

# Air Quality

# 2005

## Federal Initiative Accomplishments



### 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



Texas Agricultural Experiment Station  
THE TEXAS A&M UNIVERSITY SYSTEM



### Purpose:

To characterize air quality emissions from open feedyards and dairies in the Southern Great Plains using the best available scientific procedures. To develop and evaluate cost-effective abatement measures. To develop a scientific basis for applicable air quality protection policies. To determine the impact of feedyard air contaminants on animal health and productivity. To deliver education and technology transfer programs to CAFO operators, livestock associations, and agencies.

### Accomplishments/Impacts:

- Work on microbial degradation of odor-causing compounds using genetically modified bacteria is ongoing. Researchers have demonstrated a 90% reduction in para-cresol using the horseradish peroxidase (HRP) enzyme and have successfully isolated the gene sequence of HRP. In vitro studies show zeolites could reduce ammonia emissions by up to 50% in seven days; even greater reductions may be possible with a mixture of alum and zeolites.
- Hydrogen sulfide data collected in this project showed low probability of exceeding Texas ambient air quality standard of 80 ppb net ground-level concentration at the property line, based on downwind measurements from feedyards and runoff holding ponds. A 120 ppb standard applies if adjacent land is not occupied by people.
- Costs were projected for solid-set sprinkler systems used for feedlot dust control. Total capital costs range from \$307,000 to \$1,015,000. Cost per head marketed depends on the annual average turnover rate of about two times per year. For three assumed turnover rates of 1.75, 2, and 2.25 per year, the total cost per head marketed ranged as follows: 10,000-head feedlot, \$1.82–\$2.34 per head; 30,000-head feedlot, \$1.32–\$1.69 per head; 50,000-head feedlot, \$1.24–\$1.60 per head.
- Particle-size distribution data of particulate matter (PM) emitted from agricultural operations will likely be used to address inappropriate regulation of agriculture using PM-coarse (PM<sub>c</sub>). Few agricultural operations emitting PM may be able to meet the EPA's 2006 proposed National Ambient Air Quality Standards (NAAQS) for PM<sub>c</sub> of 70 micrograms per cubic meter, calculated as the difference between PM<sub>10</sub> and PM<sub>2.5</sub> concentrations.
- A preliminary ammonia emission factor derived for dairies from project results may impact the regulation of dairy ammonia emissions. Short-term intermittent flux gradient measurements gave ammonia losses of 27%–57% of nitrogen fed.
- Supplied data and guidance to EPA's Office of Air and Radiation on technical issues such as improved PM<sub>10</sub> feedyard emission factors; inaccuracies of EPA-approved FRMs for PM<sub>10</sub> measurements for agricultural particulates; and inappropriateness of PM<sub>c</sub> as an independent indicator of air contaminant emissions for agricultural sources, including feedyards and open-lot dairies, due to lack of direct or proven measurement devices and aerodynamic differences of urban vs. rural/agricultural PM.
- Found relationships between measured evaporation rates from simulated feedyard surfaces using weighing lysimeters and predicted evaporation. This information may guide feedlot water management decisions.