

Vented Plumbing for Livestock Manure Handling Systems



Livestock manure handling systems have undergone many changes in the last decade. Manure now is often transferred from buildings to storage through buried polyvinyl chloride (PVC) pipes over distances of several hundred feet. One main system may have several branches connecting several buildings to one storage pit. The system has several similarities to home sewage systems, except up until now no one has recommended any venting.

Field experience has revealed two problems with the use of unvented plumbing systems in livestock manure handling systems:

1. When the manure pit is being emptied, manure gas can bubble back into the livestock structure through the PVC pipe. Because manure gas may contain methane, which is highly combustible, this can create an environment that will explode or burn. In one case, an open flame heater started a manure gas fire when a plug near the heater was removed to drain the manure from a shallow pit. Hydrogen sulfide in manure gas also can be life-threatening. Cases have been reported in which pigs in pens located above manure plugs have lost consciousness while the pit was being emptied.

2. Pressure in the plumbing system can lift and unseat other plugs, which allows liquids to drain and leave solids behind.

The plumbing system for all livestock manure handling systems should be vented, as shown in Figure 1, to reduce or eliminate these two problems.

Plumbing design

- Use at least 8-inch diameter PVC for main runs. This ensures adequate velocity and reduces plugging.
- Slope horizontal lines on a 0.5 percent grade (6 inches per 100 feet).
- Place a 4-inch vent pipe just outside the building wall between the building and the storage pit. This vent will prevent manure gas in the pipe from entering the building.
- Extend the main line completely through the building and place a second 4-inch vent pipe and clean-out trap outside the far end of the building. This vent reduces pressure build-up and unseating of plugs. Extending the main line through the building is relatively inexpensive and will facilitate future expansion options.
- Use Y-fittings, rather than T-fittings, to reduce plugging by manure solids. Y-fittings also facilitate cleaning. (Sanitary T-fittings also can be used.)

Venting sealed storage tanks

Many manure storages are now sealed to reduce odors. To prevent the build-up of dangerous gases and to release gases when livestock pits are emptied

into the tank, sealed tanks should be vented.

- Vent sealed tanks with a vent pipe at least 4 inches in diameter.
- Extend the vent stack at least 6 feet above the tank to reduce the risk of human exposure to escaping gases.

Summary

Animal manure systems that drain building manure pits into separate storage pits should have vented plumbing systems. Venting these systems reduces the risk of dangerous manure gases returning into the livestock building and unintentional unseating of drain plugs from pressure build-up. Use only Y-fittings and sanitary T-fittings on all lines that carry manure to reduce plugging. Extend lines through buildings to facilitate clean-out and future expansion.

References

- Blankenbaker, E. Keith (1981) *Modern Plumbing*. South Holland, IL: Goodheart-Willcox Co., Inc.
- Galowin, Lawrence S. and John Cook (1984) "Reduced sized venting for plumbing branch lines," *Heating/Piping/Air Conditioning*. January 1984, pg. 107-118.
- Swaffield, J. A. and L. S. Galowin (1992) *The Engineered Design of Building Drainage Systems*. Hants, England and Brookfield, VT: Ashgate Publishing Ltd.

