Milking Shed Effluent Management in the Mount Lofty Ranges Watershed

A report on the audits conducted during 2000-2002

Mount Lofty Ranges Watershed Protection Office
Milking Shed Effluent Management in the Mount Lofty Ranges Watershed

A report on the audits conducted during 2000-2002

Mount Lofty Ranges Watershed Protection Office
Milking Shed Effluent Management in the Mount Lofty Ranges Watershed
- a report on the audits conducted during 2000-2002

Author: Geoffrey Bradford, Vanessa Geerts and Phil Hazell

For further information please contact:

Environment Protection Authority
GPO Box 2607
Adelaide SA 5001
Telephone: (08) 8204 2004
Facsimile: (08) 8204 9393
Free call (country): 1800 623 445

ISBN 1 876562 57 9
OCTOBER 2003

© Environment Protection Authority

This document may be reproduced in whole or part for the purpose of study or training, subject to the inclusion of an acknowledgment of the source and to its not being used for commercial purposes or sale. Reproduction for purposes other than those given above requires the prior written permission of the Environment Protection Authority.

Printed on recycled paper
TABLE OF CONTENTS

GLOSSARY iii

SUMMARY v

INTRODUCTION 1
Concern about milking shed effluent management in the Mount Lofty Ranges Watershed 1
The Environment Protection (Milking Shed Effluent Management) Policy 1
Code of Practice for Milking Shed Effluent 2003 1
Mount Lofty Ranges Watershed Protection Office 2

AUDIT METHOD 2

OUTCOMES 3
Milking sheds and their distribution in the Mount Lofty Ranges Watershed 3
Milking shed effluent management systems 5
Compliance issues 6
Use of enforcement instruments 7
Observations of milking shed effluent and dairy farm management 9

CONCLUSIONS AND RECOMMENDATIONS 11
Application of the findings of the audit 11
Education and assistance for dairy farmers 13
The future of the audit program 14
Incorporating audit findings into future audits 14
Need to promote this report and its recommendations to stakeholders 16

REFERENCES 16

List of Figures

Figure 1 Milking sheds within the Mount Lofty Ranges Watershed 4
Figure 2 The number of milking cows at the milking sheds audited 5
Figure 3 The types and numbers of milking shed effluent management systems in use in the Mount Lofty Ranges Watershed 5

List of Tables

Table 1 Enforcement instruments used to ensure compliance with the Milking Shed Effluent Management Policy and general environmental duty 8
List of Plates

Plate 1
The water that flows into watercourses within the Mount Lofty Ranges Watershed is an essential part of Adelaide’s drinking water supply

Plate 2
There are approximately 14,000 dairy cows within the Mount Lofty Ranges Watershed

Plate 3
Milking shed effluent is produced by washing dairy yards after milking and must be managed to protect our watercourses

Plate 4
The EPA carries out audits to check that milking shed effluent is managed in accordance with the Milking Shed Effluent Management Policy

Plate 5
Sumps, holding milking shed effluent flows, pose a high risk to water resources if equipment fails when back-up systems are not in place

Plate 6
Manure carts can be attached to farm machinery to spread milking shed effluent over farmland

Plate 7
It is an offence under the Policy to allow milking shed effluent to escape onto any land not owned by the milking shed operator

Plate 8
The application of milking shed effluent to land must be carried out sustainably

Plate 9
Operators of milking sheds must ensure that effluent lagoons have at least 600 mm freeboard to prevent the overflow of effluent

Plate 10
Yards where cows are held before or after milking are considered to be part of the milking shed, so their washdown waters must be directed to an effluent management system

Plate 11
The use of sprinklers such as this travelling irrigator allows effluent to be spread in a thin layer over a wide area

Plate 12
Innovative but simple ideas such as this foot wash can improve the management of milking shed effluent

Plate 13
Well managed lagoons large enough to hold milking shed effluent over the wet season are considered the most effective management system

Plate 14
The use of catchment or on-stream farm dams for storing milking shed effluent is not considered acceptable as the inflow of water may cause overflows and the escape of effluent from the dam

Plate 15
The Meadows Dairy Discussion Group discusses milking shed effluent lagoon management with EPA officers

Plate 16
Plugs are a common device for diverting rainfall runoff from yards

Plate 17
Stock races are necessary for moving cows around dairy farms, but are a source of water pollution if not designed and located appropriately
GLOSSARY

environment protection order—a written notice issued under the *Environment Protection Act 1993* to secure compliance with a requirement imposed by or under that Act.

expiation notice—an on-the-spot fine issued under the *Expiation of Offences Act 1996* to a person alleged to have committed an offence for which an expiation fee is fixed under an Act, regulation or by-law.

general environmental duty—as described in the *Environment Protection Act 1993*, ‘a person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm’.

mandatory provision—compliance with the provision is obligatory and its contravention is an offence under the *Environment Protection Act 1993*.

