

Choosing an Effluent Management System

Guideline No 5



There are many variables that you need to consider when selecting a suitable dairy effluent system for your property.

- *The system must comply with the general obligations as stated in the Environment Protection (Water Quality) Policy 2003.*
- *Observe the restrictions associated with effluent pond placement and the spreading of effluent.*
- *Evaluate the operational and environmental factors on your farm which will influence your choice of effluent system.*
- *Weigh up the advantages and disadvantages associated with each of the available types of dairy effluent systems.*

Choosing an effluent management system that meets the requirements of the Environment Protection Authority, Regional Natural Resource Management (NRM) plans and also suits your own farm circumstances requires some thought and planning.

This guideline outlines the issues which need to be considered in the decision making process and provides references to other guidelines and information which will provide more detailed information to help you make your decision.

What are the Regulatory Issues that I need to Consider?

The Environment Protection (Water Quality) Policy 2003 imposes general obligations for all activities which produce wastes to avoid:

- the discharge of wastes into any waters,
- or onto land from which it is reasonably likely to enter any waters.

Dairy effluent must therefore be managed in such a way that it remains on the farm and it does not contaminate surface water or groundwater resources. This means that the effluent must be managed so that its nutrients can be utilised on the farm and any overflow from the ponds, sprinklers or drains is not allowed to leave the farm. It also means that effluent is not allowed to percolate downward to the water table and into the groundwater.

A wastewater management system is mandatory for all dairies. The system must be operating effectively at all times that the premises is being used as a milking shed.

(Refer to Guideline 17: Legal Requirements and Constraints).

Limitations to Dairy Effluent Pond Location

The following restrictions apply to the location of a dairy effluent pond. A pond used for storage or treatment of dairy shed effluent must not be located:

- Closer than 200 metres to a house not located on the subject land;
- Closer than 20 metres to a public road;
- Where it is likely to be inundated or damaged by water during a flood which has an average recurrence interval of one in 10 years or greater;
- Within the 1956 River Murray Flood Plain.

Solids separation pits should not be located:

- within 50 metres of a house on a neighbouring property
- 25 metres of a water supply bore, sink hole or watercourse
- within a flood plain with a flooding frequency of more than once every 10 years.

Limitations of Spreading Dairy Effluent

Limitations also apply to spreading dairy effluent and solids. Milking shed effluent must not be discharged or allowed to escape onto land within:

- 50 metres of an irrigation drainage channel containing water, or a water course, bore, dam or sink hole;
- 10 metres of a dry irrigation drainage channel;
- 100 metres of a dwelling not on the subject land;
- 10 metres of land not owned by the owner of the milking shed.



Dairy Effluent being spread over pasture, taking in consideration the limitations described above.

Whatever system you choose, it must operate and comply with the requirements of the Environment Protection (Water Quality) Policy 2003. This must also include limitations outlined for pond storage and spreading of effluent.

Choosing Your System

When choosing an effluent system that is appropriate for your needs, you will need to consider operational and environmental factors that will influence your design choice.

To assist you in making this choice, a list of operational and environmental factors has been compiled for you to consider. As you review the following examples, make a list of the environmental factors that have the greatest influence on your property. This will provide you with some guidance in making the correct effluent system choice.

Operational factors that influence effluent system choice

Herd Size

- Plan for the size herd you anticipate milking in the future, eg 20 years time

Effluent Volume

- Measure the amount of water used to wash machines, yards, cups, platform etc.
- Minimise the amount of water entering the effluent system by diverting clean storm water and implementing water saving practices in the dairy (recycle plate cooler water, recycle dairy plant wash water, change hose nozzles, recycle yard wash water).

Land Area for Effluent Utilisation

- Is there sufficient area available for sustainable utilisation of the effluent? Allow at least **one hectare for every 15 cows** milked for initial planning.
- Identify restricted areas, such as nearby houses, waterways such as creeks, drains, swamps and wetlands (whether permanent or seasonal), wells etc.
- Will you be constructing a feed pad that will produce effluent, which will also need to be utilised?

Environmental factors that will influence effluent system choice

Soil Type

Sandy soils are able to absorb effluent more quickly than loams or clays, but they also let nutrients such as nitrate percolate through more easily into the groundwater. (**Refer to Guideline No 6: Climate and Soils**).

- Effluent should not be spread on any soils that are water-logged.
- Clay soils may be suitable for sealing the effluent ponds.

Climate

- Is there a time of the year when effective rainfall exceeds evaporation? Effluent should not be applied to land at those times, so storage of effluent will be required. (**Refer to Guideline No 6: Climate and Soils**).

Topography

- Are there suitable sites for ponds?
- Can the effluent be conveyed to the ponds by gravity flow, or are pumps needed?
- Is runoff likely to occur from sloping ground where the effluent will be spread?

Surface Water

- Are there permanent streams, dams and waterways such as creeks, drains, swamps and wetlands (whether permanent or seasonal), or wells, which you must keep away from?
- Do gullies run water during the winter?

Groundwater

- How close to the surface is the permanent groundwater?
- Is the groundwater used for household purposes, stock water, or irrigation – either by yourself or other persons?
- If the soil type readily allows effluent to seep down to the groundwater, care will need to be taken to match the nutrients spread in effluent with crop uptake.

