

Fertilizer Value of Nitrogen Captured from Poultry Facilities Using Ammonia Scrubbers

Authors : Philip A. Moore Jr., Jerry Martin, Hong Li

Abstract : Research has shown that over half of the nitrogen (N) excreted from broiler chickens is emitted to the atmosphere before the manure is removed from the barns, resulting in air and water pollution, as well as the loss of a valuable fertilizer resource. The objective of this study was to determine the fertilizer efficiency of N captured from the exhaust air from poultry houses using acid scrubbers. This research was conducted using 24 plots located on a Captina silt loam soil. There were six treatments: (1) unfertilized control, (2) aluminum sulfate (alum) scrubber solution, (3) potassium bisulfate scrubber solution, (4) sodium bisulfate scrubber solution, (5) sulfuric acid scrubber solution and (6) ammonium nitrate fertilizer dissolved in water. There were four replications per treatment in a randomized block design. The scrubber solutions were obtained from acid scrubbers attached to exhaust fans on commercial broiler houses. All N sources were applied at an application rate equivalent to 112 kg N ha⁻¹. Forage yields were measured five times throughout the growing season. Five months after the fertilizer sources were applied, a rainfall simulation study was conducted to determine the potential effects on phosphorus (P) runoff. Forage yields were significantly higher in plots fertilized with scrubber solutions from potassium bisulfate and sodium bisulfate than plots fertilized with scrubber solutions made from alum or sulfuric acid or ammonium nitrate, which were higher than the controls (7.61, 7.46, 6.87, 6.72, 6.45, and 5.12 Mg ha⁻¹, respectively). Forage N uptake followed similar trends as yields. Phosphorus runoff and water soluble P was significantly lower in plots fertilized with the scrubber solutions made from aluminum sulfate. This study demonstrates that N captured using ammonia scrubbers is as good or possibly better than commercial ammonium nitrate fertilizer.

Keywords : air quality, ammonia emissions, nitrogen fertilizer, poultry

Conference Title : ICAHWE 2018 : International Conference on Animal Health, Welfare And Environment

Conference Location : Sydney, Australia

Conference Dates : January 29-30, 2018