

Poultry Guard™

as a Litter Amendment

The volatilization of ammonia has been attributed to microbial decomposition of nitrogenous compounds, principally uric acid, in poultry house litter. Numerous laboratory and field studies have shown how ammonia affects bird health and performance. Continued exposure to ammonia levels in the poultry house as low as 10 parts per million (ppm) can damage the bird's respiratory system and allow infectious agents to become established, leading to declining flock health and performance. Body weight, feed efficiency, and condemnation rate may be poorer in birds exposed to levels of ammonia that exceed 25 ppm.

Litter pH plays an important role in ammonia volatilization. Once formed, the free ammonia will be in one of two forms: as the uncharged form of NH_3 or the ammonium ion (NH_4^+), depending on the pH of the litter. Ammonia concentration tends to increase with increasing pH. Ammonia release remains small when litter pH is below 7, but can be substantial when litter pH is above 8. Uric acid decomposition is most favored under alkaline ($\text{pH} > 7$) conditions. Uricase, the enzyme that catalyzes uric acid breakdown, has maximum activity at a pH of 9 with uric acid decreasing linearly for more acid or alkaline pH values. One principal ureolytic bacterium, *Bacillus pasteurii*, cannot grow at neutral pH but thrives in litter above 8.5. Typically, litter pH in a broiler house ranges between 9 and 10. The combination of these factors contributes to ammonia formation and volatilization within the poultry house environment.

Litter treatments may be used to enhance the composition of the litter as a fertilizer or as part of a best management practice to reduce food-borne pathogens. Ammonia-reducing litter treatments offer a potentially better in-house environment for both birds and growers. They may also play an

increasing role in reducing ammonia and odor emissions from poultry facilities. In recent years, the reasons for using a litter treatment and any potential benefits from its use have expanded to include improvements in performance and environmental concerns.

The primary question for poultry growers is "What is the best litter treatment?" Unfortunately, this most frequently asked question has no general answer, and the difficulties in addressing this question may be complicated and numerous. There has never been an experimental study evaluating the various litter treatment products under various management conditions. Litter moisture, brooding and lighting programs, ambient temperature, strain type, ventilation management, litter management, and disease challenge are only a few of the variables that can impact product selection, efficacy, and potential return on investment. Although different litter treatments vary in their ability to control ammonia, each offers a unique set of characteristics that need to be considered in selecting the appropriate product to meet an individual's needs. The litter treatment that offers the best return on investment will depend on the user's ability to select the product that best meets the overall goals of his application.

Poultry Guard litter amendment is a granulated sulfuric acid product that controls ammonia volatilization. This product eliminates ammonia by converting litter ammonium to ammonium sulfate, lowering litter pH to acidify litter, and providing potent ionic effects that enhance acidification. Ammonia (NH_3) produced from poultry manure by the breakdown of uric acid can be inhibited if converted to NH_4^+ (ammonium), which can be accomplished by lowering litter pH. Poultry Guard is an absorbent Fuller's earth carrier loaded with pure concentrated sulfuric acid that releases hydrogen ions (H^+) that will attach to ammonia to form ammonium, which further reacts with sulfate ions to form ammonium sulfate— $(\text{NH}_4)_2\text{SO}_4$. Ammonium sulfate is simply a water-soluble fertilizer. Because of these reactions, the amount of ammonia emitted from the litter will be reduced, which will increase the nitrogen (N) content of the litter.

A rate of 50 to 100 pounds of Poultry Guard per 1,000 square feet of floor space used as the brooding area is the typical treatment recommendation. Treatment area, therefore, varies from 30 to 60 percent of the total floor area depending on house size and brooding management considerations. For most broiler houses, this will equate to one-half ton of amendment per house for each grow-out. A lower rate of 50 pounds per 1,000 square feet will control normal levels of ammonia during grow-out. At the rate of 100 pounds per 1,000 square feet, higher ammonia levels will be significantly controlled. Rate selection for an individual's operation will be dependent on current management practices and needs based on such factors as ventilation control and litter moisture levels. Higher rates are recommended where high ammonia conditions prevail.

Before application, the broiler house needs to be de-caked or rototilled. Afterward, Poultry Guard can be broadcast at the chosen level using a drop spreader. During application, gloves should be worn to prevent skin irritation and burns. Goggles should be worn for eye protection, and a dust mask should be worn to prevent dust inhalation. Equipment should be rinsed and lubricated after application.

Research has demonstrated cost savings to the poultry producer from the use of products of this type. Cost savings can be realized due to a reduction

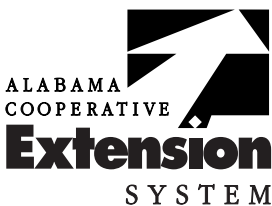
in heating and ventilation costs and improvements in performance. Treatment of litter will increase the nitrogen content of the litter, creating a more valuable source of fertilizer.

Experiments and field tests resulted in the following:

- Decreased fuel usage
- Decreased house ammonia levels
- Decreased litter pH levels
- Improved performance

Summary

- The use of Poultry Guard in broiler litter management can impact performance and environmental concerns.
- Using a litter amendment can effectively reduce in-house ammonia volatilization and improve performance.
- A rate of 50 pounds per 1,000 square feet will provide ammonia control and pathogen reduction.
- Poultry Guard does not negatively impact the fertilizer or feeding value of litter.
- Wear protective gloves, goggles, and a mask when applying this product.



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