

Effects of gestation pens versus stalls and wet versus dry feed on air contaminants in swine production (Part 2).

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Keypoints:

- Concentration of pollutant levels in the finisher barn were distinctly higher during winter than during summer.
- Use of a wet feed system reduced respirable endotoxin concentrations substantially.

Objective

Evolving production practices in the swine industry may alter the working environment. The second part of this research project characterized the wet versus dry feed in finishing on air contaminant concentrations.

Methods

Eight-hour time-weighted ammonia, hydrogen sulfide, respirable dust, respirable endotoxin, and carbon dioxide concentrations and temperature were measured regularly at stationary locations throughout a year in a facility with parallel finishing rooms using dry and wet feed delivery systems. Hazard indices were calculated using ammonia, hydrogen sulfide, and endotoxin concentrations and relevant occupational exposure limits. Statistical analyses were performed to assess the influence of time of year, housing, and feed on measured parameters.

Results

All ammonia (NH₃), respirable dust, and carbon dioxide (CO₂) concentrations were below relevant regulatory and recommended levels (OSHA PELs, NIOSH RELs, and ACGIH TLVs). Hydrogen sulfide (H₂S) concentrations were always below the regulatory levels but they reached one of the recommended threshold levels on two occasions in the dry feed room. Respirable endotoxin concentrations regularly exceeded the proposed health-based recommended occupational exposure limit (HBROEL) of 90 EU/m³ during autumn in the dry feed room and in both rooms during winter. In all cases, concentrations varied significantly as a function of time ($P < 0.013$). Concentrations of respirable dust, endotoxin and carbon dioxide were distinctly higher during winter than during summer. Temperatures varied significantly with time ($P < 0.0001$), but this difference was driven more by the need of the growing piglets than by seasonal differences.

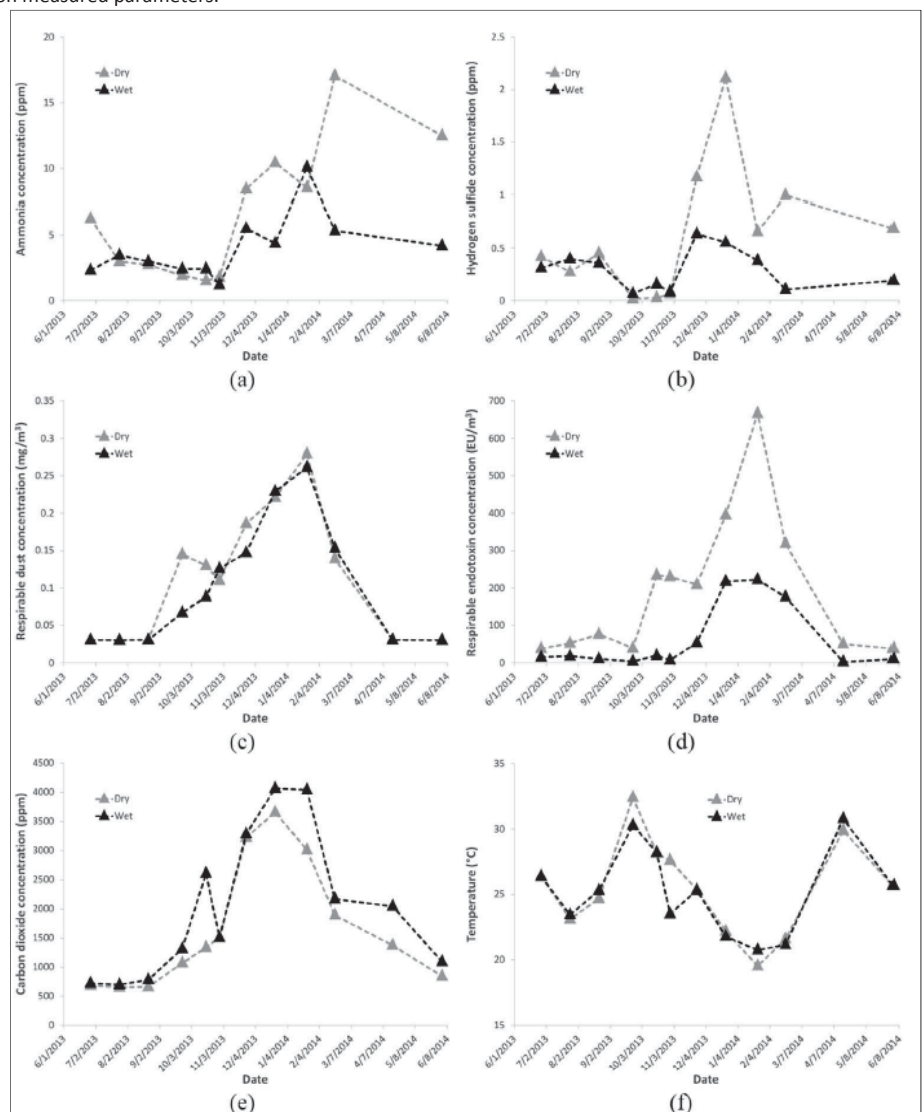
Conclusions

Use of a wet feed system reduced respirable endotoxin concentrations substantially. Changing ventilation rates in response to seasonal differences influenced contaminant concentrations more than feed type.

Figure 1. Measured values versus date in the finishing rooms providing dry and wet feed for (a) ammonia concentration, (b) hydrogen sulfide concentration, (c) respirable dust concentration, (d) respirable endotoxin concentration, (e) carbon dioxide concentration, and (f) temperature.

Complete paper:

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