Controlling hydrogen sulfide gas in swine barns with a manure pit scraper system

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Hydrogen sulfide (H_2S) gas in swine barns is produced by the anaerobic degradation of liquid manure. Most of the H_2S produced in manure pits remains dissolved in the liquid manure as long as the manure is not agitated. However, a previous study at Prairie Swine Centre Inc. (PSCI) showed that routine barn tasks such as manure pit plug-pulling and power-washing may generate elevated H_2S levels, which may potentially pose a risk to workers and animals. Hence, this study was undertaken to develop and evaluate simple engineering control measures that can be implemented in existing swine barns to reduce H_2S levels during manure handling operations. One such measure investigated was a manure pit scraper system used to remove manure daily from the manure pit.

The manure scraper system was installed in a swine grower-finisher room at PSCI. The H_2S and ammonia levels between the scraper room and an identical normal production room (control room) were compared. Initial results showed that H_2S levels in the scraper room were lower by an average of 80 to 96% compared to the control room. Additionally, maximum H_2S concentration in the scraper room did not exceed the prescribed 15-ppm occupational exposure limit (OEL), while in the control room the OEL value was exceeded three times out of eight measurements. Ammonia emissions in the scraper room were 44% higher compared to the control room. However, the average ammonia concentration in the scraper room was only about 3 ppm higher than in the control room and peak concentrations were well below the 25-ppm 8-hr OEL value for ammonia. Additional tests are on-going to complete the evaluation of the scraper system and to evaluate means to mitigate the increase in ammonia levels in the scraper room.

Implications:
This study showed that removing manure daily can effectively protect the workers and animals from potential exposure to elevated H_2S levels. A scraper system is one option for achieving daily manure removal.

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