



# A Review of WV Poultry litter analysis from 1994 to 2010 that demonstrates a continual fluctuation in nutrient concentrations resulting from changes in Poultry Feed Formulations and New Storage Methods



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## Introduction

Nutrient management planning requires continual nutrient analysis of poultry litter to determine accurate agronomic land application rates. To understand challenges nutrient management planners face with these changes in poultry litter nutrient concentration, an analysis was conducted of sample results submitted to the West Virginia Department of Agriculture Nutrient Management Lab, from 1994 to 2010.

## WV Poultry Production in 2010

- Broilers in WV was 87,600,000\*
- Turkeys in WV was 3,100,000

\* National Agricultural Statistics Service  
2010 Report for WV

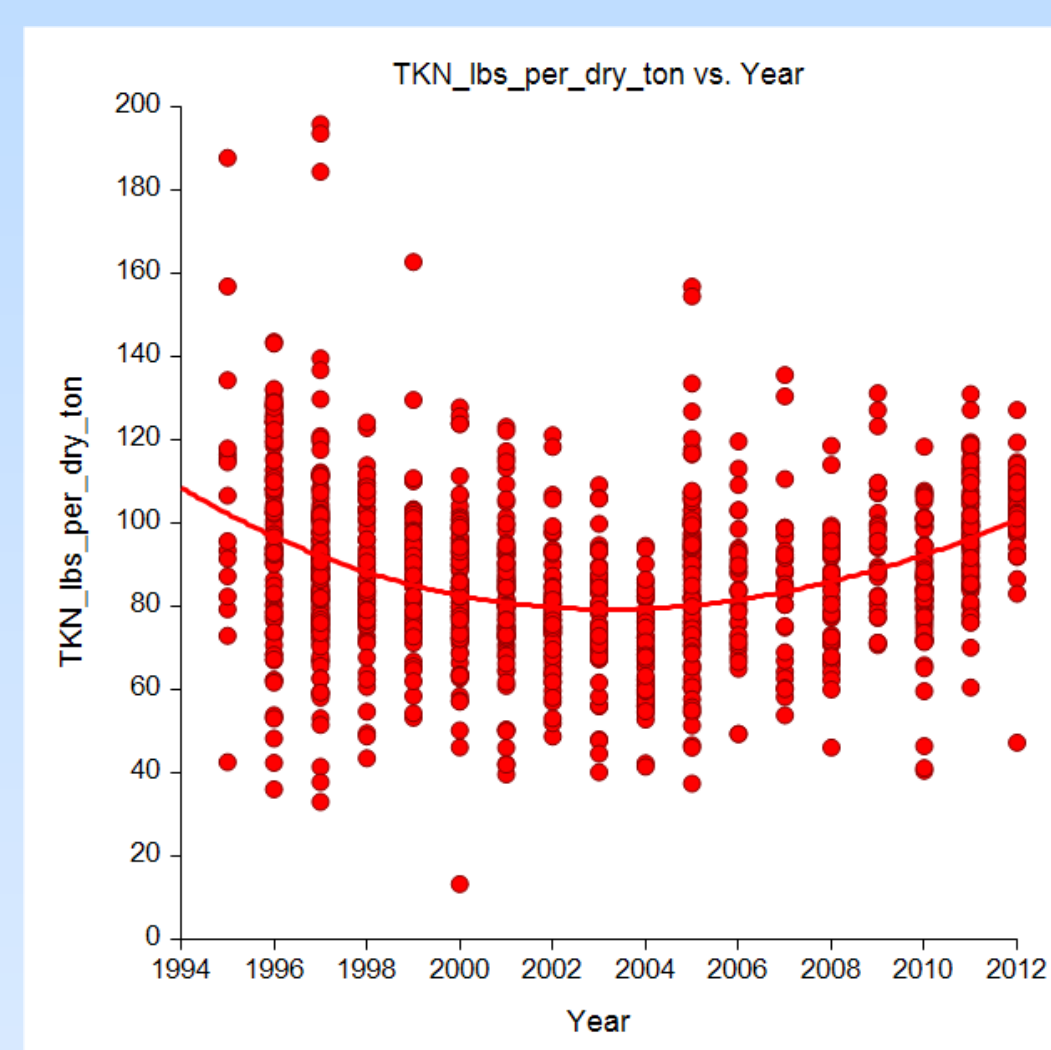
## Factors Contributing to Nutrient Changes in Poultry Litter

- **Storage methods** have evolved during the study period. From 1994 to early 2000s litter was cleaned from houses after each flock. Now in house storage occurs with a major clean out once per year or every other year.
- **Feed Formulation** by integrator nutritionists continually select least cost feed sources. Consumer demand for different carcass characteristics causes feed formulation changes, such as increased breast meat production.