milking shed—as described in the *Environment Protection (Milking Shed Effluent Management) Policy 1997*, ‘any structure, whether roofed or not, at which operations for the milking of animals are carried on, including any associated yard areas at which the animals are confined prior to or following milking’.

milking shed effluent management system—as described in the *Environment Protection (Milking Shed Effluent Management) Policy 1997*, ‘a system that is designed and operated:

- for the purpose of collecting milking shed effluent and disposing of it to land or storing milking shed effluent and subjecting it to evaporation in a lagoon or some other treatment process; and

- so as to minimise any adverse impacts on the environment’.

milking shed wastewater (effluent)—as described in the *Environment Protection (Milking Shed Effluent Management) Policy 1997*, ‘manure, urine, washdown water or contaminated runoff from milking shed operations, and includes components of such matter produced by storage and evaporation in a lagoon or some other treatment process, but does not include natural runoff from stock races’.

Mount Lofty Ranges Watershed—the area prescribed under the *Water Resources Regulations 1997*. Surface waters within this area are captured in reservoirs for the supply of drinking water to the city of Adelaide or flow into an area in which a reservoir may be constructed in the future.

stormwater—rain that runs off building roofs and hard paved surfaces.

water protection area—an area proclaimed under the *Environment Protection Act 1993* to be a water protection area for locally and regionally significant surface and underground water resources.
SUMMARY

This report outlines the methods and findings of a comprehensive audit conducted by the Environment Protection Authority (EPA) of effluent management practices at 104 milking sheds operated in the Mount Lofty Ranges Watershed (the watershed) during the 2000–2002 period. The audit was conducted to review and enforce compliance with the Environment Protection (Milking Shed Effluent Management) Policy 1997 (the Policy) within the region. The report identifies:

- the level of compliance with the Policy when initial visits were undertaken
- the action taken by the EPA to enforce compliance
- the types of effluent management systems in use
- a range of environmental management issues observed during the audit.

The report makes a number of conclusions about the value of the environmental auditing process and the need for it to be continued in some form.

In summary, the report recommends:

- a review of interstate milking shed effluent management policies, practices, and standards to assist in determining best practice environmental management for South Australia
- modification of the Code of Practice for Milking Shed Effluent 2003 to incorporate current best practice environmental management for milking shed effluent, particularly for the operation of milking sheds in water protection areas
- promotion of the concept of milking shed effluent management as a part of holistic farm management, including consideration of future dairy farm expansion
- promotion of systems for the storage of milking shed effluent during winter months as a preferred management system in the Mount Lofty Ranges Watershed
- the phased introduction of compulsory milking shed effluent storage during winter months in the Mount Lofty Ranges Watershed through the Code of Practice for Milking Shed Effluent 2003
- improved coordination between government and non-government agencies to provide assistance and advice on milking shed effluent management to dairy farmers within South Australia
- assessment of the requirements for milking shed effluent management common to government and industry bodies to develop a commonly agreed accreditation system
- review and update of the Guidelines for the Management of Milking Shed Wastewater and Intensive Stock Use Areas on Dairy Farms in the Mount Lofty Ranges and conduct of an associated extension and demonstration program
- the need for, and feasibility of, providing financial assistance to dairy farmers for the upgrade of milking shed effluent management systems within the Mount Lofty Ranges Watershed be assessed
- continuation of audits by the EPA of milking shed effluent management within the Mount Lofty Ranges Watershed, using a water quality risk scoring system to determine each milking shed’s priority in the audit program
• development by the EPA of a water quality risk scoring system that can be applied to each milking shed within the Mount Lofty Ranges Watershed so as to determine its priority in the milking shed effluent management audit program

• promotion of the need for a back-up milking shed effluent management system in case the primary system fails after the introduction of the *Code of Practice for Milking Shed Effluent 2003*

• incorporating assessment of the size of milking shed yards and management of stock races into the milking shed effluent management audit

• promotion of improved management of rainfall runoff from milking shed roofs by using it beneficially and/or separating it from the milking shed effluent management system

• incorporating management of stormwater from milking shed yards into the review of best practice environmental management for milking shed effluent management

• promotion of the findings, conclusions, and recommendations of this report to stakeholders, including dairy farmers and dairy industry representatives, relevant government agencies, and natural resource management organisations in the Mount Lofty Ranges Watershed.

*Plate 1* The water that flows into watercourses within the Mount Lofty Ranges Watershed is an essential part of Adelaide’s drinking water supply.
INTRODUCTION

Concern about milking shed effluent management

Water quality monitoring studies conducted in the watershed by the Engineering and Water Supply Department during the late 1980s quantified the nature of milking shed effluent generated on typical dairy farms in the region and compared the pollutant loads from these point sources with a range of diffuse sources on dairy farms (Hazell, 1991). The studies showed that milking shed effluent contains very high concentrations of nutrients and bacteria and could be a major source of water pollution if not properly managed.

