

STORING LAYER MANURE ON-FARM

Providing a storage area for manure improves management flexibility and allows manure supply to be better matched to demand. Shed cleaning operations are often timed to align with other farm activities, which can result in large volumes of manure being generated when demand for reuse is low. This may contribute to low prices for manure sold off site, or necessitate on-site storage.



A well-designed and properly constructed storage facility can improve manure handling and enable producers to store product until demand and market conditions are more favourable.

Manure Management & Storage

Manure storage has the potential to generate odour nuisance and cause nutrient losses to surface and groundwater if not appropriately designed and managed. Storage systems should therefore be designed based on site-specific risk factors, including soil type, slope, climate, and proximity to sensitive receptors.

Appropriate control measures and design principles should align with the level of environmental risk at each site. Refer to the Egg Industry Environmental Guidelines (Edition III – McGahan et al., 2026) for further information on assessing risks associated with nutrient loss.

High moisture manure is more prone to anaerobic decomposition, which increases the potential for odour generation. Forming manure into windrows and turning at least once can reduce moisture content and promote aerobic conditions, thereby reducing odour and initiating partial composting. For covered storage systems, adequate ventilation may be required to manage moisture and odour.

Storage Systems

Different types of manure storage areas suit different production systems, climates, and site contexts. In rural or isolated settings, stockpile or windrow storage may be appropriate. However, in more densely populated areas, covered storage systems are generally preferred to minimise odour impacts and improve environmental control.

Stockpile or windrow storage

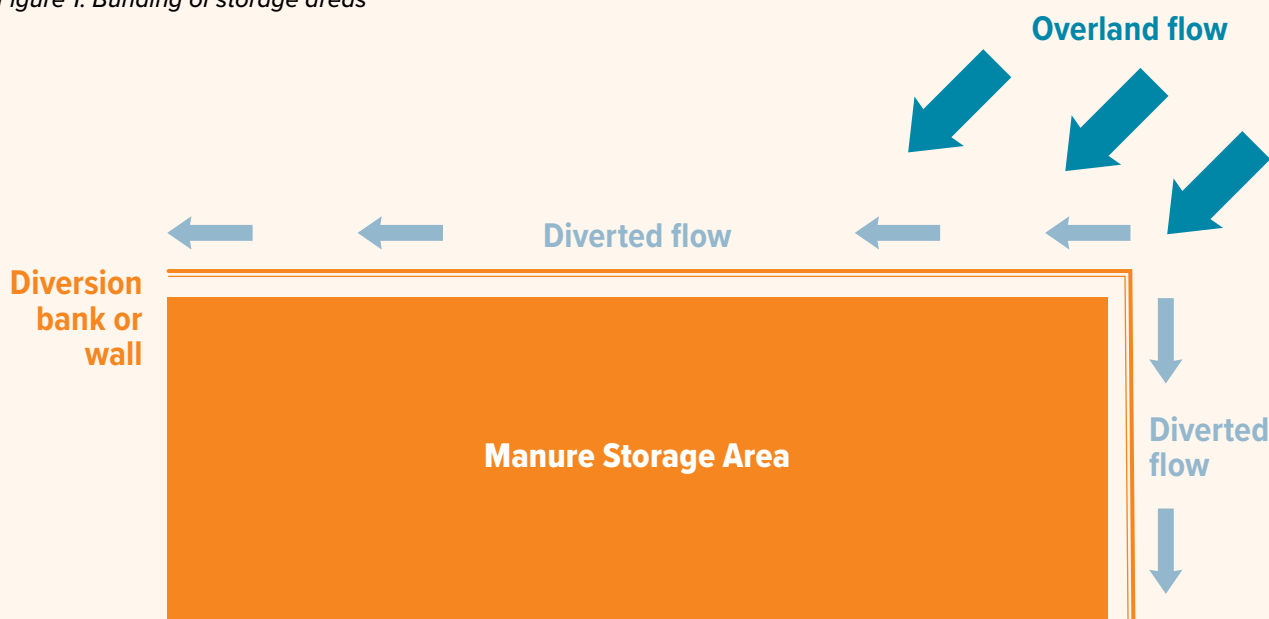
Manure can be safely stored in a stockpile or windrow for an extended period if the site has been carefully selected and constructed. On sites with a high risk of impacts to groundwater, stockpiling manure should be undertaken on a formed pad.

