Evaluation of Agricultural Odors

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Goals:

- To provide unbiased sampling and evaluation of agricultural odors and odor emission rates.
- To measure concentration and intensity of agricultural odors for evaluation of control systems for the treatment of odor emissions.
- To validate science-based models that predict odor impact distances between private residences and livestock buildings.

Recent Publications:

Dong, L., A. J. Heber and J. A. Patterson. 1997. A bioscrubber for removing ammonia from livestock building exhaust air. Poster presented at the *International Symposium on Ammonia and Odour Control from Animal Production Facilities*, 529-532. Vinkeloord, The Netherlands, October 6-10.

Heber, A. J. 1997. Setbacks for sufficient swine odor dispersion and dilution. *Livestock and Environment Symposium*. Columbus, NE: University of Nebraska Cooperative Extension Service, December 10-11, 13 pp.

Heber, A. J., D. Bundy, B. L. Haymore, T. T. Lim, R. K. Duggirala, J. Ni and C. A. Deal. 1998. Odor emissions from large tunnel-ventilated swine finishing buildings. Paper to be presented at the International *Conference on Animal Production Systems and the Environment*, Des Moines, IA, July 19-22.

Statement of Problem: Research is needed to significantly reduce or eliminate the sources of odors while sustaining efficient production operations. The importance of measuring odor emissions from agriculture is that base lines can be established for emission rates which will allow evaluation and comparison of treatment and control systems. Such measurements are needed to estimate approximate separation distances between facilities and neighbors. Factors influencing nuisance odor complaints are highly variable. Odor impact distance is therefore a judgement based on statistical probabilities. A science-based setback guideline is needed to guide and educate livestock producers and policy makers.

Current Activities: A state-of-the-art odor evaluation laboratory was developed. The lab utilizes olfactometry along with gas chromatography. Olfactometric evaluations of odor utilize the sense of smell of eight trained human panelists. The panel determines the dilutions to threshold or the volume of odor-free air needed to dilute the odorous air to its threshold concentration. Odor emission rate from a process is calculated as the threshold odor concentration multiplied by the air flow rate.

The odor laboratory has equipment to collect field samples of air into Tedlar bags. One of the first research projects utilizing the new lab involves measurements of odor emissions from swine nurseries. Odor emission rates from swine finishing houses were determined in a recent study. The odor emission rate averaged 14 odor units per second per finishing pig.

An emission flux chamber for measuring odor emissions from lagoons was designed and constructed. The floating, stainless-steel lined chamber was designed to allow odor-free air to pass over a 0.75 m^2 area of lagoon surface at 1.0 m/s air speed.

The olfactometer presents a precisely diluted odor sample to each panelist.