These studies gave rise to the preparation and promotion of *Guidelines for the Management of Milking Shed Wastewater and Intensive Stock Use Areas on Dairy Farms in the Mount Lofty Ranges* (EWS, 1992) by a combined industry and State Government working group. An extension and demonstration program for dairy farmers in the region was conducted in the mid 1990s using National Landcare funding. In response to these extension and promotion activities, many dairy farmers in the Mount Lofty Ranges region, and elsewhere in the State, moved to improve their effluent management practices and, in the process, spent considerable time and money to install effluent management systems on their farms.

Some dairy farmers failed to upgrade their milking shed effluent management systems and, as a result, in 1996 the South Australian Dairy Farmers Association asked the Environment Protection Authority (EPA) to make it mandatory for all dairy farmers to have an effluent management system in place. This request led to the eventual introduction of the *Environment Protection (Milking Shed Effluent Management) Policy* 1997 (the Policy).

The Environment Protection (Milking Shed Effluent Management) Policy

The Policy established the following basic requirements across the State:

- An operator of a milking shed must not allow milking shed effluent to enter a watercourse, bore or sink hole, or flow onto land not owned by the owner of the milking shed (a mandatory provision).
- All milking sheds constructed after the commencement of the Policy must have an effective effluent management system in operation prior to starting milking operations.

The Policy also contains provisions relating to:

- the location, design and construction of milking shed effluent lagoons, which can be imposed through the *Development Act 1993*.

Plate 2 There are approximately 14,000 dairy cows within the Mount Lofty Ranges Watershed.
irrigation or spreading of milking shed effluent onto land (including hydraulic and nutrient application rates onto land and buffer distances to watercourses, houses and roads) at all existing and new milking shed operations throughout the State.

**Code of Practice for Milking Shed Effluent 2003**

On 1 October 2003 the Milking Shed Effluent Management Policy was revoked and replaced by the *Environment Protection (Water Quality) Policy 2003*. The Water Quality Policy 2003 requires anyone operating a milking shed in South Australia to comply with the *Code of Practice for Milking Shed Effluent 2003* (Code of Practice), which essentially represents a translation of the old Policy into a code of practice legally linked to the new Water Quality Policy.

**Plate 3** Milking shed effluent is produced by washing dairy yards after milking and must be managed to protect our watercourses.

**Mount Lofty Ranges Watershed Protection Office**

In late 1998, there were a number of water quality incidents that affected Adelaide. As a result of these incidents, the EPA was commissioned to audit the Mount Lofty Ranges Catchments and report on issues affecting water quality. The *State of Health of the Mount Lofty Ranges Catchments from a Water Quality Perspective* report was published and a ‘whole-of-government’ strategy to improve and protect water quality in the watershed was developed for presentation to Cabinet. From this, Cabinet endorsed the five-year *Watershed Protection Strategy* to protect and improve water quality in the watershed of the Mount Lofty Ranges. The EPA established the Mount Lofty Ranges Watershed Protection Office at Stirling in 2000.

Amongst other things, the Mount Lofty Ranges Watershed Protection Office was charged with the task of increasing the level of enforcement and compliance with the *Environment Protection Act 1993* (the Act) and associated environment protection policies, including the Milking Shed Effluent Management Policy.

**AUDIT METHOD**

A program of auditing milking shed effluent management in the watershed was undertaken by the EPA to assess each milking shed operator’s compliance with the Policy. Although the Policy applies to cows, sheep and goats, only milking sheds at which cows are milked were audited. Compliance with the general environmental duty under the Act was also reviewed where it was found that other milking shed practices not covered by the Policy were likely to affect water quality.

The program commenced in October 2000 and will continue indefinitely. The audits were carried out with the support and cooperation of the South Australian Dairyfarmer’s Association. A milestone was reached in December 2002, by which time all milking sheds in the watershed had been audited at least once and were either complying with, or were on the way to complying with, the Policy. The audits were conducted by three staff from the Mount Lofty Ranges Watershed Protection Office, all of whom were authorised officers appointed under the Act.

The locations of the milking sheds were obtained from milk haulage companies and were plotted on topographic maps of the watershed. As the auditing progressed, each milking shed was numbered for identification and milking shed operator details were obtained.
The audit checklist was developed from one that had previously been used by the EPA to audit milking sheds outside the watershed. It was modified at a later stage of the program to more closely reflect the contents of the Policy, thereby enabling easier determination of compliance.

EPA staff used two approaches to contact dairy farmers when carrying out the audits. The first was an unannounced inspection, often used for a first audit. If it was not possible to locate the farmer, a letter explaining the reason for the inspection and asking the farmer to contact the EPA was left at the milking shed. A time could then be arranged so that the farmer was present for the audit. The second approach, which was used for some first audits and most follow-up inspections, was to contact the farmer a day or two before the audit to arrange a suitable time. When the inspection was conducted, the farmer was given a copy of the handout *Advice to milking shed operators—EPA audit of milking shed effluent management*, which explained the purpose of the audit, the development of the Policy, and the consequences of breaching the Policy. A copy of the Policy was attached to the handout. During the audit any breaches of the Policy were noted and discussed with the operator, as were the required remedial actions. The details of the audit were recorded in an electronic register and any necessary follow-up action was undertaken.

