

ENVIRONMENT

Title: Evaluation of Boric Acid and Sodium Tetraborate to Reduce Ammonia and Hydrogen Sulfide Emissions from Swine Facilities – **NPB #05-112**

Investigator: Melvin T. Yokoyama, Professor of Animal Science, Department of Animal

Institution: Michigan State University

Co-Investigators: Robert von Bernuth, Susan M. Hengemuehle,

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Scientific Abstract

Borates have long been used in a number of commercial products for cleaning and controlling odors. However, they have not been examined for controlling hazardous gas emissions from stored livestock manure. The objective of this study, based on previous laboratory in vitro incubation studies, was to test the efficacy of boron (20 Mule Team Borax) in reducing ammonia and hydrogen sulfide emissions from stored manure in an operational swine facility. Shallow, pull plug manure storage pits beneath nursery rooms at the Michigan State University Swine Research and Teaching Facility were treated with borax powder or left untreated as control, and the air quality in the rooms were continuously monitored for ammonia and hydrogen sulfide concentrations using a continuous emissions 1314 photoacoustic multi-gas monitor (CEM) and Jerome hydrogen sulfide detector with data logger. Manure pits were treated weekly with a quarter of the borax dose needed to attain a 1 and 2% final treatment based on the anticipated volume of manure accumulating in 4 weeks. Data on pig numbers, estimated pig weights and pit depth measurements were collected weekly. Issues with ventilation differences, pig numbers and weights, manure accumulation rates, and other variables associated with normal operations of the facility were encountered. Based on a comparison of the hydrogen sulfide concentrations in the treated and control nursery rooms, borax treatment significantly decreased hydrogen sulfide emissions from stored swine manure. Hydrogen sulfide concentrations measured at the time the pull plugs were opened and the stored manure drained from the manure pits, indicate that this inhibition was about 80%. Measurements of ammonia concentrations in the treated and control nursery rooms, indicated that borax treatment did not inhibit ammonia emissions from the store manure. These results confirm our laboratory in vitro studies for the inhibition of hydrogen sulfide, but not for the inhibition of ammonia by borax. Further studies are being planned to explain this difference in response.

These research results were submitted in fulfillment of checkoff funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer reviewed

For more information contact:

National Pork Board, P.O. Box 9114, Des Moines, Iowa USA

800-456-7675, **Fax:** 515-223-2646, **E-Mail:** porkboard@porkboard.org, **Web:** <http://www.porkboard.org/>