

Air Quality: Reducing Feedlot Emissions

2009

Federal Initiative Accomplishments

Purpose/Objectives

To develop science-based emission factors and cost-effective abatement technologies, researchers are studying dust, particulate matter, ammonia, hydrogen sulfide, odor, and volatile compounds from cattle feedlots and dairies in Texas and Kansas. The project develops emissions characterizations, identifies emission factors with appropriate abatement measures, and provides technology transfer that will improve the sustainability of cattle and dairy operations as vital economic sectors of rural communities in the southern Great Plains.

Accomplishments/Impacts

- Particulate matter (PM_{10}) reductions using a sprinkler system for dust control averaged 50% compared with rain events, at 70%.
- A 20% moisture content on feedlot pen surfaces was determined to be a critical threshold for reducing PM_{10} emissions.
- When water supply is limited, sprinkler applications can be reduced if applied in late afternoon rather than morning. Conversely, the most distal end of feedyards should be sprinkled earlier in the day than feedyard locations nearest downwind receptors.
- A cost analysis was performed on manure-harvesting equipment used as a PM and dust abatement measure. A tractor-pulled box scraper had an initial cost of \$77,000 and an estimated operating cost of \$31.53/hr. Pen cleaning cost can be partially offset through Environmental Quality Incentives Program (EQIP) funding.
- When a test feedyard started feeding distillers grains as a ration ingredient, the protein levels went up and so did the measured ammonia concentrations and emissions.
- Most excess nitrogen fed to cattle as crude protein was emitted as ammonia (30%–35% of total fed nitrogen became ammonia emissions in winter, compared to about 60% in summer).
- Hydrogen sulfide was monitored for more than a year at a 20,000-head cattle feedyard. Most 30-minute average concentrations were below the Texas Commission on Environmental Quality level of concern (80 ppb). Long-term average concentration in the center of the feedyard was 5 ppb, close to the measurement threshold.
- Data interpretation for 2008 demonstrates that having a slope on pens helps reduce moisture absorption, contributing to reductions in odor and peak emissions of indole and skatole.
- Summer emission factors for scraped and unscraped pens were 0.6 lb and 3.4 lb per 1,000 head per day, respectively, indicating that the scraped pens significantly reduced emissions.
- The Air Quality Research Team received the 2009 Texas A&M AgriLife Vice Chancellor's Award in Excellence for Research. The team also received the TCEQ Environmental Excellence Award for its 2009 work and was nominated for the USDA-CSREES Partnership Award, June 2009.
- Two National eXtension webcasts/webinars were conducted through a subcontract to the National Livestock and Poultry Environmental Learning Center at the University of Nebraska-Lincoln.



Lead Agency
Texas AgriLife Research

Partners
Texas AgriLife Extension Service;
West Texas A&M University; Kansas
State University; USDA Agricultural
Research Service

Federal Funding
USDA National Institute of Food and
Agriculture

Jobs Generated
13 FTEs

Nonfederal Funds Leveraged
\$1.482 million

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