If further action was necessary to obtain compliance with the Policy, it was discussed with the dairy farmer. The actions typically involved earthworks, plumbing, and/or changes to management practices; a date for completion was specified. From the EPA’s perspective, non-compliance with the Policy normally led to the need for follow-up inspections, or the issue of an environment protection order or expiation notice.

**Plate 4** The EPA carried out audits to check that milking shed effluent is managed in accordance with the Milking Shed Effluent Management Policy.

**OUTCOMES**

**Milking sheds and their distribution in the Mount Lofty Ranges Watershed**

In October 2000 there were an estimated 133 milking sheds in the watershed. Many milking sheds closed down in 2000–-2001 because of dairy industry deregulation. One hundred and four milking sheds in the watershed were audited against the Policy between October 2000 and December 2002. However, a number of milking sheds have since closed, and only 97 milking sheds were in operation in the watershed in December 2002. Approximately one quarter of the milking sheds are located in the northern half of the watershed between Mount Pleasant and Hahndorf. The remaining three-quarters are located in the southern half of the watershed between Mylor and Myponga.
Figure 1 Milking sheds within the Mount Lofty Ranges Watershed
There were approximately 14,000 cows being milked at the 104 milking sheds. The smallest milking sheds audited had between 20 and 40 milking cows. Between 100 and 200 cows were milked at the majority of milking sheds. The largest number of cows milked at an audited milking shed was 450.

![Figure 2 The number of milking cows at the milking sheds audited](image)

**Milking shed effluent management systems**

A variety of milking shed effluent management systems was identified during the audit. The type of system used by dairy farmers varied according to financial constraints, ease of management, the number of cows milked, the location of the milking shed with respect to watercourses and land availability, and safety considerations.

![Figure 3 The types and numbers of milking shed effluent management systems in use in the Mount Lofty Ranges Watershed](image)
Milking shed effluent management in the Mount Lofty Ranges Watershed

Plate 5 Sumps holding milking shed effluent pose a high risk to water resources if equipment fails when back-up systems are not in place.

Compliance issues
The level of compliance observed on first inspection
Thirty dairy farms (29%) were found to be in compliance with the Policy and general environmental duty on their first inspection. Of the 74 dairy farms that did not comply on the first inspection, 24% complied after the second inspection, and 40% required between three and 12 inspections or contacts before reaching compliance. Seven per cent of dairy farmers were either in the process of closing their operations down when audited or closed down following the audit.

Typical non-compliance issues identified during the audits included:

• no milking shed effluent management system
• milking shed effluent escaping into a watercourse or onto land not owned by the milking shed owner
• milking shed effluent not being applied to land sustainably, usually as a result of it being discharged from the end of a pipe rather than through a sprinkler
• use of on-stream farm or catchment dams instead of milking shed effluent lagoons with controlled drainage catchment areas
• milking shed effluent applied or escaping to land within 50 m of a watercourse.

Plate 6 Manure carts can be attached to farm machinery to spread milking shed effluent over farmland. Dairy farmers using this disposal method ensure that in wet periods access to suitable land is available so that effluent can be applied in accordance with the Policy all year round.
It is an offence under the Policy to allow milking shed effluent to escape onto any land not owned by the milking shed operator. This included roadside verges from where effluent can easily flow into a watercourse.

The inability of some dairy farmers to comply with the Policy or the general environmental duty was often due to inadequately maintained effluent management systems. For example, overflows from lagoons into watercourses or onto someone else’s land occurred as a result of lagoons being full of solids and needing to be cleaned out. Similarly, overflow from sumps into watercourses and/or off the property was often caused by pump breakdowns and sumps not having a secondary containment system. In other cases, farmers were unaware of the legislative requirements for effluent management and, for example, failed to apply effluent sustainably or applied it to land within 50 m of a watercourse.

Use of enforcement instruments
The Act allows for the use of various legal tools, including environment protection orders, expiation notices and prosecutions, to obtain compliance. Environment Protection Orders (EPOs) were the most widely used legal tool during the audit. They were generally issued to enforce compliance with the non-mandatory provisions of the Policy and the general environmental duty. Twenty-six EPOs were issued to 24 dairy farmers, two farmers each receiving two. The EPOs issued included the following requirements:

- ensure that a milking shed effluent management system is operative and provides for the collection, storage and disposal of milking shed effluent without causing environmental harm to neighbours, soil or water resources
- prevent the further discharge of milking shed effluent into any watercourse at the site
- cease adding milking shed effluent to any lagoon so that contents of the lagoon reach a level closer than 600 mm to the maximum level at which liquid can be contained in the lagoon
- ensure that no milking shed effluent escapes onto land within 50 m of a watercourse
- cease allowing effluent from the milking shed to discharge onto pasture at a nitrogen application rate exceeding 100 kg per hectare per year.
Expiation notices were largely issued to dairy farmers who failed to comply with an EPO, but were also issued for breaches of the mandatory provision of the Policy. Two incidents involving the escape of milking shed effluent into watercourses were investigated. These incidents may result in prosecutions but were still under investigation at the time of preparing this report.

