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Use of Sodium Bisulfate to Reduce Ammonia Emissions from Poultry and Livestock Housing

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Species: Poultry (Broiler, layer & turkey), cattle & horses

Use Area: Animal Housing

Technology Category: Chemical Amendment

Air Mitigated Pollutants: Ammonia, Volatile Organic Compounds

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System Summary:

The application of Sodium bisulfate (SBS) has been shown to effectively reduce ammonia emissions from poultry housing, horse stalls, and dairy facilities. In addition, VOC emissions from fresh cattle manure are also greatly reduced (Marsh Johnson, et al. 2006, Ullman, et al., 2004; Blake and Hess, 2001; Sweeney, et al., 1996; Harper, 2002, Sun et al, 2008). Currently, 40-50% of all broilers produced in the United States are raised on SBS treated litter (PLT[®] litter acidifier, Jones-Hamilton Co., Walbridge, OH) for the purpose of controlling interior ammonia levels below 20 PPM and reducing litter bacterial levels for bird welfare and performance reasons. In addition to reducing ammonia emissions by 60% from fresh dairy manure, ethanol and methanol emissions were also reduced 61% and 58%, respectively (Sun, et al. 2008). Sodium bisulfate is broadcast over the surface of the bedding material and can be applied in the presence of poultry and livestock.

Sodium bisulfate is a dry, granular acid salt. Current application rates are dependent on litter age, animal density, and other factors and range from 0.32-1.95 kg/m² (50-300 lbs/1000 sqft) of animal housing space. Decreasing interior ammonia concentrations in poultry housing allow for a reduced ventilation rate leading to substantial fuel savings of up to 43% with sodium bisulfate application (Terzich, 1997). In addition, sodium bisulfate usage improves bird performance, reduces pathogens on poultry carcasses, and decreases poultry respiratory lesions and ascites (Pope and Cherry, 2000; Terzich et al, 1998 a & b).

Applicability and Mitigating Mechanism:

- SBS reduces litter and bedding pH reducing ammonia flux
- SBS reacts with ammonia to form ammonium sulfate preventing release of ammonia as pH increases over time
- The combination of sodium and hydrogen reduce manure bacterial populations thereby reducing VOC emissions and pathogens
- SBS can be safely applied in the presence of animals or prior to animal placement

Limitations:

- SBS application rates need to be increased as ammonia demand in the litter increases

Cost:

Sodium bisulfate costs \$0.50/kg (\$0.23/lb) and the use of a commercial applicator is approximately \$40-45 per house. SBS is safe enough to be applied by the farmer or poultry grower. No additional house preparation is necessary for application. Fuel savings in the first 2-3 days recoup the cost of SBS and its application. Improvements in feed conversion, weight, livability, and paw quality all provide substantial additional return on investment.