

Guide to Land Spreading of Milk and Milk By-products (Tasmania)

August 2020



ENVIRONMENT PROTECTION AUTHORITY

Publishing Information

Citation:

Environment Protection Authority (2020) *Guide to Land Spreading of Milk and Milk By-products (Tasmania)*, Environment Protection Authority, Hobart, Tasmania.

Date:

August 2020

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Introduction

In 2019-20 Tasmania's 394 dairy farms produced 950 million litres of milk. There are times when this milk may not be suitable for processing for human consumption and is required to be disposed of in a manner which does not harm the environment, or human and animal health.

Milk and milk by-products (including whey) may be suitable for land spreading and a valuable soil conditioner when managed and applied appropriately, these materials possess the following attributes:

- Low levels of contamination by environmentally harmful chemicals;
- Contain several agricultural nutrients of value; notably nitrogen, phosphorous and potassium, as well as calcium, magnesium and some trace elements;
- The soluble organic matter is mainly lactose, which is quickly assimilated by soil micro-organisms; and
- In cases where the milk by-product has been pasteurised during processing, low risk of pathogenic micro-organisms.

However, excessive or repeated land application can result in irreversible damage to soils. Environmental risks potentially arising from land spreading of milk or milk by-products include nutrient and salt contamination of soil, surface water and groundwater as well as odour generation.

Unpasteurised milk contains micro-organisms, some of which may be disease-causing. The main pathogens which could be present or impact on human or animal health include *Salmonella* spp., *Yersinia* spp., *Campylobacter* spp., *Leptospirosis* spp., *E. coli*, Cryptosporidia, Q-Fever and Johnes Disease. A common reason for milk disposal is the presence of antibiotics.

Should a highly infectious disease outbreak occur, such as Foot and Mouth Disease, an Emergency Response by Biosecurity Tasmania will be implemented and is not covered by this guide.

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1. Purpose

This document provides a guide on the factors that will need to be considered and form part of an application to EPA or a Planning Authority to dispose of milk and milk by-product waste to land.

Generally, an application to dispose to land will only be considered where:

- Benefit to the environment has been demonstrated; or
- No other viable alternative management method has been demonstrated and application of the waste to land will not cause serious or material environmental harm.

2. Regulatory Requirements

Milk and milk by-product waste is normally considered a general waste. It is an offence under Regulation 18 of the *Environmental Management and Pollution Control (Waste Management) Regulations 2020* to dispose of general waste without a relevant authority.

Milk waste streams are not classified as a restricted substance, on the basis that calves need to drink milk (Biosecurity Tasmania). However, under the *National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 2010*, some aspects of List 2 in Schedule A are relevant:

- **List 2** (6.2 Infectious substances – Substances or wastes containing viable micro-organisms or their toxins which are known or suspected to cause disease in animals and humans).

This Guide intends that when milk and milk by-products are transported in a fit for purpose vehicle and applied to land directly or composted as a beneficial soil conditioner in accordance with environmental and animal health safeguards, Tasmania's controlled waste handling requirements are achieved. However additional requirements would be triggered if the milk waste is mixed with other waste types considered to be a controlled waste (e.g. sludge from a wastewater treatment system). In this scenario the mixed waste is considered a controlled waste and transportation by a registered controlled waste transporter is required.

Prior to the commencement of waste milk and milk by-product composting or land application advice must be sought from the local Planning Authority (local council) on any legal approvals that may be required. The legal approval may be subject to conditions, including the requirement for a transport, storage and land application management plan and the implementation of an appropriate monitoring program.

In Tasmania, waste milk and milk by-product composting and land application are either regulated by the EPA or the local council based on specific circumstances. Depending on the circumstances the local council may issue a legal approval in the form of a planning permit or an Environment Protection Notice (EPN). For larger activities, the local council may be required to refer the application to the EPA Board for assessment. If approved the EPA Board may require relevant conditions to be included in a planning permit issued by the local council. The EPA Board can also direct the Director, EPA to issue an EPN. Regulation may also include imposition of conditions via an EPN or Environmental Approval (Regulation 21) issued by the Director, EPA under the *Environmental Management and Pollution Control Act 1994*.

The environmental objectives are to:

- maintain the environmental value of surface water and groundwater, including their ecology;
- minimise any potential risks related to land application of milk or milk by-product which may lead to the degradation of soil structure, salinisation, waterlogging, chemical contamination or erosion; and
- avoid off-site nuisance or interference with amenity, such as odours associated with inappropriate or poorly operated land application systems.