- A well prepared pad surface provides two advantages: It ensures the pad is trafficable in all weather conditions, and
- 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
- compacted earth

Figure 1. Bunding of storage areas



Runoff control

Runoff management systems should be designed according to site-specific risk and regulatory requirements. For sites generating minimal runoff, a Vegetative Filter Strip (VFS) may provide sufficient treatment. However, regulatory requirements from local councils and state agencies must always be met.

Where outdoor storage is used, clean water should be diverted away from the storage area, and contaminated runoff should be captured and managed. While ponds and dams are generally discouraged on layer farms due to biosecurity risks (e.g. attraction of waterfowl), they may be necessary where runoff cannot be otherwise managed.

Where required, runoff storage systems should be designed to capture at least a 1-in-10-year, 24-hour rainfall event, with additional capacity considered where prolonged wet conditions are likely. Storage structures should be located away from poultry sheds to reduce biosecurity risks.

In regions with winter-dominant rainfall, a water balance assessment is recommended to ensure sufficient storage capacity and minimise overflow risks.

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

Collected runoff can be managed through evaporation or land application, depending on site conditions and regulatory requirements.

Evaporation systems should be designed based on local climate conditions and storage capacity requirements to ensure they can accommodate extended wet periods. Where runoff is reused via irrigation, application rates should be guided by both water balance and nutrient balance considerations to avoid over-application and nutrient accumulation in soils.

Storage Sheds

Storage sheds are appropriate where outdoor stockpiling is not feasible or where greater environmental control is required. Although construction costs are high, 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.

Storage sheds should be sized to accommodate the required storage volume and allow safe and efficient operation of machinery.

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 becomes limiting. For caged layer systems, fresh manure production is approximately $80 \text{ m}^3 / 1000 \text{ birds / yr}$ based on a moisture content of 55% and a density of 450 kg/m^3 .

For litter-based systems this figure is closer to $50 \text{ m}^3 / 1000 \text{ birds / yr}$, 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 400 kg m^3 . 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 80 to 100 m^3 of manure. A large windrow with 45° slide slope, 3.6m wide, 1.8m high, and 100m long would contain approximately 320 to 400 m^3 of manure. A large flat-topped stockpile of 10m radius and 5m in height, with 45° slide slope may contain around 800 to $1,000 \text{ m}^3$ of manure.

Buffer Distances

Adequate buffer distances should be maintained between the operations of the enterprise (including manure/spent litter utilisation areas and free-range areas) and sensitive receptors including groundwater, surface waters and neighbouring properties.

Buffers reduce the risk of nutrient movement to water resources and help mitigate odour and biosecurity risks. They also provide opportunities for natural



attenuation processes such as filtration, adsorption, and biological uptake.

Regulations

Manure storage may require regulatory approval depending on the scale of storage and jurisdictional requirements. Approval may be required from both local councils and state environmental authorities.

Producers should ensure that storage systems comply with relevant environmental protection, planning, and biosecurity regulations.

In addition, poultry manure is classified as Restricted Animal Material (RAM) in Australia. Storage

and use of this material must comply with RAM regulations, particularly in relation to preventing access by ruminant livestock. Where manure storage areas are located near land used for grazing, appropriate controls (e.g. fencing and access restrictions) should be implemented to ensure livestock cannot access stored manure or recently treated areas. Any withholding periods or land use restrictions specified under RAM regulations must also be observed.

Well-designed storage systems can improve manure management outcomes, support better nutrient utilisation, and enhance the value of manure products while protecting 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