

## Elements of a Dust Management Plan for Open Lot Livestock Facilities

Other than the different moisture dependence shown in Figure 42-1, dust control strategies for open lots follow the same lines as odor control strategies with respect to pen surface management. Major dust events (Figure 42-2) occur when dry, loose manure accumulates on the corral surface and is pulverized and suspended by hoof action. The well-known evening dust peak appears to result from the following three main factors:

1. The afternoon heat, wind, and solar radiation have driven off surplus moisture, leaving the manure pack drier than at any other time of the day.
2. Cattle emerge from their typical afternoon lethargy to move to the feed bunk, to take a drink of water, or to play.
3. With the atmosphere's tendency to become more stable between dusk and midnight than during the afternoon, the manure particles suspended in the air by cattle activity tend to remain near the ground, creating a "dust cloud." The resulting dust event may persist well into the evening or early morning.

The general approach to dust control consists, then, of (a) removing dry, loose manure from the corral surface; (b) manipulating the moisture regime at the corral surface to achieve optimum moisture content; and (c) attempting to reduce peak cattle activity during the critical late afternoon hours.

### Corral design

The same design principles apply to dust control as to odor control. Managing the corral surface for both odor and dust control is easiest and most effective when the pens do not accumulate moisture in small or localized areas. Pen areas that retain moisture are most likely to end up mushy, disturbing the firm 1- to 2-inch compacted layer that provides a firm base for operating manure-harvesting machinery.

Provide easy access to water throughout the feedlot for water trucks. In

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Figure 42-2. Feedyard dust event in the Texas Panhandle.

semi-arid and arid regions, application of supplemental moisture is often necessary to keep up with daily evaporation and maintain optimum moisture content in the corral surface. Feedlots and dairies that opt for water trucks (as opposed to sprinkler systems) should ensure that distribution pipelines across the AFO put water where trucks will not be required to “deadhead,” or roll empty, over large distances.

Corrals should be conducive to cross fencing for stocking density manipulation, if applicable. Dust control in regions with moderate annual moisture deficits (e.g., semi-arid and temperate regions of the High Plains or the Trans-Mountain West) may be improved by periodic adjustment of stocking density in existing pens. Stocking density increases of up to 100% (i.e., from 150 ft<sup>2</sup>/hd to 75 ft<sup>2</sup>/hd cattle spacing) have been shown to reduce downwind dust concentrations by up to 29% (Romanillos 2000). Increasing the number of cattle per pen is one approach, but it reduces the linear bunk space available to each animal and may result in behavioral changes that increase stress and reduce livestock performance. A more plausible alternative is to install temporary (e.g., electric hot wire) or permanent fences in suitable corrals, being careful to maintain convenient herd management and easy access by pen riders and machinery. Preliminary, unpublished evidence suggests that the behavioral effect of increased stocking density may be more significant in large (> 150 head) pens than in small (< 100 head) pens, so managers should experiment with stocking density manipulation cautiously and on a small scale.

### **Corral and road maintenance**

Besides those practices outlined for odor control, the following measures reduce dust potential in corrals and on unpaved roads within the AFO.

**Remove loose material on surface; maintain a compacted layer of manure 1 to 2 inches thick.** Frequent harvesting of loose, dry manure from the feedlot surface improves manure quality for land application and reduces the amount of material that may be pulverized and suspended in air by hoof action.

**Topical application of crop residues on corral surfaces (experimental).** Top dressing corral surfaces with organic residues of crop harvesting or processing may increase the manure’s moisture-holding capacity. In addition, the residue may provide a cushioning property that reduces the hoof’s shearing effect. No research data yet exist to document this technique’s effectiveness. Candidate top dressings include straw, waste hay, cotton “gin trash,” and peanut hulls. These carbonaceous additives may also improve the quality of the manure-composting process.

**Topical application of chemical resins on dirt or caliche roads (experimental).** Corral dust control is vastly different from road dust control because livestock are continually adding new material to the corral surface. As a result, topical treatments would probably require frequent re-application to be effective. Applying expensive resins or petroleum derivatives to dirt or caliche roads, however, appears to effectively (Gillies et al. 1999) reduce dust from truck traffic.

### **Feeding strategies**

**Discourage end-of-day spike in livestock activity (experimental).** Morrow-Tesch (1999) collected preliminary data suggesting that delay of the last daily feeding (typically, the third of three) into the afternoon may drastically reduce cattle activity in the late afternoon and early evening.

Although the method requires further validation, the concept has some merit.

**Modest increase in ration's fat content (experimental).** Slight excess fat content in rations may increase the cohesiveness or plasticity of the resulting manure, making the dried manure less susceptible to re-suspension. This method has not been conclusively evaluated in production-scale research and is likely to be expensive. Anecdotal evidence suggests that this approach may increase the hazard to pen riders due to the slicker corral surface.