

Managing Feedlot Pen Dust

There are several sources of dust emissions from feedlot operations, such as road use, fieldwork, feed processing and livestock pens. This factsheet provides recommendations to help minimize excessive pen dust that can cause animal health and performance issues, as well as being a nuisance. Implementing pen and manure management practices can help minimize dust emissions from a feedlot pen surface.

Feedlot pen dust is the result of dry, un-compacted manure (including bedding and soil) being pulverized into a fine powder by livestock activity and then being 'kicked-up' into the air by hoof action and wind. As warm, dry conditions reduce the manure's moisture content, it becomes more susceptible to being broken down into fine particles.

Warm temperatures tend to reduce livestock activity during the day; however, as temperatures decrease in the evening, livestock become more active. Increased livestock activity, combined with dry material on the pen surface, can result in higher dust emissions from pens in the evening.



Dust emitted during the evening is often slow to disperse and will settle in low spots which can negatively affect livestock, workers and neighbours. This is due to stable air conditions created by atmospheric inversions, which confine dust emissions to a shallow layer of air at the ground level, rather than dispersing dust particles upward. In these situations, the short-term concentration of dust particles in the air may be 10 to 15 times higher than the daily average.



Although a dust management plan is not a requirement under the *Agricultural Operation Practices Act* (AOPA), the Natural Resources Conservation Board (NRCB) may require a feedlot to have and implement a dust management plan in response to repeated nuisance dust complaints.

Primary Dust Control Method: Reduce Pen Manure Volume

The removal of accumulated manure, bedding and deteriorated pen base is the most effective approach to managing pen dust.

Livestock activity breaks down the manure into loose, un-compacted material, so heading into the summer months with minimal un-compacted manure volume on the pen surface will help reduce the potential for dust formation.



A good practice is to have pen manure removed to a practical minimum volume by early June.

Monitoring for dust and removing un-compacted material will help minimize pen emissions. If dust plumes are noticeable around the livestock as they walk through the pen, then manure removal should be considered. Maintain no more than 2.5 cm (one inch) of un-compacted manure on the pen surface, and ensure the pen floor is kept smooth, firm, and well compacted. Several manure removal events (two to four times) may be needed during the

summer if dust emissions persist. Operators may find it easier to remove manure from pens that are empty; however, research has shown that animals do get accustomed to the equipment and cleaning activities.



Completely removing un-compacted material from the pen for field spreading or storage is ideal, but in-pen mounding is also possible. In this case, loose material is collected and stored in the pen using a box scraper, moistened, and then compacted in place with heavy equipment.



Secondary Dust Control Methods

Secondary methods of dust control can be used to further reduce or address dust emissions. Maintaining no more than 2.5 cm of un-compacted manure will improve the effectiveness of secondary dust control methods. The following practices will have reduced benefit without first properly managing pen manure volumes.

Applying Water to Pen Surface

In this approach, water is added to the pen surface to increase the moisture content of the manure. The most common methods of applying water include the use of water trucks, solid-set sprinkler systems, and traveling gun watering systems. These systems should be able to deliver 2/3 cm (1/4 in) of water uniformly across the back 2/3 of each pen.

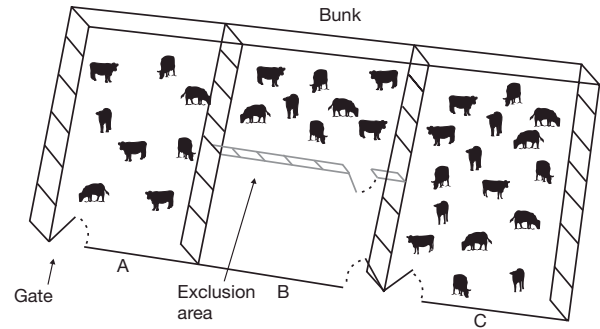
Weather will impact water application efficiency. While it is more effective to apply water in the late afternoon, it may be too windy to do this properly. Alternatively, water applied in the morning or mid-day is wasted if evaporative demand is high.

Applying water to a layer of un-compacted manure greater than 2.5 cm (one in) deep is not an effective dust control practice because of the significant volume of water required to penetrate the manure profile. If the manure cannot be effectively moistened (to 20 to 30 per cent moisture content) and then compacted, livestock hoof action will penetrate the wetted crust, exposing the dry material underneath, creating dust.

The use of water for feedlot pen application should be discussed with the local water supplier as it may not be part of the water license and may require allocation of additional water resources.

Increase Stocking Density

Increasing livestock density will help increase pen moisture content by distributing manure and urine over a smaller area, which reduces the susceptibility of the manure to breakdown into a fine powder. Research suggests doubling the livestock density can reduce pen dust by up to 50 per cent. This is accomplished by limiting livestock access to portions of the pen by using electric fence or portable panels. This practice also creates an exclusion area where any un-compacted manure (collected during pen cleaning) could be stockpiled to ensure livestock do not disturb the pile and generate dust. These two practices can be combined to reduce pen dust potential.



- A. Normal stocking density
- B. Double stocking density with portable panels or electric fences
- C. Double stocking density by doubling animal numbers

Alternatively, increasing livestock numbers per pen is another way of achieving a higher stocking density. This approach requires care and attention to avoid negative impacts on livestock performance due to increased competition for bunk space and water access. Where water resources are limited and seasonal moisture deficits are not too extreme, stocking density manipulation may be a cost-effective option to reduce direct water application.

Conclusion

Feedlot pen dust is the result of pen manure being broken down into fine powder that becomes disturbed and elevated into the air above the feedlot. The most effective method to minimize dust emissions is to remove excess manure from the pen, plus monitor and remove any loose, un-compacted materials that accumulate over the summer. Secondary management practices to further minimize dust emissions include applying water to the pen surface and increasing the pen stocking density.



For More Information:

Call the Ag-Info Centre toll free at 310-FARM (3276)
or email: aginfocentre@gov.ab.ca

References:

- **Feedyard Dust Control in an Epic Panhandle Drought, 2010-2011:** <https://aglifesciences.tamu.edu/baen/wp-content/uploads/sites/24/2017/01/ESP-417.-Feedyard-Dust-Control-in-an-Epic-Panhandle-Drought-2010-2011.pdf>
- **Dust Emissions from Cattle-Feeding Operations Part 2 of 2: Abatement:** <https://aglifesciences.tamu.edu/baen/wp-content/uploads/sites/24/2017/01/E-631.-Dust-Emissions-from-Cattle-Feeding-Operations.pdf>
- **Managing Dust in Open Beef Feedlots:** <https://water.unl.edu/article/animal-manure-management/managing-dust-open-beef-feedlots>

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