

Storing Layer Manure On-Farm

Providing a storage area for manure improves management flexibility and allows manure supply to be matched to demand. Shed cleaning operations are generally timed to fit in with other operations. This can produce large quantities of manure at times when demand for reuse is low. This may contribute to low prices for manure sold off site, or the need for some form of on-site storage. Having a properly designed and constructed storage facility can improve manure handling and sale prices by holding the product until demand is higher.

Manure Management & Storage

Storing manure can cause odour nuisance and water contamination by nutrients unless the appropriate storage design and management is put in place, taking into account site constraints. Appropriate control measures and design principles should be based on the level of risk at each site. Refer to the Egg Industry Environmental Guidelines (Edition II – McGahan et al., 2018) for more information on determining risk factors for nutrient loss to surface and groundwater.

High moisture manure is often associated with increased odour emissions because it promotes anaerobic breakdown. Storing manure in windrows and turning at least once is likely to reduce the moisture level of the manure and promote low odour aerobic decomposition and partial composting. For covered storages, ventilation may be required to manage odour production.



Storage Systems

Different types of manure storage areas suit different production systems and locations. If the facility is located in a rural area, windrow or stockpile storage may be an option. However, if the farm is in a more densely populated area, a covered storage is likely to be more appropriate, in order to reduce potential odour impacts.

Stockpile or windrow storage

Manure can be safely stored in a stockpile or windrow for an extended period if the site has been carefully selected and

constructed. On sites with a high risk of impacts to groundwater, stockpiling manure should be undertaken on a formed pad. A well prepared pad surface provides two advantages. Firstly, it ensures the pad is trafficable in all weather conditions and secondly, it minimises leaching of water from the manure to groundwater. Materials that can be used to form an impermeable pad, include:

- concrete/paving,
- cement stabilised earth, and
- compacted earth.

