratory only had data for the date range of September 2010 through May of 2013. Those data included results from 1,405 poultry litter tests, but only 328 of those records included sufficient data for use in this assessment. This limited data set was entered into the poultry litter template spreadsheet and provided to the PLS for the development of this report.

In addition to the information obtained from the cooperating private laboratory, staff at PA Department of Environmental Protection (DEP) accessed layer manure testing data contained in concentrated animal feeding operation (CAFO) permit files for farms in the South-central region of PA. That region has the vast majority of the layer farms in PA. From those files DEP obtained layer manure test data for 71 separate manure tests for the period of 2003 through 2013. That information was entered into the poultry litter template spreadsheet and provided to the sub-committee for their use.

Due to the limited amount of data available from Pennsylvania's layer operations (averaging 7 data points per year), scientifically defensible nutrient content and manure volume figures and trends are not able to be developed. In addition, the limited manure information provided did not link the manure test or generation data to the various farm management systems (deep pit, cage free, and belted operations) associated with the individual manure data points. This lack of linkage between the manure information and the farm management systems is problematic as the differing management systems are expected to have significantly different manure generation and content figures.

Population Data

Laying hens (layers) are the most common poultry type being raised in PA. NASS does not provide yearly population estimates for layers, nor does PA have yearly estimates of layer populations. Thus PA supports the AMS development of an alternative method for estimating layer populations based upon 5-year Ag Census data. This method should only be used if NASS yearly data is not available in the coming years. PA supports using NASS yearly population data for the state's other poultry types where available.

PA Data Gaps

The data obtained from the above two PA data sources were significantly limited compared to information collected from some other Chesapeake Bay states. Only data that could be verified were included and information on bird market weight, the growout period, or other farm management questions were generally not available. Thus, the PA data may not fully support the purposes of this report.

Pennsylvania state agencies are working with their program partners to continue to look for other avenues to obtain this type of information for future collection and use at an aggregated scale. For example, DEP has approached one of the more active and inclusive organizations representing the agriculture industry in PA and is working on an agreement to obtain a more inclusive data set for poultry and possibly other manure types in PA. In addition, PA state agencies are considering how they can more inclusively collect the manure testing information currently in approved nutrient management plans developed for CAFOs and other farms in PA. This information is not stored in any centralized data storage or filing system, so collection of the data is very difficult and time consuming. DEP is also supporting an effort of Penn State to reevaluate their manure testing procedures and forms to see if they can be revised to better support the poultry industry.

There continues to be interest in initiating a state funded project to systematically collect poultry litter from the various types of poultry operations in PA and develop a comprehensive set of litter data. Such a data set would permit differentiation of data from farms managed under various management styles, providing a more reliable nutrient content average for different farm types. DEP continues to determine where funding may be available to implement such a project, and if the timing of that project would be consistent with when the information is needed for model revisions.

PA panel members recognize the vast amounts of poultry litter data that are available in PA's neighboring states. With technical review of those data to determine comparability to PA circumstances, it may be possible to apply those data within PA where farm management, animal genetics, feed sources, and other trends in the poultry industry do not differ significantly from other states. This may provide an opportunity for added efficiency and consistency as DEP looks to incorporate revised poultry litter data into the Chesapeake Bay modeling process. PA supports the AMS developing default estimates for poultry litter parameters to be used in the Phase 6 Watershed Model where data is unavailable.

Virginia

Nutrient Concentration Data

Since 2001 DCR has used Clemson University's Agricultural Service Laboratory as our contractor to perform Manure Nutrient Analysis. The laboratory analysis uses methods consistent with Recommended Methods of Manure Analysis, publication A3769, University of Wisconsin, 2003 (Wisconson, 2003).

As part of that contract, Virginia DCR receives a report annually of all samples submitted under the contract. The concentration data summarized in this report come directly from those annual reports. Data are divided into four bird types: chicken broiler, chicken layer breeder, turkey, and turkey breeder, and three storage categories: covered, uncovered, and unspecified. These designations are based on coding of the manure sample submittal form by the person submitting the sample.

The templates contained in attachment 1 of this report are delineated in the same manner with a few exceptions. "Unspecified" storage is depicted as "other" in the spreadsheet. "Uncovered" storage is depicted as "uncovered stack" in the spreadsheet. "Covered" storage is depicted as "covered stack" in the spreadsheet. "Covered stack" may include roofed storage and in-house samples because there is no designation on the sample submittal form to separate the type of storage cover.

Data were divided into two categories for review – 2001 to 2005, or pre-phytase, and 2006 to 2012, or post-phytase. The data were also divided into two bird groups – chicken and turkey.

For litter volume production estimates, DCR maintains a nutrient management plan database for all permitted poultry operations. Data is available for 2006 to 2013. The database contains population and manure volume estimates for each operation. Volume data entries in the attached template are based on active plans for each given year. Data is only provided for a bird type for a year in which 30 or more plans were active. Also, the turkey volume data set is currently not presented for use due to data extremes that require further review.

Chicken (Broiler) Litter Concentration Data

When comparing the pre-phytase to post-phytase data, average N concentration in chicken litter has increased slightly, average P concentration has decreased slightly, and average moisture content has stayed almost constant. The modest N increase and slight P decrease may be attributed in part to house management.

As total house cleanout frequency decreases, litter volume also decreases from a decrease in bedding material added to the poultry house. The amount of actual excreted manure generated, however, may not change as dramatically. Therefore, nutrient concentration of the litter may increase as a result of house management. This change in management likely explains the slight N increase seen in the data.

In the case of P, the inclusion of phytase has created an opportunity to decrease P in poultry feed. That decrease in feed P translates into a decrease in P in the manure. That reduction, coupled with the above house management potential to increase nutrient concentration, can lead to the modest changes seen over time in these samples versus the litter P content declines we would expect with phytase in the ration if all other variables were constant.

Turkey Litter Concentration Data

The turkey data summarized in Attachment 1 represent a weighted average of values of turkey and turkey breeder data with the turkey data making up around 90% of the data. The turkey and turkey breeder data values were only modestly different with the most notable differences in the P values. The turkey litter averaged about 7 pounds more P (P_2O_5) than the turkey breeder samples.

When comparing the pre-phytase to post-phytase summary data, average N concentration has increased, average P concentration is unchanged, and average moisture content has increased slightly. The same argument could be made for this increase in N and unchanged P as was made with the chicken data. Only in this case, the house management may have completely offset the gains made with phytase in litter P concentration.

Litter Generation Data

The VA litter mass data for 2006 to 2013 were summarized from the plan tracking database for permitted operations. Each plan submitted contains an estimated mass of litter produced and an estimated flock capacity for the operation. Generation data entries in the attached template are based on active plans for each given year. Data is only provided for a bird type for a year in which 30 or more plans were active. Also, the turkey litter mass data set is currently not presented for use due to data extremes that require further review. The mass estimates are based on load counts and spreader calibrations, litter sales receipts, and, when nothing else is available, estimates from "Virginia Nutrient Management Standards and Criteria".

For example, nutrient management specialists in the DCR Verona field office have been tracking mass data by integrator when conducting calibrations and load counts. They have started to use this data set to estimate production for similar houses within integrator complexes when no specific on-farm data are available. For instance, they are seeing broiler litter mass ranging from 0.7 – 1.2 tons per thousand depending on integrator. A decline in litter mass estimates is anticipated as plans are revised and this type of more specific mass data are incorporated in the database.

Bird Population and Size Data

USDA-NASS annual production data and USDA-NASS annual slaughter data were used for annual broiler and turkey population and size, respectively. Broiler production numbers dropped from a high of 271.5 million in 2001 to 240.5 million in 2012. This decline in production was an almost constant downward trend with one major 9.5 million bird drop in 2009 followed by an offsetting 9.6 million bird jump in 2010. Conversely, broiler weights were at their lowest in 2001 averaging 4.9 lb/bird and highest in 2012 averaging 5.4 lb/bird bird. Average weights increased from 4.9 to 5.2 lb from 2001 to 2007. Weights stayed between 5.2 and 5 pounds until an increase in 2011 to an average 5.3 pounds. All that considered, total mass of broilers produced hovered around 1.3 billion pounds annually from 2001 to 2012 except for a dip to 1.2 billion pounds in 2009.

Turkey production data can be divided into two distinct segments. From 2001 to 2007 annual production ranged from 19.7 to 24 million with an average of 21.6 million birds per year over the period. Average bird weights for this period ranged from 20.6 to 22.7 pounds per bird with an average of 22 pounds per birds for the period.

Between 2008 and 2012 annual turkey production ranged from 17 to 18 million birds with an average of 17.3 million birds per year over the period. Bird weights for this period ranged from 26.3 to 27 pounds with an average of 26.6 pounds per bird for the period.

Looking at the total pounds of turkeys produced for these two time periods, average annual production are very similar. Average total annual production from 2001 to 2007 was 474 million pounds and from 2008 to 2012 was 460 million pounds.

VA Data Gaps

Some gaps do exist in the litter mass database from 2006 to 2012 due to plan writing frequency. For instance, no turkey breeder data exists for 2008 because no plans were delineated as such in the database in 2008. In this case, the average mass for two years before (2006, 2007) and after (2009, 2010) were averaged together to give a generation estimate for 2008 turkey breeder. There are no data in the database for 2001 to 2005. Currently, estimates from "Virginia Nutrient Management Standards and Criteria" are used for those years.

Bird growout periods and some flock counts are not currently included in the VA data. Flock counts that are included are default values from DCR's plan writing software – NutMan 3. No population or size data are included for chicken or turkey layer / breeder operations. Information will be sought from the poultry industry for these missing parameters. Also, efforts will be made to verify flock counts, current average bird weights, and growout periods. In the past four years in VA, broiler weights, for instance, have fluctuated between 4 and 6 pounds; growout periods have fluctuated, accordingly, from 5 to 6.5 weeks; and down time between flocks has fluctuated from 7 days to several weeks.

Finally, VA's turkey litter generation data should not be used in the Phase 6 Watershed Model until a more complete QA/QC effort is undertaken.

For these reasons, VA supports the AMS recommending default parameters for turkey litter data and other parameters not specifically provided by NASS or the state.

West Virginia

Nutrient Concentration Data

Input data from West Virginia (WV) come from the West Virginia Department of Agriculture's Nutrient Management Laboratory in Moorefield, WV. This laboratory is certified by the Minnesota Department of Agriculture. Since 1995 over 1,167 broiler samples, 526 layer samples, 90 pullet samples and 548 turkey samples have been analyzed by the lab. A submission form is required for all litter samples submitted to the lab. The submission form includes the type of litter: (Broiler, Breeder (Pullet), Layer,

Turkey) and where the litter was taken: (house, uncovered stack, covered stack and roofed storage). West Virginia has a detailed record system of all litter samples that have been analyzed.

West Virginia data show that there have been reductions in P concentration due to the introduction of phytase into poultry feed. Data from the past fiscal year showed a 32% reduction of P_2O_5 in broiler litter, 23% reduction of P_2O_5 in layer litter, 20% reduction of P_2O_5 in pullet litter and a 12% reduction of P_2O_5 in turkey litter in comparison to the pre-phytase years (1995-1999).

WV Data Gaps

It is not known exactly if the P_2O_5 reductions are solely the result from phytase addition to the feed or if it is a combination with different feed ingredients. Integrators have changed their feed ingredients throughout the years for feed efficiency, availability, cost, and genetics. This knowledge gap will be hard to fill due to the integrators' undisclosed feed ingredients, which keeps them competitive.

The usage of different N amendments in the litter samples that are submitted to the lab is unknown. This could also be causing the small rise in TKN in the litter as shown in the data. The PLS believes that this gap would be hard to fill due to the various amendments on the market. But, it is easy to say that most farms are using some type of amendment. The higher TKN numbers in accordance with lower moisture percentages is causing less P_2O_5 to be applied to the fields.

Historic poultry production numbers are lacking. These data includes average bird market weights, stocking densities, flocks per year, and bird market age thoughout the years. Such data would be very difficult to retrieve, and would only be available if integrators would want to share it.

Litter management programs of each farm are unknown, which means litter samples could have been taken from different stages of the program. Is the sample a crust sample from a built-up litter program or from a total clean-out? Is the litter sample from the 1^{st} stage, 2^{nd} stage, or 3^{rd} stage area of a turkey operation? Is the litter sample from hens or toms in a turkey operation? Because there are so many variables to consider, poultry litter data from the state should be based on weighted averages for each bird type. This applies to all state data.

Data on bedding material are also missing from reported litter analyses. Shavings, saw dust, peanut hulls, and mulch are the most common beddings in WV. Each of these beddings has a different C:N ratio and moisture content that affects nutrient availability and weight. Once again, there are so many variables that it would be very difficult to split out the differences.

WV was unable to obtain litter generation estimates for any animal type, and supports the use of default estimation procedures for poultry litter generation. WV also has a limited amount of litter concentration data for some animal types in some years. Thus, WV also supports the development of default estimates for litter concentrations for those parameters.

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Appendix B. Nutrients Produced Per Bird

Broilers

DE	Average Lbs Market Weight/Bird	Wet Lbs Litter/Bird	Dry Lbs/Lb Wet Litter	Dry Lbs Litter/Bird	Lbs P/Dry Lb of Litter	Lbs P/Bird	Lbs N/Dry Lb Litter	Lbs N/Bird
1985	4.799999	2.267338	0.713500	1.617745	0.018336	0.029663	0.046215	0.074765
1986	4.799998	2.267337	0.713500	1.617745	0.018336	0.029663	0.046215	0.074765
1987	4.997618	2.330518	0.713500	1.662825	0.018336	0.030489	0.046215	0.076848
1988	5.000000	2.331280	0.713500	1.663368	0.018336	0.030499	0.046215	0.076873
1989	5.000000	2.331280	0.713500	1.663368	0.018336	0.030499	0.046215	0.076873
1990	5.000000	2.331280	0.713500	1.663368	0.018336	0.030499	0.046215	0.076873
1991	5.100000	2.363251	0.713500	1.686180	0.018336	0.030918	0.046215	0.077927
1992	5.100000	2.363251	0.713500	1.686180	0.018336	0.030918	0.046215	0.077927
1993	5.100000	2.363251	0.713500	1.686180	0.018336	0.030918	0.046215	0.077927
1994	5.300039	2.427205	0.713500	1.731811	0.018336	0.031754	0.046215	0.080036
1995	5.299886	2.427157	0.713500	1.731776	0.018336	0.031754	0.046215	0.080035
1996	5.500000	2.491135	0.713500	1.777425	0.018336	0.032591	0.046215	0.082144
1997	5.500195	2.491197	0.713500	1.777469	0.018336	0.032592	0.046215	0.082146
1998	5.500000	2.491135	0.713500	1.777425	0.018336	0.032591	0.046215	0.082144
1999	5.599921	2.523081	0.713500	1.800218	0.018336	0.033009	0.046215	0.083198
2000	5.899879	2.618980	0.713500	1.868642	0.018336	0.034263	0.046215	0.086360
2001	5.800155	2.587098	0.713500	1.845894	0.018354	0.033879	0.044284	0.081744
2002	6.000000	2.650990	0.713500	1.891481	0.017213	0.032559	0.042818	0.080990
2003	6.000000	2.650990	0.713500	1.891481	0.015728	0.029749	0.043513	0.082305
2004	6.199834	2.714879	0.713500	1.937066	0.014412	0.027918	0.041786	0.080942
2005	6.500000	2.810845	0.713500	2.005538	0.013724	0.027524	0.041782	0.083795
2006	6.600000	2.842816	0.713500	2.028349	0.013538	0.027461	0.040294	0.081730
2007	6.500000	2.810845	0.713500	2.005538	0.013689	0.027454	0.040669	0.081564
2008	6.500206	2.810911	0.713500	2.005585	0.014122	0.028324	0.040363	0.080952
2009	6.905832	2.940593	0.713500	2.098113	0.014346	0.030100	0.039897	0.083709
2010	6.939795	2.951452	0.713500	2.105861	0.014744	0.031048	0.040236	0.084731
2011	7.000000	2.970700	0.713500	2.119594	0.014830	0.031435	0.040236	0.085284
2012	7.100000	3.002671	0.713500	2.142406	0.015704	0.033643	0.041000	0.087839
2013	7.100186	3.002730	0.713500	2.142448	0.015826	0.033907	0.042545	0.091150

MD	Average Lbs Market Weight/Bird	Wet Lbs Litter/Bird	Dry Lbs/Lb Wet Litter	Dry Lbs Litter/Bird	Lbs P/Dry Lb of Litter	Lbs P/Bird	Lbs N/Dry Lb Litter	Lbs N/Bird
1985	4.200001	2.075512	0.713500	1.480878	0.018336	0.027153	0.046215	0.068439
1986	4.300002	2.107484	0.713500	1.503690	0.018336	0.027572	0.046215	0.069494
1987	4.399998	2.139454	0.713500	1.526500	0.018336	0.027990	0.046215	0.070548
1988	4.300000	2.107483	0.713500	1.503689	0.018336	0.027572	0.046215	0.069494
1989	4.300001	2.107483	0.713500	1.503689	0.018336	0.027572	0.046215	0.069494
1990	4.300000	2.107483	0.713500	1.503689	0.018336	0.027572	0.046215	0.069494
1991	4.400000	2.139454	0.713500	1.526500	0.018336	0.027990	0.046215	0.070548
1992	4.500000	2.171425	0.713500	1.549312	0.018336	0.028408	0.046215	0.071602
1993	4.500000	2.171425	0.713500	1.549312	0.018336	0.028408	0.046215	0.071602
1994	4.600000	2.203396	0.713500	1.572123	0.018336	0.028826	0.046215	0.072656
1995	4.599932	2.203374	0.713500	1.572108	0.018336	0.028826	0.046215	0.072656
1996	4.700136	2.235410	0.713500	1.594965	0.018336	0.029245	0.046215	0.073712
1997	4.799865	2.267295	0.713500	1.617715	0.018336	0.029662	0.046215	0.074763
1998	4.699897	2.235334	0.713500	1.594911	0.018336	0.029244	0.046215	0.073709
1999	5.000000	2.331280	0.713500	1.663368	0.018336	0.030499	0.046215	0.076873
2000	4.799859	2.267293	0.713500	1.617713	0.018336	0.029662	0.046215	0.074763
2001	4.799861	2.267294	0.713500	1.617714	0.018354	0.029691	0.044284	0.071639
2002	4.699898	2.235334	0.713500	1.594911	0.017213	0.027454	0.042818	0.068291
2003	4.700068	2.235389	0.713500	1.594950	0.015728	0.025085	0.043513	0.069402
2004	4.800070	2.267360	0.713500	1.617762	0.014412	0.023316	0.041786	0.067600
2005	4.800000	2.267338	0.713500	1.617746	0.013724	0.022202	0.041782	0.067592
2006	5.400000	2.459164	0.713500	1.754614	0.013538	0.023755	0.040294	0.070701
2007	5.399932	2.459142	0.713500	1.754598	0.013689	0.024019	0.040669	0.071359
2008	5.399866	2.459121	0.713500	1.754583	0.014122	0.024779	0.040363	0.070820
2009	4.791709	2.264687	0.713500	1.615854	0.014346	0.023182	0.039897	0.064468
2010	4.770050	2.257763	0.713500	1.610914	0.014744	0.023751	0.040236	0.064816
2011	5.299904	2.427162	0.713500	1.731780	0.014830	0.025683	0.040236	0.069680
2012	5.299868	2.427151	0.713500	1.731772	0.015704	0.027195	0.041000	0.071003
2013	5.300131	2.427235	0.713500	1.731832	0.015826	0.027409	0.042545	0.073680

NY	Average Lbs Market Weight/Bird	Wet Lbs Litter/Bird	Dry Lbs/Lb Wet Litter	Dry Lbs Litter/Bird	Lbs P/Dry Lb of Litter	Lbs P/Bird	Lbs N/Dry Lb Litter	Lbs N/Bird
1985	4.400000	2.139454	0.713500	1.526500	0.017323	0.026443	0.049507	0.075572
1986	4.500000	2.171425	0.713500	1.549312	0.017323	0.026838	0.049507	0.076701
1987	4.500000	2.171425	0.713500	1.549312	0.017323	0.026838	0.049507	0.076701
1988	4.500000	2.171425	0.713500	1.549312	0.017323	0.026838	0.049507	0.076701
1989	4.600000	2.203396	0.713500	1.572123	0.017323	0.027233	0.049507	0.077831
1990	4.600000	2.203396	0.713500	1.572123	0.017323	0.027233	0.049507	0.077831
1991	4.500000	2.171425	0.713500	1.549312	0.017323	0.026838	0.049507	0.076701
1992	4.600000	2.203396	0.713500	1.572123	0.017323	0.027233	0.049507	0.077831
1993	4.500000	2.171425	0.713500	1.549312	0.017323	0.026838	0.049507	0.076701
1994	4.666667	2.224710	0.713500	1.587331	0.017323	0.027497	0.049507	0.078583
1995	4.928571	2.308444	0.713500	1.647074	0.017323	0.028532	0.049507	0.081541
1996	5.333333	2.437850	0.713500	1.739406	0.017323	0.030131	0.049507	0.086112
1997	5.000000	2.331280	0.713500	1.663368	0.017323	0.028814	0.049507	0.082348
1998	5.210526	2.398587	0.713500	1.711392	0.017973	0.030759	0.046152	0.078985
1999	5.500000	2.491135	0.713500	1.777425	0.016790	0.029843	0.042337	0.075250
2000	5.619048	2.529196	0.713500	1.804581	0.016870	0.030443	0.041446	0.074793
2001	5.304348	2.428583	0.713500	1.732794	0.016768	0.029056	0.041868	0.072548
2002	5.517241	2.496647	0.713500	1.781358	0.016255	0.028956	0.042555	0.075805
2003	5.615385	2.528025	0.713500	1.803746	0.015435	0.027841	0.043373	0.078233
2004	5.615385	2.528025	0.713500	1.803746	0.015132	0.027295	0.043438	0.078351
2005	5.615385	2.528025	0.713500	1.803746	0.014963	0.026990	0.043063	0.077675
2006	5.615385	2.528025	0.713500	1.803746	0.014758	0.026620	0.042546	0.076742
2007	5.615385	2.528025	0.713500	1.803746	0.014396	0.025967	0.042349	0.076387
2008	5.615385	2.528025	0.713500	1.803746	0.014451	0.026065	0.041925	0.075622
2009	5.615385	2.528025	0.713500	1.803746	0.014486	0.026130	0.041437	0.074742
2010	5.615385	2.528025	0.713500	1.803746	0.014578	0.026294	0.041639	0.075107
2011	5.615385	2.528025	0.713500	1.803746	0.014553	0.026250	0.043656	0.078744
2012	5.615385	2.528025	0.713500	1.803746	0.014981	0.027022	0.045146	0.081432
2013	5.615385	2.528025	0.713500	1.803746	0.015252	0.027510	0.045560	0.082179

