The role of litter amendment use in the Delmarva broiler industry

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Introduction

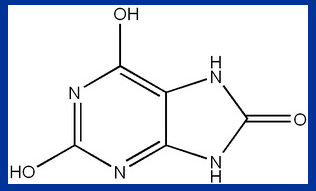
- The main purpose of poultry litter amendments is to reduce ammonia volatilization.
- Other benefits of poultry litter amendments include:
  - Lower ventilation rate required
  - Decrease fuel usage
  - On-farm food safety
  - Flock health/welfare
  - Environmental benefits

Introduction

- Where does all of the ammonia (NH3) come from?

Protein source:
made up of amino acids
which contain NH3

Uric Acid



Bacteria living
in the litter

NH3

Introduction

- Use of litter amendment on Delmarva
  - Applied prior to chick placement (once/flock application).
  - Initially amendments were used during the winter months and only in the brood chamber of the chicken house.
  - Now wider adoption of year round whole house application.
  - Typically, poultry company pays for the amendment product and grower pays for the application of the product.

Common Litter Amendments

- Temporarily bind/inhibit ammonia release
- Chemicals that lower pH (acidic) of the litter.
- Contain either sulfate or sulfuric acid
- Some reduce litter moisture
- Form ammonium sulfate, a water soluble fertilizer
  1. PLT® (sodium bisulfate)
  2. AL + Clear® (aluminum sulfate)
  3. Poultry Guard® (acidified clay)
  4. Citric acid (organic production)

Chemistry of Acidifying Litter Amendment Products

Litter Treatments		Water		Sulfuric Acid	By-Products
Acidified clay, alum, sodium bisulfate	+	H_2O	⟶	H_2SO_4	spent clay, various salts

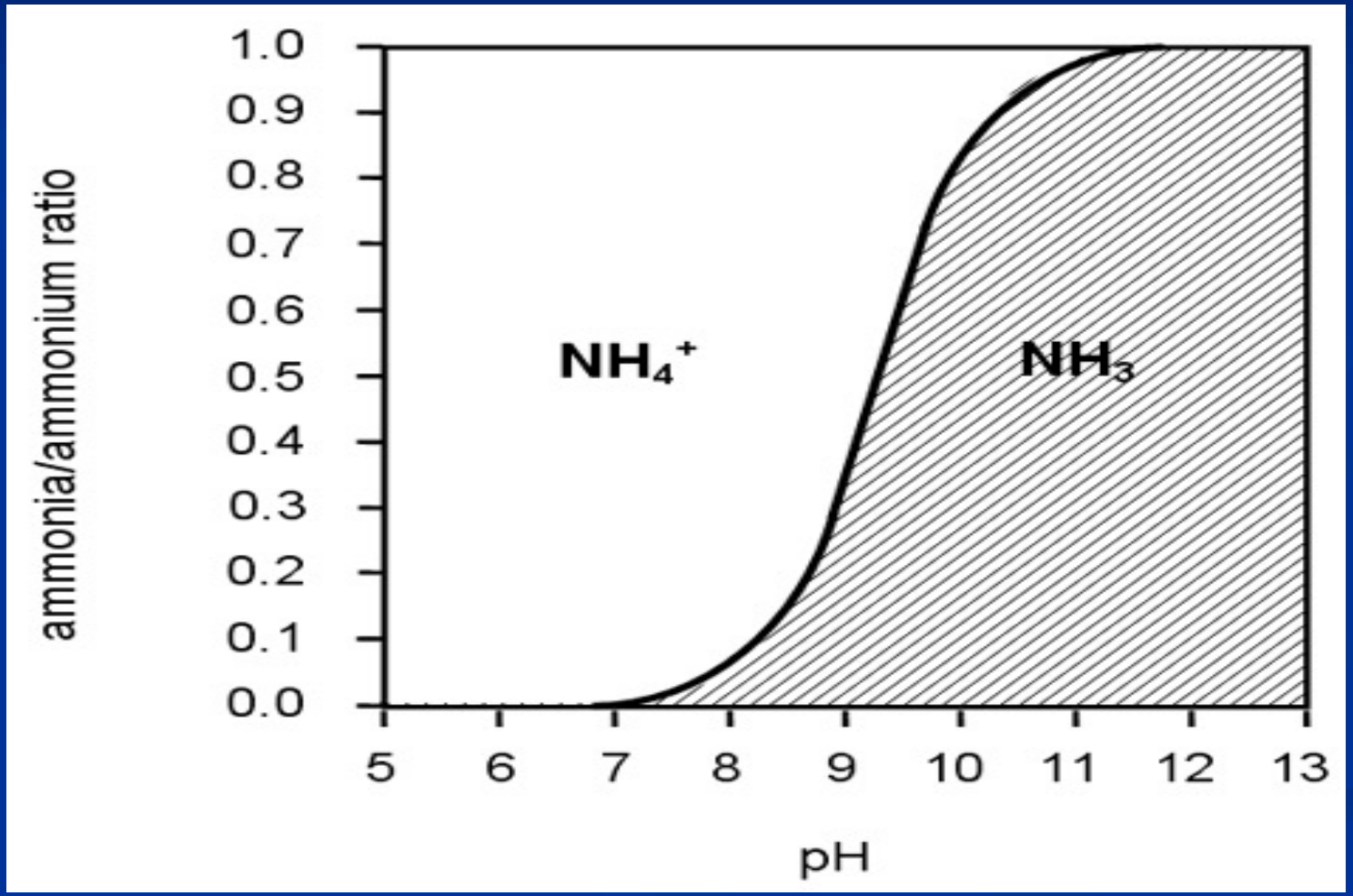
$$H_2SO_4 + NH_3 \longrightarrow (NH_4)_2SO_4$$

Sulfuric acid + ammonia ⟶ ammonium sulfate

Introduction

- Four main factors influence ammonia volatilization from poultry litter:
  1. Nitrogen level in the manure
  2. Moisture
  3. Heat
  4. pH

pH and ammonia production



(Gay and Knowlton, 2005)

Data sources and method available to identify the implementation of litter amendments for ammonia emission mitigation on Delmarva?

- Multiple applications of a litter amendment throughout a flock have been studied (Weiss et al., 2015).
- Treatments:
  - 1. Litter amendment applied on day 0 in the brood chamber. (100 lb/1,000 ft^2).
  - 2. Litter amendment was applied on day 0 (brood chamber, 100lb/1,000 ft^2), day 21 and day 35 (50 lb/1,000 ft^2).
- Results: 25.2% overall reduction of ammonia for the entire growout period (42 days).

Introduction

- Challenges to implement litter amendment usage on farms and opportunities for improving future implementation data.
  - Short layout time between flocks.
  - Cost of the product and application
  - Lack of equipment/technology for multiple applications of litter amendments during a flock.

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Introduction

- Level of data quality and completeness for identifying commercial production management and use of litter amendments for ammonia emission mitigation?
  - Amendment manufacturers
- Potential opportunities for improving future implementation data?

Introduction

- Conclusions for the potential of representing poultry ammonia emissions and changes over time (with litter amendment use) through commercial production and research data.
  - The use of litter amendments to lower ammonia volatilization is widely adopted by growers.
  - In most cases, litter amendments are used year round however the application rate changes.

Thank you!

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