Details of the enforcement measures used by the EPA during the audit are contained in Table 1. The number of EPOs and expiation notices issued in 2002 was considerably greater than in previous years of the audit program. This is a reflection of the increased number of audits performed during that year, and of the recognition of the value of using such legal tools.

Plate 9 Operators of milking sheds must ensure that effluent lagoons have at least 600 mm freeboard to prevent the overflow of effluent.

Table 1
Enforcement instruments used to ensure compliance with the Milking Shed Effluent Management Policy and general environmental duty.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number Issued</th>
<th>Breach of Legislation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2</td>
<td>Environment Protection (Milking Shed Effluent Management) Policy</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>General Environmental Duty</td>
</tr>
<tr>
<td>2001</td>
<td>2</td>
<td>Environment Protection (Milking Shed Effluent Management) Policy</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>General Environmental Duty</td>
</tr>
<tr>
<td>2002</td>
<td>17</td>
<td>Environment Protection (Milking Shed Effluent Management) Policy</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>General Environmental Duty</td>
</tr>
<tr>
<td>TOTAL</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Number Issued</th>
<th>Breach of Legislation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1</td>
<td>Failure to comply with an environment protection order</td>
</tr>
<tr>
<td>2001</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>7</td>
<td>Failure to comply with an environment protection order</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Breach of mandatory provision of the Environment Protection (Milking Shed Effluent Management) Policy</td>
</tr>
<tr>
<td>TOTAL</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>
Observations of milking shed effluent and dairy farm management

Maintenance and back-up measures for effluent management systems

Some milking shed effluent management systems are prone to failure and need constant maintenance. It is not uncommon for pumps to break down or irrigation pipes to become blocked. In some instances the failure to adequately maintain effluent management systems resulted in breaches of the Policy.

Poor maintenance of lagoons was a particular problem. The most common issue was not removing solids frequently enough. This reduced the capacity of the lagoons and led to milking shed effluent overflowing, particularly if irrigation was not undertaken. Compounding this, uncontrolled weeds, particularly grasses, grew out from the lagoon walls onto the solids to form a floating mat of vegetation, which further reduced the lagoon’s capacity and its ability to effectively treat waste.

Some procedures used to de-sludge lagoons were also of concern; some dairy farmers were unaware of how the work should be carried out and who was to do it. This resulted in works being delayed and sometimes carried out by inexperienced contractors, leading to further problems. The design of some lagoons hampered attempts to clean them, especially lagoons that were too large to allow an excavator to reach into the middle. Lagoons with poor vehicular access or overgrown by vegetation were also difficult to clean.

Other maintenance problems included neglecting to keep effluent drains free of obstructions such as earth and vegetation; not repairing damage to pipes and sprinklers caused by stone blockages or cows; and failing to clean out sumps and solids separation pits frequently enough.

Poor maintenance can result in milking shed effluent escaping onto land and, in the worst case, entering a watercourse or someone else’s land. Dairy farmers need to be aware that failure to maintain a milking shed effluent management system so that it works effectively can lead to a breach of the Policy.

For milking shed effluent management systems that have a high likelihood of failure—for example, pit, pump, and sprinkler systems—it is essential that the dairy farmer have a back-up system available to manage the effluent until the primary system is repaired. The back-up system may simply be a second pump, or a larger sump or catch dam that can hold effluent for two or three days. A back-up system may also be necessary for other systems such as manure carts. These may require a catch dam to intercept overflow that may occur when the tank is being filled.

There is no requirement under the Policy for a dairy farmer to have a back-up system and very few dairy farmers were found to have one. However, lack of a back-up system exposes the farmer to potential scrutiny by the EPA should failure of the primary system result in a breach of the Policy. Environment Protection Orders that required the implementation of a back-up system were issued to some dairy farmers when it was found that failure of the primary system was causing a breach of the Policy.

Milking shed yards

The definition of a ‘milking shed’ in the Policy includes ‘any associated yard areas at which animals are confined prior to or following milking’. Hence, milking shed effluent from these yards must be directed to a management system to ensure compliance with the Policy. As the program progressed it became increasingly obvious that the size of yards at many milking sheds was inadequate to hold all cows before or after milking. Many milking sheds were constructed when cow numbers were smaller and have not been modified to accommodate increased herd sizes. Consequently, cows were observed standing in stock races or on unsealed surfaces whilst waiting to be milked, or following milking. As these areas are not connected to effluent management systems, they can act as a source of pollution of surface water runoff. This problem has been recognised by some dairy farmers and they have endeavoured to address it. This has been done by sealing yards with concrete or by dividing herds into smaller numbers for milking so that all cows being milked at one time can be contained in the existing yards.
Milking shed effluent management in the Mount Lofty Ranges Watershed

Plate 10 Yards where cows are held before or after milking are considered to be part of the milking shed so must have their washdown waters directed to an effluent management system. As herd sizes increase, yard sizes must also increase and be connected to an effluent management system.

