

Evaluation of Effectiveness of Nanoparticles for Reducing Odour and Gas Emissions from Swine Manure Slurry

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The overall goal of this work was to control odour and gaseous emissions from swine operations by adapting new technologies from other fields of science, specifically nanotechnology. The approach of this work was to conduct a systematic evaluation of the effectiveness of using nanoparticles to reduce gas and odour emissions from swine manure slurry. Potential nanoparticles and deployment techniques used in similar environmental remediation applications were screened based on suitability for application in swine barn conditions. Controlled experiments were conducted to develop the experimental test set-up and to determine the factors influencing the effectiveness of the nanoparticles. This was followed by testing of each type of selected nanoparticles and deployment technique. Nanoparticles were deployed by mixing with the slurry, spraying into the headspace above manure slurry and acting as a filtering medium for the manure gases. The main findings from these series of tests will be presented. Results so far showed that among the tested nanoparticles, zinc oxide was able to reduce hydrogen sulphide concentration by 53% using the mixing method, while 16% reduction in ammonia concentration was observed when tungsten oxide was sprayed into the headspace of the slurry. With the air filtration method using zinc oxide, ammonia was reduced by 46% while hydrogen sulphide was reduced below the detection level of the instrument.