CHEMICAL ODORANTS MEASURED DOWNWIND FROM PIG PRODUCTION FACILITIES

AARHUS UNIVERSITY

Michael J. Hansen[1], Pernille L. Kasper[2], Pia Brandt[3], and Michael Holm[3]

Affiliations: [1]Aarhus University, Department og Biological and Chemical Engineering; [2]Danish Technological Institute; [3]SEGES Innovation P/S

BACKGROUND

Some studies indicate that only a small fraction of the chemical odorants emitted from livestock facilities can be detected downwind [1, 2].

Understanding which chemical odorants reach concentrations near or above their odor threshold values (OTVs) [3] is crucial, as they are likely correlated with the perceived nuisance experienced by neighboring individuals.

AIM OF THE STUDY

The aim of the study was to identify which chemical odorants can be detected downwind of a pig production facility and to compare their concentrations with established odor threshold values.

METHODS

A pig production facility with weaner and finishing pigs was used in the study.

At four days air samples were collected downwind in PTFE bags. The samples were analyzed with PTR-TOF within 30 min and corrected for the decay over time and background.

At 25, 50, and 75 m chemical odorants were measured continuously with a perforated sample line.

Chemical odorants emitted from the facility was measured continuously by PTR-QMS.

RESULTS

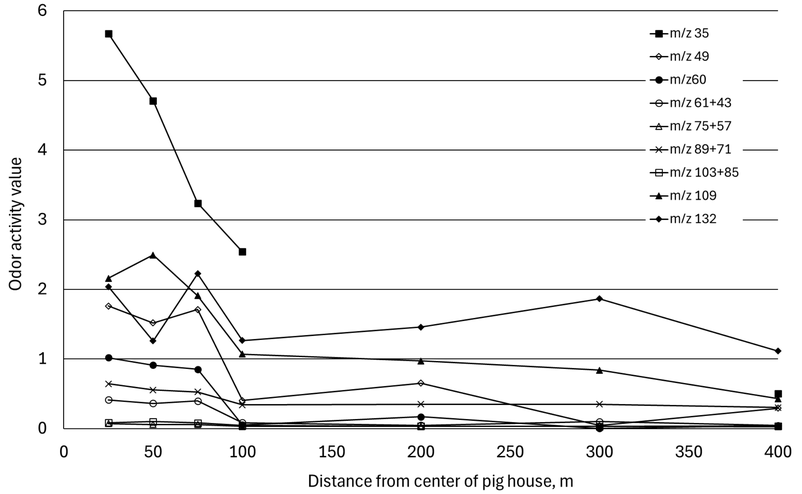

Figure 1: Apparent dilution of chemical odorants at one of the measurement days.

Further research

In 2025, a second pig farm will be investigated, along with continued studies at the initial farm.

Furthermore, downwind concentration measurements will be compared with an odor dispersion model.

Summary

Hydrogen sulfide (m/z 35) and methanethiol (m/z 49) remain above their respective OTVs of 0.8 and 0.03 ppb, within distances of 75-100 m.

4-methylphenol (m/z 109) maintains concentrations above or near its OTV (0.02 ppb) up to 200 meters.

3-methylindole (m/z 132) exceeds its OTV (0.003 ppb) at all distances but shows some variability in concentration.

References: [1] Journal of Environmental Management (233, 12-23); [2] Journal of Agricultural and Food Chemistry (53, 8663-8672); [3] Sensors (18, 788).

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