Stormwater management
The watershed is generally a high rainfall area and large volumes of stormwater can be generated at milking sheds, particularly from yards.

Rain falling on roofs of milking sheds can be captured for productive use or diverted away from effluent management systems. It is a source of clean water that can be used around the dairy – for example, in refrigeration of milk and for cleaning. Most but not all dairies capture roof runoff and this can reduce the amount of stormwater entering the effluent management system.

However, yard runoff can be polluted and needs to be handled through the milking shed effluent management system. Not all of the effluent management systems audited have been designed to handle the extra flows from yard runoff, which can result in increased pressures on components of effluent management systems, such as pumps, irrigation systems and lagoons. Some dairy farmers have chosen to divert runoff from washed yards to the stormwater system. The most commonly used diversion system for rainfall runoff from yards is simply the insertion or removal of a device such as a board or ball-plug to block and unblock stormwater pipes.

Stock race design and management
The definition of milking shed effluent in the Policy specifically excludes natural runoff from stock races. Therefore, they were not assessed during the audit.

However, as the audit progressed it became increasingly obvious that stock races can be a significant source of water pollution.

Stock races can extend over great distances and often cross watercourses, or run adjacent to them. Stock races were observed to have a thick layer of manure and mud built up on them, particularly during winter on the approach to the milking shed. In wet periods runoff can move this sludge from the stock race. Stock races tend to be earthen and run for considerable distances so the job of keeping them clean can be impracticable. On some farms the final section of the stock race leading to the milking shed was sealed, allowing the manure and mud to be removed, thereby keeping the yards cleaner.
CONCLUSIONS AND RECOMMENDATIONS

Application of the findings of the audit
Best practice environmental management for milking shed effluent

A number of deficiencies in milking shed effluent management within the watershed were identified during the audit. These included effluent management systems that pose a high risk to water resources, an absence of back-up systems, inadequately sized milking shed yards, and poor stormwater management. These deficiencies and the impact that they could have on water resources indicate that there is a need to change milking shed effluent management, particularly in the watershed, but also potentially within the whole of South Australia.

The policies currently applicable to milking shed effluent management in South Australia were developed from the practices and standards considered acceptable in the early 1990s. A decade on, and with the findings of this audit in hand, it is important to re-assess current best practice environmental management for milking shed effluent.

A review by the EPA of the policies, practices, and standards applied to milking shed effluent management in other Australian states may assist in determining best practice environmental management. If considered applicable and relevant to South Australia (in particular the watershed and other water protection areas), best practice should be incorporated into the Code of Practice following consultation with the industry.

Plate 11 The use of sprinklers such as this travelling irrigator allows effluent to be spread in a thin layer over a wide area, thereby allowing nutrients to be used for plant growth.

Plate 12 Innovative but simple ideas such as this foot wash can improve the management of milking shed effluent. The foot wash reduces the amount of stone and gravel carried into the yard and possibly washed into the sump, damaging the pump.

Recommendation

Review interstate milking shed effluent management policies, practices, and standards to assist in determining best practice environmental management for South Australia.

Modify the Code of Practice for Milking Shed Effluent 2003 to incorporate current best practice environmental management for milking shed effluent, particularly for the operation of milking sheds in water protection areas.
A holistic approach to farm management

The management of milking shed effluent is simply one part of dairy farm management. The audit indicated that milking shed effluent management at some dairy farms is carried out in an ad hoc manner without considering the broader issues of farm management. This ties in with other issues such as siting of dairies, management and siting of stock races, and future farm expansion. Some dairies and milking shed effluent management systems have been developed in a haphazard manner without thought for the future. Greater consideration needs to be given to whole-of-farm management and how the management of milking shed effluent fits into this planning, particularly with regard to future farm expansion.

Recommendation

Promote the concept of milking shed effluent management as a part of holistic farm management, including consideration of future dairy farm expansion.

Promotion of winter storage as a preferred effluent management system

As the watershed has great importance as a water supply catchment area for Adelaide, it is essential that activities within its boundaries, such as dairy farming, have a minimal impact on water quality. A number of milking shed effluent management systems were identified during the program. These varied in their adequacy and effectiveness in minimising the risk to water quality.

The most successful systems were those that stored milking shed effluent over winter. These usually employed multiple lagoons of sufficient capacity to contain milking shed effluent produced during wet periods so that it could be used to irrigate during dry periods. Systems that require immediate irrigation, such as pit, pump and sprinkler systems, are a greater risk to water resources, as milking shed effluent may be carried by runoff into watercourses during wet weather. This is particularly so when soils have reached saturation and milking shed effluent is still being applied.

