

Manure Storage

Process Improvement for Animal Feeding Operations



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Introduction

The objective of this fact sheet is to help producers understand the need for manure storage facilities.

Why Do We Store Manure?

The capability to store manure reduces or eliminates the need to collect, remove, and spread manure on a daily basis. In past years, when livestock operations were smaller, daily hauling or very short-term storage with frequent hauling was a common and manageable system. However, as operations increased in size, and manure management systems evolved from solid/semisolid systems to liquid systems, the need for storage became more pronounced.

The primary reason to store manure is to allow the producer to land spread the manure at a time that is compatible with the climatic and cropping characteristics of the land receiving the manure. Manure nutrients can be best utilized when spread near or during the growing season of the crop. Therefore, the type of crop and method of manure application are important considerations in planning manure storage facilities. For example, manure applied to a corn crop with a tank wagon or injection system needs to be applied in the fall after the crop is harvested, in the spring prior to planting, or both.

Spring application is preferred because it is closer to the crop's growing season. If irrigation from a lagoon is the application method, then manure might be spread on the growing plants.

Forage or hay crops generally provide the greatest flexibility in planning land application operations. Cool season grasses can generally utilize manure nutrients from early spring to late fall, and application equipment generally does not adversely affect the crop regardless

of its growth stage. In warmer regions, cropping scenarios might be developed that provide growing plants during a major portion of the year (double cropping/triple cropping).

Climate and associated soil conditions are additional factors that strongly influence the storage period needed for manure. Saturated, wet, frozen, or snow-covered soil conditions are not suitable for land application of manure. Therefore, a manure storage structure should be sized to provide a storage period compatible with the required cropping operations (tillage, planting, harvesting), and climatic conditions expected.

While crop schedules and soil/climatic conditions are the most critical factors in manure storage, other considerations may also be important.

- Soil compaction. Large manure hauling and application equipment may cause excessive soil compaction under certain soil moisture conditions. If sufficient storage is available, application operations can be performed when soil moisture conditions minimize the effects of compaction.
- Odors. Sufficient manure storage may allow spreading operations to be scheduled when odor risks influenced by wind direction and temperature/humidity conditions are minimized.
- Labor/equipment availability. While the same labor is required annually to spread manure, that labor and equipment may be available only during certain times of the year due to other needs (planting, harvesting). Therefore, a manure storage period is needed so labor and equipment can be utilized when available.

Table 1 summarizes some conditions and characteristics associated with different lengths of storage period time for manure.

The actual size of manure storage structure needed depends upon the (1) volume of manure and wastewater

Table 1. Conditions and characteristics associated with storage period for manure	
Storage Period	Conditions and Characteristics
Short-term (3 months or less)	Warm climate, no long periods with frozen or saturated soil. Pasture, grass, and hay land available for spreading. Equipment, time, and labor available as needed for frequent spreading.
Mid-term (3 to 6 months)	May accommodate short periods with frozen, snow-covered, or saturated soil. May not be adequate for traditional annual crop rotations. Some pasture, grass, or hay land will likely be needed for spreading.
Long-term (6 months to 1 year)	Provides greatest flexibility for spreading operations. Accommodates longer winter seasons. May best fit timing of cropping operations. Provides storage from one irrigation season to the next. Most flexibility for scheduling custom spreading operations.

produced and (2) storage period needed based on the considerations described above. Primarily, animal species and number determine manure volume. Wastewater volume depends upon many sources such as rainfall; runoff from open lots, wash water used in the buildings, and fresh water used for flushing or pit recharge. The length of storage period needed depends primarily on cropping schedules, soil and climatic conditions, and labor/equipment factors noted above. Most operations utilizing a single, full-season annual row crop or small grain crop will need at least six months manure storage to schedule land spreading around cropping operations. Experience has shown that even a full year's storage is beneficial when wet conditions may make fall application difficult and manure needs to be stored until spring. Land application operations in the central and upper Midwest using irrigation usually benefit from a full year's storage so that effluent can be applied during the typical irrigation season. Shorter storage periods may be acceptable in milder climates and where forage crops are utilized for receiving manure.

Reference: Livestock and Poultry Environmental Stewardship curriculum, lesson authored by Charles Fulhage and John Hoehne, University of Missouri, courtesy of MidWest Plan Service, Iowa State University, Ames, Iowa 50011-3080.

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