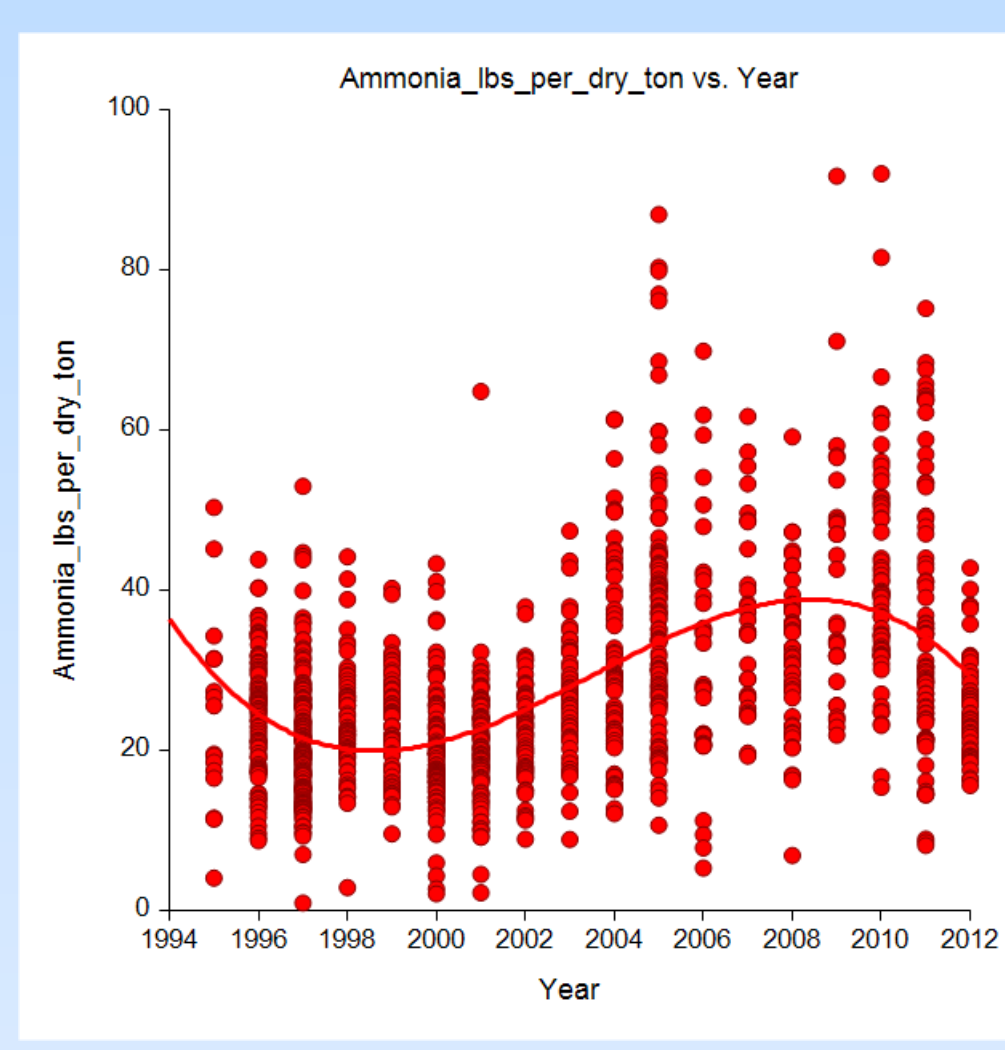
## WV Poultry Litter Sample Characteristics