PA	Average Lbs Market Weight/Bird	Wet Lbs Litter/Bird	Dry Lbs/Lb Wet Litter	Dry Lbs Litter/Bird	Lbs P/Dry Lb of Litter	Lbs P/Bird	Lbs N/Dry Lb Litter	Lbs N/Bird
1985	4.199998	2.075511	0.713500	1.480877	0.017323	0.025653	0.049507	0.073313
1986	4.199996	2.075511	0.713500	1.480877	0.017323	0.025653	0.049507	0.073313
1987	4.200000	2.075512	0.713500	1.480878	0.017323	0.025653	0.049507	0.073313
1988	4.200000	2.075512	0.713500	1.480878	0.017323	0.025653	0.049507	0.073313
1989	4.300000	2.107483	0.713500	1.503689	0.017323	0.026048	0.049507	0.074443
1990	4.500000	2.171425	0.713500	1.549312	0.017323	0.026838	0.049507	0.076701
1991	4.700000	2.235367	0.713500	1.594934	0.017323	0.027628	0.049507	0.078960
1992	4.900000	2.299309	0.713500	1.640557	0.017323	0.028419	0.049507	0.081218
1993	4.799824	2.267282	0.713500	1.617706	0.017323	0.028023	0.049507	0.080087
1994	5.000000	2.331280	0.713500	1.663368	0.017323	0.028814	0.049507	0.082348
1995	5.000000	2.331280	0.713500	1.663368	0.017323	0.028814	0.049507	0.082348
1996	5.099844	2.363201	0.713500	1.686144	0.017323	0.029208	0.049507	0.083475
1997	5.099852	2.363204	0.713500	1.686146	0.017323	0.029208	0.049507	0.083475
1998	5.100369	2.363369	0.713500	1.686264	0.017973	0.030307	0.046152	0.077825
1999	5.200296	2.395317	0.713500	1.709058	0.016790	0.028695	0.042337	0.072356
2000	5.200300	2.395318	0.713500	1.709059	0.016870	0.028832	0.041446	0.070834
2001	5.300076	2.427217	0.713500	1.731819	0.016768	0.029039	0.041868	0.072508
2002	5.300300	2.427289	0.713500	1.731871	0.016255	0.028151	0.042555	0.073699
2003	5.300154	2.427242	0.713500	1.731837	0.015435	0.026731	0.043373	0.075114
2004	5.300375	2.427313	0.713500	1.731888	0.015132	0.026207	0.043438	0.075230
2005	5.399730	2.459078	0.713500	1.754552	0.014963	0.026254	0.043063	0.075556
2006	5.400000	2.459164	0.713500	1.754614	0.014758	0.025895	0.042546	0.074651
2007	5.599868	2.523064	0.713500	1.800206	0.014396	0.025916	0.042349	0.076237
2008	5.799876	2.587008	0.713500	1.845830	0.014451	0.026673	0.041925	0.077386
2009	5.700326	2.555181	0.713500	1.823122	0.014486	0.026411	0.041437	0.075544
2010	5.620228	2.529573	0.713500	1.804850	0.014578	0.026310	0.041639	0.075153
2011	5.600257	2.523188	0.713500	1.800295	0.014553	0.026200	0.043656	0.078594
2012	5.600116	2.523143	0.713500	1.800263	0.014981	0.026970	0.045146	0.081275
2013	5.600118	2.523144	0.713500	1.800263	0.015252	0.027457	0.045560	0.082020

VA	Average Lbs Market Weight/Bird	Wet Lbs Litter/Bird	Dry Lbs/Lb Wet Litter	Dry Lbs Litter/Bird	Lbs P/Dry Lb of Litter	Lbs P/Bird	Lbs N/Dry Lb Litter	Lbs N/Bird
1985	4.399997	2.139453	0.713500	1.526500	0.015337	0.023412	0.044759	0.068325
1986	4.500000	2.171425	0.713500	1.549312	0.015337	0.023762	0.044759	0.069346
1987	4.600003	2.203397	0.713500	1.572124	0.015337	0.024112	0.044759	0.070367
1988	4.500000	2.171425	0.713500	1.549312	0.015337	0.023762	0.044759	0.069346
1989	4.399998	2.139453	0.713500	1.526500	0.015337	0.023412	0.044759	0.068325
1990	4.500000	2.171425	0.713500	1.549312	0.015337	0.023762	0.044759	0.069346
1991	4.500000	2.171425	0.713500	1.549312	0.015337	0.023762	0.044759	0.069346
1992	4.400000	2.139454	0.713500	1.526500	0.015337	0.023412	0.044759	0.068325
1993	4.599836	2.203344	0.713500	1.572086	0.015337	0.024111	0.044759	0.070366
1994	4.700040	2.235380	0.713500	1.594943	0.015337	0.024462	0.044759	0.071389
1995	4.600154	2.203445	0.713500	1.572158	0.015337	0.024112	0.044759	0.070369
1996	4.800077	2.267363	0.713500	1.617763	0.015337	0.024812	0.044759	0.072410
1997	4.700077	2.235392	0.713500	1.594952	0.015337	0.024462	0.044759	0.071389
1998	4.799848	2.267289	0.713500	1.617711	0.015337	0.024811	0.044759	0.072408
1999	4.899888	2.299273	0.713500	1.640532	0.015337	0.025161	0.044759	0.073429
2000	4.899962	2.299297	0.713500	1.640548	0.015337	0.025161	0.044759	0.073430
2001	4.900184	2.299368	0.713500	1.640599	0.015337	0.025162	0.044759	0.073432
2002	4.900188	2.299369	0.713500	1.640600	0.015337	0.025162	0.044759	0.073432
2003	4.900038	2.299321	0.713500	1.640566	0.015337	0.025161	0.044759	0.073431
2004	5.100000	2.363251	0.713500	1.686180	0.015418	0.025997	0.045258	0.076314
2005	5.099885	2.363214	0.713500	1.686153	0.015804	0.026648	0.045163	0.076151
2006	5.199844	2.395172	0.713500	1.708955	0.015891	0.027157	0.045529	0.077806
2007	5.199840	2.395171	0.713500	1.708954	0.015406	0.026328	0.045818	0.078300
2008	5.000000	2.331280	0.713500	1.663368	0.014743	0.024523	0.045299	0.075349
2009	5.000000	2.331280	0.713500	1.663368	0.014493	0.024107	0.044640	0.074254
2010	5.160144	2.382480	0.713500	1.699899	0.014295	0.024299	0.044502	0.075650
2011	5.299836	2.427141	0.713500	1.731765	0.014191	0.024576	0.045575	0.078925
2012	5.400000	2.459164	0.713500	1.754614	0.013801	0.024216	0.047509	0.083360
2013	5.399840	2.459113	0.713500	1.754577	0.013804	0.024221	0.048230	0.084623

WV	Average Lbs Market Weight/Bird	Wet Lbs Litter/Bird	Dry Lbs/Lb Wet Litter	Dry Lbs Litter/Bird	Lbs P/Dry Lb of Litter	Lbs P/Bird	Lbs N/Dry Lb Litter	Lbs N/Bird
1985	3.699988	1.915653	0.713500	1.366819	0.017354	0.023720	0.049559	0.067738
1986	3.600000	1.883686	0.713500	1.344010	0.017354	0.023324	0.049559	0.066607
1987	3.700000	1.915657	0.713500	1.366821	0.017354	0.023720	0.049559	0.067738
1988	3.699994	1.915655	0.713500	1.366820	0.017354	0.023720	0.049559	0.067738
1989	3.700011	1.915661	0.713500	1.366824	0.017354	0.023720	0.049559	0.067738
1990	3.800000	1.947628	0.713500	1.389633	0.017354	0.024116	0.049559	0.068868
1991	3.800000	1.947628	0.713500	1.389633	0.017354	0.024116	0.049559	0.068868
1992	3.800000	1.947628	0.713500	1.389633	0.017354	0.024116	0.049559	0.068868
1993	4.299716	2.107392	0.713500	1.503624	0.017354	0.026094	0.049559	0.074518
1994	4.299776	2.107411	0.713500	1.503638	0.017354	0.026094	0.049559	0.074518
1995	4.400450	2.139598	0.713500	1.526603	0.017354	0.026493	0.049559	0.075656
1996	4.400223	2.139525	0.713500	1.526551	0.017354	0.026492	0.049559	0.075654
1997	4.200441	2.075653	0.713500	1.480978	0.017354	0.025701	0.049559	0.073395
1998	4.000000	2.011570	0.713500	1.435255	0.017757	0.025485	0.045961	0.065966
1999	4.000000	2.011570	0.713500	1.435255	0.016486	0.023661	0.042063	0.060371
2000	4.000000	2.011570	0.713500	1.435255	0.016622	0.023857	0.041203	0.059137
2001	4.100223	2.043612	0.713500	1.458117	0.016528	0.024100	0.041295	0.060213
2002	4.000000	2.011570	0.713500	1.435255	0.016107	0.023117	0.040616	0.058295
2003	4.099771	2.043468	0.713500	1.458014	0.015701	0.022893	0.038763	0.056517
2004	4.099537	2.043393	0.713500	1.457961	0.016286	0.023744	0.037909	0.055270
2005	4.100565	2.043722	0.713500	1.458195	0.016833	0.024546	0.039160	0.057102
2006	4.000000	2.011570	0.713500	1.435255	0.017648	0.025330	0.041274	0.059238
2007	4.000000	2.011570	0.713500	1.435255	0.017450	0.025045	0.041797	0.059989
2008	4.100350	2.043653	0.713500	1.458146	0.017285	0.025205	0.041887	0.061077
2009	4.000000	2.011570	0.713500	1.435255	0.016163	0.023198	0.043530	0.062477
2010	3.949772	1.995512	0.713500	1.423797	0.014883	0.021191	0.045288	0.064481
2011	4.000000	2.011570	0.713500	1.435255	0.013294	0.019080	0.048033	0.068940
2012	4.000000	2.011570	0.713500	1.435255	0.012584	0.018061	0.049372	0.070861
2013	4.000000	2.011570	0.713500	1.435255	0.012584	0.018061	0.049372	0.070861

Turkeys

DE	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1986	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1987	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1988	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1989	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1990	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1991	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1992	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1993	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1994	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1995	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1996	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1997	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1998	58.000000	0.720000	0.260000	10.857600	0.016995	0.184522	0.038377	0.416680
1999	58.000000	0.720000	0.260000	10.857600	0.016410	0.178170	0.036751	0.399025
2000	58.000000	0.720000	0.260000	10.857600	0.017319	0.188039	0.039558	0.429508
2001	58.000000	0.720000	0.260000	10.857600	0.018133	0.196885	0.042041	0.456462
2002	58.000000	0.720000	0.260000	10.857600	0.017601	0.191107	0.042441	0.460807
2003	58.000000	0.720000	0.260000	10.857600	0.016083	0.174626	0.042413	0.460498
2004	58.000000	0.720000	0.260000	10.857600	0.015031	0.163203	0.042565	0.462150
2005	58.000000	0.720000	0.260000	10.857600	0.015638	0.169790	0.044067	0.478461
2006	58.000000	0.720000	0.260000	10.857600	0.016586	0.180085	0.046468	0.504531
2007	58.000000	0.720000	0.260000	10.857600	0.017313	0.187981	0.048327	0.524711
2008	58.000000	0.720000	0.260000	10.857600	0.017243	0.187219	0.048987	0.531876
2009	58.000000	0.720000	0.260000	10.857600	0.016791	0.182309	0.049885	0.541628
2010	58.000000	0.720000	0.260000	10.857600	0.016812	0.182533	0.051798	0.562404
2011	58.000000	0.720000	0.260000	10.857600	0.016412	0.178196	0.052815	0.573447
2012	58.000000	0.720000	0.260000	10.857600	0.016444	0.178547	0.053000	0.575449
2013	58.000000	0.720000	0.260000	10.857600	0.016181	0.175684	0.052719	0.572397

MD	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1986	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1987	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1988	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1989	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1990	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1991	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1992	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1993	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1994	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1995	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1996	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1997	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1998	58.000000	0.720000	0.260000	10.857600	0.016995	0.184522	0.038377	0.416680
1999	58.000000	0.720000	0.260000	10.857600	0.016410	0.178170	0.036751	0.399025
2000	58.000000	0.720000	0.260000	10.857600	0.017319	0.188039	0.039558	0.429508
2001	58.000000	0.720000	0.260000	10.857600	0.018133	0.196885	0.042041	0.456462
2002	58.000000	0.720000	0.260000	10.857600	0.017601	0.191107	0.042441	0.460807
2003	58.000000	0.720000	0.260000	10.857600	0.016083	0.174626	0.042413	0.460498
2004	58.000000	0.720000	0.260000	10.857600	0.015031	0.163203	0.042565	0.462150
2005	58.000000	0.720000	0.260000	10.857600	0.015638	0.169790	0.044067	0.478461
2006	58.000000	0.720000	0.260000	10.857600	0.016586	0.180085	0.046468	0.504531
2007	58.000000	0.720000	0.260000	10.857600	0.017313	0.187981	0.048327	0.524711
2008	58.000000	0.720000	0.260000	10.857600	0.017243	0.187219	0.048987	0.531876
2009	58.000000	0.720000	0.260000	10.857600	0.016791	0.182309	0.049885	0.541628
2010	58.000000	0.720000	0.260000	10.857600	0.016812	0.182533	0.051798	0.562404
2011	58.000000	0.720000	0.260000	10.857600	0.016412	0.178196	0.052815	0.573447
2012	58.000000	0.720000	0.260000	10.857600	0.016444	0.178547	0.053000	0.575449
2013	58.000000	0.720000	0.260000	10.857600	0.016181	0.175684	0.052719	0.572397

NY	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1986	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1987	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1988	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1989	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1990	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1991	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1992	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1993	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1994	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1995	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1996	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1997	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1998	58.000000	0.720000	0.260000	10.857600	0.016995	0.184522	0.038377	0.416680
1999	58.000000	0.720000	0.260000	10.857600	0.016410	0.178170	0.036751	0.399025
2000	58.000000	0.720000	0.260000	10.857600	0.017319	0.188039	0.039558	0.429508
2001	58.000000	0.720000	0.260000	10.857600	0.018133	0.196885	0.042041	0.456462
2002	58.000000	0.720000	0.260000	10.857600	0.017601	0.191107	0.042441	0.460807
2003	58.000000	0.720000	0.260000	10.857600	0.016083	0.174626	0.042413	0.460498
2004	58.000000	0.720000	0.260000	10.857600	0.015031	0.163203	0.042565	0.462150
2005	58.000000	0.720000	0.260000	10.857600	0.015638	0.169790	0.044067	0.478461
2006	58.000000	0.720000	0.260000	10.857600	0.016586	0.180085	0.046468	0.504531
2007	58.000000	0.720000	0.260000	10.857600	0.017313	0.187981	0.048327	0.524711
2008	58.000000	0.720000	0.260000	10.857600	0.017243	0.187219	0.048987	0.531876
2009	58.000000	0.720000	0.260000	10.857600	0.016791	0.182309	0.049885	0.541628
2010	58.000000	0.720000	0.260000	10.857600	0.016812	0.182533	0.051798	0.562404
2011	58.000000	0.720000	0.260000	10.857600	0.016412	0.178196	0.052815	0.573447
2012	58.000000	0.720000	0.260000	10.857600	0.016444	0.178547	0.053000	0.575449
2013	58.000000	0.720000	0.260000	10.857600	0.016181	0.175684	0.052719	0.572397

PA	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1986	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1987	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1988	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1989	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1990	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1991	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1992	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1993	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1994	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1995	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1996	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1997	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1998	58.000000	0.720000	0.260000	10.857600	0.016995	0.184522	0.038377	0.416680
1999	58.000000	0.720000	0.260000	10.857600	0.016410	0.178170	0.036751	0.399025
2000	58.000000	0.720000	0.260000	10.857600	0.017319	0.188039	0.039558	0.429508
2001	58.000000	0.720000	0.260000	10.857600	0.018133	0.196885	0.042041	0.456462
2002	58.000000	0.720000	0.260000	10.857600	0.017601	0.191107	0.042441	0.460807
2003	58.000000	0.720000	0.260000	10.857600	0.016083	0.174626	0.042413	0.460498
2004	58.000000	0.720000	0.260000	10.857600	0.015031	0.163203	0.042565	0.462150
2005	58.000000	0.720000	0.260000	10.857600	0.015638	0.169790	0.044067	0.478461
2006	58.000000	0.720000	0.260000	10.857600	0.016586	0.180085	0.046468	0.504531
2007	58.000000	0.720000	0.260000	10.857600	0.017313	0.187981	0.048327	0.524711
2008	58.000000	0.720000	0.260000	10.857600	0.017243	0.187219	0.048987	0.531876
2009	58.000000	0.720000	0.260000	10.857600	0.016791	0.182309	0.049885	0.541628
2010	58.000000	0.720000	0.260000	10.857600	0.016812	0.182533	0.051798	0.562404
2011	58.000000	0.720000	0.260000	10.857600	0.016412	0.178196	0.052815	0.573447
2012	58.000000	0.720000	0.260000	10.857600	0.016444	0.178547	0.053000	0.575449
2013	58.000000	0.720000	0.260000	10.857600	0.016181	0.175684	0.052719	0.572397

VA	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1986	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1987	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1988	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1989	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1990	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1991	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1992	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1993	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1994	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1995	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1996	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1997	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1998	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
1999	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
2000	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
2001	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
2002	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
2003	58.000000	0.720000	0.260000	10.857600	0.015711	0.170586	0.044140	0.479250
2004	58.000000	0.720000	0.260000	10.857600	0.014659	0.159156	0.043228	0.469357
2005	58.000000	0.720000	0.260000	10.857600	0.015247	0.165546	0.043886	0.476491
2006	58.000000	0.720000	0.260000	10.857600	0.016217	0.176081	0.046347	0.503217
2007	58.000000	0.720000	0.260000	10.857600	0.017064	0.185279	0.048320	0.524635
2008	58.000000	0.720000	0.260000	10.857600	0.016852	0.182967	0.049374	0.536088
2009	58.000000	0.720000	0.260000	10.857600	0.016506	0.179220	0.049947	0.542300
2010	58.000000	0.720000	0.260000	10.857600	0.016369	0.177731	0.051634	0.560625
2011	58.000000	0.720000	0.260000	10.857600	0.016167	0.175540	0.052310	0.567957
2012	58.000000	0.720000	0.260000	10.857600	0.016291	0.176884	0.052614	0.571263
2013	58.000000	0.720000	0.260000	10.857600	0.016187	0.175754	0.052511	0.570145

WV	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1986	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1987	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1988	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1989	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1990	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1991	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1992	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1993	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1994	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1995	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1996	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1997	58.000000	0.720000	0.260000	10.857600	0.016821	0.182639	0.037116	0.402995
1998	58.000000	0.720000	0.260000	10.857600	0.016995	0.184522	0.038377	0.416680
1999	58.000000	0.720000	0.260000	10.857600	0.016410	0.178170	0.036751	0.399025
2000	58.000000	0.720000	0.260000	10.857600	0.017319	0.188039	0.039558	0.429508
2001	58.000000	0.720000	0.260000	10.857600	0.018282	0.198494	0.040822	0.443232
2002	58.000000	0.720000	0.260000	10.857600	0.018307	0.198773	0.037985	0.412422
2003	58.000000	0.720000	0.260000	10.857600	0.017744	0.192662	0.037184	0.403726
2004	58.000000	0.720000	0.260000	10.857600	0.018541	0.201316	0.039641	0.430411
2005	58.000000	0.720000	0.260000	10.857600	0.019257	0.209087	0.045635	0.495490
2006	58.000000	0.720000	0.260000	10.857600	0.020195	0.219274	0.047444	0.515132
2007	58.000000	0.720000	0.260000	10.857600	0.019075	0.207110	0.044402	0.482102
2008	58.000000	0.720000	0.260000	10.857600	0.019454	0.211229	0.043129	0.468272
2009	58.000000	0.720000	0.260000	10.857600	0.018271	0.198382	0.047342	0.514020
2010	58.000000	0.720000	0.260000	10.857600	0.018477	0.200617	0.053443	0.580264
2011	58.000000	0.720000	0.260000	10.857600	0.017586	0.190947	0.056771	0.616393
2012	58.000000	0.720000	0.260000	10.857600	0.016727	0.181614	0.055255	0.599942
2013	58.000000	0.720000	0.260000	10.857600	0.016727	0.181614	0.055255	0.599942

