

Air Quality Initiatives

Fact Sheet



Introduction

For years, pork producers have made great strides in reducing odors from their farms. Recently, air quality and odor issues related to livestock production have received much attention from residents, policy makers and the media.

Producers are continually seeking out solutions and adopting new technologies, making substantial improvements in their operations and management techniques.



Overview of Iowa's pork producers

Pork production naturally belongs in Iowa because of the state's fertile soil, excellent transportation systems and capable producers. Iowa grain farmers rely on swine manure nutrients for crop fertilizer, and livestock producers rely on high quality grain to feed their animals.

Iowa pork producers raise 25 million hogs in Iowa each year. Iowa has over 10,000 pork operations, resulting in \$12 billion in annual economic impact to the state. This important commodity also provides 86,000 jobs to Iowans and provides over \$3 billion in payroll income each year.



What do we know about livestock odor?

Over 160 compounds make up livestock odors. Like many other common odors, odor from livestock is very complex. Due to this complexity, it is extremely difficult to measure these odors beyond the human nose. Gases such as hydrogen sulfide and ammonia make up a small portion of livestock odors.

Livestock odors are typically associated with three different sources. Odors from livestock farms can be found in and around the animal barns, manure nutrient storage facilities or from the land application of the manure nutrients.

Odor can be minimized with various management techniques. Minimizing the manure storage surface area, covering manure storage facilities, reducing dust and feed wastage inside buildings, increasing air exchange, filtering odorous air, modifying diets, utilizing pit additives and incorporating manure during land application all help minimize odors.

How are producers being proactive about livestock odor?

Over 60% of Iowa producers utilize a "100% containment of manure" system. These systems greatly reduce odors by storing manure below the buildings in concrete structures, out of the wind. They also allow the producer to fully utilize the nutrients as crop fertilizer.

Manure storage covers reduce odors. Methods such as covering the manure storage area with bio-covers, or putting the storage area under the building minimize exposure of odor to the atmosphere. Impermeable covers also reduce additional loading to the storage facilities with rain water.



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Producers utilize landscaping and tree planting to minimize odors. Increased dispersion of odor into the atmosphere reduces odor concentration at the downwind receptor. Some producers use a variety of trees and native grasses to provide buffers for wind and odor, and create a more aesthetically pleasing environment. Atmospheric transport of odor can be reduced by maintaining filtering barriers.



Limiting agitation time of manure minimizes odor. Agitating manure in the storage facility is necessary prior to application to ensure consistent nutrient application rates, however, agitation does create added odor. Limiting the time of agitation, yet creating a consistent slurry, minimizes the amount of odor created.



Limiting the pump outs per year. Using adequately sized manure storage structures allows minimizing the number of times per year that manure is land applied.

Modifying swine diets to better balance rations reduces odor. Dietary manipulation for improved digestibility and utilization of feed has been shown to reduce excretion volume and the loading rate of the manure storage facility. A change in the composition of the feed will also change the composition of the manure excreted from pigs and minimize anaerobic gases.

Utilizing feed additives to reduce phosphorus excretions. With phytase, a feed additive that improves digestion, pig nutrient output is reduced. Research from Iowa State University and University of Nebraska has shown that phosphorus excreted using phytase is reduced by as much as 34%.



Incorporation or injection of manure reduces manure nutrient exposure and odor. Tremendous advances have been made in the application equipment used to apply manure nutrients to the land. Manure incorporation reduces odor dramatically during and after the application process. Incorporation also results in reducing the loss of nutrients, making more nutrients available for the crop.

Extra measures to reduce dust. Producers utilize good housekeeping practices to reduce dust, like using drop tubes to feeders, adding fat to feed and using oil and/or water sprinkling systems. Air exchange rate in buildings with fans is increased by removal of manure and dust accumulation in the flow path of exhaust and inlet air openings.



Written and filed manure management plans

Most hogs produced in Iowa are raised on farms that have a Manure Nutrient Management Plan on file at the Department of Natural Resources. A manure management plan limits the amount of animal nutrients applied to land to only the nitrogen nutrients needed by the crops that will be produced, drastically reducing the risk of over application and potential run-off.

Reducing water and feed losses impacts odor. Higher feeding efficiency reduces the loading rate of contributors into the manure storage system. Efforts to reduce the spillage of feed and water also reduce odor emission.

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Odor Research - Funded through the Pork Checkoff

Each year the IPPA and the National Pork Board, comprised of pork producers, supports and funds research that is focused on finding solutions to current and emerging issues effecting the environment.

Air Quality

- ❑ Types of bedding material, frequency of adding bedding and amount of bedding may greatly affect the air quality generated from hoop buildings.
 - J. Harmon et al, Iowa State University
- ❑ Based upon H₂S data collected during manure agitation and land application from deep pit swine barns, compliance with the Minnesota ambient air standard for any size of producer would be difficult. The Minnesota Pork Producers were able to use this data to benefit producers by getting the standard revised.
 - National Pork Board
- ❑ Most methods involving some soil incorporation of liquid swine manure reduced odor levels up to 90% from the odor level emitted after broadcast application.
 - H. Hanna et al, Iowa State University
- ❑ Based on the finding of this study, there is no evidence that salmonella organisms excreted in the feces of infected swine pose a health risk to neighbors by airborne dissemination from the swine facility.
 - G. Bowman et al, The Ohio State University

Nutrient Utilization

- ❑ The combination of phytase and low-phytate corn diets resulted in a 51% reduction in phosphorus excretion.
 - G. Cromwell, University of Kentucky
- ❑ Reducing crude protein and supplementing diets with synthetic amino acids can be an effective way to control ammonia and odor emissions from confinement buildings.
 - A. Sutton et al, Purdue University
- ❑ Distillers dried grain with solubles should be considered an economical feed ingredient by swine producers who purchase protein sources for their livestock enterprise.
 - W. Powers et al, Iowa State University

Soil and Water Quality

- ❑ Constructed wetlands as an additional treatment for secondary lagoon water has been shown to significantly reduce pathogens and nutrients from swine waste.
 - M. Sobsey et al, University of North Carolina at Chapel Hill
- ❑ Safely composting swine mortality in roofed compost systems can be effectively completed using either ground straw or ground corn stover as an alternative to sawdust.
 - S. Moeller et al, The Ohio State University

For more information on odor research, contact:

Iowa Pork Producers Association, 800-372-7675 or www.iowapork.org

National Pork Board, 800-456-7675 or www.porkboard.org