The answers to these questions will provide the basis for the decision on which system will best suit your dairy. For assistance in making this choice or documenting operational and environmental factors, please refer to Guideline No 19, Sources of More Information.

How do I determine what effluent system to use?

Direct Application To Pastures and Crops

Direct application may be used where soils, groundwater levels and topography are suitable. Direct application for part of the year will reduce the size of the ponds required for effluent storage.

Wet weather storage may be required for some period over winter when effective rainfall exceeds evaporation. (**Refer to Guideline 6 : Climate and Soils**).

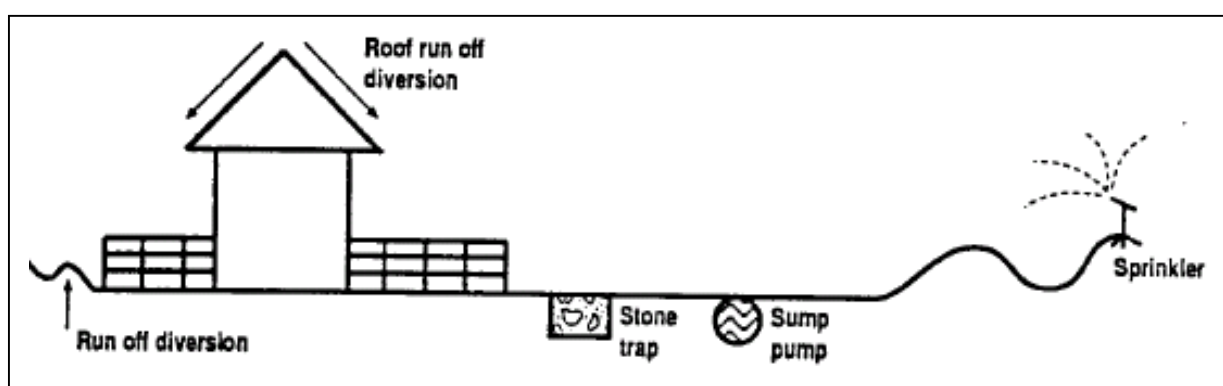
Storage may be required at times of the year when soil temperatures are low and significantly depress the growth of crops and pastures. (**Refer to Guideline 6 : Climate and Soils**).

Fundamentals of Direct Application to Pasture and Crops

- For small herds spreading can be done with a manure cart
- For larger herds effluent can be applied by sprinkler. This will require a pump. To extend the life of the pump, a solids separation system should be installed to remove the stones and grit.
- Additional capacity in the effluent collection tank should be planned to cater for breakdowns in the spreading equipment
- At times of the year when the pastures are waterlogged, or effective rainfall exceeds evaporation, or soil temperatures restrict plant growth the effluent may need to be pumped to a storage facility

Advantages

- Better use of the nutrients in the effluent
- Ponds may not be required



Example of a sump, pump and sprinkler effluent system

(Source: Agriculture Notes: Victoria Agriculture, Dairy Effluent: Applying dairy shed effluent to land.)

Disadvantages

- It is only suitable on well drained soils where surface runoff or deep infiltration are not likely to occur
- Application to waterlogged soils should be avoided. Alternative areas, or larger areas may be required in winter
- Some effluent storage may be required during wet or cold periods
- Careful management is required, as the potential for effluent to move off the property is greater
- The system must be operated over the whole of the milking season
- The need to spell treated paddocks before grazing may interrupt grazing rotations
- Effluent can not be recycled for yard cleaning
- Pumps must be reliable

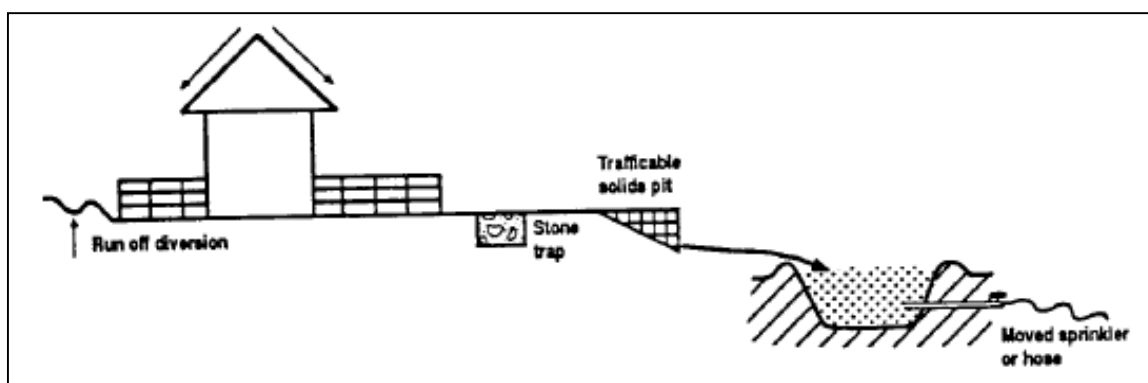
Single Storage Pond

Fundamentals of the Single Storage Pond System

- Effluent is conveyed to a single storage pond. The effluent is then applied to crops and pastures when the conditions are favourable.
- Solids separation at the dairy yard will reduce the amount of solids and nutrients conveyed to the pond and extend the life of pumps used to convey the yard effluent.
- The single pond may be used as a wet weather storage in conjunction with direct application to pastures and crops. In this instance where the pond only needs to hold wet weather storage it can be smaller than one designed to hold effluent for longer periods.

