

**AIR QUALITY AND EMISSIONS FROM LIVESTOCK AND
POULTRY PRODUCTION/WASTE MANAGEMENT SYSTEMS**

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This paper summarizes the information available in the literature related to gaseous concentration and emissions of the following constituents from livestock and poultry buildings as well as from manure management systems (storage and treatment units): odor, hydrogen sulfide, ammonia, methane, non-methane volatile organic carbon, dust, microbial and endotoxin aerosols.

Animal agriculture can be a source of numerous airborne contaminants, including gases, odor, dust and microbes. Numerous gaseous compounds and living organisms are generated from livestock and poultry manure decomposition shortly after it is produced, during storage and treatment, and during land application as a fertilizer on cropland. Particulate matter and dust come primarily from both feed and animals. The rate of generation of these gases, microorganisms and particulates varies with weather, time, species, housing, manure handling system, feed type and management system used. Therefore, predicting contaminant presence and concentrations is extremely difficult.

Research in the United States, Europe and elsewhere has shown that some animal production systems have reduced contaminant generation rates as compared to other production systems. Numerous control strategies are being investigated to reduce the generation of airborne materials. However, even when best management systems and/or mitigation techniques are used, airborne contaminants or sub-products are generated. Contaminants may build up concentrations inside livestock and poultry buildings that result in animal and human health concerns. Most of these concerns are associated with chronic or long-term exposure. On the other hand, both human and animal health concerns or safety hazards can

result from acute or short-term exposures, like those experienced during agitation and pumping of liquid manure from a pit inside a slatted-floor livestock building.

Once airborne contaminants are generated, they can be emitted from the sources (building, manure storage, manure treatment unit or cropland) through the barn's ventilation system or by natural (weather) forces. Emission rates are dependent on many factors: time of year and day, temperature, humidity, wind speed and other weather conditions, ventilation rates, housing type, manure properties or characteristics, and animal species. Determination of emission rates for gases and odor, dust and microorganisms is an active area of research both in the U.S. and Europe. Emission rates from point sources (buildings) and area sources (manure storage and treatment units and manure applied on cropland) are difficult to determine accurately. There is no standardized collection technique, and there are many uncontrollable factors and conditions that affect measurements. Emission rates of only a few of the many gaseous compounds identified have been investigated. Ammonia and methane are the most common gases studied and measured because of the negative environmental impact they can have on ecological systems. There are very little emission data for other contaminants such as odor, non-methane volatile organic compounds, dust and microorganisms. The environmental and health effects of these ambient air contaminants on people, animals and the environment surrounding animal production sites are only beginning to be investigated. In certain areas some or all of the emission contaminants have created environmental or health concerns, but long-term impacts on ecological systems and people are not known.

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