3. Milk and Associated Product Characteristics

3.1 Milk and Milk by-product Waste Streams

The main streams of milk and milk by-products in Tasmania which have the potential to require land spreading are:

- Milk from farms unable to be transported to a processing facility due to unplanned events (i.e. mechanical breakdowns) or natural disaster (i.e. fire, flood, road closures). This is generally disposed of via land application by dairy farms.
- Milk direct from farms which has been contaminated with antibiotics or other potentially hazardous substances that exceed the Maximum Residue Limits adopted by Food Standards Australia New Zealand (FSANZ).
- Whey, as a by-product of cheese making. This may be land spread, fed to cows or pigs, or processed into whey powder.
- Milk, milk permeate, or whey permeate from a processing facility which is unable to be processed due to a breakdown of processing or storage infrastructure. Small volumes may be suitable for pig feed however for significant volumes land spreading may be more practicable.
- Out of specification product. Finished products may be suitable for land spreading, however each product would require an assessment on a case by case basis.

3.2 Characteristics

The average milk yield for dairy cattle per day is highly variable and is dependent on breed, seasonality, feed, health and fertility. Average annual milk by-production per cow for Tasmania, as reported by Dairy Australia for the 2018/2019 season was 6107 litres. Cows are generally milked twice daily with milk collection once a day. Typical characteristics of milk and milk by-products include:

- **High moisture content.** Most milk by-products will still have a very high moisture content (>85%). This makes milk by-products vulnerable to microbial activity and odour production. Care is necessary to avoid liquid spilling during transport and processing.
- **Nutrients.** Milk contains valuable nutrients for soil productivity including phosphorous, potassium, magnesium and nitrogen. Procedures are necessary to prevent overloading of soils.
- **Salts.** Including sodium, potassium and calcium may be a limiting factor depending on the milk-based product, and the type of process and cleaning used.
- **Biodegradability.** The organic solids in milk are very suitable for diluted land spreading and break down when exposed to sunlight. Composting and undiluted land-spreading of thick material is generally not suitable and can result in odours and soil degradation. Good management of the process is required to minimise environmental problems such as nutrient-rich run-off, leaching to groundwater and odour nuisance.
- **Microorganisms.** Unpasteurised milk contains high levels of microorganisms, potentially including pathogens. A well-managed stock exclusion procedure is essential to ensure that the application area is safe for grazing animals.
- **Contaminants.** Milk generally contains negligible levels of these compounds; however all potential contaminants should be considered.
- **Acidity.** Milk pH is neutral at around 7.0.

4. Treatment and Handling

4.1 Dilution and land application methods

Milk and milk by-products should be diluted to the maximum level practically possible for transport, storage and application.

The application method used to apply milk and milk by-products to land may vary according to the waste type, local conditions and relevant environmental and animal health protection requirements (Section 4.4). Once these factors have been considered the following land application methods, or a combination of these methods, may be considered suitable:

- Applied wet, directly to pasture, by a tanker or trailer,
- Processed into a different product of which the product or by-product may be applied directly, or
- Applied via an irrigation system following storage in a manner that does not result in environmental harm or nuisance.

Risks

Milk and milk by-products may have an adverse impact on soil health if not managed appropriately and can adversely affect the environment if excessive application rates result in leaching of nutrients and salts to groundwater or run-off into waterways. Odour nuisance from the application area or storage dam or tank may also occur.

Risk Management

Milk and milk by-product should be diluted to assist in spreading the waste as much as possible to prevent salt and nutrient over-application. The dilution will also assist in reducing the risk of odour. Lime may be added to minimise bacterial growth and odour and assist with assimilation into soil. To ensure the application rate can be adequately controlled the land application method used must be given due consideration.

4.2 Transport

Risks

Transporting milk and milk by-products has potential to cause odour nuisance and environmental harm via spills to roads, property and waterways. Spillage of this material may potentially present a risk to human and animal health.

Risk Management

Transport routes, times, and application activities must be undertaken to avoid public nuisance, particularly with respect to odour. Spill kits should be carried by these vehicles. Procedures should be developed and followed, with monitoring and reporting systems implemented, to ensure that the material is disposed of correctly.

4.3 Storage

Risks

Milk and milk by-products, if not stored appropriately, may contaminate waterways or groundwater and potentially cause public nuisance, particularly with respect to odour and vermin.

Risk Management

Milk by-product should be applied fresh unless provision has been made to control odour generation during storage (such as pH adjustment to above pH 6). The material should preferably be stored in a suitably lined dam or bunded tank.

