

TECHNOLOGY SUMMARY

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Water Requirements for Dust Control on Feedlots

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Species: Beef and Dairy
Use Area: Animal Housing
Technology Category: Facility Management
Air Mitigated Pollutants: Dust, Odor

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System Summary:

Feedlot dust contributes to cattle illness along with potential non-attainment of PM₁₀ emission standards in localized areas of North America. Increasing the surface moisture content decreases the potential for entrainment of PM₁₀ particles during evening cattle activity resulting in improved cattle health and attainment with air quality standard. Individual feedlots vary in capacity, pen density and overall area necessitating educational outreach efforts including one-on-one technology transfer. A computer model was developed to enable feedlot owners to evaluate their particular facilities including the potential water requirements and cost of mitigating dust and other air emissions. The water requirement is estimated based on initial soil moisture, desired final moisture content, surface coverage area, soil wetting depth, sprinkler efficiency and application time. These parameters are used to estimate well capacity, main and branch water pipe size, number of wetting zones based on sprinkler head capacity, application time and nozzle requirements. Pumping requirements are based on application rate, pump efficiency and total head losses. Operational costs are based on an initial investment in the system along with pumping cost. This results in a total cost per head per month based on the fixed and variable cost.

Applicability and Mitigating Mechanism:

- Design sprinkler package for open lot dust control
- Economic analysis of the dust control system
- Spreadsheet based model - easy to use
- Provides quick evaluation of when inputs parameters are varied
- Estimates daily water requirements per head for dust control

Limitations:

- Results dependent on input parameters
- Assumes water application is uniform
- Assumes initial cost of installation of a sprinkler package is known
- Adequate water availability for dust control

Cost:

The cost of dust control on open feedlots ranges from \$0.60 to \$2.40 per marketed head. The cost of the infrastructure of the sprinkler system or water application equipment is reduced with increases in feedlot capacity or marketed head per year. The fixed cost represents 60 to 80 percent of the annual cost. The variable costs are dependent on the days per year necessary for attainment of PM₁₀ emissions from open feedlots or earthen dry lots commonly found in the High Plains region of the North America.