

# Oil spray reduces greenhouse gas emissions from pig finishing barns

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Animal feeding operations are an important emission source of air pollutants including methane and carbon dioxide—known greenhouse gases. Recent inventories suggest that animal manure makes a significant contribution to global methane emissions. As a consequence, greenhouse gas emissions can potentially become a limiting factor in the development and sustainability of animal production and technologies are needed to mitigate pollutant gas emissions. Oil spray has been used as a mitigation technique to reduce pollution from animal buildings. However, little is known about its effect on greenhouse gas emissions.

Scientists at Purdue University and the University of Missouri have investigated oil spray on air pollutant emissions from pig barns in northern Missouri. Specifically, they studied the quantity and characteristics of methane and carbon dioxide emissions from two commercial pig finishing barns and tested three oil spray techniques—vegetable oil sprinkling, essential oil misting, and misting of essential oil with water—to reduce these emissions. Results from the study were published in the November-December issue of *Journal of Environmental Quality*.

The study revealed average emissions of 32.5 g methane and 15.8 g carbon dioxide per day per animal unit (500 kg animal live weight) from the two barns. Treatments of oil sprinkling, misting of essential oils, and misting of essential oils with water reduced the average emissions of methane by 20% and of carbon dioxide by 19%. Barn methane and carbon dioxide concentrations and emission rates were affected by diel

and seasonal fluctuations of ambient temperature. Methane was produced from decomposing manure and released from recycled lagoon effluent during barn gutter flushing. Carbon dioxide was produced from pig exhalation, manure decomposition, and combustion heaters and was also released from recycled lagoon effluent. The flushing lagoon effluent was responsible for 9.8 % of methane and 4.1 % of carbon dioxide in the total barn emissions.

A state-of-the-art mobile laboratory monitoring system was set up between two barns and connected to the barns via tubing and cables. One barn was used as control and another was treated with the three oil spray techniques, one after another for a total of 247 days. Air samples were taken at the exhaust fans of the two barns and from outdoor background and pumped into the mobile laboratory via tubing. Concentrations of methane and carbon dioxide in the sample air were measured continuously with two gas analyzers. Air sampling and measurement were conducted 18 times daily to cover diel variations. Ventilation fans were monitored for gas emission calculations. Barn temperature, relative humidity, animal activity, barn space heaters, manure flushing, and weather conditions were also continuously monitored. The field investigation was conducted from August 2002 to July 2003 to cover seasonal variations.

Quantification and mitigation of air pollution from animal feeding operations helps researchers to understand and reduce the industry's negative impact on local and global environments. Research on greenhouse gases and other pollutants emissions from animal barns of different animal species is ongoing at Purdue University in collaboration with other universities in the U.S. Mitigation technology development will be one of the research focuses in this field. Further study on oil spray in animal barns is needed to optimize its application method for better effects on reducing emissions of not only greenhouse gases but also particulate matter and odor.

Source: American Society of Agronomy

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