Layers

DE	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1986	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1987	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1988	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1989	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1990	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1991	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1992	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1993	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1994	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1995	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1996	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1997	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1998	69.350000	0.820000	0.257900	14.665999	0.021552	0.316078	0.033595	0.492705
1999	69.350000	0.820000	0.257900	14.665999	0.021219	0.311200	0.033754	0.495031
2000	69.350000	0.820000	0.257900	14.665999	0.021279	0.312077	0.033912	0.497357
2001	69.350000	0.820000	0.257900	14.665999	0.020032	0.293795	0.034071	0.499683
2002	69.350000	0.820000	0.257900	14.665999	0.019445	0.285185	0.034229	0.502010
2003	69.350000	0.820000	0.257900	14.665999	0.018519	0.271602	0.034388	0.504336
2004	69.350000	0.820000	0.257900	14.665999	0.019096	0.280068	0.034547	0.506662
2005	69.350000	0.820000	0.257900	14.665999	0.019092	0.280002	0.034705	0.508988
2006	69.350000	0.820000	0.257900	14.665999	0.019724	0.289277	0.034864	0.511314
2007	69.350000	0.820000	0.257900	14.665999	0.020059	0.294183	0.035023	0.513640
2008	69.350000	0.820000	0.257900	14.665999	0.019889	0.291691	0.035181	0.515967
2009	69.350000	0.820000	0.257900	14.665999	0.019312	0.283223	0.035340	0.518293
2010	69.350000	0.820000	0.257900	14.665999	0.018883	0.276933	0.035498	0.520619
2011	69.350000	0.820000	0.257900	14.665999	0.018497	0.271278	0.035657	0.522945
2012	69.350000	0.820000	0.257900	14.665999	0.018573	0.272391	0.035816	0.525271
2013	69.350000	0.820000	0.257900	14.665999	0.018573	0.272395	0.035974	0.527597

MD	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1986	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1987	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1988	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1989	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1990	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1991	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1992	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1993	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1994	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1995	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1996	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1997	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1998	69.350000	0.820000	0.257900	14.665999	0.021552	0.316078	0.033595	0.492705
1999	69.350000	0.820000	0.257900	14.665999	0.021219	0.311200	0.033754	0.495031
2000	69.350000	0.820000	0.257900	14.665999	0.021279	0.312077	0.033912	0.497357
2001	69.350000	0.820000	0.257900	14.665999	0.020032	0.293795	0.034071	0.499683
2002	69.350000	0.820000	0.257900	14.665999	0.019445	0.285185	0.034229	0.502010
2003	69.350000	0.820000	0.257900	14.665999	0.018519	0.271602	0.034388	0.504336
2004	69.350000	0.820000	0.257900	14.665999	0.019096	0.280068	0.034547	0.506662
2005	69.350000	0.820000	0.257900	14.665999	0.019092	0.280002	0.034705	0.508988
2006	69.350000	0.820000	0.257900	14.665999	0.019724	0.289277	0.034864	0.511314
2007	69.350000	0.820000	0.257900	14.665999	0.020059	0.294183	0.035023	0.513640
2008	69.350000	0.820000	0.257900	14.665999	0.019889	0.291691	0.035181	0.515967
2009	69.350000	0.820000	0.257900	14.665999	0.019312	0.283223	0.035340	0.518293
2010	69.350000	0.820000	0.257900	14.665999	0.018883	0.276933	0.035498	0.520619
2011	69.350000	0.820000	0.257900	14.665999	0.018497	0.271278	0.035657	0.522945
2012	69.350000	0.820000	0.257900	14.665999	0.018573	0.272391	0.035816	0.525271
2013	69.350000	0.820000	0.257900	14.665999	0.018573	0.272395	0.035974	0.527597

NY	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1986	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1987	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1988	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1989	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1990	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1991	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1992	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1993	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1994	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1995	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1996	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1997	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1998	69.350000	0.820000	0.257900	14.665999	0.021552	0.316078	0.033595	0.492705
1999	69.350000	0.820000	0.257900	14.665999	0.021219	0.311200	0.033754	0.495031
2000	69.350000	0.820000	0.257900	14.665999	0.021279	0.312077	0.033912	0.497357
2001	69.350000	0.820000	0.257900	14.665999	0.020032	0.293795	0.034071	0.499683
2002	69.350000	0.820000	0.257900	14.665999	0.019445	0.285185	0.034229	0.502010
2003	69.350000	0.820000	0.257900	14.665999	0.018519	0.271602	0.034388	0.504336
2004	69.350000	0.820000	0.257900	14.665999	0.019096	0.280068	0.034547	0.506662
2005	69.350000	0.820000	0.257900	14.665999	0.019092	0.280002	0.034705	0.508988
2006	69.350000	0.820000	0.257900	14.665999	0.019724	0.289277	0.034864	0.511314
2007	69.350000	0.820000	0.257900	14.665999	0.020059	0.294183	0.035023	0.513640
2008	69.350000	0.820000	0.257900	14.665999	0.019889	0.291691	0.035181	0.515967
2009	69.350000	0.820000	0.257900	14.665999	0.019312	0.283223	0.035340	0.518293
2010	69.350000	0.820000	0.257900	14.665999	0.018883	0.276933	0.035498	0.520619
2011	69.350000	0.820000	0.257900	14.665999	0.018497	0.271278	0.035657	0.522945
2012	69.350000	0.820000	0.257900	14.665999	0.018573	0.272391	0.035816	0.525271
2013	69.350000	0.820000	0.257900	14.665999	0.018573	0.272395	0.035974	0.527597

PA	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1986	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1987	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1988	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1989	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1990	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1991	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1992	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1993	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1994	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1995	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1996	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1997	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033436	0.490379
1998	69.350000	0.820000	0.257900	14.665999	0.021552	0.316078	0.033595	0.492705
1999	69.350000	0.820000	0.257900	14.665999	0.021219	0.311200	0.033754	0.495031
2000	69.350000	0.820000	0.257900	14.665999	0.021279	0.312077	0.033912	0.497357
2001	69.350000	0.820000	0.257900	14.665999	0.020032	0.293795	0.034071	0.499683
2002	69.350000	0.820000	0.257900	14.665999	0.019445	0.285185	0.034229	0.502010
2003	69.350000	0.820000	0.257900	14.665999	0.018519	0.271602	0.034388	0.504336
2004	69.350000	0.820000	0.257900	14.665999	0.019096	0.280068	0.034547	0.506662
2005	69.350000	0.820000	0.257900	14.665999	0.019092	0.280002	0.034705	0.508988
2006	69.350000	0.820000	0.257900	14.665999	0.019724	0.289277	0.034864	0.511314
2007	69.350000	0.820000	0.257900	14.665999	0.020059	0.294183	0.035023	0.513640
2008	69.350000	0.820000	0.257900	14.665999	0.019889	0.291691	0.035181	0.515967
2009	69.350000	0.820000	0.257900	14.665999	0.019312	0.283223	0.035340	0.518293
2010	69.350000	0.820000	0.257900	14.665999	0.018883	0.276933	0.035498	0.520619
2011	69.350000	0.820000	0.257900	14.665999	0.018497	0.271278	0.035657	0.522945
2012	69.350000	0.820000	0.257900	14.665999	0.018573	0.272391	0.035816	0.525271
2013	69.350000	0.820000	0.257900	14.665999	0.018573	0.272395	0.035974	0.527597

VA	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1986	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1987	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1988	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1989	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1990	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1991	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1992	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1993	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1994	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1995	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1996	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1997	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1998	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
1999	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
2000	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
2001	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
2002	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
2003	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
2004	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
2005	69.350000	0.820000	0.257900	14.665999	0.018737	0.274804	0.034063	0.499573
2006	69.350000	0.820000	0.257900	14.665999	0.019422	0.284848	0.035439	0.519754
2007	69.350000	0.820000	0.257900	14.665999	0.020010	0.293465	0.034856	0.511194
2008	69.350000	0.820000	0.257900	14.665999	0.019748	0.289626	0.034851	0.511124
2009	69.350000	0.820000	0.257900	14.665999	0.018839	0.276295	0.033708	0.494364
2010	69.350000	0.820000	0.257900	14.665999	0.018148	0.266164	0.034176	0.501231
2011	69.350000	0.820000	0.257900	14.665999	0.017781	0.260774	0.034451	0.505255
2012	69.350000	0.820000	0.257900	14.665999	0.018056	0.264806	0.035636	0.522632
2013	69.350000	0.820000	0.257900	14.665999	0.018215	0.267144	0.035480	0.520357

WV	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs P/Lb Dry Litter	Lbs P/Bird	Lbs N/Lb Dry Litter	Lbs N/Bird
1985	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1986	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1987	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1988	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1989	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1990	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1991	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1992	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1993	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1994	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1995	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1996	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1997	69.350000	0.820000	0.257900	14.665999	0.021387	0.313657	0.033998	0.498610
1998	69.350000	0.820000	0.257900	14.665999	0.021552	0.316078	0.035197	0.516194
1999	69.350000	0.820000	0.257900	14.665999	0.021219	0.311200	0.034833	0.510860
2000	69.350000	0.820000	0.257900	14.665999	0.021279	0.312077	0.036389	0.533683
2001	69.350000	0.820000	0.257900	14.665999	0.020032	0.293795	0.034173	0.501182
2002	69.350000	0.820000	0.257900	14.665999	0.019445	0.285185	0.031359	0.459905
2003	69.350000	0.820000	0.257900	14.665999	0.018583	0.272540	0.028896	0.423788
2004	69.350000	0.820000	0.257900	14.665999	0.019408	0.284641	0.028761	0.421813
2005	69.350000	0.820000	0.257900	14.665999	0.020027	0.293711	0.032146	0.471450
2006	69.350000	0.820000	0.257900	14.665999	0.020520	0.300951	0.034314	0.503248
2007	69.350000	0.820000	0.257900	14.665999	0.019631	0.287912	0.036082	0.529178
2008	69.350000	0.820000	0.257900	14.665999	0.019494	0.285897	0.037898	0.555811
2009	69.350000	0.820000	0.257900	14.665999	0.019632	0.287924	0.038070	0.558330
2010	69.350000	0.820000	0.257900	14.665999	0.020301	0.297738	0.042807	0.627812
2011	69.350000	0.820000	0.257900	14.665999	0.020453	0.299967	0.040231	0.590022
2012	69.350000	0.820000	0.257900	14.665999	0.020959	0.307380	0.037804	0.554437
2013	69.350000	0.820000	0.257900	14.665999	0.020959	0.307380	0.037804	0.554437

Pullets

DE	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs Recoverable P/Lb Dry Litter	Lbs P/Bird	Lbs Recoverable N/Lb Dry Litter	Lbs N/Bird
1985	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1986	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1987	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1988	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1989	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1990	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1991	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1992	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1993	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1994	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1995	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1996	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1997	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1998	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1999	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2000	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2001	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2002	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2003	49.910000	0.820000	0.259400	10.616256	0.018366	0.194978	0.026200	0.278146
2004	49.910000	0.820000	0.259400	10.616256	0.019390	0.205849	0.026200	0.278146
2005	49.910000	0.820000	0.259400	10.616256	0.018934	0.201008	0.026200	0.278146
2006	49.910000	0.820000	0.259400	10.616256	0.019562	0.207675	0.026200	0.278146
2007	49.910000	0.820000	0.259400	10.616256	0.019893	0.211189	0.026200	0.278146
2008	49.910000	0.820000	0.259400	10.616256	0.019725	0.209406	0.026200	0.278146
2009	49.910000	0.820000	0.259400	10.616256	0.019152	0.203323	0.026200	0.278146
2010	49.910000	0.820000	0.259400	10.616256	0.018727	0.198811	0.026200	0.278146
2011	49.910000	0.820000	0.259400	10.616256	0.018345	0.194755	0.026200	0.278146
2012	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146
2013	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146

MD	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs Recoverable P/Lb Dry Litter	Lbs P/Bird	Lbs Recoverable N/Lb Dry Litter	Lbs N/Bird
1985	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1986	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1987	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1988	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1989	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1990	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1991	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1992	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1993	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1994	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1995	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1996	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1997	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1998	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1999	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2000	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2001	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2002	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2003	49.910000	0.820000	0.259400	10.616256	0.018366	0.194978	0.026200	0.278146
2004	49.910000	0.820000	0.259400	10.616256	0.019390	0.205849	0.026200	0.278146
2005	49.910000	0.820000	0.259400	10.616256	0.018934	0.201008	0.026200	0.278146
2006	49.910000	0.820000	0.259400	10.616256	0.019562	0.207675	0.026200	0.278146
2007	49.910000	0.820000	0.259400	10.616256	0.019893	0.211189	0.026200	0.278146
2008	49.910000	0.820000	0.259400	10.616256	0.019725	0.209406	0.026200	0.278146
2009	49.910000	0.820000	0.259400	10.616256	0.019152	0.203323	0.026200	0.278146
2010	49.910000	0.820000	0.259400	10.616256	0.018727	0.198811	0.026200	0.278146
2011	49.910000	0.820000	0.259400	10.616256	0.018345	0.194755	0.026200	0.278146
2012	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146
2013	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146

NY	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs Recoverable P/Lb Dry Litter	Lbs P/Bird	Lbs Recoverable N/Lb Dry Litter	Lbs N/Bird
1985	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1986	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1987	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1988	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1989	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1990	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1991	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1992	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1993	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1994	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1995	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1996	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1997	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1998	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1999	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2000	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2001	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2002	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2003	49.910000	0.820000	0.259400	10.616256	0.018366	0.194978	0.026200	0.278146
2004	49.910000	0.820000	0.259400	10.616256	0.019390	0.205849	0.026200	0.278146
2005	49.910000	0.820000	0.259400	10.616256	0.018934	0.201008	0.026200	0.278146
2006	49.910000	0.820000	0.259400	10.616256	0.019562	0.207675	0.026200	0.278146
2007	49.910000	0.820000	0.259400	10.616256	0.019893	0.211189	0.026200	0.278146
2008	49.910000	0.820000	0.259400	10.616256	0.019725	0.209406	0.026200	0.278146
2009	49.910000	0.820000	0.259400	10.616256	0.019152	0.203323	0.026200	0.278146
2010	49.910000	0.820000	0.259400	10.616256	0.018727	0.198811	0.026200	0.278146
2011	49.910000	0.820000	0.259400	10.616256	0.018345	0.194755	0.026200	0.278146
2012	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146
2013	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146

PA	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs Recoverable P/Lb Dry Litter	Lbs P/Bird	Lbs Recoverable N/Lb Dry Litter	Lbs N/Bird
1985	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1986	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1987	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1988	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1989	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1990	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1991	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1992	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1993	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1994	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1995	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1996	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1997	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1998	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1999	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2000	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2001	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2002	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2003	49.910000	0.820000	0.259400	10.616256	0.018366	0.194978	0.026200	0.278146
2004	49.910000	0.820000	0.259400	10.616256	0.019390	0.205849	0.026200	0.278146
2005	49.910000	0.820000	0.259400	10.616256	0.018934	0.201008	0.026200	0.278146
2006	49.910000	0.820000	0.259400	10.616256	0.019562	0.207675	0.026200	0.278146
2007	49.910000	0.820000	0.259400	10.616256	0.019893	0.211189	0.026200	0.278146
2008	49.910000	0.820000	0.259400	10.616256	0.019725	0.209406	0.026200	0.278146
2009	49.910000	0.820000	0.259400	10.616256	0.019152	0.203323	0.026200	0.278146
2010	49.910000	0.820000	0.259400	10.616256	0.018727	0.198811	0.026200	0.278146
2011	49.910000	0.820000	0.259400	10.616256	0.018345	0.194755	0.026200	0.278146
2012	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146
2013	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146

VA	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs Recoverable P/Lb Dry Litter	Lbs P/Bird	Lbs Recoverable N/Lb Dry Litter	Lbs N/Bird
1985	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1986	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1987	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1988	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1989	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1990	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1991	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1992	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1993	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1994	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1995	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1996	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1997	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1998	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1999	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2000	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2001	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2002	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2003	49.910000	0.820000	0.259400	10.616256	0.018366	0.194978	0.026200	0.278146
2004	49.910000	0.820000	0.259400	10.616256	0.019390	0.205849	0.026200	0.278146
2005	49.910000	0.820000	0.259400	10.616256	0.018934	0.201008	0.026200	0.278146
2006	49.910000	0.820000	0.259400	10.616256	0.019562	0.207675	0.026200	0.278146
2007	49.910000	0.820000	0.259400	10.616256	0.019893	0.211189	0.026200	0.278146
2008	49.910000	0.820000	0.259400	10.616256	0.019725	0.209406	0.026200	0.278146
2009	49.910000	0.820000	0.259400	10.616256	0.019152	0.203323	0.026200	0.278146
2010	49.910000	0.820000	0.259400	10.616256	0.018727	0.198811	0.026200	0.278146
2011	49.910000	0.820000	0.259400	10.616256	0.018345	0.194755	0.026200	0.278146
2012	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146
2013	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146

WV	Wet Lbs As-Excreted Manure/Bird	Wet Lbs Recoverable Manure/Lb As-Excreted	Dry Lbs/Lb Wet Recoverable	Lbs Dry Litter/Bird	Lbs Recoverable P/Lb Dry Litter	Lbs P/Bird	Lbs Recoverable N/Lb Dry Litter	Lbs N/Bird
1985	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1986	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1987	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1988	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1989	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1990	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1991	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1992	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1993	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1994	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1995	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1996	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1997	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1998	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
1999	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2000	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2001	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2002	49.910000	0.820000	0.259400	10.616256	0.019285	0.204735	0.026200	0.278146
2003	49.910000	0.820000	0.259400	10.616256	0.018366	0.194978	0.026200	0.278146
2004	49.910000	0.820000	0.259400	10.616256	0.019390	0.205849	0.026200	0.278146
2005	49.910000	0.820000	0.259400	10.616256	0.018934	0.201008	0.026200	0.278146
2006	49.910000	0.820000	0.259400	10.616256	0.019562	0.207675	0.026200	0.278146
2007	49.910000	0.820000	0.259400	10.616256	0.019893	0.211189	0.026200	0.278146
2008	49.910000	0.820000	0.259400	10.616256	0.019725	0.209406	0.026200	0.278146
2009	49.910000	0.820000	0.259400	10.616256	0.019152	0.203323	0.026200	0.278146
2010	49.910000	0.820000	0.259400	10.616256	0.018727	0.198811	0.026200	0.278146
2011	49.910000	0.820000	0.259400	10.616256	0.018345	0.194755	0.026200	0.278146
2012	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146
2013	49.910000	0.820000	0.259400	10.616256	0.018420	0.195551	0.026200	0.278146