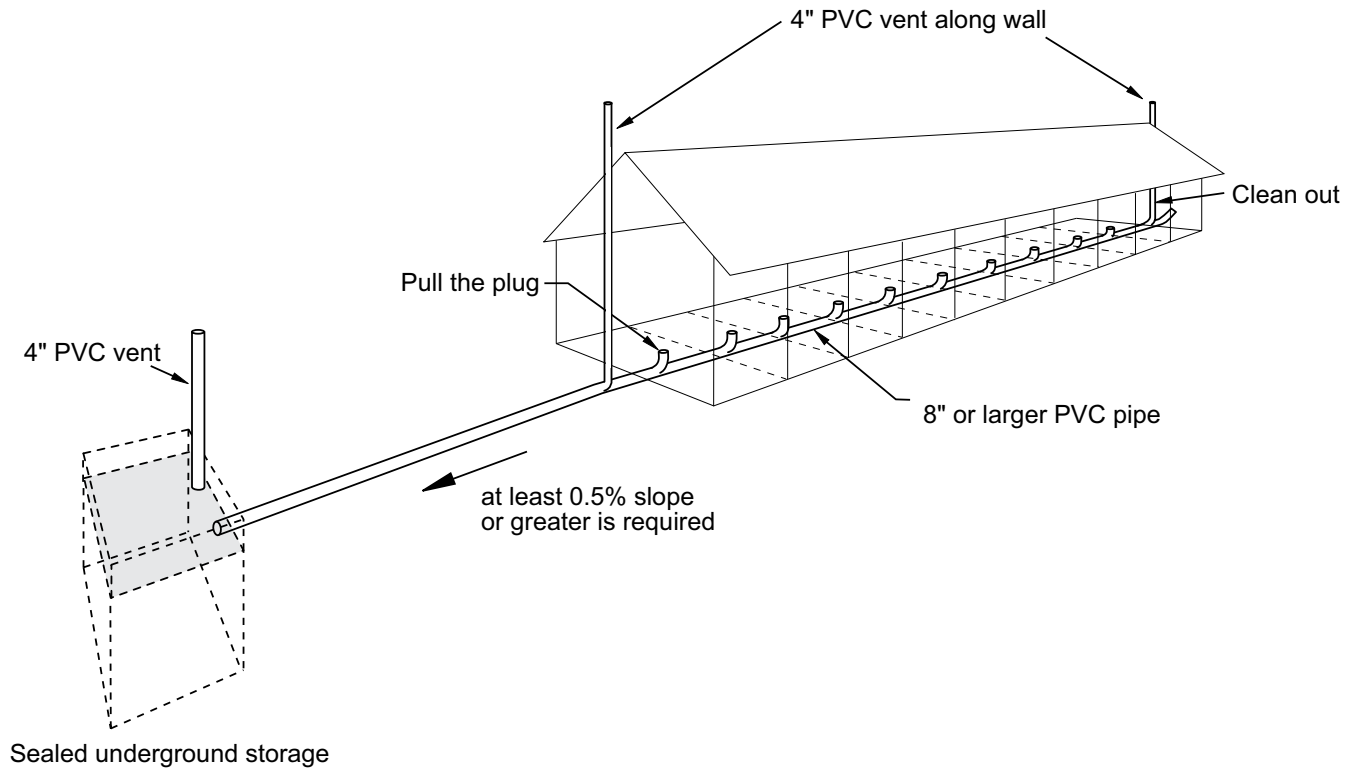


Figure 1. Recommended plumbing vents for livestock manure handling system

Note: Drawing not to scale.

Additional resources

Other publications in the LIFE series, available from any Iowa State University Extension office, include:

Environmental Guidelines for Confinement Swine Housing, Pm-1586

Environmental Guidelines for Confinement Swine Housing (pocket cards), Pm-1586a

Choosing Fans for Livestock and Poultry Ventilation, Pm-1587

Health Hazards in Swine Confinement Housing: How Bad is Bad? Pm-1588

Concrete Specifications for Agriculture, Pm-1589

Design and Management of Anaerobic Lagoons in Iowa for Animal Manure Storage and Treatment, Pm-1590

Pit Recharge Manure Management System, Pm-1601

Selecting Manure Management Systems for Swine Operations, Pm-1602

Earthen Pits for Liquid Manure Storage, Pm-1603

Watering Systems for Grazing Livestock, Pm-1604

Guidelines for Minimizing Odors in Swine Operations, Pm-1605

Tunnel Ventilation to Alleviate Animal Heat Stress, Pm-1606

Environmental Regulations for Livestock Manure Management, Pm-1607

Open or Enclosed Swine Finishing: Making the Decision, Pm-1608

You Can't Afford Not to Haul Manure, Pm-1609

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