

Control of hydrogen sulphide emissions from swine barns using nitrite and molybdate: effect of manure age

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Emission of odorous and gaseous compounds such as hydrogen sulphide (H₂S) from livestock operations can be a major impediment to the expansion of these facilities, especially in locations close to populated areas. Occupational and environmental concerns, as well as stricter government regulations, require the control of H₂S emissions. A biological approach used in the oil industry, in which nitrite and/or molybdate are added to control the production of H₂S in oil reservoirs, was shown to be effective in controlling H₂S emissions from swine manure. The method utilizes nitrite and molybdate as metabolic inhibitor to hinder the activity of bacteria responsible for the production of H₂S from manure. With fresh manure, addition of 80 millimole (mM) nitrite or 2 mM molybdate reduced H₂S concentration from 6000 parts per million (ppm) to below 100 ppm in small-scale systems. Low H₂S concentrations were maintained throughout the treatment using molybdate, but with nitrite, concentrations increased again after a few days. The effect of manure age on the level of emitted H₂S and the required quantity of nitrite and molybdate was also investigated using fresh, 1, 3, and 6 month-old manure. The extent of H₂S emission from aged manure was lower than the fresh manure and so was the required level of nitrite and molybdate to control the emission of H₂S. Experiments in semi-pilot and room-scale systems are being conducted to verify the trends observed from the small-scale systems and to assess the effectiveness of this approach in real barn situations. The economic aspects of this approach will also be evaluated.

Implications: This study will provide an effective and practical way of controlling H₂S emissions from swine barns. It will contribute to mitigating the health and environmental concerns associated with H₂S and thus enhance the acceptability and sustainability of the swine industry.