- WV Dept. of Agriculture provides free Manure analysis to farmers
- Manure samples were submitted by farmers and consulting NM planners
- All storage methods (in house, roofed storage, covered pile, uncovered pile) were combined
- Data shows large variability of nutrient concentrations within years and across years

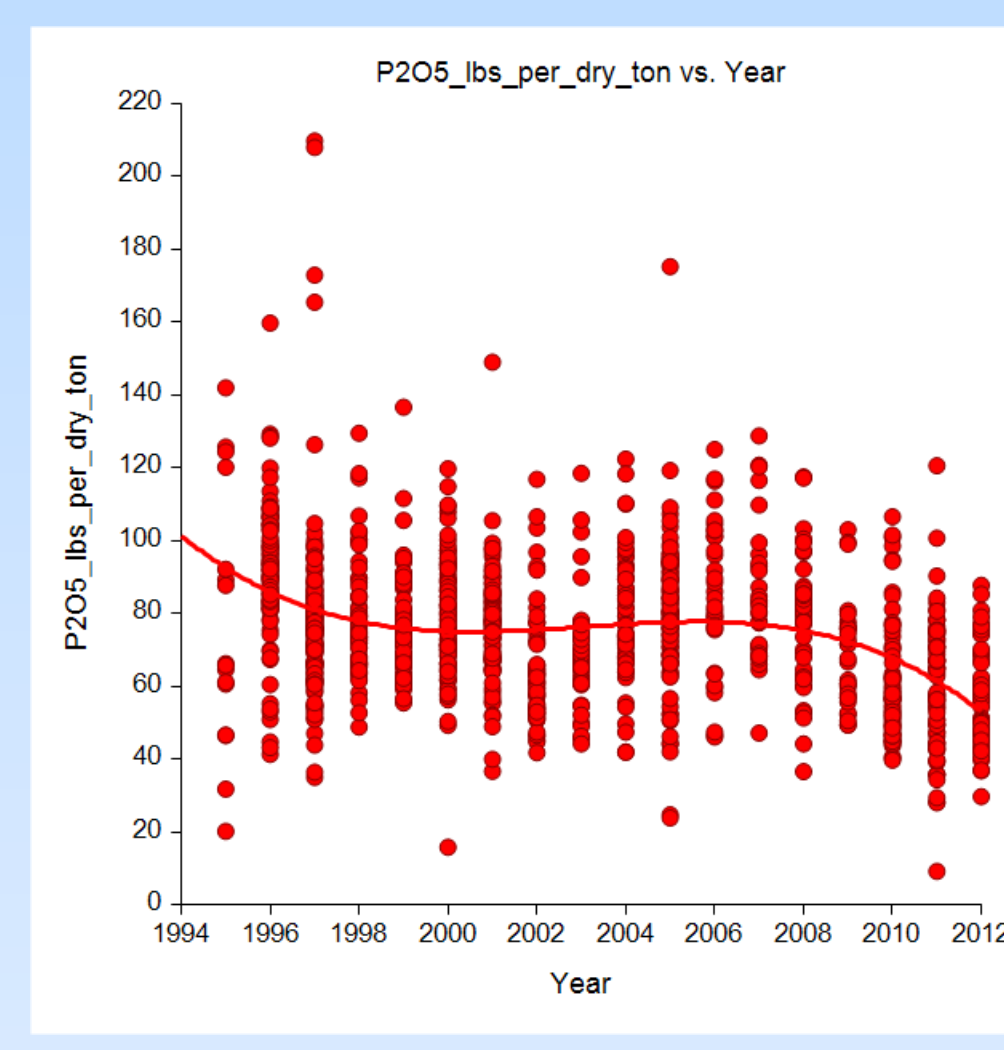
