TREATMENT OF POULTRY LITTER TO REDUCE SOLUBLE PHOSPHORUS

(Tons)

CODE 193

DEFINITION
Treatment of poultry litter with amendments (such as alum) to reduce soluble phosphorus.

PURPOSE
- Primary: To minimize phosphorus runoff from application fields by reducing the soluble phosphorus in poultry litter.
- Secondary: To reduce ammonia emissions from poultry litter; improve or protect animal health; and/or improve or protect air quality.

CONDITIONS WHERE PRACTICE APPLIES
This practice may be used where runoff of phosphorus from field-applied litter can cause water quality impairment.
This practice may also be used in poultry houses where continuous use of litter by poultry produces unfavorable growing conditions due to high ammonia emissions.

CRITERIA
A. Use of Alum as a Litter Amendment to Reduce Soluble Phosphorus in the Litter and/or to Improve Air Quality in Poultry Houses by Reducing Emissions of Ammonia

Criteria for Minimizing Phosphorus Runoff from Litter Application Fields
Rate. Use the following formula to calculate the amount of alum needed to achieve a designated or desired reduction in soluble P in runoff:

\[ \text{Pounds of alum per bird} = \frac{\text{Soluble P reduction in runoff} \times \text{Pounds of alum per bird}}{375} \]

Guides:
1. For reductions in soluble P of approximately 50%, apply dry alum at a minimum rate of 100 lbs. of dry, per 1,000 sq. ft. alum (or equivalent amounts of other forms of alum).
2. For reductions in soluble P of approximately 75%, apply dry alum at a minimum rate of 200 lbs. of dry alum per 1,000 sq. ft. (or equivalent amounts of other forms of alum).

Form. If dry alum is used, the product shall be 95% pure $\text{Al}_2(\text{SO}_4)_3\cdot 14\text{H}_2\text{O}$. The particle size distribution of dry alum shall be:

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For Standard Ground: 100% of the material shall pass a 4 mesh sieve and 90% shall pass a 6 mesh sieve.

If liquid alum is used, the product shall be equivalent to the active ingredient of 48.5% dry alum equivalent (dry weight/volume).

Criteria for Reducing Ammonia Emissions from Poultry Litter
To reduce ammonia emissions from poultry houses, alum may be applied at a rate using any of the following methods for calculation or by using the guides in #3.

1. Pounds of alum per bird = number of days of at least 50% reduction ÷ 240
2. Apply alum to poultry litter at a rate of 0.2 lb. per bird.

3. Guides:
   a. To achieve at least a significant reduction in ammonia emissions for approximately 2 weeks, apply 100 lb. dry alum to each 1000 square feet (or equivalent amount of other forms of alum).
   b. To achieve at least a significant reduction in ammonia emissions for approximately 4 weeks, apply 200 lb. dry alum to each 1000 square feet (or equivalent amount of other forms of alum).

Method. For dry alum materials, broadcast product evenly over the litter surface and incorporate to a minimum of 0.5 inches.

For liquid alum material, broadcast spray product evenly over the litter surface. Incorporation is not required for liquid alum.

Timing. For broiler operations, apply the product between flocks. Apply alum material only after the litter has been either decaked or tilled to a depth of at least 4 inches. Do not apply material after the last flock has been removed and before total clean-out.

If application to the litter prior to adding flocks is not consistent with the specific producer’s program for maintaining air quality (reducing ammonia emissions) in the poultry houses, alum may be applied to the litter following the last flock prior to cleanout.

Land application of litter will be according to Nutrient Management standard (Code 590).

B. Use of Other Products as Litter Amendments to Reduce Soluble Phosphorus
Other products to reduce soluble phosphorus in poultry litter will be approved for usage based on findings from research evaluations of the respective product. Products shall be applied at the rate, timing, and methods as substantiated by the research findings for the respective product.

C. Use of Other Products as Litter Amendments to Improve Air Quality in Poultry Houses by Reducing Emissions on Ammonia
Other products to reduce ammonia emissions in poultry houses will be approved for usage based on findings from research evaluations of the respective product. Products shall be applied at the
rate, timing, and methods as substantiated by the research findings for the respective product.

**CONSIDERATIONS**

Reduced rates of alum can be utilized if diet modification has reduced total phosphorus content of the manure.

Higher application rates of alum can be used when additional ammonia or phosphorus reductions are desired.

Consideration should be given when applying this material to phosphorus deficient soils since alum reduces available phosphorus in the litter. Soil test to monitor available soil phosphorus levels.

Use of alum will reduce ammonia emissions thus reducing the ventilation requirements, which in turn will reduce energy (heating) costs.

Spot treatment may be warranted in areas where the litter moisture becomes higher due to water spills or leaks.

Multiple treatments may be required for certain poultry types, such as broiler breeders and turkeys.

Application of alum to poultry litter has been shown to reduce runoff of other potential contaminants such as heavy metals, carbon, and hormones (such as estrogen) from application fields.

Application of alum may also lower pathogen numbers in litter and on poultry carcasses.

If the primary reason for use of alum is to reduce emissions of ammonia, alum may be applied in half of the house when half-house brooding (until 10-14 days). However, the rate should be no less than 10% by litter weight. Less reduction of phosphorus in runoff can be expected with this application rate.

**OPERATION AND MAINTENANCE**

Follow MSDS information to ensure safety and health while applying the alum. All personnel must wear goggles for eye protection and dust masks to prevent inhaling dust where applying and incorporating alum into poultry litter.

Gloves must be worn when handling alum to prevent skin burns or irritation.

Apply the material so there is even distribution over the intended treatment area. Ensure that incorporation is even and to a uniform depth.

Application equipment shall be calibrated to deliver rates within +/- 15% of the planned rate.

Application equipment shall be cleaned and maintained after each application period. Alum is caustic material.

Take soil samples and analysis of the application fields according to the prescribed nutrient management plan to ensure adequate soil fertility for the intended crop rotation.

**PLANS AND SPECIFICATIONS**

Specification for this practice will be developed specifically for each house treated. The individual house specification shall be documented on appropriate job sheets, narrative statements in the conservation plan, or other appropriate documentation. Plans and specifications shall include these items:

- Location of houses to be treated.
- Tons of litter to be treated
- Alum application rate.

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• Form of material to be applied.
• Timing of the application.
• Method of application, including the equipment used for incorporation
• Operation and maintenance, including safety instructions discussed with the producer

REFERENCES
Babb, Charles, 2000. Special Study in Chesterfield County to Evaluate the Use of Alum to Treat Poultry Litter


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