

Recommended Site Selection Factors for Concentrated Animal Feeding Operations in the Southern Great Plains

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The Southern Great Plains region of the United States has been home to concentrated livestock operations for more than 50 years. Continued growth of open-lot cattle feedlots, open-lot dairies and confinement swine facilities in the Southern Great Plains, including the Texas Panhandle, has underscored the need to identify and communicate appropriate site selection for management and protection of natural resources and long-term sustainability of the industry for the next 50-plus years.

Conjunctive management of both water and air resources as well as beneficial use of the manure resources is a growing necessity in an atmosphere of increased public scrutiny, neighbor concerns, and intensifying regulatory requirements at state and federal levels.

Appropriate site selection for new concentrated animal feeding operations (CAFOs) is one of the most important factors that will enable livestock producers to successfully protect natural resources of the region. While many sites are eligible for operating permits from environmental regulatory agencies, this document is designed to encourage

evaluation of factors that go beyond the permitting process, in advance of making a final site selection. CAFOs must comply with all applicable regulatory requirements.

Key factors to consider include: topography, geology, watershed characteristics, water supply, drinking water quality, soils, land area available for manure and wastewater application, proximity to neighboring land uses, prevailing wind direction, and other factors (Sweeten et al., 1991; Sweeten and Wolfe, 1993).

General Overview of Site Characteristics

1. TOPOGRAPHY

- Elevation—production and manure handling facilities above the 100-year flood plain.
- Drainage—ability to divert up-slope clean water run-on around feed pens and retention ponds.
- Drainage—ability to capture storm water runoff or wastewater from confinement areas in retention ponds.
- Slope direction—away from planned buildings or working corrals.
- Drainage—feed pen slopes of 3-5 percent away from all feedbunks.
- Slope aspect—west or south facing slopes preferred for rapid drying.
- Near top of ridge or hill—avoid or mitigate subsurface water flow.



2. GEOLOGY

- Deep fresh water aquifer—greater than 100 ft to groundwater tables.
- Restrictive layer(s) between subsoil and groundwater table.
- Moderate textured soil material above first restrictive layer for internal soil drainage.

3. WATERSHED CHARACTERISTICS

- Review of State 303(d) list for impaired watersheds to identify pre-existing areas of concern.
- Assessment of other CAFOs and nutrient loads within watershed (based on environmental regulatory agency or USDA records).
- Status regarding potential Total Maximum Daily Loads (TMDLs).



4. WIND AND ATMOSPHERIC VARIABLES

- Downwind from neighbors (optimum wind direction)—review National Climatic Data Center wind direction frequency/wind velocity/atmospheric stability class databases.
- Separation distance—0.5 to 2 miles from rural neighbors or town, depending on facility size, local conditions, and regulatory considerations.
- Good atmospheric dispersion features.
- Consider historical, seasonal climatic data in site selection or pre-design phase.
- Consider community growth factors/potential

5. WATER QUANTITY AND QUALITY



- Acceptable groundwater quality for employee and animal consumption—state-classified as “fresh water.”
- Absence of (or ability to protect) recharge features.
- Adequate water supply—livestock watering, manure handling, dust control, crop irrigation for nutrient balance, as applicable.
- Wellhead/source water protection—facilities 150 ft. from private water supply wells or 500 ft. from public water supply wells.
- Facilities a sufficient distance from surface water or flood plain to install and maintain protective measures.
- Consider groundwater conservation district rules regarding well size, well spacing and permitted groundwater depletion allowances, if applicable (e.g., 50% of saturated thickness remaining after 50 years).

6. SOILS (different soil types may be needed for facilities construction, groundwater protection, or land application/nutrient management)

a. Building Site and Corrals/Feed pens (firm, stable subsoil).

- Well-graded subsoil—high coefficient of uniformity (clay through pebbles).
- Medium texture topsoil.
- Low shrink-swell potential.
- Moderately well-drained soil profile.
- Restrictive layer—2 to 3 ft or more beneath soil surface.

b. Retention Ponds and Lagoons (surface and groundwater protection).

- Clay subsoil—permeability 1×10^{-7} cm/sec to meet TCEQ requirements or USDA Technical Guides-Animal Waste Management Field Handbook (Appendix 10d).
- Good characteristics of excavated soil material to form stable embankments.



c. Land Application of Manure/Wastewater

- Good soil depth (3 ft) for agricultural crop or forage production, tillage, etc.
- Absence of restricting layer in root zone.
- Moderate permeability and internal drainage.
- Medium texture.
- Good nutrient holding capacity.
- Fresh water availability to grow adequate crops needed for nutrient removal.

7. LAND AREA

- Appropriate to size and design of facility.
- Neighboring farmer interest or demand for manure/wastewater.
- Availability of land application areas at reasonable haul distance.
- Sufficient crop or pastureland to achieve nutrient balance based on adequate nutrient uptake of plant-available nitrogen or phosphorous according to accepted agronomic practice and/or regulatory requirements.
- Appropriate distance from waterways (approximately 100-ft vegetative buffer); may need to be larger for source water protection areas.
- Proximity to other CAFOs in watershed and air shed, i.e. cumulative effects.

8. ACCESSIBILITY

- Good all-weather roads.
- Feedstuffs supply.
- Labor and market access.

9. UTILITIES

- Electricity—3 phase.
- Natural gas supply—if steam flaking of grain or water heating.
- Absence of major oil, gas or electric transmission lines in construction zones.

10. AESTHETICS

- Visual barriers along highways or nearby neighboring residences.
- Compatible land uses, including potential community growth.