Appendix C. PLS Data Templates and Letters of Response from Poultry Industry

West Virginia Broiler Data

State: WV Agency: WVDA Lab: WVDA-Moorefield																								
Year																								
(1985-Present)	1995	1995	1995	1995	1996	1996	1996	1996	1997	1997	1997	1997	1998	1998	1998	1998	1999	1999	1999	1999	2000	2000	2000	2000
Manure Type																								
Dry	x	x	x	x	x	x	x	x																
Wet																								
Sample Type																								
In-House	x				x				x				x				x				x			
Uncovered Stack		x				x				x				x				x				x		
Covered Stack			x				x				x				x				x				x	
Roofed Storage				x				x				x				x				x				x
Other (specify)																								
Bird Population (x10^6)																								
NASS Value	88.9				89.7				90.8				89.6				89.5				91.3			
Bird Market Weight lbs																								
Value Range																								
Weighted Average																								
Growout Periods days																								
Value Range																								
Weighted Average																								
Flocks per year #/yr																								
Value Range																								
Weighted Average																								
Manure Generation lbs/1000 birds																								
Value Range																								
Weighted Average																								
Sample Number																								
(1-10,000)	9	4	1	3	28	18	31	16	53	35	5	50	13	8	6	42	18	7	2	34	27	14	5	50
TKN lbs/T																								
Value Range	49.6 - 83.6	61-80.32	87	59.9-106.2	18.5-96	15-88.8	37.7-106.7	35.72-96.7	28.32-75.65	28.20-85.75	53.97-66.64	43.56-93.40	41.91-91.89	46.33-80.46	55.87-100.85	32.86-88.74	51.17-80.95	45.12-75.78	60.60-66.83	3.93-93.05	11.56-80.00	36.74-73.49	34.67-75.92	33.07-95.76
Weighted Average	72.23	67.08	87	89.1	59.77	70.93	82.25	64.59	57.59	58.56	61.38	69.6	64.89	62.87	72.04	61.27	60.46	59.38	63.72	61.78	61.11	59	54.75	63.43
P205 lbs/T																								
Value Range	13.7-78.6	34.4-39.6	44.7	52.3-94	18.8-91.35	36.9-102.53	30.03-86.9	30.4-91.4	29.94-69.56	27.15-78.22	57.54-64.04	24.82-78.34	41.44-80.99	37.85-57.06	33.08-83.01	33.29-85.95	41.18-64.07	40.12-65.84	48.62-55.25	.58-100.85	13.71-72.08	43.07-72.98	40.50-79.97	29.00-88.55
Weighted Average	52.09	38.15	44.7	79.3	62.21	69.48	64.7	65.47	52.78	51.94	60.39	57.28	56.66	49.8	61.63	57.36	51.64	47.57	51.94	57.93	53.04	59.84	55.12	60.03
K20 lbs/T																								
Value Range	32.2-58.4	40.7-42.2	39.1	27.5-59.1	22.3-83.8	5.16-60.56	29.88-75.80	32.6-65.64	16.21-92.49	6.32-72.54	52.19-100.92	26.05-127.89	45.45-105.22	42.36-68.02	41.89-78.24	29.05-98.87	27.07-87.16	31.35-61.73	38.60-56.45	3.70-125.19	7.06-107.66	33.29-77.80	38.38-248.44	29.17-119.79
Weighted Average	43.76	41.63	39.1	41.6	49.53	41.33	50.47	47.00	49.84	48.42	70.9	60.39	66.15	57.11	54.88	59.63	46.96	42.94	47.53	50.59	57.66	59.81	101.94	61.6
Cu lbs/T																								
Value Range	.03-.88	.02-.93	0.66	.184-.366	0-0.62	.03-.68	.01-.96	.09-1.0	.03-.83	.11-4.40	.55-.67	.06-1.17	.38-2.06	.30-.57	.41-.79	.25-.86	.09-.66	.34-.69	.52-.67	.02-1.49	.08-.93	.38-.72	.48-.65	.07-1.28
Weighted Average	0.47	0.68	0.66	0.28	0.33	0.38	0.27	0.5	0.48	0.58	0.59	0.55	0.73	0.46	0.6	0.55	0.48	0.5	0.59	0.58	0.52	0.55	0.55	0.6
% Moisture																								
Value Range	23.04-34.58	25.95-64.85	26.24		19.8-56.4	19.42-58.42	18.08-42.20	17.4-46.4	8.13-45.8	4.96-52.83	22.46-31.73	9.74-73.22	22.95-36.53	19.62-48.56	17.92-32.70	12.30-36.85	17.14-56.21	25.38-53.44	23.51-30.02	8.57-99.02	13.13-46.60	17.46-43.34	19.19-44.15	10.89-58.60
Weighted Average	27.16	39.24	26.24			30.49	27.9	31.38	26.07	32.53	25.27	28.38	27.33	29.76	29.45	27.29	17.99	33.71	26.77	26.77	23.4	28.85	34.7	26.96
C:N Ratio																								
Value Range				9.73		13.15-15.39	13.04		14.29-38.77	3.60-46.79	16.04-22.76	8.18-23.15	13.97-26.52	15.10-21.97	13.18-18.72	13.86-38.94	12.42-23.44	10.52-22.59	19.31-19.59	3.38-32.42	6.28-146.93	16.11-30.43	13.42-26.02	11.96-29.37
Weighted Average				9.73		14.27	13.04		21.09	19.29	19.61	16.99	19.62	18.5	15.83	20.69	18.97	18.99	19.45	19.25	24.25	20.14	19.21	19.45
NH-4																								
Value Range	8.1-23.57	17.7-25.4	12.2	13.2-16.5	6.34-23.60	8.86-25.87	6.44-26.40	7.4-28.3	6.69-25.73	5.78-23.33	11.45-17.50	.67-25.30	12.55-26.29	10.78-24.68	1.94-24.00	10.24-23.30	11.10-20.63	14.60-20.63	13.45-21.48	3.50-28.84	1.74-23.14	11.04-20.45	2.45-20.29	1.75-25.84
Weighted Average	15.95	23.37	12.2	16.2	13.73	18.01	19.74	16.65	12.32	15.81	14.11	16.24	15.95	16.88	17.09	16.94	15.48	17.36	17.47	16.85	13.5	15.29	12.52	14.75
Ca lbs/T																								
Value Range				155.25		35.20-59.88	48.61		13.48-104.43	16.43-49.03	24.03-37.14	5.05-107.91	25.87-45.32	18.29-36.36	19.88-50.46	19.02-56.46	26.42-150.84	8.32-47.28	30.46-34.78	.49-125.97	9.14-61.91	28.77-53.40	25.14-43.31	16.35-133.94
Weighted Average				155.25		47.54	48.61		32.1	31.61	31.06	36.81	34.44	27.69	35.1	35.03	43.48	31.61	32.62	36.93	32.65	38.41	33.06	43.85
Mg lbs/T																								
Value Range				7.7		6.09-7.35	6.36		2.95-9.2	3.59-10.93	2.88-8.79	.59-11.02	5.78-10.57	6.23-8.92	4.70-10.15	5.11-11.19	2.94-10.01	3.24-7.86	6.83-7.73	.11-11.85	1.65-20.79	6.31-13.66	5.48-12.50	4.92-12.97
Weighted Average				7.7		6.72	6.36		6.97	6.82	6.47	7.4	7.73	7.6	7.6	7.99	7.01	6.51	7.28	7.14	7.85	8.98	9.56	8.87
% H2O Extract P																								
Value Range																								
Weighted Average																								

West Virginia Broiler Data

State: WV
Agency: WVDA
Lab: WVDA-Moorefield

Year (1985-Present)	2001	2001	2001	2001	2002	2002	2002	2002	2003	2003	2003	2003	2004	2004	2004	2005	2005	2005	2006	2006	2006	2007	2007	2007
Manure Type																								
Dry																								
Wet																								
Sample Type																								
In-House	x				x				x				x			x			x			x		
Uncovered Stack		x				x				x				x			x			x			x	
Covered Stack			x				x				x													x
Roofed Storage				x				x				x			x			x			x			
Other (specify)																								
Bird Population (x10^6)																								
NASS Value	89.8				89.7				87.2				86.4			88.5			89.7			88.9		
Bird Market Weight lbs																								
Value Range																								
Weighted Average																								
Growout Periods days																								
Value Range																								
Weighted Average																								
Flocks per year #/yr																								
Value Range																								
Weighted Average																								
Manure Generation lbs/1000 birds																								
Value Range																								
Weighted Average																								
Sample Number																								
(1-10,000)	26	10	3	42	20	4	1	29	3	5	2	36	30	4	29	15	13	73	5	6	22	5	4	1
TKN lbs/T																								
Value Range	30.83-73.90	25.11-79.76	63.80-72.32	37.45-82.55	23.98-82.08	46.03-58.41	53.97	36.65-98.09	39.56-74.82	49.67-66.88	53.13-56.98	29.54-78.20	32.83-64.65	40.88-42.23	33.94-67.41	30.33-92.21	26.00-63.78	29.08-72.03	46.78-66.44	38.03-54.99	40.53-72.04	46.06-69.57	41.31-66.87	63.96
Weighted Average	55.25	58.04	69.18	63.51	53.29	50.55	53.97	57.71	54.83	55.51	55.06	55.04	43.42	41.8	48.82	58.01	52.67	53.23	57.68	47.58	55.4	54.45	55.7	63.96
P205 lbs/T																								
Value Range	29.18-68.15	46.75-75.63	45.23-71.62	37.15-86.56	18.86-66.51	28.82-41.63	40.75	26.58-87.85	47.03-75.94	43.37-54.63	47.99-52.12	30.65-90.95	26.89-92.92	36.83-56.66	30.77-88.38	34.01-75.65	36.88-61.21	18.16-70.18	46.85-64.60	39.25-79.74	29.95-86.20	38.61-68.88	52.24-74.40	60.27
Weighted Average	50.02	60.32	61.04	59.3	41.88	35.35	40.75	51.27	62.17	47.48	50.06	49.15	51.71	49.62	53.61	57.8	49.68	47.26	53.59	57.75	54.97	51.46	61.44	60.27
K20 lbs/T																								
Value Range	21.61-111.93	37.01-143.79	68.66-200.69	39.68-170.06	22.85-86.06	43.44-57.15	75.86	31.57-126.19	36.44-61.41	30.74-50.42	48.18-49.72	22.82-64.13	25.99-79.55	37.31-42.01	32.97-67.69	36.39-69.54	32.50-58.13	23.56-65.92	33.46-55.10	34.70-39.77	30.31-67.99	34.59-74.52	43.26-53.27	52.6
Weighted Average	52.15	64.06	156.23	77.73	52.15	49.76	75.86	66.66	50.47	41.15	48.95	42.27	46.91	40.23	45.14	52.88	47.2	45.13	43.13	37.26	48.95	51.68	48.49	52.6
Cu lbs/T																								
Value Range	.24-.76	.34-1.42	.47-.60	.15-.73	.30-.77	.43-.57	0.38	.09-10.04	.06-.64	.41-.52	.44-.47	.10-1.02	.41-2.17	.73-1.16	.35-1.28	.42-1.54	.82-1.77	.54-1.91	.02-1.55	.52-1.23	.03-1.79	.78-1.49	.56-1.52	0.99
Weighted Average	0.49	0.65	0.55	0.51	0.51	0.5	0.38	0.85	0.44	0.45	0.46	0.48	0.99	0.86	0.88	1.18	1.14	1.09	0.86	0.94	1.07	0.98	1.08	0.99
% Moisture																								
Value Range	12.75-37.78	18.52-50.14	11.57-32.07	12.24-36.42	13.60-54.84	27.79-35.58	33.24	13.73-41.20	17.25-30.45	29.73-36.85	21.44	16.66-43.76	17.39-51.46	31.80-33.55	10.04-43.23	14.46-45.20	28.23-68.03	13.26-60.47	26.07-56.26	30.64-50.67	17.88-48.06	28.45-53.46	25.13-39.79	24.62
Weighted Average	25.77	28.97	18.4	25.81	31.69	33.41	33.24	26.51	23.63	34.48	21.44	28.32	33.4	32.67	32.05	29.76	41.01	38.36	36.97	36.84	32.65	41.2	33.87	24.62
C:N Ratio																								
Value Range	15.23-46.63	13.23-25.31	18.24-19.08	3.44-35.88	13.92-33.23	20.80-24.27	19.83	14.16-25.87	17.51-27.84	15.58-22.01	23.20-24.88	15.56-36.30	16.65-31.71	17.58-27.37	16.51-31.27	11.44-34.58	13.73-29.98	10.32-32.92	10.38-19.41	14.80-21.16	15.31-30.65	15.23-19.85	15.81-24.72	19.39
Weighted Average	24.03	18.76	18.72	18.91	22.59	22.66	19.83	20.74	22.76	19.56	24.04	21.77	24.7	24.71	22.41	19.99	17.08	19.23	16.84	18.39	19.92	17.61	18.98	19.39
NH-4																								
Value Range	7.13-19.19	2.26-19.61	14.16-15.89	1.42-44.01	7.72-19.57	17.69-19.69	20.84	9.74-22.35	7.36-18.51	17.52-22.37	16.95-17.08	12.84-28.41	11.15-27.67	15.54-29.94	10.62-35.43	9.87-23.85	3.41-38.12	12.54-35.71	7.90-30.56	11.30-29.30	3.07-32.87	15.78-32.33	16.49-25.96	21.82
Weighted Average	13.12	13.4	15.28	16.65	13.68	18.72	20.84	16.17	12.76	20.51	17.02	19.84	17.48	19.35	23.15	17.68	21.93	23.15	19.79	19.55	20.54	23.77	21.04	21.82
Ca lbs/T																								
Value Range	16.72-50.95	25.77-51.47	26.09-47.84	19.47-74.39	18.25-49.14	20.68-120.58	22.63	20.13-166.40	26.53-212.31	33.54-58.17	33.58-38.93	19.84-190.63	21.52-169.62	22.99-38.15	17.11-198.08	28.47-73.83	32.96-93.20	16.19-117.93	21.80-85.30	22.90-159.84	10.04-87.20	25.41-47.84	21.76-33.75	37
Weighted Average	34.41	40.11	38.57	38.31	31.34	50.38	22.63	38.95	90.67	43.49	36.26	47.23	49.22	32.65	49.88	50.9	56.48	45.56	39.1	72.33	34.46	31.96	28.54	37
Mg lbs/T																								
Value Range	5.26-13.33	7.75-16.62	7.63-16.37	6.20-13.64	4.24-14.38	5.78-9.35	10.22	5.75-16.63	8.38-11.82	8.20-15.14	19.40-22.36	6.12-23.47	5.02-18.44	6.90-8.61	1.83-18.07	6.32-15.20	6.72-14.78	3.08-14.81	3.50-9.81	5.97-10.79	4.14-11.35	6.70-10.25	8.97-18.57	9.5
Weighted Average	8.41	10.32	13.05	9.31	8.95	7.46	10.22	10.08	10.5	11.53	20.88	10.84	9.34	7.91	8.98	10.62	10.31	8.57	7.89	8.82	8.23	8.43	11.88	9.5
% H2O Extract P																								
Value Range																								
Weighted Average																								

West Virginia Broiler Data

State: WV Agency: WVDA Lab: WVDA-Moorefield																			
Year																			
(1985-Present)	2007	2008	2008	2008	2009	2009	2009	2009	2010	2010	2010	2011	2011	2011	2011	2012	2012	2012	2012
Manure Type																			
Dry																x	x	x	x
Wet																			
Sample Type																			
In-House		x			x				x			x				x			
Uncovered Stack						x				x			x				x		
Covered Stack			x				x							x				x	
Roofed Storage	x			x				x			x				x				x
Other (specify)																			
Bird Population (x10^6)																			
NASS Value		85.7			82.7				87.6			85.4				94			
Bird Market Weight lbs																			
Value Range																			
Weighted Average																			
Growout Periods days																			
Value Range																			
Weighted Average																			
Flocks per year #/yr																			
Value Range																			
Weighted Average																			
Manure Generation lbs/1000 birds																			
Value Range																			
Weighted Average																			
Sample Number																			
(1-10,000)	19	15	2	29	7	2	3	17	25	6	35	14	9	1	53	15	2	1	32
TKN lbs/T																			
Value Range	34.72-85.77	36.65-65.95	65.54-68.38	22.49-72.46	44.68-61.73	29.84	57.39-66.63	43.00-72.56	36.37-78.15	18.75-62.39	36.77-81.26	47.64-108.59	24.29-70.31	62.81	43.96-83.47	34.93-89.97	59.61-61.57	74.11	35.91-93.62
Weighted Average	51.69	52.04	66.96	55.57	53.47	29.84	63.52	59.86	58.83	44.74	62.43	71.92	56.53	62.81	67.35	71.93	60.59	74.11	71.37
P205 lbs/T																			
Value Range	30.40-77.61	28.63-61.63	46.55-74.55	17.84-74.55	32.01-39.23	41.46-41.69	35.37-48.20	27.47-63.64	23.60-52.23	33.05-52.61	28.31-75.76	30.02-59.09	11.16-60.66	45.54	6.13-74.39	22.75-63.61	27.47-37.73	58.99	15.30-64.65
Weighted Average	52.03	47.41	60.55	51.94	34.38	41.58	43.69	43.57	38.16	37.56	46.35	41.59	36.49	45.54	41.95	37.75	32.6	58.99	40.5
K20 lbs/T																			
Value Range	12.40-71.86	25.53-56.01	50.18-67.94	33.54-89.08	33.99-43.20	18.95-19.07	42.33-56.67	29.33-64.51	27.48-57.86	26.27-53.47	34.23-79.37	10.32-54.01	9.86-66.54	56.15	5.90-72.84	25.46-63.78	41.57-43.41	41.08	39.60-73.69
Weighted Average	46.55	42.28	59.06	33.19	39.32	19.07	51.87	45.85	43.43	40.76	50.71	41.61	37.62	56.15	38.84	47.84	42.49	41.08	56.48
Cu lbs/T																			
Value Range	0-1.47	.49-1.17	.87-1.24	.17-1.51	.70-.87	.06-.07	.92-1.16	.77-1.44	.31-1.39	.86-1.85	.57-1.90	.80-1.58	.31-1.61	1.14	.03-1.65	.56-1.56	.49-.98	0.54	.48-1.77
Weighted Average	0.88	0.93	1.05	1.02	0.79	0.07	1.08	1.13	1.06	1.26	1.25	1.16	1.03	1.14	1.1	1.11	0.73	0.54	1.23
% Moisture																			
Value Range	12.47-49.68	22.15-51.35	23.36-42.35	9.96-51.22	32.23-57.01	58.14	37.95-47.70	23.75-47.83	14.34-47.57	24.94-53.75	18.78-47.69	13.68-44.27	27.55-71.95	17.64	6.96-48.72	18.48-59.66	37.50-46.48	32.7	15.23-48.44
Weighted Average	35.34	36.28	32.86	33.19	41.3	58.14	41.2	36.36	29.63	34.69	29.83	25.67	37.74	17.64	31.17	32.7	16.94	32.7	29.92
C:N Ratio																			
Value Range	11.87-28.79	16.25-29.32	12.89-15.16	14.73-26.97	12.66-24.21	15.24	14.30-14.79	13.35-22.32	14.34-24.37	17.93-29.43	13.19-26.12	13.06-29.85	14.34-22.33	21.95	13.12-25.27	13.18-20.43	14.33-16.32	15.56	13.08-32.44
Weighted Average	19.88	20.23	14.03	18.49	18.74	15.24	14.47	17.43	19.91	22.22	18.36	17.96	17.55	21.95	16.85	15.56	15.33	15.56	15.91
NH-4																			
Value Range	15.01-33.12	13.98-22.76	22.75-34.11	3.36-30.53	14.48-39.43	23.77-24.31	25.50-30.06	17.70-32.27	12.94-30.41	10.70-28.06	22.65-52.44	7.39-39.30	8.03-44.01	6.71	8.32-45.75	10.52-20.61	10.97-22.91	18.61	12.44-24.78
Weighted Average	22.25	18.61	28.43	20.95	21.38	24.01	28.51	24.35	23.55	19.41	33.33	20.45	19.59	6.71	25.75	16.36	16.94	18.61	17.55
Ca lbs/T																			
Value Range	4.74-116.63	17.47-49.02	25.20-33.78	18.05-159.25	15.10-39.03	126.14-126.24	37.08-37.40	12.73-78.47	6.73-42.08	9.69-13.70	8.25-49.49	6.53-34.85	8.05-43.88	23.91	4.44-191.45	11.61-34.45	16.13-26.02	47.7	9.90-35.30
Weighted Average	35.58	29.4	29.49	41.05	25.75	126.19	37.29	31.7	16.23	11.76	21.17	20.53	22.48	23.91	20.82	24.18	21.08	47.7	24.49
Mg lbs/T																			
Value Range	2.42-23.17	5.87-10.26	8.51-10.62	5.88-18.61	6.21-8.92	9.99-10.03	7.35-11.42	5.37-15.41	5.92-11.64	7.22-14.93	6.37-16.35	2.88-12.72	1.62-13.56	3.64	1.76-12.47	1.98-11.74	8.60-8.77	7.9	2.77-16.30
Weighted Average	12.84	8.17	9.57	10.04	7.71	10.01	10.04	9.28	8.32	9.52	10.08	6.51	8.42	3.64	6.87	9.14	8.69	7.9	9.87
% H2O Extract P																			
Value Range		37.4		23.80-31.75	25.90-35.00	16.4	33.80-40.60	18.60-43.60	22.10-58.10	21.40-50.40	13.20-64.20	24.20-43.60			19.20-84.10				
Weighted Average		37.4		28.23	30.17	16.4	38.1	29.71	34.14	41.25	35.57	32.67			39.51				