Advantages

- Effluent can be stored so that it can be applied to pastures and crops when the conditions are favourable. When applied appropriately, this may lead to minimal runoff and minimal leaching to groundwater.
- Irrigation is not needed all year round.
- Workload is shifted to a different time of the year.
- Effluent may be mixed with irrigation water during the irrigation season.



Example of a single storage pond effluent system

(Source: Agriculture Notes: Victoria Agriculture, Dairy Effluent: Applying dairy shed effluent to land.)

Disadvantages

- The pond must be on a site that can be sealed to ensure effluent does not seep into groundwater. Shallow groundwater may require a turkeys nest pond to be constructed.
- Pumps may be required on flat sites, or for turkeys nest ponds.
- Pond contains more solids than the second pond of a two pond system. A special manure pump may be needed.
- Pond needs de-sludging every few years.
- Nutrient content is lower in single ponds than direct application.

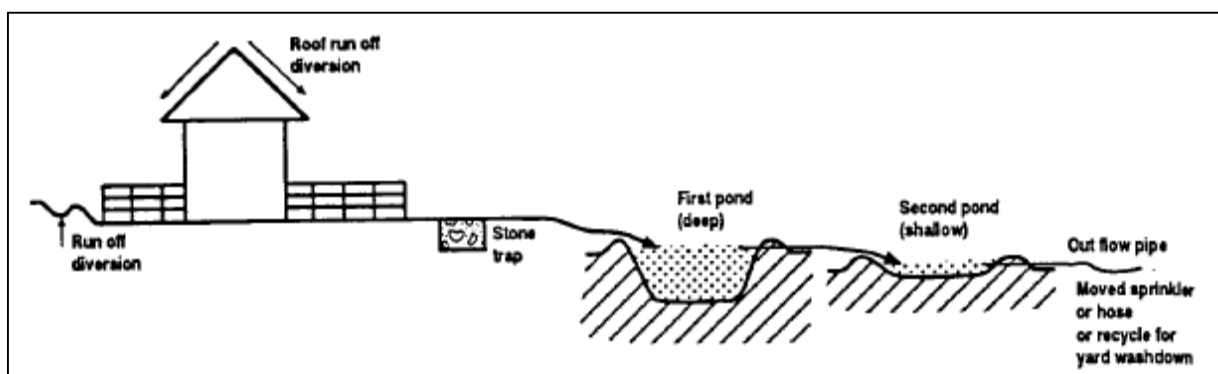
Multi-pond Systems

Fundamentals of the Multi-pond System

- Effluent is conveyed to a storage pond where it is allowed to settle for a period of time.
- Overflow from the pond is conveyed into one or more storage ponds.
- Solids separation at the dairy yard will reduce the amount of solids and nutrients conveyed to the first pond and extend the life of pumps used to convey the yard effluent.
- The effluent on the second or subsequent pond will be low in solids and can be re-used in yard washing systems. Recycling effluent can reduce the volume of fresh clean water which is used.

Advantages

- Effluent can be stored so that it can be applied to pastures and crops when the conditions are favourable. When applied appropriately this may lead to minimal runoff and minimal leaching to groundwater.
- Irrigation is not needed all year round.
- Workload is shifted to a different time of the year.
- Effluent may be mixed with irrigation water during the irrigation season.
- Low solids in the second and subsequent ponds means that standard pumps can be used for irrigation and there are fewer problems with blocked pipes.
- Effluent from the second or subsequent ponds may be re-used in yard washing systems, which allows the planned storage capacity to be reduced.



Example of a multiple storage pond effluent system

(Source: Agriculture Notes: Victoria Agriculture, Dairy Effluent: Applying dairy shed effluent to land.)

Disadvantages

- The ponds must be on a site that can be sealed to ensure effluent does not seep into groundwater. Shallow groundwater may require turkeys nest ponds to be constructed.
- Pumps may be required on flat sites, or for turkeys nest ponds.
- Pond contains more solids than the second pond of a two pond system. A special manure pump may be needed.
- The first pond needs de-sludging every few years.
- Nutrient content is lower than direct application.

Using all this information you should be able to choose the type of system which best meets your needs and determine its size and capabilities.

Comparison of different effluent management systems

The following table summarises the different aspects of each effluent system. You will therefore be able to compare the advantages and disadvantages of each system to determine which best suits your needs.

System	Reliability	Wet weather storage	Water recycling	Labour cost	Capital cost
Continuous application					
Sump & gravity flow	Low	None	No	High	Low
Sump, pump & sprinkler	Medium	None	No	High	Medium
Sump & tanker	Medium	None	No	High	High
Ponds					
Single	High	Yes	No	Low	Medium
Double or multiple	High	Yes	Yes	Low	High