Managing Dairy Farm Effluent

Why worry about effluent?

- Effluent contains valuable nutrients, organic matter and water. You can use effluent on your farm to boost production.
- Effluent movement from farms can cause water pollution and poor water quality in local catchments, as well as spread disease to humans and other livestock. Dairy farmers have a legal responsibility to ensure their dairy shed effluent is not leaving their property.

What you need to know?

Dairy effluent is legislated under the Environment Protection Act 1970 and is administered by the Environment Protection Authority (EPA). To assist in complying with the Act you need to meet the requirements of the State Environment Protection Policy (SEPP) Waters of Victoria revised 2003, which states:

- Wastes and waste water from dairy sheds, feedpads and laneways must not be discharged to surface and groundwaters.
- Farmers need to implement management practices that are consistent with approved protocols, guidelines & codes of practice.

Source: DairySAT (Dairy Self Assessment Tool, Dairy Australia 2009)

What happens if I don’t comply?

Where effluent is leaving the property boundaries or polluting surface or ground water, dairy farmers face a Minor Works Pollution Abatement Notice (MWPAN).

Whilst no fine is attached to this notice, it is a statutory document which sets out timelines for various tasks to be undertaken. Breaching the requirements (ie: failing to complete the required works) of the MWPAN may result in further enforcement action in the form of a Penalty Infringement Notice (PIN), which currently (July 2010) stands at $1,401.84 for an individual and $5,841 for a company.

What is in effluent?

Dairy effluent contains water, organic matter and valuable nutrients including; nitrogen (N), phosphorous (P), potassium (K) and sulphur (S). The sludge that forms on the bottom of the pond and the liquid component are two quite different materials. Each has a different chemical composition and it is important to understand the differences.

Sludge is the solids from the effluent. It will sink to the bottom of the pond. Oxygen is limited creating an anaerobic environment where bacteria break down or digest solids and organic matter. In this process gases of carbon dioxide, methane and ammonia are given off. The digested solids settle to the bottom of the pond to form sludge.

Desludging involves reducing the amount of sludge on the bottom of the pond. It is recommended that this takes place at least every 3 years to maintain optimum pond depth allowing for anaerobic digestion of the waste.

The sludge can be spread onto soil or pastures. The sludge contains both nutrients that are readily available to plants and others that are bound to organic matter and act as a "slow release" nutrient source.

The chemical composition of dairy sludge varies from pond to pond. A typical sludge at around 8% dry matter (DM) has: (G. Ward 2010)

- Total Nitrogen (N) = 1000 kg/ML
- Total Phosphorous (P) = 192 kg/ML
- Potassium (K) = 650 kg/ML pH = 7.5

Note: The higher the dry matter the greater the kg/ML. This occurs: a) with increased pond depth and b) more time between desludging of the pond (years).

Effluent water is a valuable nutrient rich water source. The nutrients are in a plant available form. Generally this effluent water is from a second pond. In a properly functioning second pond, the effluent undergoes further treatment by bacteria and algae to further break down the organic matter.

The brown coloured liquid has a very low solid content and can be pumped with conventional pumping equipment.

The actual concentration of nutrients can vary considerably from pond to pond because of factors such as water use in the dairy, recycling for yard wash, the period of time between emptying and how effectively the ponds are functioning.
Where possible, it is desirable to get the effluent tested for nutrient content to allow calculation of optimum application rates.

The chemical composition of second pond effluent water is fairly uniform at all depths. A typical composition is (G. Ward 2009):

<table>
<thead>
<tr>
<th>Nitrogen (N)</th>
<th>Phosphorous (P)</th>
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</thead>
<tbody>
<tr>
<td>200 kg/ML</td>
<td>52 kg/ML</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>pH = 7.6</td>
</tr>
<tr>
<td>395 kg/ML</td>
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</tbody>
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For an average Gippsland dairy farm milking approximately 300 cows, it is likely that 750 kg of nitrogen (N), 150 kg of phosphorous (P) and 810 kg of potassium (K) will be added to the effluent pond annually from dung and urine (South East Dairy Effluent Guidelines, 2005). Given current fertiliser costs, this quantity of nutrient may be valued at approximately $7,500 - $8,000 (July 2010).

This cost does not take into account that dairy effluent has a pH of around 7.6, thus an application will have a liming effect. The organic content of effluent is a useful addition to soils, providing energy for soil microbes, stabilising soil structure, increasing water storage capacity of the soil, storing carbon and supplying nutrients.

**Designing an effluent system to suit your needs**

Dairy pond effluent systems collect, partially treat and store waste from dairy sheds, dairy yards and ancillary areas before it is utilised on farm. Consider the following points when designing a system to meet your needs:

**The effluent system needs to:**

- Provide a method for collection and distribution of all effluent generated from the milking shed, yard and feed pad areas all year round. The storage capacity should be based on water use in the dairy and sized to take into account rainfall and runoff during wetter periods. It is also useful to consider stormwater diversion - that is when rainfall runoff from shed roofs and cleaned yards is directed away from the pond.
- Be designed to prevent effluent from leaching into ground water storages ie clay lined
- Appropriately located on a site with adequate room for the system and associated infrastructure, allowing for effluent to be spread ideally over a minimum of 35% of the milking area
- Cater for solids (sludge) and water components of the effluent
- Consider labour and access requirements of emptying the system, spreading the effluent and maintenance ie weed control
- Consider the infrastructure (pumps, spreaders, irrigation pipe etc) required to spread the effluent, sludge and water components
- Allow for the power required to run the system
- Allow for the system to be upgraded with farm expansion or the addition of new infrastructure eg. feedpad

**When applying the effluent to your land consider;**

- Matching the nutrient loading in effluent to the specific nutrient requirements of your pastures, crops and soils. A nutrient management plan or comprehensive annual soil testing program will allow you to understand the nutrient levels in various paddocks. Effluent can be used to boost nutrients in areas of need. It is important to monitor soils that receive effluent on a regular basis to monitor nutrient loads. It is best to rotate the distribution of effluent on as wide an area as possible
- Labour requirements in managing the distribution system. A contractor with specialised equipment may be required to assist with some aspects of your effluent management system
- The weather, prepare for the wetter periods of the year by planning ahead and emptying ponds prior to the wetter months. Make the most of the nutrient rich water to irrigate pastures in the drier months or when plants are most actively growing

### Tips when applying dairy effluent in relation to animal health.

- Avoid applying effluent to areas where young stock graze (disease causing micro organisms could be transferred)
- Avoid applying effluent where cows are to be calved (grass tetany and milk fever issues may result)
- When applying effluent to pasture a withholding period of 3 weeks is a good rule of thumb

### Safety tips in relation effluent systems.

- Dairy effluent ponds have the potential to be extremely hazardous to children, farm operators, pets and livestock and every effort should be made to make them safe
- Farm children and employees need to be made aware of the hazards of effluent ponds and particular attention needs to be paid to warning visiting children
- Ponds should be fenced as soon as construction has been completed to minimise the risk to young children and stock
- Display appropriate signs warning of deep water. Signs are available from safety equipment suppliers
- It is important to be very aware of safety when working around effluent ponds
- WorkSafe Victoria suggest that where practicable farmers, farm contractors and the designers of effluent ponds should try to minimise the need to use tractors near the edge of effluent ponds. Where this is not possible, safe systems of work should be adopted, which include using barriers or chocks to prevent the tractor from moving backwards into the pond.

Further Information:


A South Australian Resource available at www.dairyingfortomorrow.com

Reference:

Graeme Ward (2016) - personal communication DPIV

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