

Effects of manure storage time and filling scheme on odor and headspace analysis using simulated manure storage pits

**S.B. Bastyr, undergraduate research assistant, and W.J. Powers, assistant professor,
Dept. of Animal Science**

Project duration: January 1, 2001 – December 31, 2001

Funding agency: IAHEES

Summary and Implications

Swine manure was stored in 2 L simulated manure storage vessels for up to 91 d. Manure was added to the vessels using one of two filling schemes. Vessels were filled either completely on d 0 (SF) or received a 1/10th-volume addition each week (200 ml) for 10 wk (WF). Weekly, headspace gases were collected for analysis by an electronic nose and gas chromatography. Once weekly, headspace gases were adsorbed to cotton swatches for odor evaluation by human panelists. Vessel contents were collected when vessels were terminated (between 56 and 91 d) and analyzed for composition. Findings indicate that filling mode and length of manure storage influenced manure components. Solids content was greater in WF vessels. While total nitrogen did not change with storage time, NH₄-N increased with time, likely due to conversion of organic nitrogen to inorganic nitrogen. Headspace gas content was influenced by both storage time and filling scheme although not all analytes were affected similarly. Length of storage time did impact odor score. A prediction equation developed from headspace analytes reflected odor scores moderately ($R^2 = 0.18$). Development of an equation based on the chemical composition of the manure following storage did not improve predictive capability ($R^2 = 0.20$). Correlation of the electronic nose response to odor score was similar ($r = 0.20$). However, the prediction equation developed from headspace gas constituents predicted electronic nose response well ($R^2 = 0.76$). Results suggest that manure management practices may be modified to address odor potential. Instrumental methods continue to require further development before they become practical tools for odor assessment.