

# PORK PRODUCTION HOW-TO

*Pork Information Gateway*

## How-to maintain a manure storage system

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### Introduction

Properly designed and operated manure management systems prevent manure from overflowing or discharging from a facility, and allow for timely nutrient application for vegetative growth. Whether the manure is stored in a lagoon, earthen structure, tank or deep pit, similar principles exist to maintaining a sound manure storage structure. Frequent evaluation of the system and preventative maintenance reduce the risk of costly structural and/or environmental issues down the road.

This How-to lists tasks and evaluations that should be performed at least monthly, if not more often, and was adapted from a more detailed guidance document on manure storage maintenance and operation [1]. Some tasks and records may be regulatory requirements. If you are unsure of regulatory requirements, contact your local state regulatory agency, Natural Resource Conservation Service, University Extension office or other qualified professionals [1]. Since every farm is slightly different, compiling the applicable items into a farm-specific checklist helps ensure that the necessary tasks are completed, is evidence of responsible operational management, and over time provides data that can help explain if, when and why changes occur in a system. A checklist should include the date, name of person completing the checklist, and places to record actions taken and other observations.

When working around stored manure, always think about safety first. Factsheets are available for general safety [2] and confined space [3] procedures.

### Operating Level of Manure Storages

- **Why:** Monitoring and recording the changing depth of a manure storage over time makes it easier to estimate the remaining storage capacity, the amount of manure available for land application, and documents the impact of rainfall events. The sludge depth also impacts the treatment volume for lagoon systems. With under-floor deep pits, the manure level can affect the amount of air exhausted from pit fans. The manure volume record is required by most regulatory programs.
- **How:** The liquid level of outdoor manure storages can be measured using a fixed liquid level marker [4]. For under-floor deep pits, the manure level can be monitored by inserting a pole through the slats and measuring the manure-covered length of the pole, or using a laser [5]. A basic record would include the manure depth. A more detailed record would include precipitation events, manure removal dates and amounts, and water leaks (i.e. from waterers). A bi-annual sludge evaluation is also recommended for lagoons.

- **Potential Checklist Questions/Items:**

- Is the liquid level marker visible (if applicable)? What is the depth of manure?
- Is there adequate storage for a storm event (25-year, 24-hour or other)? Is there adequate freeboard?
- Is the manure depth higher or lower than expected based on previous fill rates? Can any difference be explained by precipitation records, water leaks, animal numbers?

## Visual Structural Inspection

- **Why:** A regular inspection schedule helps identify indications of structural or operational problems so that they can be addressed as early and as soon as possible. If there is a suspected structural problem, contact an engineer or other professional for further consultation and recommendations.
- **How:** For an outdoor, earthen structure, perform a walk around the perimeter of the structure, paying close attention to inlet points, the berm sidewalls and base.
- **Potential Checklist Questions/Items:**
  - Are there trees, large plants or large weeds growing along the berms? Are there any indications of burrowing animals? Are there any deep cracks? If so, where?
  - Are there any indications of erosion at the inlet or from wave action?
  - Is there any seepage?
  - Is the area freshly mowed and trash (medical supplies, etc.) removed?
  - Is clean water being diverted?

## Odor Intensity

- **Why:** Many different factors contribute to the gases and odors released from a swine system, including the climate, housing type, animal size and management decisions. Because odor is a sensation, odor is difficult to quantify objectively, so making a conscious effort to record and report observations is important.
- **How:** On a day with stable wind conditions, record the weather conditions, date and time. At a minimum, drive around the perimeter of the operation. If possible, include additional distances in your routine.
- **Potential Checklist Questions/Items:**
  - Would you describe the odor as None, Faint, Distinct, Strong, Unbearable? [1]

## Safety

- **Why:** There are known risks to working in and around manure [2,3]. Regularly maintaining and reviewing safety protocols keeps safety foremost in the minds of owners, managers and workers.
- **How:** Regularly review safety protocols.
- **Potential Checklist Tasks/Questions:**
  - Are both regular and seasonal workers aware of general and seasonal risks and safety protocols?
  - Is it time to review these procedures?
  - Are all fences, escape ladders and signage intact?

## Summary

Regular attention to the level, integrity, appearance and safety of a manure storage system reduces the risk of environmental issues. Recording and reviewing checklist items provides a means to identify problem areas.

## References

[1] Fulhage C; Hoehne J. Lesson 24: Operation and maintenance of manure storage facilities. Livestock and Poultry Environmental Stewardship Curriculum. MidWest Plan Service; 2001.

[2] Donham K, Aherin R, Baker D, Hetzel G. Safety in swine production systems. PIG 16-01-02. Pork Information Gateway; 2006.

[3] Shutske J, Schermann M. Confined spaces. PIG 16-01-06. Pork Information Gateway; 2012.

[4] Rahman S, Aakre A, Rockeman K, Augustin C. Liquid level or depth marker for earthen runoff ponds. NM-1514; Fargo, ND: NDSU Extension Service; 2011.

[5] May J, Benjamin M. Measuring manure depth in the PEDv era [homepage on the Internet]. c2014 [updated 2014 Aug 18; cited 2014 Sept 4] Available from: [http://msue.anr.msu.edu/news/measuring\\_manure\\_depth\\_in\\_the\\_pedv\\_era](http://msue.anr.msu.edu/news/measuring_manure_depth_in_the_pedv_era).