### Broiler Litter, TKN



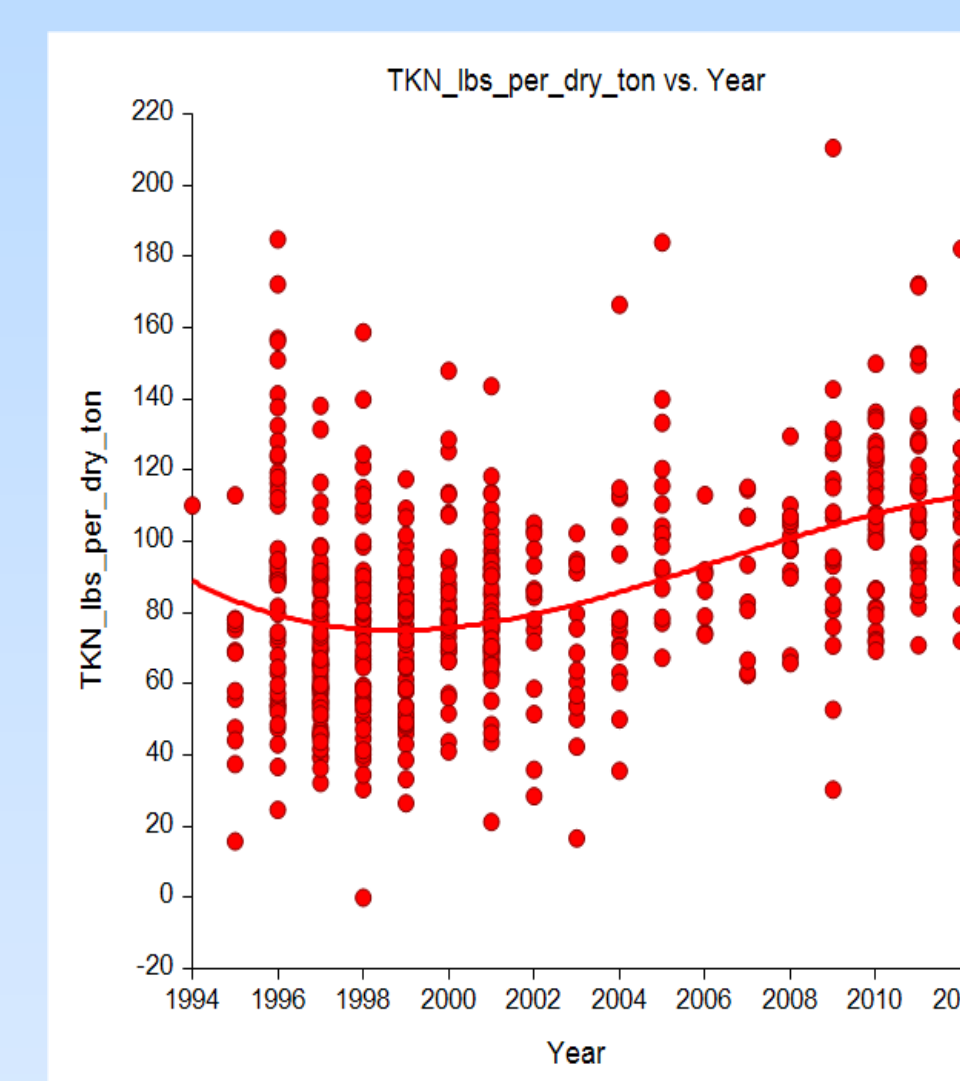
### Broiler Litter, Ammonia



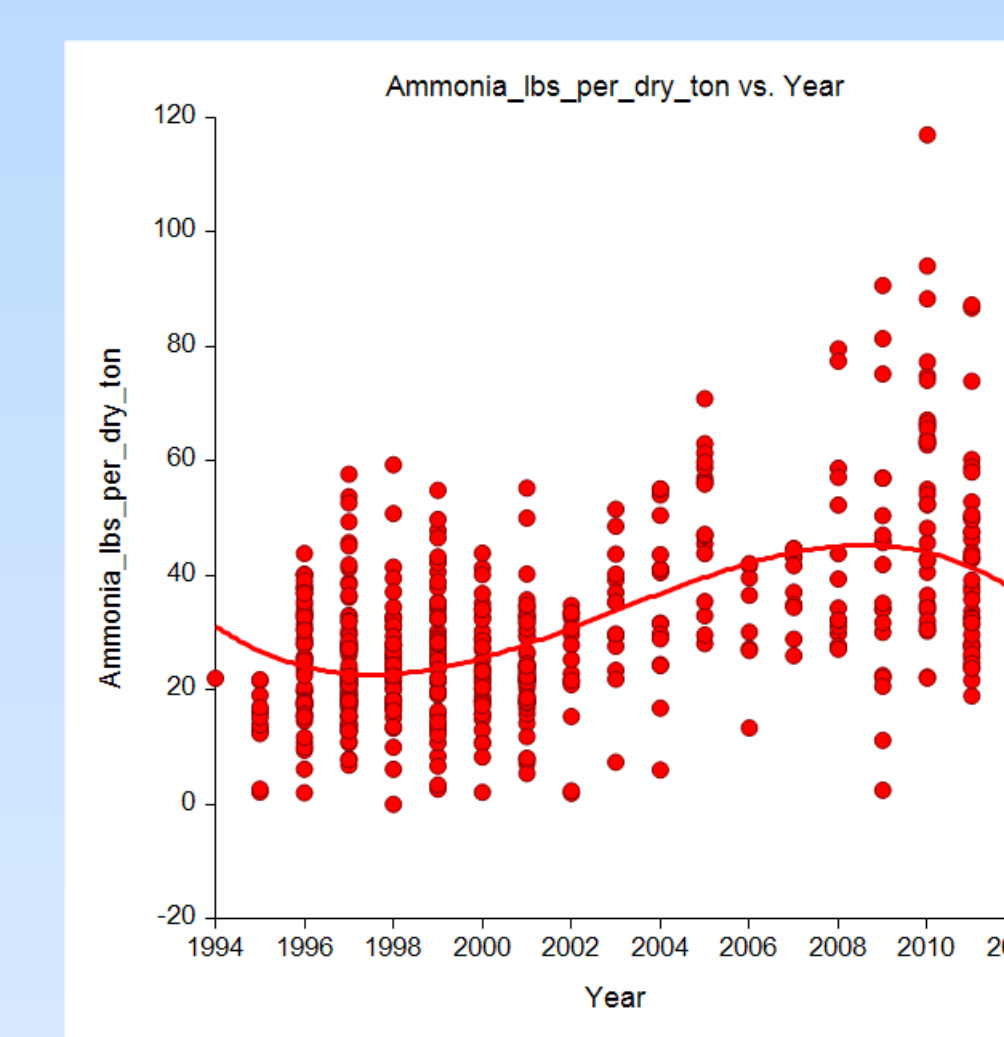
### Broiler Litter, P<sub>2</sub>O<sub>5</sub>