It is recognised that a lagoon system can be as ineffective as a direct irrigation system if not maintained correctly, and that the use of lagoons may be difficult for some farmers due to the location of the milking shed. However, from a water quality perspective, the storage of milking shed effluent over the wet season should be promoted as a system that is preferred over direct irrigation systems. The benefits of winter storage can be further investigated during the review of best practice environmental management for milking shed effluent management.

The Policy and the Code of Practice do not place any restrictions on the type of system that can be used to manage milking shed effluent. However, it is envisaged that, due to the sensitivity of water resources within the watershed, storage of milking shed effluent during the winter months will eventually become mandatory in the watershed. This can be best implemented in a staged approach through the Code of Practice following consultation with industry bodies.

Recommendation

Promote systems involving the storage of milking shed effluent during winter months as a preferred management system in the Mount Lofty Ranges Watershed.

Implement the phased introduction of compulsory milking shed effluent storage during winter months in the Mount Lofty Ranges Watershed through the Code of Practice for Milking Shed Effluent 2003.

Plate 13 Well managed lagoons with sufficient capacity to hold milking shed effluent over the wet season are considered the most effective management system. A solids separation pit can be combined with a single lagoon to reduce the amount of solids entering the lagoon.
Milking shed effluent management in the Mount Lofty Ranges Watershed

Plate 14 The use of catchment or on-stream farm dams for storing milking shed effluent is not considered acceptable, as the inflow of water may cause overflows and the escape of effluent from the dam. Milking shed effluent lagoons must be constructed for storing effluent only.

Education and assistance for dairy farmers - coordination of advice and assistance
As the audit progressed it became increasingly obvious that many dairy farmers are out of touch with the systems and requirements for milking shed effluent management. This is not surprising as there is no one agency or framework available to coordinate extension services for dairy farmers. Primary Industries and Resources SA at Flaxley plays a small role in providing information to the dairy industry through the SA Dairy Network and field days. Dairy discussion groups provide a valuable forum for information exchange and inform farmers of current standards and expectations, but are not attended by all farmers. The EPA provides information to assist dairy farmers to comply with environmental legislation. However, the provision of this information is uncoordinated, making it difficult for dairy farmers to know where best to obtain assistance. There is a need for a coordinated approach between government and non-government agencies so that dairy farmers can more readily obtain advice or assistance on management of milking shed effluent.

Associated with this need for greater coordination of assistance programs is the need to assess requirements for milking shed effluent management common to the EPA, South Australian Dairyfarmer’s Association, and the milk companies. This could lead to the development of a dairy accreditation system whereby dairies at which milking shed effluent is managed effectively and in compliance with these common requirements are specially recognised by government and industry bodies.

Recommendation

Improve coordination between government and non-government agencies for the provision of assistance and advice on milking shed effluent management to dairy farmers within South Australia.

Assess requirements for milking shed effluent management that are common to government and industry bodies with the view to developing a commonly agreed accreditation system.

Plate 15 The Meadows Dairy Discussion Group discusses milking shed effluent lagoon management with EPA officers.

Guidelines for the Management of Milking Shed Wastewater and Intensive Stock Use Areas on Dairy Farms in the Mount Lofty Ranges

Given the poor coordination of information and assistance to dairy farmers and the introduction of the Code of Practice, it is an appropriate time to revise and update the Guidelines for the Management of Milking Shed Wastewater and Intensive Stock Use Areas on Dairy Farms in the Mount Lofty Ranges (EWS, 1992). This update should incorporate the findings of the review of best practice environmental management for milking shed effluent management and the requirements of the Code of Practice. In addition, an extension and demonstration program should be conducted to provide practical milking shed effluent management information to dairy farmers within the watershed.
Recommendation
Review and update the Guidelines for the Management of Milking Shed Wastewater and Intensive Stock Use Areas on Dairy Farms in the Mount Lofty Ranges and conduct an associated extension and demonstration program.

Financial assistance
A common complaint heard during auditing was that there is a lack of financial assistance available to dairy farmers who wish, or need, to upgrade effluent management systems. There may be value in providing some form of financial assistance. This happens in some other states such as Victoria in an effort to improve milking shed effluent management. This may be particularly important in the watershed, which is a very water sensitive region with a large number of high-risk milking shed effluent management systems. An opposing view of this is that environmental management should be structured into the dairy farmer’s business and financed by each operator, as has been done by most dairy farmers in the watershed.

Recommendation
Assess the need and feasibility of providing financial assistance to dairy farmers to upgrade milking shed effluent management systems within the Mount Lofty Ranges Watershed.

