

Eco-efficiency for Australian dairy processors

Fact sheet 6: Use of treated wastewater

Disposal of treated wastewater is a significant cost for dairy processors. Trade waste discharge costs vary according to the region and charging structure. Most local councils have adopted a 'user pays' charging system where customers must pay for the volume and quality of the wastewater discharged. Eco-efficiency opportunities to improve wastewater quality by recovering valuable materials, and to reduce the volume of water entering the wastewater stream, are discussed in Fact sheet 7, 'Yield optimisation and product recovery' and Fact sheet 1, 'Water management'. An eco-efficient approach to wastewater management should also consider options to reuse the treated wastewater and recycle biosolids.



Stock feed storage tank

Wastewater reuse

Opportunities to reuse wastewater include using the treated water to meet some processing and wastewater treatment needs or for those plants in regional areas, the irrigation of crops and pasture.

Reuse of treated wastewater for irrigation

Some wastewater streams from dairy processing plants may be suitable for irrigation in regional areas. The feasibility of using wastewater for irrigation can vary according to:

- the total concentration of dissolved salts in the water and the concentrations of specific salts such as sodium, phosphate and nitrates
- soil type (e.g. permeability and drainability)
- crop type (e.g. salt tolerance of particular species)

- climate (e.g. leaching potential due to rainfall)
- method of irrigation (e.g. wastewater with high salt levels sprayed from overhead sprinklers may cause leaf burn).

Table 1 shows salinity levels in effluent and possible uses.

Table 1: General salinity classes¹

Concentration of dissolved salts (EC units)	Conditions suitable for use of saline wastewater
1500–2500	For continued use, moderate to high leaching and salt tolerance is needed.
2501–5000	Salt-tolerant crops, considerable leaching and permeable well-drained soils are needed for continued use.
5000	Such water should only be used on salt-tolerant crops and usually only to supplement rain or low-salinity water.

As the uptake of salt by crops and pasture can reduce growth, discolour or scorch leaves and even cause death of vegetation, it is important that the salinity level of wastewater used for irrigation is constantly maintained and monitored. A risk assessment that includes a water, nutrient and salt model should be developed to fully assess the hydraulics, nutrient salt loadings of the soil, and the likely impact of irrigation. The prevention of runoff and contamination of water ways and the prevention of spray drift onto neighbouring lands also need to be addressed. As a starting point, refer to the ANZECC *Guidelines for fresh and marine water quality* for information on quality of water that can be used for irrigation.²

Wastewater for irrigation³

Bonlac Foods in Stanhope will begin reusing 100% of its wastewater as irrigation in a project focusing on the sustainable reuse of water. Previously the water was irrigated to land over summer and to surface waters during winter. The project will involve building new storage and treatment lagoons and the preparation of in excess of 250 hectares of land for irrigation. By separating high-salinity wastewater streams for membrane and ionic exchange treatment, the plant has been able to significantly reduce the concentration of dissolved salts in its wastewater.

¹ Goulburn Murray Water, *Waternotes: A close look at saline water*, 2001.

² ANZECC, *Guidelines for fresh and marine water quality*, 1992, www.deh.gov.au/water/quality/nwqms/volume, viewed 7 June 2004.

³ Bonlac Foods Ltd, 'Bonlac Foods Ltd Stanhope plant launches 100% water recycling', *Bonlac News*, January 2004.

Reuse of treated wastewater for processing

Some wastewater streams are relatively clean and can be reused onsite. If the quality of wastewater streams is not suitable, some form of treatment may be necessary before the water can be reused. Water recycling and reuse for dairy processing is discussed in Fact sheet 2, 'Water recycling and reuse'.

Recycling of biosolids and sludge

Biosolids are the part of the wastewater stream containing solids after wastewater treatment. They can be rich in nitrogen, phosphorus and potassium, and high in organic content making them a useful soil amender and stabiliser. Depending on the method used, dewatered solids have a water content ranging between 10% and 80%, depending on the quality. Biosolids and sludge, such as that from separators, may be used for composting, soil injection, landspreading and possibly animal feed.



Sludge from dissolved air flotation (DAF) treatment

Animal feed

Dairy processing wastes such as separator de-sludge and product returns are a good source of protein and fat, and are often disposed as animal feed. Transport costs are often the biggest expense associated with this means of disposal. It is important, however, to consider the components of the biosolids, such as chemicals and polymers used in wastewater treatment, which could pose a risk to animal health.

Recovery of separator de-sludge

Murray Goulburn in Maffra recover separator de-sludge and milk solids retained in the dryer wet scrubbing system for recycling as pig food.

Composting

Composting is usually only viable for dairy processing plants in regional areas that have sufficient space. Transporting organic waste to large-scale offsite facilities for composting may be a good alternative to landfill if transport costs are viable. Sludge thickening can be used to increase sludge concentration and reduce transport costs. The cost of drying sludge with hot air is often prohibitive, but new technologies such as those using superheated steam are becoming increasingly more viable.

Disposal of sludge as compost

Murray Goulburn in Koroit established a composting facility on its treatment farm for sludge from the site's treatment plant, saving \$72 000/yr in disposal costs. The payback period was 6 months.

Soil injection and landspreading

Liquid biosolids from dairy processing plants can be injected directly into soil to increase organic matter and nutrient levels. Application rates are limited by the nutrient requirements of the soil, so the components of the organic waste must be known and regularly monitored. The obvious advantages of direct landspreading are that there is no need for further processing and the product does not need to be stored for any length of time. Organic waste that has been dewatered or dried can be used directly for landspreading with conventional manure spreaders. Organic waste can also be processed into granulated product for application as a fertiliser.

Soil injection of DAF plant sludge

DAF (wastewater treatment) sludge from Dairy Farmers in Lidcombe is collected for direct soil injection on farms west of Sydney by the company Applied Soil Technology. Dairy farmers see this service as invaluable in periods of drought.

This project (DAV447) was funded by Dairy Australia.

For further information see the *Eco-efficiency for the Dairy Processing Industry Manual*, August 2004 or contact the UNEP Working Group for Cleaner Production: phone 07 3365 1432, email p.prasad@uq.edu.au

Fact sheet published August 2004.