Any potentially contaminated stormwater, runoff or spills should be collected for treatment prior to release to environment.

One of the most difficult aspects of a milk or milk by-product reuse scheme is the requirement to store material when conditions are too wet to irrigate. It is important to allow adequate storage volume, which can be calculated using Sections 7.2 to 7.5 of the *Environmental Guidelines for the Use of Recycled Water in Tasmania 2002*. Any system should be designed should have sufficient storage for a one-in-ten wettest year.

5. Land Application

5.1 Site selection

Site selection should consider impacts potentially associated with the proximity to residences, recreational areas, industrial activities, sensitive areas and other environmental factors such as depth to groundwater and distance to waterways.

For optimal results, milk and milk by-products should be applied to fallow land as close as possible to the time of sowing pasture or crops. Spreading in winter should be avoided as nutrient demand is lower and increased rainfall and soil saturation increases the risk of nutrient leaching and run-off.

5.2 Application rates

Assessment of the site-specific capability of the land, including soil analyses to determine the Nutrient (or Salt) Limiting Application Rate (NLAR), should be undertaken by an agronomist. This is in order to establish the application rate for milk or milk by-product appropriate for the land and associated climatic and environmental considerations.

Limitations on the application of milk or milk by-products to farmland include:

- Very high organic levels. Excessive application rates can lead to a loss of cover plants, clogging of soil structure, ponding and contaminated run-off. Organic overloading of the soil can also lead to odour issues, especially in heavy clay soils.
- Hydraulic limitations of the soil must be observed.
- To maintain normal mineral balance in the soil, application rates must often be based on one or more controlling nutrients. Effluent concentrations of cations (Na, Ca, K, Mg) need to be considered in the context of the agricultural uses of the land. Imbalances may need to be rectified via selected fertiliser topdressing applications to avoid soil structure decline and impacts on crop health.
- The nitrogen application rate must be controlled so that the nitrogen leaching fraction is maintained at a sustainable level (i.e. not impacting on groundwater resources).
- Any fat content can clog sprays and the surface of the soil.
- The land used must be suitable with regard to area, topography, soil structure and chemistry, proximity to surface waters, access, location with respect to residents, and proximity to the factory. The presence and sensitivity of groundwater resources should also be considered. Soil type and dam liner characteristics are important factors.
- To avoid burning of pasture, irrigation of permeate or other high strength product should be followed with clean water.
- Effluent should be spread as evenly as possible over the area to achieve a uniform application rate. Irrigation equipment should be selected with this in mind; flood irrigation is generally not acceptable.
- A good general rule of thumb for emergency irrigation is to have irrigation periods followed by rest periods in a ratio of approximately 4:1. For long-term irrigation rest periods of 14-21 days are recommended to allow breakdown of wastes.

Irrigation activity must be managed in such a way as to prevent land or water contamination as well as impacts on stock health and agricultural crops. It is essential that the landholder is involved in this assessment and has an understanding and commitment to meet the determined application requirements.

The following parameters should be checked on each site inspection –

1. Check that ponding has not occurred.
2. Ensure that run off has not occurred to water courses, stormwater drains or other properties.
3. Inspect vegetation - is it wet or dry?
4. Check soil condition – is it dry, moist, saturated?
5. Inspect vegetation condition – healthy, wilting, discoloured?
6. Record grass length.
7. Record any evidence of spray drift or likely occurrence.
8. Record presence and type of any odour.
9. Read rain gauge (these should be used to check irrigation rate as well as any natural precipitation).

5.3 Exclusion zones

Buffer zones are required between sites of milk-based material application and the surrounding landscape, as detailed in Table 1.

Table 1: Minimum buffer distances (Source: Tasmanian Biosolids Reuse Guidelines)

Feature	Buffer zone (m)
Surface water	100
Farm dams	30
Drinking water bores	250
Other bores	50
Farm driveways, access roads and fence lines	10
Native forests and other significant vegetation types	10
Animal enclosures	50
Occupied dwelling	100
Residential zone, urban areas	500

5.4 Animal Health Protection Measures

Risks

Milk and milk by-product land spreading has potential to contribute to the distribution of Johnes Disease in cattle younger than 12 months. All other cattle may access the areas following a suitable stock exclusion period as the risk is minimal.

Risk Management

Milk spreading on land must only be carried out once required legal approvals have been obtained and where a formal, written agreement between the spreading contractor and the property owner exists. An agreement must ensure a suitable stock exclusion period is enforced to negate the risk of disease transmission.

