

# Siting Animal Production Operations

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Establishing sites for new and expanded animal production facilities in Minnesota, Wisconsin, and other parts of the Upper Midwest has become increasingly difficult due to the air quality concerns of residents living near these operations. Such concerns often include the effects of nuisance odors on quality of life and the effects of odors and manure gases on both human health and the environment. “Site Selection of Animal Operations using Air Quality Criteria,” a white paper that primarily addresses the development of setback distances with regard to nuisance odor issues, has recently been prepared for the National Center for Manure and Animal Waste Management (see [Resources](#) for their web site address). Some general discussion on human health issues related to emissions from animal production sites is also included. Environmental concerns such as water quality impacts and recreational land use issues stemming from livestock and poultry facility emissions are only mentioned.

The predominant approach to address the release of agricultural air emissions is the use of setback distances between animal production sites and neighboring residences and businesses. Determination of setback distances is difficult and usually involves compromises—large setback distances restrict the development of new or the expansion of existing animal production sites and small setback distances are insufficient to mitigate the frequency and severity of nuisance odor events. But, the determination of appropriate setback distances is imperative to the viability of the livestock production industry. However, many setback distances are determined on the basis of anecdotal and subjective information rather than objective and scientific relationships.

The airborne emissions from animal production sites that should be considered when determining setback distances include odor, gases, dust, insects, and microorganisms. The quantity and proportions of these emitted materials are primarily a function of animal species, facility design, and management. Odors from animal production sites are probably the most important factor to consider when determining setback or buffer distances from neighbors and communities. Other airborne emissions may have a greater environmental impact, but odor is typically used as an indicator for these other pollutants, and *everyone* has a sensor for odor.

The establishment or determination of setback distances from animal production facilities can be accomplished using a guideline approach or by the use of dispersion models. Guidelines are used to determine setback distances based on criteria such as zoning or land use or empirical formulas based on animal units, animal housing system, physical size of operation, or similar parameters. The dispersion model method is a more robust tool that takes as inputs specific airborne emissions, such as odor, ammonia, or pathogens, from the animal production site as well as weather conditions, then estimates a concentration of the pollutant (odor, ammonia, etc.) downstream, which can be used to

establish a setback distance.

In Minnesota, the OFFSET method is a step by step process that systematically uses empirical field odor emissions as well as weather data for the state to predict the setback distance required for several odor annoyance free frequencies levels. The first step is to identify all of the odor sources at an animal production site. The next step is to select the odor emission number on a per square foot basis for buildings or manure storage units from tabulated values. Finally, determine the total surface area of the barns and/or storage units, credit any odor control technology, and then calculate the total odor emission factors for each source.

A new extension publication that describes OFFSET in more detail, *OFFSET-Odor From Feedlots Setback Estimation Tool* (FO-07680-C), is available from the University of Minnesota Extension Service. The Biosystems and Agricultural Engineering Department has also created an online OFFSET calculator that will calculate the Total Odor Emission Factor (TOEF) and determine the setback distance at the various odor annoyance frequencies for up to five odor sources using the concepts found in the publication. For information on both, see [Resources](#).

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