

Air Quality: Reducing Feedlot Emissions

2006

Federal Initiative Accomplishments



Purpose/Objectives

Conduct field and laboratory research to develop science-based emission factors and abatement technologies for dust (particulate matter), ammonia, hydrogen sulfide, odor, and volatile compounds from cattle feedlots and dairies in Texas and Kansas. Characterize air quality emissions from cattle feedlots and dairies in the Southern Great Plains using the best available scientific procedures. Develop and evaluate cost-effective abatement measures. Develop a scientific basis for applicable air quality protection policies. Determine the impact of feedyard air contaminants on animal health and productivity. Develop process-based models that can accurately quantify air quality emissions. Deliver education and technology transfer programs to feedlot operators and agencies.

Accomplishments/Impacts

- Long-term continuous monitoring networks were established at sprinkled vs. nonsprinkled paired feedlots in Texas and Kansas.
- Identified the following factors as contributing to evening peak concentrations of feedlot dust/particulate matter (PM): daytime evaporation, agonistic cattle movement, and atmospheric inversion conditions. Water sprinkling can be targeted to mitigate the 3- to 4-hour peak dust episodes.
- A Texas Panhandle region monitoring site for wet and dry ammonia deposition was approved and is being established. (Ammonia dry deposition occurs mostly within 800 meters of the feedlot.)
- Retention pond effluent may have higher potential for hydrogen sulfide emissions than feed pens.
- Research continues with genetically modified bacteria for degradation of odor-causing compounds. Researchers have isolated the gene sequence of horseradish peroxidase enzyme and demonstrated a 90% reduction in emissions. Other materials tested also served to mitigate odor emissions.
- Relative to animal health, data that includes blood samples suggest that dust exposure did not create a health threat.
- A 1,500 ton/day feedlot manure-fired steam-generating plant is being constructed to supply energy to a co-located ethanol plant. This will provide economic incentives for frequent surface-manure collection and be eligible for cost sharing to control feedlot dust.
- Hydrogen sulfide and ammonia concentrations were below levels for health concerns, whereas PM concentrations showed trends related to daytime activity of cattle.
- Process-based models will be developed to predict emissions, with or without abatement measures.
- A project Web site has been developed to provide timely progress reports and accomplishments (<http://caaques.tamu.edu>).

Lead Agency:

Texas Agricultural Experiment Station

Partners:

Texas Cooperative Extension,
West Texas A&M University,
Kansas State University,
U.S. Department of Agriculture–
Agricultural Research Service



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