

GRAVITY PIPE MANURE TRANSFER SYSTEMS

INTRODUCTION

Successful gravity pipe manure transfer systems using large diameter pipes share several common features. They require proper planning, installation, operation, maintenance and safety. However, even the best systems may have occasional problems related to plugging. Consider some of the following ideas to minimize this risk of plugging or to avoid the problem of plugging. Safety must be considered at all times especially the lack of oxygen and the presence of poisonous gases.

The most common cause of transfer system problems is the addition of too much dry bedding. Other causes of pipe blockages for gravity transfer pipes could include the addition of frozen manure, the addition of too much dry feed to the manure, loading the reception pit too quickly resulting in an air lock, building the transition between the reception pit and pipe with a rough or poor transition, curves or bends in the transfer pipe, shifting or settlement of the transfer pipe, solids buildup at the end of the pipe including clay, soil, gravel, antiskid, sand, and excessive length of transfer pipe, etc.

PLANNING & DESIGN

- Chopped bedding including straw, sawdust, or newspaper at a rate no greater than 2-3 lbs/cow/day normally works well.
- Avoid scrapping in long hay. Avoid corn stalk bedding which can swell within the pipe.
- Sand is difficult to work with because it settles out, especially wherever water is added.
- If possible, mix the milkhouse water with the manure at the gutter or the reception pit to get a smoother consistency. If possible, avoid adding water in the transfer pipe to sand bedded manure.
- Consider the shape of the reception pit and make sure it has a very smooth transition from the reception pit into the pipe. Leave no sharp edges and leave no "dead" corners in the reception pit. Do not enter reception pits without proper safety precautions.
- Plan for the transfer pipe to enter the manure storage at approximately 1'-2' above the storage floor. If freezing is a concern, lower the pipe and cover the reception pit with an insulated lid. Extremely cold sites require special considerations.
- Minimize lengths of transfer lines. Longer pipes complicate some flow problems including segregation of the manure and swelling of the bedding. The recommended maximum length of pipe is 150 feet for dairy replacement and beef. For lactating dairy, veal, and swine the maximum length is 200 feet.
- Consider installation of air vents as close as possible to the reception pit to aid the movement of the manure. Vents allow the release of trapped air pockets. Skid loaders entrap large air pockets in the reception pits.
- Consider using manholes for long pipe lengths, as a drop structure for steep sites, at bends in the pipeline, or to allow witness locations. Do not enter manholes without proper safety precautions.
- Pipe slope is not as important as the head difference, but successful pipe slopes can range between 1-15%. Head difference is defined as the height difference between the top of the reception pit and top of the storage.

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FACT SHEET #3 Gravity Pipe Manure Transfer Systems

- The recommended pipe is 24" plastic (smooth on the inside such as HDPE, SDR-35 or SDR-26) with all pipe fittings watertight.
- Provide a minimum of 3' soil cover over the pipes for frost protection and to prevent crushing by vehicles.
- Keep the transfer pipe straight and avoid elbows, bends, and curves.

OPERATION AND MAINTENANCE

- The consistency of the manure is the most important characteristic for success. Excess amounts of silage, straw, hay, and dry feedlot material plug the pipes.
- Thoroughly clean the storage each year to clean out grit and other debris. Remove all debris from both ends of the transfer pipe. Inspect the transfer pipe. Do not enter confined spaces without proper precautions. Keep large debris including dead animals out of the pipe.
- Make sure all workers understand the safety and operation and maintenance considerations including that the manure must be fluid.
- Repair or replace all broken/missing guards, covers, grates, etc.
- Frozen and/or "slushy" manure should not go into the transfer pipe or reception pit because it could freeze and plug the pipe.
- Some blockages are preceded by days of partially blocked pipes with slow flows; correct the situation before a total blockage occurs.
- Some pipes slow and clog because the manure is too stiff and the head difference between the reception pit and top of tank is too small. Such systems require the use of more fluid manure.
- If a blockage does happen, try to understand why it happened and correct it for the future.

UNPLUGGING PIPES

- On most sites, at some point in time every pipe will be plugged. The majority of plugs can often be attributed to more than one lapse in O&M. Listed below are some suggestions for unplugging a blocked pipe.
- Remove the stiff manure from the reception pit, fill the reception pit with water, and let stand overnight, use a plunging action with a pole, or pipe to agitate the slurry. Do not enter the reception pit.
 - Send a small pipe down the reception pit to attempt to relieve an airlock or burp the system (never enter the reception pit or the pipe). If the upper end of the pipe ever burps; consider installing an air vent/breather.
 - Use direct water pressure with a nozzle extension on a steel pipe and force water into the bottom of the reception pit or the upper end of the transfer pipe. Do not enter the reception pit or pipe.
 - Agitation of the storage (especially the sludge located at the transfer pipe outlet in the storage) can dislodge some types of plugs.
 - Install a steel cable inside the pipe and tie in place, when the next blockage occurs connect a car tire and pull the tire thru the pipe, pulling with a tractor. Reinstall the steel cable. Never enter the pipe or reception pit.
 - Attach a fire hose connection with a valve at the end of the pipe and use water pressure to unclog the pipe.
 - Hire a pipe cleaning company to vacuum and/or jet out the pipe. Pipe cleaning companies can work from either end of the pipe. To clean from the lower end of the pipe, the storage must be emptied.

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