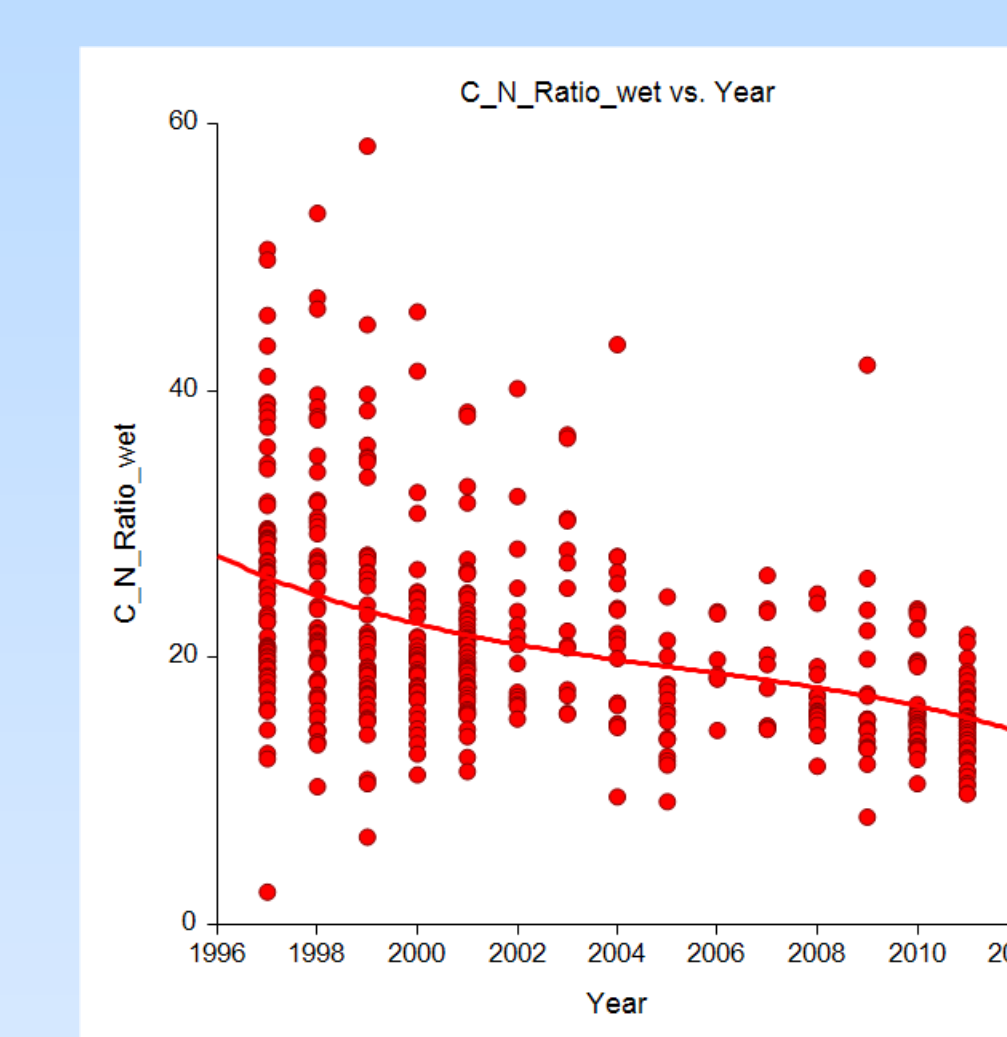
### Turkey Litter, TKN



### Turkey Litter, Ammonia



### Turkey Litter, C:N Ratio



## Turkey Litter, Nitrogen Changes

- Turkey Litter TKN and Ammonia concentration trended upward from 1998 to 2012. The C:N ratio trended downward during the same time period and supports the increases in N content of turkey litter.
- Feed Formulation
  - Turkey producers are growing larger birds with a greater breast meat component. Nutritionists have increased the amino acid density of diets to achieve maximum breast yield.