West Virginia Breeder Data

State: WV Agency: WVDA Lab: WVDA-Moorefield																								
Year																								
(1985-Present)	1995	1996	1996	1996	1997	1997	1997	1997	1998	1998	1998	1998	1999	1999	1999	1999	2000	2000	2000	2001	2001	2001	2002	2002
Manure Type																								
Dry	x	x	x	x																				
Wet																								
Sample Type																								
In-House	x	x			x				x				x				x			x			x	
Uncovered Stack			x			x				x				x				x			x			x
Covered Stack							x				x				x									
Roofed Storage				x				x				x				x			x			x		
Other (specify)																								
Bird Population (x10^6)																								
NASS Value																								
Bird Market Weight lbs																								
Value Range																								
Weighted Average																								
Growout Periods days																								
Value Range																								
Weighted Average																								
Flocks per year #/yr																								
Value Range																								
Weighted Average																								
Manure Generation lbs/1000 birds																								
Value Range																								
Weighted Average																								
Sample Number																								
(1-10,000)	2	5	11	2	32	18	2	3	20	7	2	5	24	6	3	8	36	1	13	14	5	14	14	1
TKN lbs/T																								
Value Range	34.3-70.6	18.02-80.7	11.2-67.4	62.1-83.8	25.57-86.64	5.52-57.61	27.36-23.16	32.56-52.16	27.03-112.52	24.38-58.75	46.10-58.75	34.80-93.12	28.80-97.12	17.35-83.19	50.73-55.44	38.84-52.55	13.40-83.11	22.52	33.22-73.66	23.24-106.34	23.66-62.63	25.78-65.54	14.08-80.93	18.48
Weighted Average	52.45	48.72	44.57	72.95	48.67	33.07	29.76	41.15	50.62	42.86	52.43	50.41	55.78	54.16	53.69	44.2	46.44	22.52	54.92	56.14	41.85	50.31	50.14	18.48
P205 lbs/T																								
Value Range	57-84.4	42.37-93.2	30.4-125.4	59.9-85.2	0-120.02	35.71-121.24	40.63-61.19	62.27-83.22	28.57-99.50	39.12-81.84	59.75-68.21	43.23-97.66	32.06-133.78	20.84-62.48	67.27-86.92	61.71-101.84	16.14-98.40	70.33	35.31-95.30	21.47-109.29	44.75-129.57	54.04-101.84	30.35-88.00	64.29
Weighted Average	70.7	66.02	72.05	72.55	70.24	72.94	50.91	74.76	69.17	56.48	63.98	69.93	74.71	41.59	74.38	77.42	61.73	70.33	74.14	60.85	77.13	77.04	54.15	64.29
K20 lbs/T																								
Value Range	33.4-42.7	21.27-50.8	8.38-88.52	29.8-54.4	17.66-77.89	5.78-92.04	19.52-47.16	44.82-54.44	17.35-68.19	18.29-56.06	52.38-60.04	31.47-74.13	10.56-120.60	11.79-125.40	35.70-53.80	38.38-82.36	13.84-80.12	113.48	33.37-132.62	19.96-153.00	13.44-57.72	36.04-153.00	35.84-125.58	45.05
Weighted Average	38.05	35.09	44.38	42.1	46.16	37.68	33.34	49.76	48.94	34.71	56.21	45.67	45.58	65.91	45.24	62.21	43.55	113.48	75.24	60.4	36.46	70.96	65.52	45.05
Cu lbs/T																								
Value Range	0.02	.04-.55	.02-.42	0-.03	.05-.90	.02-1.13	.05-.07	.08-.29	.04-.75	0-.46	0-.09	.04-.37	.06-.79	.05-.64	.14-.18	.11-.21	.02-.92	0.1	.04-17.51	.08-.67	.10-.84	.14-.81	.07-.87	0.07
Weighted Average	0.02	0.2	0.17	0.18	0.46	0.37	0.06	0.22	0.32	0.17	0.04	0.26	0.47	0.18	0.15	0.15	0.34	0.1	1.71	0.29	0.49	0.51	0.45	0.07
% Moisture																								
Value Range	15.63-31.62	26.23-56.36	16.5-48.2	21.1-32.3	0-50.08	12.58-54.49	25.54-54.41	17.31-29.77	13.04-56.27	9.23-61.24	25.74-47.97	13.07-36.00	3.78-61.23	7.92-64.13	23.91-26.71	15.61-45.61	5.85-76.72	48.06	18.19-41.94	9.38-66.32	16.59-44.58	11.59-58.54	8.70-65.35	35.43
Weighted Average	23.63	38.17	29.29	26.7	25.94	31.3	40.03	25.01	32.05	36.63	36.86	24.43	27.11	34.48	25.78	26.76	35.49	48.06	26.29	30.2	31.61	27.06	28.41	35.43
C:N Ratio																								
Value Range		25.93			12.21-41.40	10.46-60.65	14.54-43.03	2.44-25.16	6.57-36.27	13.41-26.64	13.94-24.78	7.85-34.80	11.29-45.03	11.74-20.25	17.19-23.72	14.29-54.11	8.23-31.08	25.08	.91-27.71	10.49-38.30	19.45-26.76	9.45-29.13	12.89-29.45	16.98
Weighted Average		25.93			22.24	26.24	28.79	17.08	19.24	18.38	19.36	22.89	20.03	15.59	20.94	27.73	19.64	25.08	16.94	20.73	22.52	17.81	21.31	16.98
NH-4																								
Value Range		7.76-22.5	1.71-24.23	14-25	4.39-18.02	.22-12.98	6.68-17.88	10.63-12.64	7.20-17.94	3.83-17.80	12.03-25.29	12.76-17.97	7.07-19.72	6.15-19.33	27.95-15.11	1.12-18.69	4.06-22.10	2.53	.85-20.63	7.62-16.30	1.76-18.68	5.28-19.93	5.17-19.42	4.33
Weighted Average		14.6	9.84	19.5	10.49	8.46	12.28	11.8	12.63	13.23	18.66	14.64	12.64	11.49	20.82	12.41	11.64	2.53	14.63	12.44	9.13	14.02	12.46	4.33
Ca lbs/T																								
Value Range		89.74			19.97-265.77	17.24-188.55	35.46-92.99	34.24-65.10	40.39-200.74	52.97-273.60	36.82-41.76	36.73-194.57	18.22-162.55	46.76-165.69	46.80-159.91	39.91-168.20	8.82-331.86	147.26	.08-641.49	26.01-113.93	104.05-238.75	19.34-181.01	33.62-246.14	83.47
Weighted Average		89.74			87.43	97.83	64.23	49.17	109.02	133.77	39.29	81.79	111.3	107.79	86.44	92.91	96.9	147.26	144.66	77.23	154.62	112.5	132.91	83.47
Mg lbs/T																								
Value Range		6.67			2.21-12.74	1.63-19.86	7.16-8.98	9.55-12.38	4.13-98.32	6.43-25.45	8.21-10.43	6.05-15.91	2.12-18.06	1.56-13.92	7.56-9.71	2.87-11.70	2.53-18.36	12.53	7.40-118.51	4.17-12.37	9.48-13.12	7.54-18.79	7.19-20.95	12.54
Weighted Average		6.67			8.07	10.94	8.07	10.59	14.04	10.94	9.32	10.81	7.94	9	8.81	9.13	8.47	12.53	18.72	8.18	11.21	12.6	12.48	12.54
% H2O Extract P																								
Value Range																								
Weighted Average																								

West Virginia Breeder Data

State: WV Agency: WVDA Lab: WVDA-Moorefield																						
Year																						
(1985-Present)	2002	2003	2003	2004	2004	2004	2004	2005	2005	2005	2006	2006	2006	2006	2007	2007	2007	2008	2008	2008	2009	2009
Manure Type																						
Dry													x	x	x	x	x	x	x	x	x	x
Wet																						
Sample Type																						
In-House		x		x				x			x				x			x			x	
Uncovered Stack					x				x			x				x						
Covered Stack						x							x						x			
Roofed Storage	x		x				x			x				x			x			x		x
Other (specify)																						
Bird Population (x10^6)																						
NASS Value																						
Bird Market Weight lbs																						
Value Range																						
Weighted Average																						
Growout Periods days																						
Value Range																						
Weighted Average																						
Flocks per year #/yr																						
Value Range																						
Weighted Average																						
Manure Generation lbs/1000 birds																						
Value Range																						
Weighted Average																						
Sample Number																						
(1-10,000)	6	8	7	7	4	3	5	16	5	8	11	3	3	3	5	7	8	6	2	13	9	8
TKN lbs/T																						
Value Range	30.61-56.75	27.15-47.30	32.27-40.17	20.12-72.41	24.12-41.56	27.79-55.68	25.53-43.44	40.76-51.24	47.13-71.51	18.27-58.94	38.50-59.17	43.90-46.26	24.24-40.63	47.30-75.66	40.76-51.24	47.13-71.51	18.27-58.94	22.70-87.46	46.04-53.54	28.00-76.15	16.02-73.21	31.94-88.00
Weighted Average	41.02	37.16	35.57	41.05	34.59	46.36	34.64	45.4	61.91	41.45	48.55	45.2	29.79	64.61	45.4	61.91	41.45	48.13	49.79	49.65	50.35	47.26
P205 lbs/T																						
Value Range	28.07-90.92	42.38-80.67	49.88-82.77	43.36-65.97	40.69-73.63	56.72-73.14	59.20-74.68	36.96-78.15	44.38-56.82	64.08-102.51	24.78-107.60	75.79-85.70	46.76-53.21	78.19-95.53	36.96-78.15	44.38-56.82	64.08-102.51	17.81-68.87	33.97-46.03	32.60-73.59	41.42-89.95	37.12-101.16
Weighted Average	63.67	61.14	64.65	56.73	59.71	62.8	66.37	63.62	49.07	82.27	57.94	80.41	49.07	88.1	63.62	49.07	82.27	51.09	40.00	56.88	65.55	67.2
K20 lbs/T																						
Value Range	45.20-114.86	24.65-59.86	28.73-67.26	32.88-49.45	31.97-45.61	41.70-61.63	38.48-58.05	22.13-46.23	36.29-44.87	19.72-62.88	16.08-59.33	39.39-39.77	34.30-38.00	42.53-69.02	22.13-46.23	36.29-44.87	19.72-62.88	11.64-46.34	30.18-30.42	29.27-53.03	25.60-86.01	30.65-69.49
Weighted Average	69.64	40.83	48.11	43.09	41.2	51.42	44.63	36.87	40.47	49.62	36.27	39.55	35.66	53.12	36.87	40.47	49.62	35.64	30.3	37.98	45.41	47.28
Cu lbs/T																						
Value Range	.10-.79	.04-.67	.07-.70	.23-.74	.44-.49	.62-.86	.06-.18	.06-.51	.05-.61	.09-1.08	.01-4.54	.01-1.23	.29-.47	.19-.63	.06-.50	.05-.61	.09-1.08	0 -.73	.04-.10	.03-.52	.15-.91	.04-1.58
Weighted Average	0.36	0.34	42	0.5	0.46	0.76	0.11	0.24	0.31	0.58	0.97	0.82	0.35	0.47	0.24	0.31	0.58	0.46	0.07	0.13	0.48	0.6
% Moisture																						
Value Range	10.34-30.04	14.32-54.07	9.74-45.52	13.85-75.25	29.38-52.14	30.94-41.48	15.82-23.51	11.55-27.02	25.37-40.86	14.59-56.43	18.85-75.29	27.80-31.82	47.54-57.46	12.96-36.71	11.55-27.02	25.37-40.86	14.59-56.43	16.63-64.02	50.01-56.81	27.40-59.76	17.71-60.43	13.55-55.80
Weighted Average	19.29	31.06	29.81	32.43	36.29	35.76	21.58	21.46	32.89	28.21	36.66	31.48	54.15	21.14	21.46	32.89	28.21	33.5	53.41	43.97	29.27	32.28
C:N Ratio																						
Value Range	18.72-29.36	21.31-38.16	16.41-29.58	16.95-28.92	18.78-20.35	17.82-25.36	25.44-36.56	16.42-31.56	25.37-40.86	16.40-26.18	7.55-24.81	17.79-18.11	16.93-17.54	13.21-22.32	16.42-31.55	7.11-17.48	16.40-26.18	14.31-19.43	9.79-13.60	10.24-30.90	16.07-26.57	13.81-21.35
Weighted Average	23.1	26.2	21.41	23.85	19.54	21.73	30.05	24.06	32.89	19.74	17.78	17.95	17.28	16.85	24.06	13.62	19.74	17.97	11.7	16.07	19.58	16.27
NH-4																						
Value Range	10.13-18.48	8.25-18.21	10.16-29.79	9.61-30.42	13.29-21.17	7.84-29.37	10.42-16.35	9.22-23.94	14.79-30.29	3.18-26.86	1.44-17.93	8.30-18.97	13.94-15.14	14.65-30.06	9.22-23.93	14.79-30.29	3.18-26.86	5.67-15.97	22.36-25.11	11.70-30.17	8.92-21.19	11.71-29.00
Weighted Average	13.26	11.47	18.82	17.99	15.54	21.25	12.57	17.44	21.21	15.64	11.45	15.36	14.6	20.11	17.44	21.21	15.64	11.25	23.74	20.56	14.17	20.83
Ca lbs/T																						
Value Range	58.78-334.36	48.63-279.94	70.91-284.34	82.11-205.53	48.57-125.83	52.67-173.24	173.34-336.19	26.68-219.87	48.18-116.48	37.67-236.09	13.04-201.85	78.60-159.84	90.40-119.18	49.46-221.07	26.68-219.86	48.18-116.48	37.67-236.09	42.18-198.76	40.93-64.36	35.80-184.26	23.82-213.25	26.35-261.51
Weighted Average	174.52	143.6	158.34	151.76	104.77	105.78	216.56	91.34	78.14	122.71	115.42	130.07	100.36	155.59	91.34	78.14	122.71	113.96	52.65	96.58	134.35	150.03
Mg lbs/T																						
Value Range	12.11-53.69	5.97-29.91	11.45-20.55	4.61-12.01	8.76-9.77	8.65-10.16	8.05-54.49	4.23-12.91	6.08-13.18	6.07-17.99	1.29-10.85	4.20-10.79	6.42-7.96	8.19-13.43	4.23-12.90	6.08-13.18	6.70-17.99	3.37-11.07	5.20-5.53	5.14-9.89	6.16-31.97	8.86-17.76
Weighted Average	27.89	15.36	16.07	10.01	9.24	9.15	27.14	9.04	9.16	10.89	7.03	8.59	6.94	11.23	9.04	9.16	10.89	7.72	5.37	7.98	14.65	12.56
% H2O Extract P																						
Value Range																		22.85			12.10-24.30	12.10-30.40
Weighted Average																		22.85			17.22	21.06

West Virginia Breeder Data

State: WV Agency: WVDA Lab: WVDA-Moorefield										
Year										
(1985-Present)	2010	2010	2010	2010	2011	2011	2011	2012	2012	2012
Manure Type										
Dry	x	x	x	x	x	x	x	x	x	x
Wet										
Sample Type										
In-House	x				x			x		
Uncovered Stack		x				x			x	
Covered Stack			x							
Roofed Storage				x			x			x
Other (specify)										
Bird Population (x10^6)										
NASS Value										
Bird Market Weight lbs										
Value Range										
Weighted Average										
Growout Periods days										
Value Range										
Weighted Average										
Flocks per year #/yr										
Value Range										
Weighted Average										
Manure Generation lbs/1000 birds										
Value Range										
Weighted Average										
Sample Number										
(1-10,000)	20	1	1	44	24	2	10	6	7	4
TKN lbs/T										
Value Range	17.19-80.40	59.49	68.37	7.64-142.79	19.83-148.33	23.26-27.31	40.57-87.15	46.79-65.93	21.95-59.81	7.46-58.25
Weighted Average	47.44	59.49	68.37	69.2	59.69	25.29	55.65	54.89	35.45	39.02
P205 lbs/T										
Value Range	25.53-86.68	23.66	40.95	4.28-108.03	20.13-95.66	32.71-86.39	40.95-127.52	22.52-50.97	47.91-102.90	6.39-107.51
Weighted Average	61.3	23.66	40.95	47.16	59.46	59.55	85.73	41.85	79.63	69.53
K20 lbs/T										
Value Range	21.59-54.69	19.79	33.66	1.95-68.76	15.02-55.13	19.22-26.23	13.96-67.81	24.51-50.48	22.12-58.03	10.41-72.78
Weighted Average	38.19	19.79	33.66	33.09	42.53	22.73	49.85	39.65	46.55	46.75
Cu lbs/T										
Value Range	.03-.64	0.08	0.05	.01-1.42	.06-1.10	.39-.67	.06-1.50	.08-.63	.44-.85	.01-.99
Weighted Average	0.26	0.08	0.05	0.13	0.56	0.53	0.87	0.33	0.72	0.39
% Moisture										
Value Range	14.63-68.66	55.34	28.82	16.66-82.31	6.75-62.03	44.82-57.16	13.73-41.22	14.57-46.10	32.53-66.26	8.34-77.12
Weighted Average	35.46	55.34	28.82	40.96	28.49	50.99	27.99	30.48	39.78	32.59
C:N Ratio										
Value Range	10.42-25.85	10.32	11.72	8.77-39.54	6.26-25.19	12.86-17.60	9.42-22.68	13.18-30.55	11.86-182.66	12.79-21.31
Weighted Average	17.41	10.32	11.72	13.96	17.88	15.23	15.72	18.96	63.93	18.77
NH-4										
Value Range	8.96-42.11	49	34.63	.14-68.74	5.24-18.84	5.89-6.44	8.64-33.43	5.51-18.12	4.88-8.50	.50-22.01
Weighted Average	16.92	49	34.63	34.68	10.43	6.17	15.7	11.5	6.84	9.33
Ca lbs/T										
Value Range	54.64-225.58	17.35	250.59	5.15-260.25	14.99-239.43	89.06-247.10	36.00-261.96	50.74-103.02	67.91-196.44	4.58-216.92
Weighted Average	153.29	17.35	250.59	145.59	131.81	168.08	171.27	78.56	126.18	130.39
Mg lbs/T										
Value Range	4.56-14.64	6.48	10.32	1.29-17.06	2.68-10.62	4.54-7.16	3.09-18.71	4.71-17.35	6.61-14.87	2.68-18.50
Weighted Average	9.41	6.48	10.32	10.04	6.66	5.85	8.51	8.82	11.36	11.73
% H2O Extract P										
Value Range	7.00-39.50	16.3	19.9	3.25-45.10						
Weighted Average	19.05	16.3	19.9	13.4						

West Virginia Pullet Data

State: WV Agency: WVDA Lab: WVDA-Moorefield																												
Year																												
(1985-Present)	1995	1996	1997	1997	1997	1998	1998	1999	2000	2001	2002	2002	2003	2003	2004	2004	2005	2005	2006	2006	2007	2008	2009	2010	2011	2011	2011	2012
Manure Type																												
Dry	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Wet																												
Sample Type																												
In-House	x	x	x			x			x	x	x		x		x				x			x	x		x			x
Uncovered Stack				x													x									x		
Covered Stack							x																					
Roofed Storage					x			x				x		x		x		x		x	x			x			x	
Other (specify)																												
Bird Population (x10^6)																												
NASS Value																												
Bird Market Weight lbs																												
Value Range																												
Weighted Average																												
Growout Periods days																												
Value Range																												
Weighted Average																												
Flocks per year #/yr																												
Value Range																												
Weighted Average																												
anure Generation lbs/1000 birds																												
Value Range																												
Weighted Average																												
Sample Number																												
(1-10,000)	3	4	2	1	5	1	1	2	3	11	4	1	3	2	1	2	2	2	6	2	2	2	16	1	2	1	3	1
TKN lbs/T																												
Value Range	41.00-48.10	25.40-39.40	36.16-36.60	15.09	42.42-46.59	39.14	36.07	40.29-41.05	31.54-56.05	34.91-45.75	37.85-44.21	38.62	38.20-57.68	39.54-39.55	43.17	46.16-51.91	54.58-55.83	37.80-53.40	30.14-67.61	42.67-51.09	46.52-49.07	47.03-50.67	38.88-69.88	43.71	51.11-56.34	62.09	41.61-59.34	51.13
Weighted Average	44.63	30.68	36.38	15.09	45.56	39.14	36.07	40.67	42.27	39.6	42.15	38.62	45.52	39.55	43.17	49.04	55.21	45.6	54.00	48.68	47.8	48.85	52.95	43.71	53.73	62.09	51.53	51.13
P205 lbs/T																												
Value Range	61.50-79.60	27.30-74.20	56.80-62.80	44.23	53.84-90.86	59.9	27.12	60.43-64.54	50.84-86.01	52.92-92.19	31.69-38.17	70.32	72.92-83.98	63.42-67.76	65.49	58.68-71.50	76.37-76.78	66.22-77.70	62.92-83.47	75.15-77.72	83.27-85.38	97.22-101.04	49.80-90.29	81.91	69.80-98.59	51.76	68.03-99.98	36.6
Weighted Average	70.6	57.5	59.8	44.23	61.74	59.9	27.12	62.49	66.83	74.7	35.06	70.32	77.82	65.59	65.49	65.09	76.58	71.96	71.4	76.44	84.33	99.13	69.72	81.91	84.2	51.76	82.79	36.6
K20 lbs/T																												
Value Range	39.80-66.20	25.20-43.10	25.35-28.51	17.26	28.49-58.56	38.5	47.06	40.88-47.92	37.36-62.92	50.11-183.20	48.90-71.28	72.17	44.67-51.22	35.67-35.99	40.76	19.55-53.13	36.32-38.09	51.54-55.83	37.53-53.30	48.98-57.48	50.86-57.06	58.29-58.40	40.70-60.16	54.9	50.42-61.11	53.98	46.28-66.93	40.95
Weighted Average	53.5	32	26.93	17.26	36.6	38.5	47.06	44.4	49.78	85.96	60.08	72.17	47.15	35.83	40.76	36.34	37.21	53.69	44.86	53.23	53.96	58.35	47	54.9	55.77	53.98	57.07	40.95
Cu lbs/T																												
Value Range	.09-1.84	0-.27	.36-.45	0.33	.47-.63	0.31	3.68	.39-.40	.49-.56	.09-.52	.04-.06	0.12	.05-.20	.32-.33	0.37	.08-.09	.35-.37	.08-.48	.08-.50	.10-.42	.11-.45	0.47	.07-1.45	0.12	.09-.12	0.68	.24-.48	0.18
Weighted Average	0.91	0.15	0.4	0.33	0.55	0.31	3.68	0.39	0.53	0.29	0.06	0.12	0.11	0.33	0.37	0.08	0.36	0.28	0.16	0.26	0.28	0.47	0.52	0.12	0.1	0.68	0.35	0.18
% Moisture																												
Value Range	19.06-24.08	25.00-36.30	31.72-33.57	67.09	12.72-72.89	22.59	19.81	31.84	16.11-24.60	17.29-45.02	12.93-30.84	19.91	10.90-43.12	45.89	35.66	18.46-29.14	21.77	20.86-22.86	25.72-32.71	17.52-22.34	14.59-26.94	27.71	17.68-35.13	17.64	25.29-26.08	30.14	15.39-31.30	20.41
Weighted Average	22.4	32.4	32.65	67.09	60.86	22.59	19.81	31.84	18.98	26.38	20.49	19.91	24.81	45.89	35.66	23.8	21.77	21.86	29.84	19.93	20.77	27.71	26.74	17.64	25.69	30.14	20.83	20.41
C:N Ratio																												
Value Range			26.64-28.98	26.34	9.74-27.06	32.96	30.57	25.97-26.46	19.54-39.08	19.44-34.75	23.78-28.80	24.31	23.02-32.11	21.02-21.03	24.18	22.77-24.81	19.82-20.28	10.85-18.87	16.44-28.32	24.34-26.37	22.91-26.18	21.68-23.37	17.82-24.58	31.49	18.82-22.83	18.61	17.17-23.51	27.58
Weighted Average			27.81	26.34	13.7	32.96	30.57	26.22	30.15	27.34	26.39	24.31	26.57	21.03	24.18	23.79	20.05	14.86	20.58	25.36	24.55	22.53	21.85	31.49	20.83	18.61	21.16	27.58
NH-4																												
Value Range	5.40-8.90	7.94-12.90	10.45-11.26	0.41	10.84-12.69	14.85	12.19	15.48-16.19	9.34-13.43	9.36-16.92	11.09-15.18	15.48	12.86-20.22	29.23-30.40	11.9	21.27-21.67	17.28-17.41	15.71-17.46	14.79-18.55	13.19-18.71	16.20-20.89	36.98-37.22	10.35-22.05	18.72	11.18-12.02	16.47	10.25-14.94	8.73
Weighted Average	7.13	10.45	10.86	0.41	12.06	14.85	12.19	15.84	10.98	12.2	13.43	15.48	16.61	29.82	11.9	21.47	17.35	16.59	17.35	15.95	18.55	37.1	17.18	18.72	11.6	16.47	11.83	8.73
Ca lbs/T																												
Value Range			23.76-40.54	26.65	26.07-36.17	25.8	23.22	22.73-23.95	19.62-68.13	19.06-62.31	28.11-35.43	30.53	55.15-99.08	43.95-44.66	33.63	38.72-41.77	93.38-109.89	87.66-109.85	31.01-66.68	41.14-52.62	53.06-54.02	57.88-58.20	15.62-108.17	34.71	45.94-51.91	29.52	44.05-54.03	29.16
Weighted Average			32.15	26.65	29.64	25.8	23.22	23.34	36.28	43.65	31.42	30.53	70.81	44.31	33.63	40.25	101.64	98.76	43.94	46.88	53.54	58.04	34.34	34.71	48.93	29.52	48.26	29.16
Mg lbs/T																												
Value Range			10.65-11.80	12.34	6.56-15.73	7.89	12.25	10.09-11.26	9.10-12.75	7.65-26.09	10.66-14.25	12.51	14.12-16.47	11.10-11.63	10.87	9.65-12.16	10.23-10.72	15.49-17.39	9.50-12.97	12.18-12.68	12.64-18.11	15.38-15.44	8.88-13.32	13.61	5.54-12.18	9.19	6.29-16.20	8.7
Weighted Average			11.23	12.34	8.6	7.89	12.25	10.68	10.55	13.63	12.32	12.51	15.01	11.37	10.87	10.91	10.48	16.44	10.62	12.43	15.38	15.41	11.65	13.61	8.86	9.19	11.43	8.7
% H2O Extract P																												
Value Range																												
Weighted Average																												