There is little risk of disease transmission from the application of milk-based material to pastures provided stock withholding periods are observed.

5.5 Monitoring and Record Keeping

A record of the volume of milk and/or milk by-products land spread must be kept and provided to the EPA or Council upon request.

Regular monitoring of the nutrient content of the by-product may be required to enable application rates to be adjusted accordingly.

A legal approval for the conduct of land spreading may include a requirement to demonstrate adherence to the conditions of the approval. This can include the provision of application records, and soil, surface water and groundwater monitoring results. An explanation of management decision made based on a review of monitoring results, including a demonstration of how application rates have been calculated, may also be required.

5.6 Milk and/or Milk By-Products Land Spreading Management Plans

A legal approval for the conduct of land spreading may include a requirement to develop and implement a Land Spreading Management Plan.

As a guide the following, or similar, requirements should be included in a condition requiring submission of a Land Spreading Management Plan:

1. A Land Spreading Management Plan must be approved in writing by the General Manager/Director prior to the commencement of land spreading milk by-products. The Management Plan must include, but is not limited to:
 - 1.1. details and map of the receiving property, including proximity of nearby watercourses, residences and roads;
 - 1.2. a signed agreement with the property owner;
 - 1.3. approximate volume of milk or milk by-products to be land spread (per day and annually);
 - 1.4. details of transport of milk or milk by-products from the activity;
 - 1.5. details of the handling and storage of milk or milk by-products, including measures to prevent environmental harm;
 - 1.6. identification of the constituent(s) that limit(s) the Nutrient Limiting Application Rate (NLAR);
 - 1.7. calculations of the environmentally sustainable NLAR in kg/ha/annum;
 - 1.8. demonstration of how the calculated application rate will be achieved, including details of the method of application;
 - 1.9. details of an on-going soil monitoring program designed to ensure adherence to the Plan and to inform management decisions.
 - 1.10. explanation of the record keeping system maintained to ensure, and demonstrate, adherence to the Plan.
 - 1.11. animal health protection measures, including stock withholding periods;
 - 1.12. details of any legal approvals for land application that may be required.
2. Subparagraph 1 will only be deemed to be complied with once the Land Spreading Management Plan has been approved in writing by the General Manager/Director.
3. The person responsible must implement and act in accordance with the approved plan.
4. In the event that the General Manager/Director, by notice in writing to the person responsible, either approves a minor variation to the approved plan or approves a new plan in substitution for the plan originally approved, the person responsible must implement and act in accordance with the varied plan or the new plan, as the case may be.

6. Checklist for appropriate milk by-product management and land application

Table 2 provides a general checklist that should be used when seeking approval to land spread milk-based material. Note: this checklist should be used as a guide and additional information may be required before a decision is made.

Table 2: Checklist for identifying the risks associated with milk by-product management and land spreading

Milk Processing Site

Risk Management	Has the risk management step been taken? If yes, provide documentary evidence	If no, explain alternative proposed risk management	Notes
Is the milk pasteurised	Yes / No		
Is the milk by-product concentration increased	Yes / No		
Is screening to remove rubbish and non-biodegradable contaminants in place	Yes / No		
Is a sealed collection system and tank provided	Yes / No		
Is milk by-product diluted	Yes / No		

Transport

Risk Management	Has the risk management step been taken? If yes, provide documentary evidence	If no, explain alternative proposed risk management	Notes
Does the vehicle used have a suitably sealed and fit-for purpose tanker design	Yes / No		Registration No:
Does the vehicle used have spill response kit or provisions	Yes / No		

Land Spreading

Risk Management	Has the risk management step been taken? If yes, provide documentary evidence	If no, explain alternative proposed risk management	Notes
Is an approved Management Plan in place	Yes / No		
Is a signed agreement in place with the receiving landowner	Yes / No		
Is the milk material stabilised prior to spreading	Yes / No		
Is milk by-product diluted	Yes / No		
Has testing of the soil been undertaken for the receiving land	Yes / No		
Is a 24-hour stock withholding period applied (12 months for young cattle)	Yes / No		
Have application buffer zones been established	Yes / No		

Management and Review of Operations

Risk Management	Has the risk management step been taken? If yes, provide documentary evidence	If no, explain alternative proposed risk management	Notes
Are Standard Operating Procedures developed and provided to employees, contractors and landowners	Yes / No		
Are site inspections/visual observations scheduled	Yes / No		
Is a process for monitoring and review of the system established	Yes / No		

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