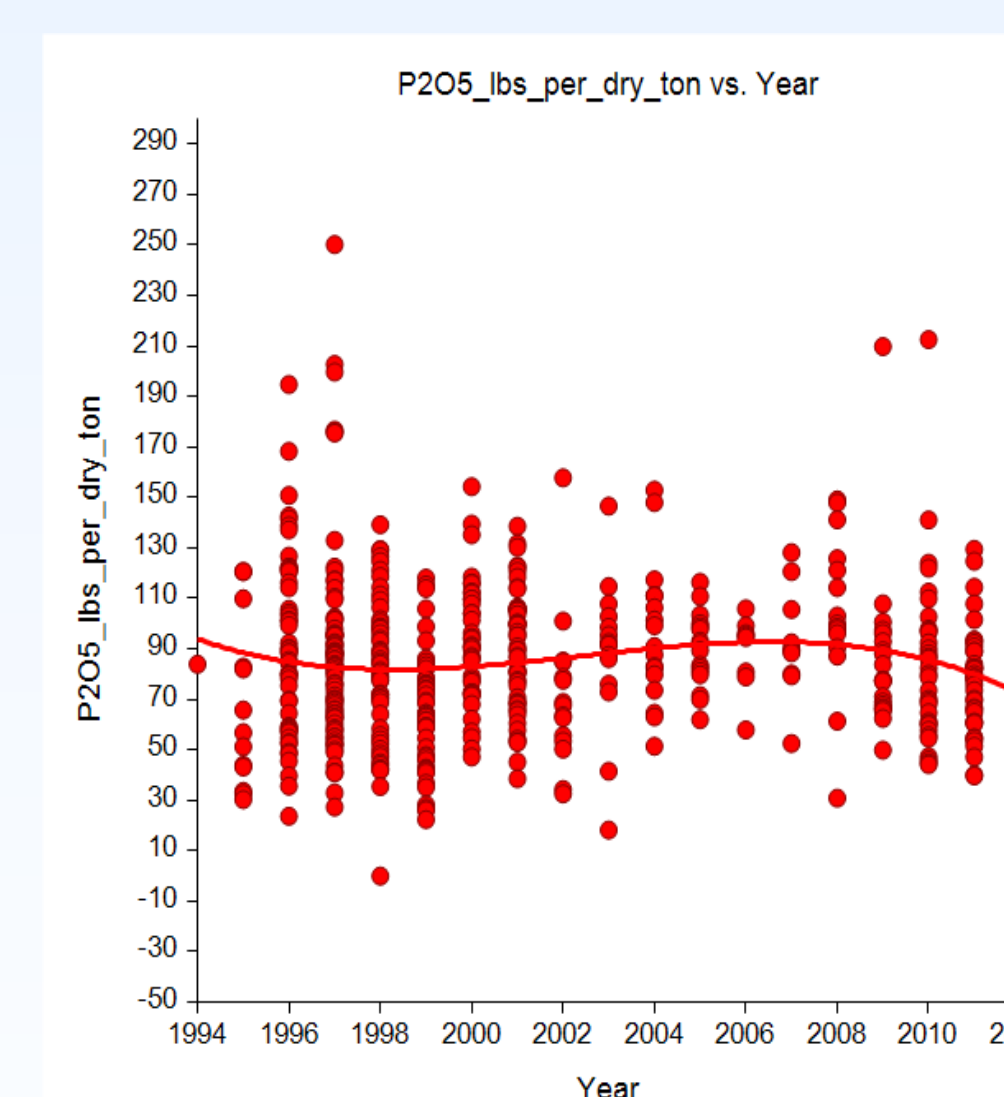
## Broiler Litter Nitrogen Changes

- TKN and Ammonia in broiler litter have increased during the period from 2000 to 2012.
- Storage Methods
  - Poultry producers changed storage methods during this time period from clean out after each flock to retained litter in houses with one full clean out per year. A reduced level of shavings are now being used resulting in higher manure content in litter.
- Feed Formulation
  - During the time period 2000 to 2012 Broiler breeding efforts resulted in increased breast meat yields that required higher amino acid levels to meet the nutritional needs of these birds

## Broiler Litter Phosphorus Changes

- Phosphorus concentrations were stable from 1994 to 2006 time period. The time period from 2008 to 2010, the trend line for P levels has decreased.
- World Phosphate Rock Prices
  - From 2007 to 2008, phosphate prices nearly doubled. Dramatic changes in Rock Phosphate prices pushed nutritionists to revise P nutritional needs of Broilers.
- Feed Formulation
  - Phytase, an enzyme that improves Phosphorus utilization in mono-gastric species, has become adopted by Integrators as a response to environmental concerns. This product has allowed nutritionists to reduced P levels in Broiler feed.

### Turkey Litter, P<sub>2</sub>O<sub>5</sub>



## Turkey Litter, Phosphorus Changes

- Phosphorus changes from 1994 to 2012 have been negligible.
- Feed Formulation
  - Feed requirements for P are not well researched so recommended nutritional requirements have not changed since the mid 1980's. The grow out period is long and the investment in feed is high to create large turkeys. A reduced P level could reduce skeletal integrity and result in a production loss. The increased use of meat and bone meal used in turkey feed formulations, brings added P into the diet along with protein needed for heavier birds and increased breast meat production.

## Conclusions

- Poultry breeding programs and changes in cost for feed constituents result in nutritionists continually reformulating feed with resulting nutrient changes.
- Wide variability within the data presented shows the extent that storage method and litter management has on nutrient content.
- Standardized sample collection methods can reduce variability of litter analysis, but to insure that nutrient management planners are as accurate as possible when developing a poultry litter loading rate on an individual farm, the planner should annually collect a litter sample and submit for analysis.

## References

- Hang, Wen-yuan. 2009. *Factors Contributing to the Recent Increase in U.S. Fertilizer Prices, 2002-08 / AR-33 Economic research Service/USDA*
- *Nutrient Requirements of Poultry, Ninth Revised Edition, 1994. Subcommittee on Poultry Nutrition, Committee on Animal Nutrition, NRC. Nat. Academy Press, Wash. DC*
- Griffith, Doug. 2012. *West Virginia Dept. Agriculture Nutrient Management Lab, Moorefield WV. Poultry Litter Analysis Samples 1994 to 2012*