Project #F009

Evaluation of Surface-Applied Char on the Reduction of Ammonia Volatilization from Broiler Litter

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"The Effect of Char on Ammonia Levels in Litter"

Ammonia (NH_3) can have detrimental effects on poultry live production performance, animal health and welfare, worker health, and the environment. Bird performance and health can be affected by both respiratory disease challenge and physical damage due to increased NH_3 concentration. Poultry farmers have historically used ventilation to reduce the effects of NH_3 inside the chicken house. However, expelled air transfers NH_3 to the external environment adding to the problems caused by dust and odor, which can lead to neighbor complaints and legal actions. Litter treatments have been developed to help control NH_3 release from litter, and have been used extensively by the poultry industry. They are applied prior to chick arrival and are a critical part of maintaining proper air quality during the brooding period when ventilation rates are at their lowest. While litter treatments can be effective in controlling NH_3 emissions, their overall use has met with varying levels of success. Carbon in its many forms has been used for years in water and air filtration systems. Chars can be manipulated to make them valuable environmental tools, such as the adsorption of NH_3 on their surfaces. Biomass materials such as peanut hulls or tree clippings are available in Georgia in large amounts and could be used as raw materials for producing chars. The purpose of this study was to evaluate the effectiveness of char and active carbon on reducing NH_3 volatilization from poultry litter when used as a surfaced-applied litter treatment. Char was produced by pyrolyzing peanut hulls at 752^{o} F for 30 minutes. The peanut hull char (pH 9.2) and two acidified chars (53% sulfuric acid; pH 2.0) made from pine chips and coconut husks were applied at rates of 50 and

150 lb per 1000 ft^2 to the floor of pens containing broilers at commercial density (0.75 ft^2 per bird). A second 150 lb treatment was split into two 75 lb applications to determine if splitting the application of the amendment into one application at the start of the brooding and another half-way through the growout could improve its efficacy. The addition of peanut hull char did not reduce NH_3 levels in the air compared to the untreated pine shavings bedding material. The addition of acidified chars applied at the 150 lb per 1000 ft^2 rate significantly reduced overall NH_3 release compared to the untreated control and peanut hull char treatments. The reduction in NH_3 from the acidified char treatment is most likely due to a combination of litter pH reduction from the acid application and NH_3 reaction with the H_2SO_4 in the acidified char. Bird performance was not influenced by the litter treatments. Further investigation into the use of carbon products for NH_3 control in poultry houses is warranted.