Livestock Industry Facilities and Environment: Health Hazards in Swine Confinement Housing: How Bad is It?

Jay D. Harmon
Iowa State University, jharmon@iastate.edu

Hongwei Xin
Iowa State University, hxin@iastate.edu

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Health Hazards in Swine Confinement Housing: How Bad Is Bad?

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Chemical Formula</th>
<th>Odor</th>
<th>Recommended Level for Swine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>NH₃</td>
<td>Sharp, pungent</td>
<td>10 ppm</td>
</tr>
<tr>
<td>Hydrogen sulfide</td>
<td>H₂S</td>
<td>Rotten egg smell, nauseating</td>
<td>5 ppm</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>CO₂</td>
<td>None</td>
<td>3,000 ppm</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>CO</td>
<td>None</td>
<td>50 ppm</td>
</tr>
<tr>
<td>Dust</td>
<td>_</td>
<td>None</td>
<td>10 mg/m³</td>
</tr>
</tbody>
</table>

Any one exposure can be harmful. Combinations of contaminants, even at low levels, may be harmful.

Ammonia
Sources
Urine (urea) drying on solid floors, slats, and in scraper gutters.

Possible solutions
- Prevent manure from drying, i.e. keep manure in solution through pit recharge; and
- If associated with deep pit, increase pit ventilation.

Human effects
- 10 to 15 ppm—irritates nose and eyes (wet body parts),
- May irritate bronchis (bronchitis),
- May irritate bronchioles (asthma), and
- May cause long-term deep lung effects.

Hydrogen sulfide
Sources
Produced during anaerobic degeneration of manure, especially present with deep pits. Can be deadly during pit agitation.

Possible solutions
- Dilute manure,
- Proper pit ventilation,
- Agitate with all fans running,
- Never enter a building while agitating pit, and
- Store manure outside, if possible.

Human effects
- 1 to 5 ppm—rotten egg smell;
- 50 to 100 ppm—olfactory paralysis (cannot be smelled);
- Greater than 100 ppm—rhinitis (runny eyes);
- 100 to 150 ppm—bronchitis (dry cough);
- 200 to 500 ppm—headaches, dizziness, nausea, pneumonitis and pulmonary edema (symptoms like pneumonia or in hogs like TB); and
- Greater than 1,000 ppm—rapid respiratory arrest, death (1 to 3 breaths).

Carbon dioxide
Sources
Exhalation, unvented heaters, and anaerobic manure decomposition.

Possible solutions
Increase ventilation rate

Human effects
- 30,000 ppm—increased breathing rate, headaches and drowsiness; and
- 300,000 ppm—possibly fatal.
Dust
Sources
Dried fecal matter, feed, animal hair, animal skin, and bacteria.

Possible solutions
▪ Keep building clean,
▪ Prevent manure from drying,
▪ Use feed drops and feeder lids, and
▪ Use pelleted feed or add fat to feed.

Human effects
▪ Respiratory irritation, especially with particles less than 5 microns, and
▪ Respirable dust operates as a conveyance mechanism for pathogens.

Carbon monoxide
Sources
Improperly adjusted, unvented space heaters or gas radiant heaters.

Possible solutions
Clean and properly adjust all heaters.

Human effects
▪ May cause death,
▪ Lingers in blood stream, and
▪ Gestating sows may abort when exposed to levels of 200 ppm.

Prepared by Jay D. Harmon and Hongwei Xin, assistant professors and extension agricultural and biosystems engineers, Department of Agricultural and Biosystems Engineering.

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