The future of the audit program - continuing the program
The milking shed effluent management audit program has overseen an improvement in both the management of milking shed effluent in the watershed and understanding of the Policy for all involved, including the EPA. It has led to positive changes in the management of milking shed effluent at the dairies at which contraventions of the Policy were found. These changes will in turn benefit the quality of the water resources within the watershed. However, without a continuation of the program, it is possible that the gains made over the last two years will be lost. Therefore, it is recommended that the audit program be continued within the watershed.

The EPA will develop a water quality risk scoring system which can be applied to a milking shed to determine its priority in future auditing programs. This will provide an objective and strategic means for deciding which milking sheds pose a higher risk to water quality and should be audited more frequently than those that pose a lower risk to water quality.

The following factors will be used as the basis for any water quality risk scoring system for individual milking sheds in the watershed:
- type of milking shed effluent management system
- location of the milking shed in relation to topography, distance from the nearest watercourse and reservoir, and presence or absence of larger on-stream dams that can act as barriers
- scale of operation.

It is important to note that scores derived from these factors may not be a true reflection of risk if the milking shed effluent management system is not managed and maintained appropriately. However, it will provide a guide for the EPA to decide which milking sheds require more frequent inspections.

Recommendation
Continue carrying out audits of milking shed effluent management within the Mount Lofty Ranges Watershed, using the water quality risk scoring system to determine each milking shed’s priority in the audit program.

Incorporating audit findings into future audits
Back-up measures for effluent management systems
The need for a back-up system to temporarily manage milking shed effluent if the primary effluent management system fails is essential for some systems, particularly pit, pump, and sprinkler systems. However, it is important that the back-up system does not become the primary system—for example, an emergency catch dam which is used on a permanent basis rather than only when the primary system fails.
The Policy does not currently require a back-up system to be available, but such a requirement has been incorporated into the Code of Practice. It should therefore form a part of future dairy audits.

**Recommendation**

*Promote the need for a back-up milking shed effluent management system after the introduction of the Code of Practice for Milking Shed Effluent 2003.*

**Milking shed yard size and management**

The Policy specifically includes yard areas in which animals are confined before or after milking as part of a milking shed. This means that dairy farmers must direct effluent from these areas into an effluent management system. The size of yards at some milking sheds has been found to be too small for holding cows before or after milking, which results in cows being held in areas that do not drain to a milking shed effluent management system. During this audit the issue of inadequately sized yards was not addressed, but it is recognised that it needs to be incorporated into future audits. The South Australian Dairyfarmer’s Association has already given in principle support for the EPA to extend audits to cover this issue in the future.

**Recommendation**

*Incorporate assessment of the size of milking shed yards into the milking shed effluent management audit program.*

**Stormwater management**

Rain that falls on the roofs of milking sheds should be captured for productive use in the milking shed, or diverted away from the milking shed effluent management system, thereby preventing it from becoming polluted. This should be promoted as a practice that will benefit the environment as well as all dairy farmers as there will be less effluent to manage. Rain falling on yards, even those that have been washed, may be contaminated. The most appropriate means of managing this source of stormwater runoff should be determined as part of the review of best practice environmental management for milking shed effluent management. If necessary, the Code of Practice should be amended to incorporate these findings.

**Recommendation**

*Incorporate stormwater management from milking shed yards into the review of best practice environmental management for milking shed effluent management.*

**Plate 16** Plugs are a common device for diverting rainfall runoff from yards.

**Stock races**

Stock races are a necessary part of any dairy farm. Their design, location and overall management are very important and should be planned from the outset when new milking sheds are being constructed. Currently, stock races are not required to be managed in accordance with the Policy. As they are potentially a significant source of water pollution in the watershed, the EPA should address stock races in future audits. The best way to resolve environmental protection issues associated with stock races should be determined in consultation with the South Australian Dairyfarmer’s Association.

**Recommendation**

*Incorporate assessment of stock races into the on-going milking shed effluent management audit program.*
Plate 17 Stock races are necessary for the movement of cows around dairy farms, but are a source of water pollution if not designed and located appropriately.

Need to promote this report and its recommendations to stakeholders

It is important that the findings, conclusions and recommendations of the milking shed effluent management audit be shared with dairy farmers, dairy industry representatives, and other natural resource management organisations in the watershed. In addition, input from these groups or individuals could be a valuable contribution to the continuation, support and success of future audits conducted by the EPA in the watershed.

The findings in this report could be a motivational tool for dairy farmers, and a good status report for their industry. Dairy farmers will be able to see where they fit into the bigger picture and this could encourage them to improve, or strive to become a leader in their industry. For dairy industry representatives and other organisations with an interest in the dairy industry, the report and findings will give a good understanding of management practices on dairy farms in the watershed. This may assist in providing direction to the dairy industry, and support continued improvement in milking shed effluent management in the watershed.

Recommendation

Promote the findings, conclusions, and recommendations of this report to stakeholders including dairy farmers and dairy industry representatives, relevant government agencies, and natural resource management organisations in the Mount Lofty Ranges Watershed.

REFERENCES