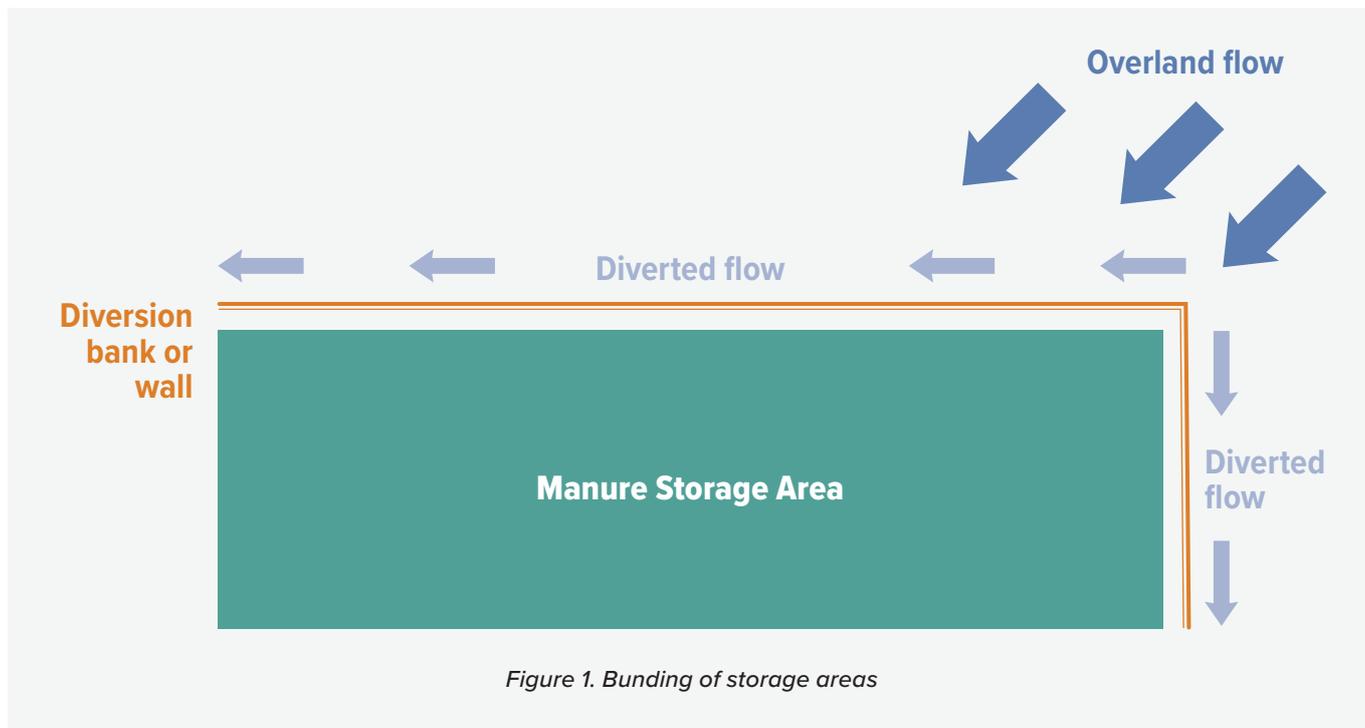


Figure 1. Bunding of storage areas

Runoff control

Site design and layout measures should be responsive to the level of risk for the site. For instance, where there is only a small amount of runoff from the storage area, a Vegetative Filter Strip (VFS) may be adequate. However, local council and state environmental regulations will need to be observed where applicable.

Ponds and dams should be avoided on layer farms where possible due to biosecurity concerns associated with attracting waterfowl. However, if the storage area is not roofed, installation of a dam may be required to catch runoff from outdoor manure and spent litter compost or stockpile sites and this can be managed by locating it at a distance from the sheds.

Design the dam to hold a 1 in 10 year, 24-hour storm event. Dams should not be located near sheds to minimise biosecurity risk. For localities with winter dominant rain, a monthly water balance calculation should be undertaken to ensure overflows are infrequent.

Sediment trap

A heavy storm may carry sediment from the stockpile to the holding pond. A simple sediment trap can collect the solids before they enter the holding pond, reducing the solids and nutrient loading of the pond.

Disposal of retained runoff

The contaminated runoff collected in holding ponds can either be evaporated or irrigated onto pasture / suitable crop. Careful analysis should be undertaken to ensure that evaporation ponds are able to store sufficient runoff to cope with prolonged wet periods. Where effluent is irrigated, both long-term water and nutrient balances should be undertaken for the reuse areas.

Storage Sheds

Storage sheds are useful where there is no option for an outside stockpile. While construction of storage shed is more expensive, the improved flexibility in manure handling may offset this cost. Sheds offer greater certainty regarding control and management

of potential odour impacts and ensure that manure is separated from causes of runoff and leaching to groundwater. Covered storages also reduce the problems of unsightly manure stockpiles, and the potential for fly breeding nuisance. The storage needs to be sized to contain the required amount of manure storage and to provide adequate room for machinery to operate inside.

Sizing

The required size of a manure storage area is a major determinant of the construction costs. It depends primarily on manure production and the period of storage required. For example, if manure needs to be stored for six months to coincide with cropping cycles, the storage facility needs to be large enough to hold the manure production for this six-month period before space will become limiting again. For caged layer systems, fresh manure production is approximately 80 m³ / 1000 birds / yr based on a moisture content of 55% and a density of 450 kg/m³.



For litter based systems this figure is closer to 50 m³ / 1000 birds / yr, due to decomposition in the shed. This assumes one third litter floor and two thirds slatted floor, with manure and litter removed at 40% moisture and a density of 400kg m³. These numbers may vary with different systems but can be used as a guide to calculate the required manure storage size.

As a rough guide, a small windrow with 45° slide slope, 1.8m wide, 0.9m in height, and 100m long would contain approximately 80m³ of manure. A large windrow with 45° slide slope, 3.6m wide, 1.8m high, and 100m long would contain approximately 320m³ of manure. A large flat-topped stockpile of 10m radius and 5m in height, with 45° slide slope may contain around 900m³ of manure.

Buffer Distances

Adequate buffer distances should be provided between the operations of the enterprise (including manure/spent litter utilisation areas and free-range areas) and any nearby groundwater and surface waters. Buffer distances aim to reduce the risk of nutrient impacts on surface and ground water, as well as biosecurity impacts to water storages. These distances allow greater opportunity for potential contaminants to be deposited or adsorbed.

Regulations

Manure storage may require a licence approval depending on the amount of manure that is being stored, and this will vary from state to state. Approval may need to be gained from both the local council and state environmental regulators. Storage may provide a way to improve manure management and boost sale prices and can be done in a variety of ways to suit each enterprise while maintaining the surrounding environment.

References and Further Reading

McGahan, E., Wiedemann, S. G., & Gould, N. (2018) *Egg Industry Environmental Guidelines*, Edition II. Australia, Australian Eggs Limited