

# Issues Related to Odors from Poultry Farms

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Complaints related to nuisance odors from poultry farms are becoming more frequently as urbanization expands. It is important to implement management practices and evaluate technologies to mitigate the normal odors emitted from a poultry facility. Any proactive actions to reduce odors and keeping records of those actions can help when dealing with complainants, public health officials, and courts.

At this moment odor is not considered explicitly an air pollutant by our NC regulations. However, the frequency of the complaints and the attitudes of discomfort of the farm neighbors may affect the perception about air contamination. At this moment, the nose and people opinions are considered instruments of detection, and no scientific instruments are valid to determine the presence of odor. If the complainants testify that the odor makes them have one or more of the following symptoms: nausea, gagging, coughing, eyes watering, headaches or an aggravation of an existing asthma conditions, are considered by public health officials and/or the courts as valid evidences of public discomforts and air pollution. The perception of odor varies among people depending on their background and previous experiences.

## Origen of Odors

Odors originate from the natural decomposition of organic material in the litter inside houses, degradation of feed wasted in the litter, mortality, manure stockpiles, piles of droppings inside or outside the houses, composting or any other waste processing method, and land application. The humidity and anaerobic conditions increase the production of nuisance odors. The degradation can be aerobic or anaerobic. Most of poultry waste management is done under aerobic conditions with low humidity and generate less nuisance odors. Anaerobic systems generate more nuisance odors because these biochemical processes produce odorous compounds characteristic of putrefaction. The drier the litter, manure, and any other waste, the less nuisance odors will be produced.

The most common chemical compound generated in poultry litter is ammonia, which can be easily detected by non-accustom noses. Other compounds are also generated in poultry litter such as hydrogen

sulphide, skatole, indole, amines, mercaptans, other sulfur containing gases, volatile fatty acids, alcohols, and aldehydes. Hydrogen sulphide is also common in piles of pure manure or egg residue degradation typical in layer or breeder farms. These compounds are even more offensive and can be detected even at lower concentrations for people non familiar with these odors.

Several microorganisms are involved in the process of degradation of organic matter that produces ammonia and the other gas that create the nuisance odors. Changing the pH of the manure to acid conditions can reduce this microbial populations, ammonia and odors. Acid pH in waste seems to be more effective. Ambient temperature affects microbial and chemical reactions; consequently it is easier to observe nuisance odor problems more frequently in the spring-summer than during the winter. Feed with higher protein levels normally cause more odor. Dust is an odor carrier and control it is important to reduce nuisance odors. The older the litter, the more odors are generated.

## Odor Control

The following measurements can be taken at the farm to reduce odors:

1. Good management practices, especially related to ventilation and temperature management to keep litter moisture between 15 and 30%.
  - a. Avoid condensation due to poor insulation or ventilation
  - b. Keep healthy birds to avoid wet manure.
  - c. Minimize spills of water by adjusting water line height, pressure and repairing any leaks from the line or from walls and roofs.
  - d. Regularly inspect and maintain cooling pads and foggers
  - e. Repair house insulation
  - f. Maintain fans
  - g. Pick up mortality frequently and immediately start a processing method. Accepted mortality disposal methods include composting, incineration, gasification and in some locations burial.
  - h. Keep litter storage facilities dry, covered and avoid leaching of contents.
  - i. Practice proper composting of litter and/or mortality.
  - j. Some additives can be used to reduce odors for litter storage and composting facilities. Ground lignite or fly ash are residues of mining and coal industries, respectively, with odor-absorbing properties.
2. Install odor reduction technologies. Effective solutions of odor nuisance require large reductions in odor concentrations emitted from poultry houses. The following technologies have proven to be efficient to reduce odors in poultry:
  - a. Windbreak walls using trees as vegetative screening, plywood, shade cloth, or straw bales.
  - b. Litter acidification or application of lime.
  - c. Electrostatic charge systems to capture fine dust.
  - d. Biofilter, where air is passed through a damp porous medium such as peat, soil or wood chippings, which provides media for odor-reducing bacteria.
  - e. Air scrubber, where air is passed through a film or mist of water to remove odorous compounds through chemical absorption, or chemical/biological reaction with an additive of sodium hypochlorite.
  - f. Installing short stacks to exhaust air at higher level and disperse odors before they reach ground level where they can be perceived.
  - g. Application of active oxygen and ozonation has been suggested as odor-abatement technologies. However, their efficiency under environmental conditions of poultry houses is very low and their costs of installation high.

Biofilters and air scrubbers are still expensive to install and maintain in poultry facilities due to the large volume of air to treat and the handling of water and chemicals needed. The electrostatic charge systems are not efficient during times of low dust concentrations in the air.

Manipulation of feed using lower protein levels while supplementing specific amino acids in crystalline forms are an effective method to reduce total nitrogen in the manure and consequently odors. Other dietary methods to reduce odors in poultry manure include addition of enzymes, some plant extracts, gypsum, and zeolites.