

Modeling and Measuring the Dispersion of Odors from Hog Confinements

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A comparison was made between predicted and measured odor concentration downwind of two hog finishing confinements. Two Gaussian dispersion models, STINKBAK and AERMOD, were used. The experimental cases examined odor emanating from a mechanically-ventilated facility and a curtain-sided facility during summer 2003. A field olfactometer was used to measure odor concentration. The odor concentrations served as input to STINKBAK, which then estimated the odor emission rate from the confinement. AERMOD used this emission rate and other meteorological data to predict the peak concentration of odor around the confinement over the sampling hour.

The calculated odor emission rates are slightly higher than those reported in the literature. At 25°C, the odor emission rate is estimated at 27.8 OU/m²/s for the mechanically-ventilated confinement and 32.7 OU/m²/s for the curtain-sided confinement. Odor release from the curtain-sided confinement was found to be higher than the mechanically-ventilated facility. A correlation with ambient temperature was observed.

Measured concentrations were compared to predicted peak concentrations over the sampling hour. The forecast odor plume compared well to observations. The importance of the meteorological information was shown to be of primary importance in plume forecast accuracy.