West Virginia Turkey Data

State: WV Agency: WVDA Lab: WVDA-Moorefield																											
Year																											
(1985-Present)	1994	1995	1995	1995	1996	1996	1996	1997	1997	1997	1997	1998	1998	1998	1998	1999	1999	1999	1999	2000	2000	2000	2000	2001	2001	2001	
Manure Type																											
Dry	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Wet																											
Sample Type																											
In-House		x			x			x				x				x				x				x			
Uncovered Stack	x		x			x			x				x				x				x				x		
Covered Stack										x				x				x					x				x
Roofed Storage				x			x				x				x				x					x			
Other (specify)																											
Bird Population (x10^6)																											
NASS Value	5.6	4.5			4.5			4.5				4.3				4.5				4.1				4.1			
Bird Market Weight lbs																											
Value Range																											
Weighted Average																											
Growout Periods days																											
Value Range																											
Weighted Average																											
Flocks per year #/yr																											
Value Range																											
Weighted Average																											
anure Generation lbs/1000 birds																											
Value Range																											
Weighted Average																											
Sample Number																											
(1-10,000)	1	10	1	2	26	4	16	50	4	5	8	29	6	3	15	16	5	18	11	10	4	2	21	12	5	6	
TKN lbs/T																											
Value Range	85.00	35.46-60.60	38.00	13.4-31.8	18.60-95.10	45.50-75.20	15.50-92.00	21.52-90.37	30.57-63.98	30.71-63.03	24.99-66.22	18.01-105.35	26.71-67.86	28.12-66.67	26.91-93.16	27.88-65.79	9.70-52.61	10.14-63.74	46.92-92.64	32.39-69.73	17.55-82.01	33.29-65.48	42.55-76.16	28.07-88.60	7.12-74.78	37.31-81.63	
Weighted Average	85.00	48.37	38.00	22.60	55.56	57.10	57.88	48.38	44.70	38.52	45.18	49.56	51.18	50.82	56.44	43.91	36.07	44.29	58.89	56.31	50.77	49.39	58.53	66.91	50.03	53.82	
P205 lbs/T																											
Value Range	64.80	23.22-83.40	27.60	102.30	19.60-90.46	25.70-69.00	14.90-91.00	26.66-76.73	31.78-73.17	37.00-81.73	21.84-68.62	17.99-103.05	35.10-68.60	40.37-84.52	36.68-99.22	16.60-77.77	20.69-46.64	13.05-53.21	26.53-74.52	34.95-90.06	30.53-85.11	31.19-63.25	42.55-76.16	29.03-105.86	17.84-81.63	36.25-71.29	
Weighted Average	64.80	40.72	27.60	102.30	55.58	51.33	53.79	52.77	52.71	55.41	45.23	56.33	48.28	59.17	61.34	44.58	36.15	38.40	49.42	63.97	52.85	47.22	58.53	70.84	56.61	57.32	
K20 lbs/T																											
Value Range	24.60	19.90-50.94	34.00	25.70-62.50	19.40-59.77	19.10-50.40	14.19-122.00	13.64-77.55	11.38-40.09	16.76-52.74	16.94-79.60	16.60-73.80	21.29-81.05	20.42-79.12	16.43-66.97	9.83-70.91	21.16-31.55	22.58-51.91	17.57-71.91	27.29-93.71	16.18-65.18	42.88-48.34	32.44-112.43	20.79-86.69	3.20-70.16	41.89-95.63	
Weighted Average	24.60	31.78	34.00	44.10	34.12	36.13	36.17	37.15	26.05	26.38	39.66	38.35	48.49	47.75	46.77	31.90	25.51	32.29	41.68	60.32	46.28	45.61	65.11	59.49	43.85	62.51	
Cu lbs/T																											
Value Range	0.01	.02-.17	2.04	.07-.08	.02-.88	.02-.40	.01-.68	0-1.35	.06-.55	0-.27	20.00-65.10	.02-.94	.11-1.12	.04-.69	.15-1.15	0-.85	.26-1.26	.07-56	.24-.85	.12-.83	.21-.56	.50-.54	.12-1.04	.19-.94	.07-.88	.16-.60	
Weighted Average	0.01	0.05	2.04	0.08	0.18	0.18	0.28	0.25	0.34	0.06	34.48	0.33	0.57	0.47	0.58	0.35	0.58	0.42	0.51	0.53	0.44	0.52	0.58	0.54	0.47	0.35	
% Moisture																											
Value Range	22.80	19.96-30.77	66.36	15.20	22.90-60.85	34.70-64.70	13.65-52.60	9.41-58.20	22.84-37.49	26.54-35.57	20.06-54.83	15.30-58.53	13.18-60.66	10.09-33.23	13.20-34.13	16.20-45.09	17.32-59.19	15.16-62.88	1.94-40.89	13.33-30.12	38.47-57.27	42.38-56.68	13.15-48.42	14.97-64.19	31.01-66.51	20.26-40.16	
Weighted Average	22.80	25.63	66.36	15.20	39.20	44.44	32.95	30.70	31.06	30.30	33.33	30.98	27.33	23.60	30.69	27.98	35.65	39.76	29.14	22.77	46.29	49.53	31.06	27.07	39.58	30.93	
C:N Ratio																											
Value Range								12.42-50.59	18.20-45.65	16.01-39.12	2.44-49.80	13.47-53.30	19.80-38.78	17.21-46.13	10.34-33.92	18.73-58.33	16.49-68.41	6.56-67.43	14.22-100.77	17.46-41.46	11.22-45.91	14.20-19.90	12.78-32.38	14.63-21.54	12.53-79.10	16.11-22.84	
Weighted Average								25.41	28.87	32.46	24.60	26.52	24.92	28.52	21.67	30.10	36.94	20.43	26.81	23.94	23.30	17.05	19.88	18.62	30.47	20.72	
NH-4																											
Value Range	17.00	10.50-17.06	4.46	1.80-2.25	3.84-26.30	13.30-26.20	1.26-25.20	4.69-26.41	8.46-22.77	9.95-19.93	6.22-23.80	8.16-23.51	2.41-24.17	11.03-23.03	8.94-34.42	5.59-24.44	2.78-19.58	3.21-31.61	7.36-26.15	6.12-19.22	5.54-22.25	12.39-23.78	1.38-27.20	11.80-22.18	2.69-26.55	12.35-16.64	
Weighted Average	17.00	12.40	4.46	2.03	14.35	17.90	15.96	13.98	17.34	15.33	13.80	16.45	14.11	17.42	19.37	14.88	13.92	20.77	17.68	13.68	15.93	18.09	16.72	16.39	17.40	14.13	
Ca lbs/T																											
Value Range								9.22-110.05	3.63-31.08	61.04-88.68	20.00-65.10	15.45-86.65	15.75-87.67	37.80-51.85	21.57-61.49	1.83-84.97	14.52-62.10	7.75-48.62	13.80-56.89	20.87-54.31	16.93-47.28	34.97-41.02	14.05-262.49	18.36-72.99	25.21-49.96	21.55-52.10	
Weighted Average								42.68	19.61	77.87	34.48	40.46	40.89	46.59	37.13	38.80	39.26	20.37	36.32	40.39	28.26	38.00	49.46	42.29	35.53	37.72	
Mg lbs/T																											
Value Range								.84-10.57	3.46-7.46	3.91-7.57	2.89-9.84	3.42-17.10	.95-7.90	5.08-8.19	.94-14.00	2.32-13.28	2.41-15.00	1.80-7.91	3.10-9.80	6.42-12.58	2.85-9.16	6.43-7.07	3.87-19.62	3.88-12.16	2.49-9.76	6.21-9.83	
Weighted Average								5.72	5.29	5.41	6.01	7.68	4.80	7.52	8.02	5.99	6.42	4.12	5.93	8.01	6.99	6.75	8.06	7.91	7.07	7.75	
% H2O Extract P																											
Value Range																											
Weighted Average																											

West Virginia Turkey Data

State: WV Agency: WVDA Lab: WVDA-Moorefield																									
Year																									
(1985-Present)	2001	2002	2002	2002	2002	2003	2003	2004	2004	2004	2005	2005	2005	2006	2006	2007	2007	2007	2008	2008	2009	2009	2009	2010	2010	2010
Manure Type																									
Dry	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Wet																										
Sample Type																									
In-House		x				x		x			x			x		x			x		x			x		
Uncovered Stack			x						x			x					x					x			x	
Covered Stack				x																						
Roofed Storage	x				x		x			x			x		x			x		x			x			x
Other (specify)																										
Bird Population (x10^6)																									
NASS Value		3.6				4.3		3.2			2.4			3.6		3.5			3.8		3.3			3.1		
Bird Market Weight lbs																									
Value Range																									
Weighted Average																									
Growout Periods days																									
Value Range																									
Weighted Average																									
Flocks per year #/yr																									
Value Range																									
Weighted Average																									
anure Generation lbs/1000 bir																									
Value Range																									
Weighted Average																									
Sample Number																									
(1-10,000)	28	3	2	3	7	7	8	6	1	7	1	1	14	4	4	6	2	2	10	5	5	1	11	16	2	15
TKN lbs/T																									
Value Range	36.43-76.63	77.06-88.83	15.73-64.45	51.30-55.17	33.08-65.90	26.21-46.65	8.57-80.29	43.96-112.29	18.47	48.57-70.27	73.53	72.89	52.02-108.37	50.30-67.00	57.76-82.80	36.31-86.52	77.53-77.58	57.82-67.08	32.64-90.89	50.54-75.43	59.56-80.41	52.21	53.86-104.33	44.11-98.81	36.29-72.65	50.32-112.52
Weighted Average	55.81	82.14	40.09	53.18	52.57	36.31	54.10	63.51	18.47	60.53	73.53	72.89	67.64	60.24	66.78	62.20	77.56	62.45	65.71	59.64	67.76	52.21	71.11	73.37	54.47	68.40
P205 lbs/T																									
Value Range	34.77-92.65	43.83-65.60	55.76-58.87	37.76-44.90	26.21-99.22	44.84-69.78	9.39-95.52	45.83-61.35	30.42	36.14-84.25	45.45	68.28	32.38-88.16	36.90-69.95	57.82-79.75	51.40-91.49	64.85-67.05	45.60-85.51	23.14-93.73	38.84-88.68	38.24-80.22	68.23	31.90-67.98	21.17-72.62	80.42-89.37	26.66-100.81
Weighted Average	62.59	54.23	57.32	42.48	52.47	56.50	61.17	54.24	30.42	63.07	45.45	68.28	59.13	60.48	68.86	67.62	65.95	65.56	67.69	67.47	60.92	68.23	47.27	51.15	84.90	54.98
K20 lbs/T																									
Value Range	22.89-150.89	45.75-57.74	15.99-72.21	43.93-46.41	26.27-56.16	26.93-46.55	5.45-55.85	36.90-53.91	6.13	36.33-54.91	44.44	43.15	33.90-53.21	30.10-35.82	40.10-53.54	22.62-49.08	50.65-50.74	48.09-50.93	11.56-52.89	32.95-50.89	29.21-45.42	31.26	30.30-51.61	24.85-62.32	29.04-50.51	23.38-56.08
Weighted Average	54.85	50.00	44.10	44.97	42.81	34.10	32.99	43.45	6.13	44.68	44.44	43.15	42.34	32.37	43.63	38.82	50.70	49.51	34.45	43.54	34.93	31.26	41.44	37.68	39.60	40.88
Cu lbs/T																									
Value Range	.15-1.14	.33-.80	.10-.57	.56-.62	.30-.83	.07-.86	.09-.64	.74-1.03	0.01	.53-1.09	0.64	0.46	.43-1.29	.01-.70	.74-.84	.42-.91	0.87	.61-.77	.14-.89	.45-.92	.36-.69	0.47	.53-1.40	.31-1.51	.46-.74	.37-1.43
Weighted Average	0.63	0.50	0.33	0.58	0.62	0.38	0.36	0.83	0.01	0.69	0.64	0.46	0.72	0.44	0.77	0.68	0.87	0.69	0.64	0.68	0.48	0.47	0.86	0.57	0.60	0.74
% Moisture																									
Value Range	5.27-55.54	15.47-21.21	30.86-44.81	28.61-29.35	7.83-40.13	26.46-51.12	15.88-48.47	25.19-32.54	63.11	28.22-41.62	36.39	33.98	18.71-47.74	27.14-36.30	21.73-26.74	24.65-41.91	27.46	13.21-19.05	17.51-74.80	23.23-36-72	15.55-25.64	1.07	26.81-50.44	20.65-52.82	28.53-57.96	17.37-44.73
Weighted Average	27.23	19.30	37.84	29.10	24.43	37.50	28.72	28.25	63.11	34.92	36.39	33.98	34.56	31.00	23.72	31.13	27.46	16.13	36.65	28.69	20.65	1.07	39.45	32.70	43.25	36.60
C:N Ratio																									
Value Range	11.47-38.40	16.34-17.08	15.41-40.16	21.60-23.47	16.83-32.08	20.89-36.70	15.76-112.79	9.57-27.56	27.58	14.78-25.55	12.60	13.84	9.21-24.56	18.45-19.85	14.55-23.45	14.62-23.65	14.88	19.49-26.17	11.87-17.17	14.94-24.78	14.57-25.94	19.89	8.06-23.57	13.06-23.48	14.84-15.10	10.56-23.66
Weighted Average	22.46	16.64	27.79	22.51	22.89	28.37	32.29	21.21	27.58	18.61	12.60	13.84	16.47	19.00	19.92	19.05	14.88	22.83	15.55	20.37	18.86	19.89	14.66	16.10	14.97	16.88
NH-4																									
Value Range	4.85-31.78	16.48-19.31	1.06-22.56	19.88-23.60	2.16-25.73	17.83-25.21	3.79-28.55	17.62-34.07	2.21	20.33-34.31	27.88	30.06	22.75-41.80	8.50-30.65	21.05-31.43	24.23-30.96	32.41	21.03-25.03	19.52-44.82	19.38-27.72	9.41-35.29	21.89	16.19-55.19	14.28-53.78	31.50-32.67	17.96-64.68
Weighted Average	18.08	17.62	11.81	21.73	16.57	21.61	22.30	22.82	2.21	29.31	27.88	30.06	31.80	23.06	23.95	26.72	32.41	23.05	28.46	22.29	24.31	21.89	30.05	30.97	32.09	39.79
Ca lbs/T																									
Value Range	25.02-74.25	37.56-42.27	29.91-60.88	29.27-37.70	20.16-62.34	36.84-154.32	14.53-85.13	38.40-79.96	60.44	23.18-70.22	137.07	95.30	29.26-141.33	28.89-61.30	27.33-32.05	44.37-112.31	55.10-55.24	35.09-76.37	20.17-133.05	23.49-80.87	20.73-82.80	99.87	15.04-87.56	3.59-148.06	22.01-47.68	10.54-49.80
Weighted Average	40.32	39.17	45.40	34.73	35.91	82.87	58.41	55.05	60.44	52.80	137.07	95.30	64.05	41.41	28.96	70.76	55.17	55.73	52.92	48.61	41.41	99.87	33.01	34.03	34.85	21.09
Mg lbs/T																									
Value Range	3.53-11.85	9.07-11.23	7.64-11.89	6.67-7.14	4.15-13.56	3.68-17.60	1.71-20.82	6.62-11.37	3.44	5.93-8.86	10.14	11.30	5.94-14.02	2.89-9.34	8.77-12.45	4.83-17.34	8.47-8.50	8.54-11.78	1.54-9.22	5.98-10.14	5.35-9.12	6.74	5.70-10.40	4.46-10.05	8.80-11.39	6.21-14.97
Weighted Average	7.43	10.38	9.77	6.90	8.60	9.71	11.95	7.96	3.44	7.13	10.14	11.30	9.46	7.39	11.00	11.12	8.49	10.16	7.22	8.63	7.57	6.74	7.91	6.99	10.10	8.33
% H2O Extract P																										
Value Range																			21.40		14.30-42.50	12.70	19.26-59.10		29.40-41.30	22.10-87.80
Weighted Average																			21.40		23.63	12.70	38.31		35.35	38.81

West Virginia Turkey Data

State: WV Agency: WVDA Lab: WVDA-Moorefield						
Year						
(1985-Present)	2011	2011	2011	2012	2012	2012
Manure Type						
Dry	x	x	x	x	x	x
Wet						
Sample Type						
In-House	x			x		
Uncovered Stack					x	
Covered Stack		x				
Roofed Storage			x			x
Other (specify)						
Bird Population (x10^6)						
NASS Value	3.3			3.3		
Bird Market Weight lbs						
Value Range						
Weighted Average						
Growout Periods days						
Value Range						
Weighted Average						
Flocks per year #/yr						
Value Range						
Weighted Average						
anure Generation lbs/1000 bir						
Value Range						
Weighted Average						
Sample Number						
(1-10,000)	18	1	18	9	3	13
TKN lbs/T						
Value Range	41.34-104.35	110.03	57.74-113.08	40.70-90.63	70.27-88.81	45.96-135.25
Weighted Average	76.20	110.03	81.92	70.34	76.74	73.71
P205 lbs/T						
Value Range	20.30-68.43	65.69	25.40-96.05	38.73-73.07	54.50-61.80	26.47-75.56
Weighted Average	48.59	65.69	58.71	51.76	57.01	45.07
K20 lbs/T						
Value Range	11.33-62.19	48.01	10.83-63.88	28.71-49.12	32.17-56.19	14.10-56.58
Weighted Average	39.84	48.01	31.91	37.85	40.21	42.97
Cu lbs/T						
Value Range	.38-.84	0.76	.36-1.13	.5-1.18	.46-.74	.36-1.28
Weighted Average	0.62	0.76	0.72	0.71	0.56	0.81
% Moisture						
Value Range	17.04-49.26	27.66	15.31-53.24	22.54-47.48	21.92-49.36	15.55-50.69
Weighted Average	28.89	27.66	31.07	34.08	40.21	31.97
C:N Ratio						
Value Range	11.09-21.71	10.58	9.79-18.96	11.73-21.44	11.59-14.32	9.42-19.08
Weighted Average	15.68	10.58	14.14	15.93	12.55	15.63
NH-4						
Value Range	15.19-39.55	24.40	15.19-58.90	15.53-24.38	16.46-26.12	11.94-35.40
Weighted Average	23.49	24.40	33.33	20.44	22.76	18.95
Ca lbs/T						
Value Range	8.13-125.08	47.62	12.60-46.20	20.88-80.34	29.82-36.32	12.21-48.98
Weighted Average	46.39	47.62	26.48	38.99	32.06	23.57
Mg lbs/T						
Value Range	1.69-9.84	3.37	1.35-18.02	5.68-13.03	6.17-8.43	5.02-11.76
Weighted Average	4.34	3.37	7.86	8.39	6.93	8.04
% H2O Extract P						
Value Range	28.90-31.30		17.10-44.30			
Weighted Average	30.10		31.38			

Virginia Broiler Data

State: Virginia Agency: DCR Lab: Clemson																																								
Year																																								
Year	2001	2001	2001	2002	2002	2002	2003	2003	2003	2004	2004	2004	2005	2005	2005	2006	2006	2006	2007	2007	2007	2008	2008	2008	2009	2009	2009	2010	2010	2010	2011	2011	2011	2012	2012	2012
Manure Type																																								
Dry	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Wet																																								
Sample Type																																								
In-House																																								
Uncovered Stack		x			x			x			x			x			x			x			x			x			x				x			x		
Covered Stack	x			x			x			x			x			x			x			x			x			x			x				x			
Roofed Storage																																								
Other (specify)			x			x			x			x			x			x			x			x			x			x			x					x
Bird Population (x10^6)																																								
Count	271.5	271.5	271.5	265.5	265.5	265.5	265.1	265.1	265.1	263	263	263	260	260	260	256.2	256.2	256.2	250.2	250.2	250.2	250.3	250.3	250.3	240.8	240.8	240.8	250.4	250.4	250.4	243.8	243.8	243.8	240.5	240.5	240.5
Bird Market Wt lbs																																								
Value Range																																								
Weighted Average	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	5.1	5.1	5.1	5.11	5.11	5.11	5.2	5.2	5.2	5.2	5.2	5.2	5	5	5	5	5	5	5.16	5.16	5.16	5.3	5.3	5.3	5.4	5.4	5.4
Growout Periods days																																								
Value Range																																								
Weighted Average																																								
Flocks per year #/yr																																								
Value Range																																								
Weighted Average																5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Manure Generation lbs/1000 birds																																								
Value Range																																								
Weighted Average	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2335	2335	2335	2346	2346	2346	2334	2334	2334	2376	2376	2376	2413	2413	2413	2468	2468	2468	2455	2455	2455
Sample Number																																								
(1-10,000)	19	4	8	116	23	17	173	13	4	310	24	54	180	7	16	208	14	16	281	15	17	137	10	5	250	20	18	254	21	7	226	14	21	225	13	7
TKN lbs/T																																								
TKN Value Range (low)	57.2	23.2	56.8	33	14	55.4	19	33	64.8	7.6	39.8	10.8	34.2	25.8	52.2	34	20.4	42	15	37.2	46.6	26.8	24.4	37	22.4	45.2	30	27.8	49.2	33.8	23.4	43.4	49.2	20.4	48	36
TKN Value Range (high)	90.6	72	80.2	144.6	101	103.8	91.2	84.4	95	104.8	83.2	89.4	98.8	72.8	92.6	93.4	123.2	78.2	102.6	90	71.6	94.8	83.8	68.6	140.8	81	79.8	119.6	86.6	83.8	104	84.8	95.8	113.6	86.6	82.2
TKN Weighted Average	68	53	67.6	66.4	63.8	67.8	64	64.2	79.4	65.6	61.8	65.5	64.8	57.6	67.4	66.6	63.6	61.6	67.2	58.4	60	64.8	56	50.8	65	65.2	58.4	69.2	67.8	64.2	69.8	64.8	71	74.4	69	67
P205 lbs/T																																								
Value Range																																								
P205 Weighted Average	52.4	45	63.8	50.8	44	51.6	50.6	46	49.8	53.8	45.8	50	53.2	44.6	53.8	51.6	46.6	50.6	47.8	47	48.4	48.2	39.6	38.6	50	52.2	44.2	48.2	45.6	52.2	46.8	50.4	46.6	46.8	41.8	40.6
high	95	58	78.8	90.4	80.6	77	87.2	61	59.8	100.8	68.6	80	116.8	63.8	64.4	95.8	73.4	69.6	88.2	76.2	72.4	92.8	57	51	118.4	94.4	73.2	92.8	68.2	75.2	94.6	75.4	67.8	102.2	59.6	61.4
low	34.8	36.2	51	24.6	15.4	38.4	14.6	28	39.2	5.2	19.6	13.6	24.4	19.6	39	17.6	21.4	40	11.4	27.6	33	13	25	29.2	21.8	35	17.4	19.8	24.6	28.8	10.4	37.4	26.6	19	29.6	22.8
K20 lbs/T																																								
Value Range																																								
K20 Weighted Average	53.6	42.8	55.6	52.8	42.4	52.2	53.8	48	48.4	55.6	50	47.2	56.2	42.4	54	56.3	43.6	55.8	52	51.4	54.6	52	37.2	45.8	52.8	50.4	46	52	45.2	46.6	50.4	44.4	51.2	51.8	49.4	44.8
high	91.2	54.2	68.8	83	68	83.2	87.2	69	58.6	109.6	82.6	65.4	103	50.8	67.2	94.2	88	72.4	84.8	69	81.8	86.8	52	63.8	113.2	74.6	64.4	83.6	69.8	62.8	91	66	74.6	74.8	67.8	73.6
low	34.6	25.6	45.4	31.4	7.4	36.8	3	27.2	40	10.2	27.4	7.8	31.8	13.4	35.8	15.6	1	38	6	31	37	23.6	20.8	29.2	16.6	35.8	24	17.2	22.4	32.8	9.8	23.4	35	13	37.2	14.6
Cu lbs/T																																								
Value Range																																								
Cu Weighted Average	0.88	0.45	0.7	1	0.7	0.8	0.9	0.7	0.7	0.9	0.9	0.7	1.1	0.7	1.1	1.1	0.9	1.3	0.8	0.8	0.8	0.7	0.5	0.5	0.8	0.8	0.7	0.8	0.7	0.9	0.7	0.6	0.8	0.7	0.9	0.7
high	2.2	0.54	1.2	2.3	1.6	2.2	2.3	1.8	0.9	2.8	1.9	1.4	3	1	1.6	2.4	2.1	2.1	2	1.5	1.4	1.9	1.1	0.7	2.1	1.5	1.4	1.9	1.1	1.5	1.8	1.2	1.8	1.8	1.5	1.9
low	0.3	0.3	0.5	0.1	0.1	0.4	0.1	0.1	0.5	0.1	0.3	0.3	0.4	0.2	0.5	0.2	0.2	0.6	0.1	0.4	0.4	0.1	0.1	0.3	0.1	0.1	0.2	0.1	0.2	0.6	0.1	0.1	0.1	0.1	0.3	0.2
% Moisture																																								
Value Range																																								
% Moisture Weighted Average	26.2	32.5	19.5	26.3	28.3	29.1	27.7	34.5	31.5	28.2	34.5	26.7	27.7	35.7	28.2	27.4	36.9	29.1	28.1	36.6	30.4	25.8	35.7	30.5	26.1	27.9	31.9	24.8	28.7	27.9	25	33.9	23.2	25.2	30.6	35.6
high	50.8	42.6	26.2	44.7	42	43.5	63.3	65	39.5	62.5	59.7	49.6	63.8	54	44	59.7	80.9	39.9	66.8	66.5	43	58.6	50.6	54.8	60.3	53.2	66.2	55.1	45.5	39	83	62.4	45.4	54	49.1	68.2
low	12.3	27.1	10.7	6	12.5	11.7	13	20.9	24.8	5.3	18.4	14.2	10.6	25.7	20.4	10	4.5	21	11.7	16.8	16.7	11.4	19.2	12.2	11.7	10	18.6	6.7	14.7	8.5	6.8	9.2	0.5	10.3	20.7	20
C:N Ratio																																								
Value Range																																								
Weighted Average																																								
high																																								
low																																								
NH-4																																								
Value Range																																								
NH-4 Weighted Average	10.4	8	8.8	12	11	11.2	10.8	13.2	17.6	12	14.4	12.6	11	15.2	12.2	10.8	12.2	10.6	11.6	11	11	10	8.4	4.8	10.4	10.2	11.4	11.4	12.6	12.2	11.6	11	10.2	12.8	13.6	13.6
high	19	14.6	12.6	98.8	25.8	16.2	29	21.8	20.8	30.6	22.8	39	27.8	24	18.8	23.2	19.6	21.4	23.6	21.4	17.8	19.8	18.4	5.8	74.4	21.4	26.6	49	20.2	17.2	27.8	18	17.4	26.2	18	18.6
low	2.2	0.4	5	0.6	0	5.4	0.8	5.2	14.4	0	5	0.6	2.8	7.4	4.4	1.2	3.6	4.4	0	4.4	3.8	0.6	0.2	2.6	0.6	2	4.4	1.2	5.4	7.8	0.6	4.8	5.2	0.8	8.6	10.4
Ca lbs/T																																								
Value Range																																								
Ca Weighted Average	37.2	29.8	44.8	40.6	45.6	34.6	38	32.6	37.4	39.8	35.6	35.6	38.8	35.2	36.2	38.2	36	33.8	36.2	33	35	39.2	32.6	29	39.4	43.8	38.6	37.2	38.2	60.4	35.6	43.2	36	31.8	28.6	27
high	47.6	35.4	55	224.8	227.2	53.6	131.4	46.8	49.6	231.6	81.8	72.8	95.6	49.4	44.6	155.4	57.2	47.2	104.8	52.2	49.8	99	54.8	30.6	196.8	120.8	150	167.4	114	178.8	173.4	99.8	138	108.4	62.8	45.6
low	26.2	24.4	37.4	20.2	21.2	25.4	12.8	21.2	28	14.8	19	8.4	14	22.6	26.4	17.8	7.4	24.4	11.4	20.2	25.6	11.8	20.4	26.4	16.6	22.4	11.4	12	17	24	9.6	26.6	11.8	15.2	17.4	12.6
Mg lbs/T																																								
Value Range																																								
Mg Weighted Average	9.6	8	10.6	9.6	13.2	9	9.4	8.4	8.4	9.4	8	7.8	9.8	7.8	9.2	9.8	8.4	9.6	9.2	8.6	9.4	10	7.6	8.8	10.4	9.6	8.8	11	11.6	10.4	9.6	9.8	9.4	9.8	8.8	8.4
high	15.6	9.2	11.8	16	118.2	13.8	16.6	11.8	11.6	24.8	14.6	12.6	18.8	10	11	17.2	14.8	12.2	17.2	12.4	15.6	28.4	10.8	11.8	25.6	20.4	12	42.6	37.4	15.6	19.2	17.2	12.8	15.4	11.2	14.2
low	6.4	6	9.4	4.6	5.6	6.8	2.8	4.8	6	2.4	3.4	2.2	5.4	5	6	2.8	1.4	5.6	2.4	5.6	6.8	3	5	7	4.6	6.4	4.2	4.6	4.8	6.4	2.4	6	6.4	2.4	6.6	4.2
% H2O Extract P																																								
Value Range																																								
Weighted Average																																								

* Reported as NH-4

Virginia Breeder Data

State: Virginia
Agency: DCR
Lab: Clemson

Year (1985-Present)	2001	2001	2002	2002	2002	2003	2003	2003	2004	2004	2004
Manure Type											
Dry	x	x	x	x	x	x	x	x	x	x	x
Wet											
Sample Type											
In-House											
Uncovered Stack				x			x			x	
Covered Stack	x		x			x			x		
Roofed Storage											
Other (specify)		x			x			x			x
Bird Population (x10^6)											
Count											
Bird Market Wt lbs											
Value Range											
Weighted Average											
Growout Periods days											
Value Range											
Weighted Average											
Flocks per year #/yr											
Value Range											
Weighted Average											
Manure Generation lbs/1000 birds											
Value Range											
Weighted Average											
Plans for Volume											
Sample Number (1-10,000)						29	17	1	48	12	1
TKN lbs/T											
Value Range						21.8-88	20.4-60	52.8	16.4-99.6	23.4-76.6	46.4
Weighted Average						51.2	40.2	52.8	49.4	45.8	46.4
P205 lbs/T											
Value Range						39.2-121.8	12.4-105.2	84.4	24.2-97.8	27.6-71.2	72.8
Weighted Average						66.8	53	84.4	59.2	48.6	72.8
K20 lbs/T											
Value Range						20.2-73	6.6-75	68.6	16.2-57.4	23.8-54	59
Weighted Average						47	37	68.6	43.8	36.4	59
Cu lbs/T											
Value Range						.1-1.6	.1-1.0	1.2	0-2.7	.3-.8	0.1
Weighted Average						0.7	0.4	1.2	0.5	0.5	0.1
% Moisture											
Value Range						7.2-69.3	9.5-61	23.5	9.4-74.5	13.2-67.1	40.2
Weighted Average						26.3	31.9	23.5	30	36.4	40.2
C:N Ratio											
Value Range											
Weighted Average											
NH-4											
Value Range						2.8-21.2	2.8-13.2	10	3.4-22.8	3-10.4	8.4
Weighted Average						8.8	7.2	10	9	7.6	8.4
Ca lbs/T											
Value Range						22.8-283.8	19.8-245.6	53.8	23.8-229.8	20.6-162.6	224.4
Weighted Average						114.4	100.8	53.8	113.2	79.4	224.4
Mg lbs/T											
Value Range						5-16.6	2.8-13.8	15.2	2.8-20.2	3.8-10.4	10.6
Weighted Average						9.8	7.8	15.2	8.8	7.2	10.6
% H2O Extract P											
Value Range											
Weighted Average											

Year (1985-Present)	2005	2005	2005	2006	2006	2006	2007	2007	2007	2008	2008	2008
Manure Type												
Dry	x	x	x	x	x	x	x	x	x	x	x	x
Wet												
Sample Type												
In-House												
Uncovered Stack		x			x			x			x	
Covered Stack	x			x			x			x		
Roofed Storage												
Other (specify)			x			x			x			x
Bird Population (x10^6)												
Count												
Bird Market Wt lbs												
Value Range												
Weighted Average												
Growout Periods days												
Value Range												
Weighted Average												
Flocks per year #/yr												
Value Range												
Weighted Average				1	1	1	1	1	1	1	1	1
Manure Generation lbs/1000 birds												
Value Range												
Weighted Average							26231	26231	26231	26120	26120	26120
Plans for Volume												
Sample Number (1-10,000)	48	1	7	37	7	2	51	3	3	40	13	3
TKN lbs/T												
Value Range	8.2-95.2	19.4	31.6-54.2	15.4-74.8	16-49.0	42.6-45	17-72	51.2-76.6	27.2-56	22-85.4	21-54.8	28..6-61.2
Weighted Average	45.6	19.4	41.8	50.8	38.4	43.8	46.8	59.8	45.4	51.8	41.2	45
P205 lbs/T												
Value Range	18.2-108.2	23.6	43.2-91	33.6-101.8	38.8-88.8	37-53.4	29.4-107	51.6-78.8	72.8-84.8	22.4-145.6	32.4-94	68.8-74.4
Weighted Average	57	23.6	67.6	62.6	68	45.2	63.4	66.2	77	59.6	60.2	72
K20 lbs/T												
Value Range	4-72.2	4.6	35.4-51.4	13.2-68.4	9.2-46.6	37.8-41	20.6-76.4	41.4-53.8	44.8-57.2	19.20-78.8	16.4-61.2	40-54.0
Weighted Average	42.4	4.6	43.2	45.6	36.2	39.4	46.2	45.8	50.4	40	39	44.8
Cu lbs/T												
Value Range	.1-1.8	0.2	.1-.9	.1-1.3	.3-.9	0.4	0-1.3	.1-.8	.1-.4	.1-1.5	.1-.7	.1-.4
Weighted Average	0.5	0.2	0.4	0.5	0.7	0.4	0.5	0.4	0.4	0.4	0.3	0.3
% Moisture												
Value Range	14-65.3	27.9	15-47.1	10.4-61.6	24-54.3	23.7-39.6	11.7-62.4	17.3-36.2	24.9-47.7	9.1-65.0	19.2-51.8	25.9-53.7
Weighted Average	33.9	27.9	35.6	33.4	40.4	31.6	29.7	24.1	36.4	25.5	32.7	36.9
C:N Ratio												
Value Range												
Weighted Average												
NH-4												
Value Range	0-14.4	0.8	3.6-15.6	.2-23	1-12.2	4.4-6.2	3-15.4	9.0-15	6.0-6.8	3.6-27.6	1.6-14.6	5.8-8.6
Weighted Average	7	0.8	8.6	9.6	7.2	5.4	9	11	6.4	8.6	7	7.2
Ca lbs/T												
Value Range	39.8-204.6	38.1	91.6-168.6	26.8-203.8	20.6-160.2	74.6-90.8	27.2-230.8	44.6-107	131-149.8	17.8-228	19-209.8	102.8-118.6
Weighted Average	121.6	38.1	140.4	105.8	105.2	82.8	108	66.2	142	117.8	125.2	113
Mg lbs/T												
Value Range	18-Feb	3	6.4-10.2	4.4-14.6	6.2-9.6	6.8-7	3.8-14.2	7.4-11.8	8.6-11	3.4-15.6	4.6-13.4	7.4-9
Weighted Average	8.2	3	8.6	9	8.2	7	8.8	9.8	9.6	8.4	8.4	8
% H2O Extract P												
Value Range												
Weighted Average												

Year (1985-Present)	2009	2009	2009	2010	2010	2010	2011	2011	2011	2012	2012	2012
Manure Type												
Dry	x	x	x	x	x	x	x	x	x	x	x	x
Wet												
Sample Type												
In-House												
Uncovered Stack		x			x			x			x	
Covered Stack	x			x			x			x		
Roofed Storage												
Other (specify)			x			x			x			x
Bird Population (x10^6)												
Count												
Bird Market Wt lbs												
Value Range												
Weighted Average												
Growout Periods days												
Value Range												
Weighted Average												
Flocks per year #/yr												
Value Range												
Weighted Average	1	1	1	1	1	1	1	1	1	1	1	1
Manure Generation lbs/1000 birds												
Value Range												
Weighted Average				27256	27256	27256	27573	27573	27573	26992	26992	26992
Plans for Volume												
Sample Number (1-10,000)	40	17	4	50	7	6	46	11	2	35	5	5
TKN lbs/T												
Value Range	16.6-132.2	12-76.6	40-85	19-77.6	38.4-86	24.4-76.2	26.8-104.8	25-76.4	49.8-53.8	19.4-85.4	43-84	47.2-71.6
Weighted Average	47.2	44	61.8	47	57.2	51.6	53	53.4	51.8	50.8	54.8	54.8
P205 lbs/T												
Value Range	20.8-120.4	15.2-93.4	51.4-66.6	17.4-94.6	49.6-77.2	39.8-93.4	29.6-99.2	40-87	61.8-71.8	25.6-96.4	47-64.4	37.4-67
Weighted Average	60.4	53.8	62.6	56.6	58.6	56	60.2	60.2	66.8	62.4	55.8	53.4
K20 lbs/T												
Value Range	23-60.8	3.8-49.4	35.4-45.8	19.4-64.8	33.2-50.4	32.2-65.2	16.4-64.6	20.4-73	42.2-52	27-71.6	39.4-49	29.6-51.2
Weighted Average	44.2	35.6	41.6	41.6	41.4	44.4	45.4	45.8	47.2	48.6	42	43.6
Cu lbs/T												
Value Range	0-1.3	0-.8	.2-.5	0-.9	.1-.6	.1-.6	.1-1.2	.1-.9	0.1	.1-1.3	.1-1	.1-.9
Weighted Average	0.4	0.4	0.3	0.3	0.3	0.3	0.5	0.3	0.1	0.4	0.3	0.4
% Moisture												
Value Range	9.2-61.8	18.9-62.7	14-40.3	11.6-72.2	17.9-33.3	24.2-47.9	6.2-64	12.2-58.8	16.4-17.6	12.6-63.2	22.7-34.3	18.6-48.3
Weighted Average	28.8	32.2	26.7	30.6	23.9	39.9	22.1	29.8	17	30.6	27.5	31.3
C:N Ratio												
Value Range												
Weighted Average												
NH-4												
Value Range	2.6-69.4	1.2-20.8	5.6-20.6	2-15.2	5-12.6	10.6-16.4	2.6-23.8	2.2-13	8.2-9	4.4-21.6	7.2-47.8	5.2-17.8
Weighted Average	9.6	8	11	8.2	8.4	13.8	6.4	7.8	8.6	9.4	17.2	9.6
Ca lbs/T												
Value Range	18.2-308.2	28.8-140.2	47-193.2	22.8-232	45.6-165.8	35-147.6	17.6-229.2	32-196	34.6-45.2	19.8-224	27.8-178.8	23.4-184.8
Weighted Average	117	77.8	123	119.6	103.4	115.4	120.4	118.8	40	111.6	115	107.4
Mg lbs/T												
Value Range	4.8-15.8	3.4-15	7.8-10.6	4.2-119.8	7.4-19.6	6.6-10.2	6-15.4	6.2-12.6	9-11.2	4.8-14	6.8-11.2	6.4-9.4
Weighted Average	9.6	7.8	9	11.8	10	8.4	9.2	9.4	10.2	10	8.6	8.4
% H2O Extract P												
Value Range												
Weighted Average												

Virginia Turkey Data

Year																											
(1985-Present)	2001	2001	2001	2002	2002	2002	2003	2003	2003	2004	2004	2004	2005	2005	2005	2006	2006	2006	2007	2007	2007	2008	2008	2008	2009	2009	2009
Manure Type																											
Dry	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x
Wet																											
Sample Type																											
In-House																											
Uncovered Stack		x			x			x			x			x			x			x			x			x	
Covered Stack	x			x			x			x			x			x			x			x			x		
Roofed Storage																											
Other (specify)			x			x			x			x			x			x			x			x			x
Bird Population (x10^6)																											
Count	24	24	24	20	20	20	23	23	23	19.7	19.7	19.7	21	21	21	21.5	21.5	21.5	22	22	22	18	18	18	17	17	17
Bird Market Wt lbs																											
Value Range																											
Weighted Average	22.1	22.1	22.1	22.3	22.3	22.3	20.64	20.64	20.64	21.78	21.78	21.78	22.71	22.71	22.71	22.32	22.32	22.32	21.95	21.95	21.95	26.9	26.9	26.9	26.4	26.4	26.4
Growout Periods days																											
Value Range																											
Weighted Average																											
Flocks per year #/yr																											
Value Range																3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5
Weighted Average																4	4	4	4	4	4	4	4	4	4	4	4
Manure Generation lbs/1000 birds																											
Value Range																											
Weighted Average	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000											
Sample Number																											
(1-10,000)	21	7	16	59	9	6	75	14	3	103	10	51	84	9	4	72	14	6	145	12	3	69	12	7	125	12	8
TKN lbs/T																											
Value Range	33-78.2	31.2-94.8	49-100.4	14.2-94.6	50.6-80.4	45.4-98	29-110.2	14.2-93.6	38-68.4	10.4-107.8	30.6-78.2	23.2-106	12.6-135.6	53.6-82.8	41.8-81.6	14.6-132.2	26.8-82.8	57.4-73.6	12.2-115.6	57.4-103.8	66.8-80.4	32.2-104.6	51.8-85	31.6-103.4	14.8-128.2	28.8-85.2	44.4-81.2
Weighted Average	61.4	66	68.2	61.8	64.2	64.6	62	54	50	62.2	57	61.2	64.2	66.6	63.4	70.8	63.4	63.6	67.2	72.2	75.6	69	68.8	58	73.8	59.8	72.2
P205 lbs/T																											
Value Range	34.4-79.8	35.8-69.6	39.2-94	13.2-90.6	34-80.8	33.2-63	19-104.4	6.6-69.6	30.2-46.6	5.6-120.8	21.4-53.8	11.8-87	9.2-92.2	40.2-70.2	31.4-70.8	21.8-111	38.4-75.8	35.6-53.6	11.2-107.8	36-74.2	38.8-64.2	27.6-92.4	29.4-77	27.6-72	18.4-102.4	33.6-68.6	43-84
Weighted Average	56.4	47.4	59	50.4	55	48	47.4	41.4	39	50	36	40.8	55.8	57.8	53.6	55.2	53.2	45.8	52.4	57.4	53.2	53.8	54.8	44.4	51.4	51.2	57.4
K20 lbs/T																											
Value Range	24.4-56.8	27.4-45.2	27.2-51.8	9.8-68	27.6-51	19.2-46.6	10.2-78.8	6.6-53	28.6-40.2	3.2-67	21.2-48.8	7.2-68.2	10.2-73	27.8-54.6	32.4-54.6	5.8-65.4	21.2-46.6	35-57	2.6-72.8	28.2-48.2	40.6-43.4	22.4-64	30.2-60	20.6-39.8	15.4-64.6	17.4-49.4	32-49.6
Weighted Average	41	38.2	39.2	34.4	39	32.6	37.2	29.2	32.6	39.4	32	38.6	43	39.8	46.2	42.6	35.4	43.6	43	38.8	42.2	43.2	44	30.4	41.4	38.8	43.6
Cu lbs/T																											
Value Range	.4-2.9	.4-.9	.3-1.0	.1-1.3	.3-.9	.1-.9	.1-1.7	.1-.9	.4-.5	0-1.1	.1-.7	0-1	0-1.4	.4-.6	.5-1	.1-1.2	.5-1.8	.6-1	0.-1.8	.1-.8	.3-.8	.2-1.4	.5-1.1	.3-.5	.1-1.2	.1-.9	.2-1
Weighted Average	0.8	0.6	0.6	0.5	0.6	0.5	0.5	0.4	0.4	0.6	0.5	0.6	0.7	0.5	0.8	0.7	0.6	0.8	0.7	0.5	0.5	0.7	0.7	0.4	0.7	0.6	0.7
% Moisture																											
Value Range	11.1-51.6	23.3-42.4	14.7-42.0	10.2-53.5	21.1-37.7	22.8-42	9-65.5	16.4-57.8	29.1-42.1	6.9-80.6	14.7-58.5	8.1-68.6	4.9-70.9	27.4-44.4	17.9-41.6	14.9-60.8	27.6-47.6	19.5-42.5	9.4-68.5	19.9-42.1	31.7-41.3	12.3-59.4	18.1-52.7	12.2-36.7	12.5-61.4	27.6-61.9	17.2-41.1
Weighted Average	29.2	31.5	28.2	28.1	28	30.7	29.8	32.3	35	27.8	32.9	28.2	28.4	35.4	28.6	30.5	38.6	30.6	30.2	33.7	35.9	29.5	36.5	18.9	30	39.8	30.6
C:N Ratio																											
Value Range																											
Weighted Average																											
NH-4																											
Value Range	2.8-30.6	5-19.4	8.2-21	.4-23.4	2.8-19.4	8.6-16	2.8-25	4.6-18.8	10-12.8	.6-24.6	6.8-17.8	5-27.4	1.6-24.4	10.2-19.8	9.4-16.4	1-32.4	2.8-21.8	9.2-19.4	0-25	10-26.8	15.6-20.2	.6-23.2	4.2-23.2	4.4-16	0-47.4	3-22.8	8.6-19
Weighted Average	13.8	14.8	13.2	13.6	13	12.4	13.8	11.4	11.4	12.8	12	13	12.6	15.2	13.4	14.8	13.4	13	13.8	15.8	17.2	13.2	14.6	9.6	15.2	15.6	15
Ca lbs/T																											
Value Range	25-69.8	22.6-51.4	27.2-63.2	9.4-111	24.6-58.4	24.2-93.2	12.8-176.8	4.8-54.2	29-35	5.6-87.4	13-58.8	9.6-62.2	4.4-84.4	32.6-71.4	33-57	16.6-83.8	25.6-50.6	25.2-38.2	16.2-157.8	25.6-88.8	27.6-44.2	20-70.2	20-56.8	19.4-56.8	14-76.0	24.6-126.4	22.4-128.8
Weighted Average	41	35.6	40.8	37.8	40.4	43.8	35.8	30	31.6	36.8	28.2	27.2	39.4	47.4	40	38.6	39	31.4	39	44	36.8	38.6	39.8	32.2	36	43.4	49
Mg lbs/T																											
Value Range	3.8-8.4	5.8-8	4.6-9.6	.2-13.8	3.8-13.2	3.0-7.4	2.6-13.8	.8-8.4	4.6-7.6	.8-85	3-6.8	1.8-11.2	1.6-10.4	5.2-92	5-8.8	3.8-14.6	5.2-9	5.2-7.6	1.4-27.4	4.4-9.6	6.2-7	3.8-12.4	5.4-10.8	3.4-7.4	2.8-11.4	4.6-8.6	6-10.4
Weighted Average	6.4	7	6.6	5.8	7	5.2	5.8	4.6	5.8	6.4	4.6	5.2	7	6.8	7.4	7.2	6.8	6.8	7.2	6.6	6.6	7.6	7.8	5.2	7.2	7	7.8
% H2O Extract P																											
Value Range																											
Weighted Average																											

Virginia Turkey Data

Year									
(1985-Present)	2010	2010	2010	2011	2011	2011	2012	2012	2012
Manure Type									
Dry	x	x	x	x		x	x	x	x
Wet									
Sample Type									
In-House									
Uncovered Stack		x			x			x	
Covered Stack	x			x			x		
Roofed Storage									
Other (specify)			x			x			x
Bird Population (x10^6)									
Count	17	17	17	17.5	17.5	17.5	17	17	17
Bird Market Wt lbs									
Value Range									
Weighted Average	27	27	27	26.3	26.3	26.3	26.4	26.4	26.4
Growout Periods days									
Value Range									
Weighted Average									
Flocks per year #/yr									
Value Range	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5
Weighted Average	4	4	4	4	4	4	4	4	4
Manure Generation lbs/1000 birds									
Value Range									
Weighted Average									
Sample Number									
(1-10,000)	126	9	12	92	9	8	95	11	11
TKN lbs/T									
Value Range	6.2-118.4	50.6-117.2	39.8-84.8	15.6-105	31.8-118.6	48-78.6	45-119.4	32.2-80.4	44-90.8
Weighted Average	74.6	82.2	65.4	71.8	79.2	67	77.6	61	72.2
P205 lbs/T									
Value Range	1.2-87.8	31.8-75.2	34.2-83.2	6.0-99	35.4-80.8	28.8-77.8	21.2-83.6	20.4-76.8	38.2-80
Weighted Average	50.6	55	54.2	52.2	57.6	44.4	54.2	47.6	60.6
K20 lbs/T									
Value Range	1.4-72	34.6-51.2	23.2-52.4	3.2-67.8	33.6-55.2	25.6-57	21.8-61.4	9-62.2	29.4-55.2
Weighted Average	42.2	43	38.6	42.4	43.4	37.8	45.8	35.2	46
Cu lbs/T									
Value Range	0-1.8	.6-1.2	.3-1	0-1.5	.4-1.1	.3-.8	.3-1.2	.1-1.4	.1-1
Weighted Average	0.7	0.7	0.7	0.7	0.6	0.6	0.8	0.6	0.7
% Moisture									
Value Range	7.9-69.7	14.6-61.3	17.2-62.3	12.7-65.3	12.7-53.6	19.8-41.7	10-48.2	20.1-64.4	15-40.6
Weighted Average	30.6	35.2	32	28.8	30.4	27.1	28.4	36.5	29.6
C:N Ratio									
Value Range									
Weighted Average									
NH-4									
Value Range	0-29.6	12.8-31.8	9.2-21.2	1.4-23.2	11.8-19.4	3.6-16.6	6-25.4	4.2-22	8.6-23.4
Weighted Average	16.4	19.6	14	14.6	15	12	15.8	15	15.6
Ca lbs/T									
Value Range	14.4-102.6	19-63.2	21.2-51	8.2-74.8	21.4-72.8	20.2-52.8	16.8-69	16.8-64.8	23.4-55.4
Weighted Average	36.4	39.4	37.4	36.4	42.8	29.2	36.4	36.6	44.2
Mg lbs/T									
Value Range	.6-27	5.4-11	6.1-9.6	1.6-20.6	5.4-10.2	4.4-9.4	3.4-13.2	3.6-10.6	5.8-11
Weighted Average	7.8	8	7.8	7.8	7.4	6.2	8	7.2	8.8
% H2O Extract P									
Value Range									
Weighted Average									

Delaware Broiler Data

State: Delaware Agency: DDA Lab: DDA testing lab (2003-present); Agri-Analysis (1996-2002)																		
Year																		
(1985-Present)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Manure Type																		
Dry																		
Wet	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sample Type																		
In-House								x	x	x	x	x	x	x	x	x	x	x
Uncovered Stack								x	x	x	x	x	x	x	x	x	x	x
Covered Stack								x	x	x	x	x	x	x	x	x	x	x
Roofed Storage								x	x	x	x	x	x	x	x	x	x	x
Other (specify)	unknown	unknown	unknown	unknown	unknown	unknown	unknown											
Bird Population (x10^6)																		
NASS Value	257.6	256.9	259.8	251.7	247.7	257.7	257.4	251.2	240.7	282.3	269.1	245.8	242.9	231.5	235.0	217.8	212	
Bird Market Wt lbs																		
Value Range																		
Weighted Average	5.5	5.5	5.5	5.6	5.9	5.8	6.0	6.0	6.2	6.5	6.0	6.5	6.5	6.9	6.9	7.0	7.1	
Growout Periods days																		
Value Range																		
Weighted Average											56	56	56	56	56	56	56	56
Flocks per year #/yr																		
Value Range																		
Weighted Average											4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Manure Generation lbs/1000 birds																		
Value Range					unknown										.2-4.6	.2-4.6	.2-4.6	
Weighted Average					2500										2990	2990		
Sample Number																		
(1-10,000)	7	13	39	46	27	54	60	228	168	462	589	522	472	721	649	743	255	514
TKN lbs/T																		
Value Range	59-79	27-95	20-98	11-87	9-91	17-86	20-89	11-87	14-107	0.69-111.20	1.58-105.83	5.84-101.28	8.34-97.75	9.93-98.12	12.43-108.99	8.48-109.46	0 - 98.3	1.96-102.51
Weighted Average	68	61	58	52	62	60	58	59	52	58.57	55.41	57.19	56.62	55.49	57.46	60.29	60.45	61.02
P205 lbs/T																		
Value Range	40-89	46-76	29-86	10-86	9-67	19-93	24-86	6-83	9=89	0.20-105.36	0.67-88.00	0.09-116.56	66.0-110.66	11.55-100.25	7.6-101.88	4.24-99.4	4.33-111.1	1.01-104.36
Weighted Average	55	59	56	52	50	55	51	41	42	44.72	40.99	46.37	48.46	44.68	49.23	48.89	54.01	50.58
K20 lbs/T																		
Value Range	33-60	20-50	20-61	7-52	7-48	12-66	25-77	17-75	22-74	4.40-83.40	1.11-82.64	1.84-82.79	2.90-81.25	3.91-78.08	1.78=101.91	8.06-80.51	4.91-78.80	1.55-87.04
Weighted Average	40.8	36.5	36.7	32.6	35.7	41.5	49.5	46.1	45.7	50.52	49.93	51.27	52.39	47.8	49.23	47.79	52.63	49.75
Cu lbs/T																		
Value Range																		
Weighted Average																		
% Moisture																		
Value Range	32 - 33	32 - 33	21-43			27-41	16-50	16-68	14-75	0.03-75.33	4.65-69.44	2.84-80.86	0.65-79.52	6.86-67.70	8.86-80.84	10.23-81.61	11.37-77.29	8.70-81.95
Weighted Average	32.5	32.5	32.7	?	?	32.7	28.9	34.7	34.0	28.18	31.95	29.43	28.97	29.43	30.83	29.57	28.29	30.58
C:N Ratio																		
Value Range																		
Weighted Average																		
NH-3																		
Value Range												.11-23.49	.13-16.38	1.01-20.30	.52-41.17	0.17-22.26		
Weighted Average												9.96	7.76	11.38	12.44	11.22		
Ca lbs/T																		
Value Range																		
Weighted Average																		
Mg lbs/T																		
Value Range																		
Weighted Average																		
% H2O Extract P																		
Value Range																		
Weighted Average																		

MD 2012 Broilers

2012	Sample Number	Mean	Standard Dev	Min	Max	Median	Total #/ton
TOTAL N% (DRY BASIS)	174.00	4.22	0.67	2.17	6.10	4.13	84.4
TOTAL P205% (DRY BASIS)	174.00	3.86	0.64	2.61	6.03	3.86	77.2

MD 2013 Broilers

2013	Sample Number	Mean	Standard Dev	Min	Max	Median	Total #/ton
TOTAL N% (DRY BASIS)	377.00	4.27	0.73	2.17	6.63	4.26	85.4
TOTAL P205% (DRY BASIS)	377.00	3.75	0.78	1.71	6.75	3.66	75

WENGER FEEDS
P.O. Box 26 ● Rheems, PA 17570 ● 1-800-692-6008 Office ● 717-367-5913 Fax ● www.wengerfeeds.com

January 16, 2015

Deanna Baldwin
Program Manager, Food Quality Assurance
Maryland Department of Agriculture
50 Harry S. Truman Parkway
Annapolis, MD 21401
410-841-5769

Ms. Baldwin:

All ISE layer and pullet feed used in Maryland and manufactured by Wenger Feeds since July 2008 has contained phytase. Please let me know if you need any additional information.

Sincerely,

Clay Henry
Quality Manager

Cc: Barry Griffen - ISE America

P.O. Box 2277, Harrisonburg, VA 22801; 540-433-2451; hobey@vapoultry.com

November 5, 2014

Ms. Rachael Rhodes
Maryland Department of Agriculture
50 Harry S Truman Parkway
Annapolis, Maryland 21401

Dear Ms. Rhodes:

Thank you for requesting a letter describing changes in poultry litter management over time. Specifically, you asked me to address grower cleanout practices, in-house composting techniques, the use of Phytase, and the use of PLT.

Grower Cleanout Practices – Your time constraints prevent the degree of data gathering necessary for a comprehensive, detailed description. However, a 2012 study led by Dr. James Pease of Virginia Tech entitled, Evaluating Net Benefits/Impacts of a Shenandoah Valley Poultry Litter to Energy Power Plant, contains a snapshot of some litter management practices at that time. I believe the described practices, such as cleanout frequencies, continue today, although litter management has always evolved as science has brought about better technologies and techniques. Generally speaking, the trend over the past two decades has been fewer total cleanouts between flocks. The Virginia Tech study, based on industry surveys, indicates the following common cleanout practices:

- Fewer than a quarter of broiler chicken growers in the Shenandoah Valley conduct a total cleanout after each flock,
- About two-thirds of broiler chicken growers in the Shenandoah Valley crust out between flocks and perform a whole house clean out once per year,
- Few turkey growers clean out after every flock. Instead, the study indicates, current common practice is to perform a total house cleanout once every one to two years.

The Virginia Tech study provides a detailed overview of litter management practices in the Shenandoah Valley. I strongly encourage the Poultry Litter Subcommittee to utilize Dr. Pease's study as it makes recommendations to the Chesapeake Bay Partnership associated with current manure production and manure management data used in the models estimating nitrogen and phosphorus generation from poultry production in the Chesapeake Bay watershed. Most notably, it indicates that total litter production in the four main poultry producing counties in the Valley is about 350,000 tons annually, which is about seven times less than the 2.6 million tons apparently assumed in the Bay Model for those counties.

In-house Composting – Typically, a two to six inch layer of bedding material (e.g., pine shavings, peanut hulls) forms an absorptive base. After a total cleanout, new bedding ranging in depth from 4-6 inches may be applied to start a new flock. Most growers choose to remove only a part of the caked litter after a flock cycle and apply a topping of one to two inches of bedding. Some growers partially compost the litter in piles or windrows to dry the litter to reduce ammonia levels and bacterial loading on the following flock.

Use of Phytase – Virginia poultry companies have been using the Phytase enzyme since about 1999. Research has shown that a 30 percent or greater reduction may be possible in some circumstances; however, variations in operations and factors such as bird size may impact operations' actual reductions.

PLT – Poultry growers who do not perform a total cleanout after each flock utilize products during the colder months to treat the litter for ammonia control. This is necessitated due to higher bedding moisture content than fresh bedding and less poultry house ventilation during cold weather. Industry animal welfare standards require in-house ammonia concentrations to be less than 25 parts per million. These products fall into two categories: 1.) dry acidifiers such as PLT; and 2.) liquid alum. In order to keep ammonia at less than 25 ppm, the dry products are commonly applied prior to flock placement at 100-125 pounds/1000 square feet. If a grower chooses instead to use a liquid product, it is applied at 25-35 gallons per 1000 square feet.

Again, I hope that you will carefully consider the Virginia Tech study referenced above as well as the work of Dr. Jim Glancey of University of Delaware. The Bay Model's significant overestimation of poultry manure generation appears to be in part due to reliance upon data and industry practices outlined in the 2003 ASAE Standard 391.4, which is based on studies performed more than twenty years ago and do not reflect subsequent ongoing innovations in bird genetics, nutrition, and production practices. The overestimation of litter generation in the Shenandoah Valley is far from trivial; indeed, it is a massive inflation from reality that must be corrected along with corresponding unrealistic and unnecessary components of Virginia's Bay TMDL Watershed Implementation Plan.

Virginia's poultry industry is committed to doing its part for water quality, and has already implemented measures costing millions of dollars. We are hopeful that the subcommittee's work will result in the use of sound science and accurate assumptions to guide our efforts moving forward.

I hope this information will be helpful. Please let me know if you have additional questions. Thank you.

Sincerely,

Hobey Bauhan

Hobey Bauhan
President

November 6, 2014

Mrs. Rachael Rhodes
Maryland Department of Agriculture
50 Harry S Truman Parkway
Annapolis, Maryland 21401

Dear Mrs. Rhodes:

In response to a recent Poultry Litter Subcommittee document, you requested that Delmarva Poultry Industry, Inc. share comments to explain industry changes related to manure management and chicken house practices over time to provide additional supplemental information for the Phase 6 draft of the Chesapeake Bay Model.

In general, we believe the thorough analysis of litter generation and nutrient content conducted by Dr. Jim Glancey at the University of Delaware captures the more recent grower litter handling practices.

Our comments on the areas you identified are shown below. Given more time to respond to the inquiry and an earlier and better understanding of what you were seeking, we would have been able to provide a more complete response.

- Trends in industry changes such as grower cleanout practices

  We are not aware of any of Delmarva's chicken growers doing whole-house cleanouts on an annual basis. The range of whole house litter removal ranges from perhaps once every two years to as long as once every eight years or more. Cleanouts are not as frequent as years ago because of the shortage of replacement bedding material, the higher cost of replacement bedding material, and better in-house litter management that extends the useful life of the litter.

- In-house composting techniques

  In-house composting, aka windrowing, has become a more used practice in the last four years. Rejuvenating the litter extends its useful life and that means less litter is removed and less new bedding material is added. As an example, the 2010 president of Delmarva Poultry Industry, Inc., a chicken grower in Maryland, reported that in the final year of cake-out litter removal prior to windrowing, he removed 350 tons of litter. The following year, the first in which he used in-house windrowing, he removed 166 tons, and in the next year he removed 155 tons. Thus, the mass of litter removed in the second year of windrowing was half what it was prior to adoption of this practice. His results no doubt are similar to other growers. This is a good example of less litter needing to be removed from chicken houses.

- The addition of phytase

  Phytase has reduced the amount of phosphorus in the excreta since its inception as a commercial chicken industry practice circa 2000. Laboratory results show reductions of 30% from pre-phytase practices are possible. Research continues on phytase use in conjunction with other ingredients to the diet to allow more phosphorus retention by the birds.

- Use of PLT

  According to the University of Delaware Extension Poultry Agent, close to 95% of Delmarva chicken growers use PLT or other litter amendment products to control ammonia emissions from the houses, while improving health conditions for the birds. Additionally, products similar to PLT help bind ammonia to the land applied bedding material to prevent movement to waters of the United States.

We agree with the recommendations of the PLS shown on pages 18 & 19 of the report **RECOMMENDATIONS OF THE EXPERT PANEL TO REDEFINE POULTRY LITTER NUTRIENT GENERATION, LITTER VOLUME GENERATION AND POULTRY POPULATION DATASETS WITHIN THE CHESAPEAKE BAY WATERSHED**

"Therefore, the PLS recommends the following changes to better model and ultimately predict current and historic N and P generation from the poultry industry:

 The bay model must be modified from a bay-wide, single set of inputs for estimating N and P generation across the entire watershed to a set of state-specific inputs that reflect the unique production attributes of each state as summarized in the attached data templates. Where there is insufficient state-specific data for a particular poultry species, the current inputs being used by the model will be the default.

 States will be responsible for providing annual updates for the parameters contained in the state-specific data templates attached to this report. As sufficient new data becomes available for a state and/or species, states can recommend that the default inputs be replaced with new data.

 The CBP will be responsible for obtaining and applying annual NASS production numbers as a basis for estimating annual broiler and turkey populations for each state at the county level. These estimates should based on the annual NASS *production* data set for each state. State wide NASS population data should be projected to the county level using the relative distribution of birds from the previous Ag Census.

 Each state will be responsible for reviewing and approving the NASS-based approach for estimating broiler and turkey populations – on a state basis - every five years after the Ag Census data is published.

 For bird species other than broilers and turkeys, states can report annual state-specific bird population data using the data templates. If no annual state-specific data exists, the current forecasting technique used in the model will be used to predict bird populations based on previous Ag Census data.

forecasting technique use