



Dairy Goat Co-operative

# A guide to managing dairy shed effluent on dairy goat farms



## Acknowledgements

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- **Environment Waikato**
- **Dairy Goat Co-operative (N.Z.) Ltd**

## Dairy shed effluent

Dairy shed effluent (DSE) is the waste that is produced in the milking shed and yards on all dairy goat farms. It is a mixture of the dung and urine that the goats deposit and wash down water used to clean up after milking. It includes spilled milk, feed, hair, and sand/ soil/ woodchips carried into the yards on goat's feet.

DSE is either an asset that you can take advantage of or a problem that won't go away. Which one it is on your farm is up to you.

## Management systems for dairy shed effluent

There are two basic management systems for dealing with dairy shed effluent: land application or a pond treatment system.

Historically, on both dairy goat and dairy cow farms, the most common form of management for effluent has been the two pond system, with a discharge of treated effluent to water. Although the two pond treatment system represents a big improvement from the old days of discharge of raw effluent into streams and drains, pond systems are viewed in most cases as less favourable environmentally than land-based treatment. **For all regional councils land application of dairy effluent is the preferred treatment option.** To a large degree the dairy cow industry has moved away from pond systems to land application.

**Table 1: Advantages and disadvantages of pond systems and land application**

Land application	
Advantages	Disadvantages
Makes use of nutrient value of effluent	Increased risk of parasite spread, especially with goats grazed outdoors
Environmentally more acceptable	Feed tainted with effluent is not acceptable to goats
A permitted activity in some regional councils, no resource consent required	Expense in set up and running the effluent system
Reduced fertiliser requirements	Management skill and time are needed to get it right
Pond systems	
Advantages	Disadvantages
Takes little time and management	Valuable nutrients go down the drain
Reduces risk of parasite spread	Waterways are not so healthy
Avoids contamination of feed	Requires resource consent – costs money
	Pond systems require maintenance and must meet standards of regional councils and dairy goat industry

Many dairy goat farms continue to use pond systems. Reasons for this include:

- The economic value of DSE as fertiliser on the average sized goat dairy farm is much less than on an average sized cow dairy farm (560 goats \$1,100, 322 cows \$7,278, based on 2010 fertiliser prices).
- Farmer concern about the spread of internal parasites with land application of effluent, especially on outdoor farms.
- Feed acceptability issues – goats do not like to eat feed that has been grown on areas where effluent has been applied
- Ease of management and savings in time. Dairy goats are management and time intensive already, so why add complexity to the system.

## Best management practices for effluent pond systems

Effluent treatment ponds are systems that have a resource consent to discharge treated effluent to a waterway. The consent will contain a number of conditions that your effluent system must meet. Generally best management practice for effluent treatment ponds means that you comply with the conditions of the consent.

Consent conditions will cover areas such as:

- Design of ponds. Most pond systems in use have two ponds, a deep anaerobic first pond followed by a shallower aerobic pond. Correct design, installation and maintenance of the pipework in ponds are all important.
- Size of ponds. A pond system should be large enough to allow for a retention time of 60-90 days.
- Sealing of ponds. It is crucial that effluent ponds are sealed or lined to ensure that contaminants do not leach into groundwater.
- Desludging. Effluent ponds should be partially cleaned out regularly.
- Effluent ponds must be fenced off for safety and to maintain stability of the banks.

If you have an effluent pond system your first step towards best management practice is to make sure that you have a valid resource consent and that the conditions of consent are being met.

Beyond meeting consent conditions here are some ways to improve the performance of your pond system:

## Minimising dairy shed effluent

Reducing the amount of effluent coming in is an effective step to improving the performance of a pond system. This effectively increases the amount of time that effluent stays in the pond and improves the quality of the discharge from the pond.

## How to minimise dairy shed effluent

### Infrastructure

- Install an effective stormwater diversion and use it – but only when the yards are clean
- Make sure that guttering and downpipes on the shed divert water away from the yards
- Construct drains or barriers around effluent ponds to ensure that runoff water from paddocks and races does not enter the pond

### Management

- Pre-wet the yard to before milking to speed up hosing down
- Use a scraper to shift solids
- Use a high volume, low pressure hose system



## Add another level of treatment to the system

Adding another pond or a wetland to the system improves water quality and encourages diverse aquatic and bird life.

## Keep things out that don't belong in the pond

As well as things like gloves and syringes which will block the pipes, chemicals should never be allowed to run into the ponds. For example foot treatment chemicals like copper sulphate will kill the bacteria between the toes but also wipe out the bacteria that make the treatment pond work.

### This is important!

**You must have resource consent to discharge treated effluent from a pond system into water.**

**If your effluent pond system does not discharge effluent to water, it does not mean that you do not need resource consent. It means that your ponds are leaky. Your regional council will regard this as an illegal discharge of effluent to land where it may contaminate groundwater.**

## Land application of dairy shed effluent

There is good potential to use the nutrient content of the dairy shed effluent (DSE) to help reduce fertiliser use. A well set up and managed effluent system will enable use of 80-90% of the nutrient value of DSE. A poorly set up and managed system can waste more than 50% of the nutrient value and get you in trouble with your regional council. The fertiliser value of DSE is shown below.

**Table 2: Calculated nutrient values of dairy shed effluent on an average-sized dairy goat farm using 2009 fertiliser equivalent prices**

	DSE (500 goats) Volume/day = 4 m <sup>3</sup>		
	Concentration	Farm total	Value
	mg/l	kg/day	\$/year
<b>Nitrogen</b>	203	0.9	\$370
<b>Phosphorus</b>	55	0.3	\$222
<b>Potassium</b>	144	0.7	\$357
<b>Sulphur</b>	140	0.7	\$150
		<b>Total</b>	<b>\$1100</b>

As fertiliser becomes more expensive the return on investment is greater.

The principles of land application of DSE are the same for dairy goat farms as for dairy cow farms. The same regulatory standards also apply, such as rules setting limits on the allowable N application rate and depth of irrigation application. The only difference between goat and cow farms is that the land area required for DSE application on an average-sized goat farm is only 1.7 ha, much less than the 11 ha required on an equivalent 120 cow dairy farm.

**Table 3: Area required for DSE application**

N application rate kg N/ha	500 dairy goats	
	Daily area m <sup>2</sup>	Annual area ha
50	149	4.8
100	74	2.4
150	49	1.7
25mm depth per application	179	

Best practice for applying effluent to land is about getting it in the right place, at the right rate, at the right time.

### The right place

The right place for effluent irrigation is where the nutrient content of DSE is made good use of and where it won't run off or leach into groundwater. On dairy goat farms this is complicated by issues of tainting of feed and potential spread of parasites. It is common practice for DSE to be spread on parts of the farm that are grazed by cattle rather than grazed by or harvested for goats. However, care must be taken to not spread effluent in unsuitable areas, such as near drains or on steep areas where runoff is more likely to occur. There are ways to avoid the problem of feed tainting such as applying to paddocks that will not be grazed or harvested for a long time, or applying DSE to cropping areas.

Make sure that your effluent system is capable of covering sufficient area to give you flexibility in where you put the effluent.

### The right rate

Rate of application is measured in the depth of application in a given time. An application depth of 25 mm per application is often used as a maximum figure, and is the maximum allowed under regional council permitted activity rules. However, many effluent irrigators exceed the 25 mm limit, or they apply the effluent in such a short time that the soil cannot absorb all the effluent, and runoff or ponding occurs. You can get an idea of the application depth by putting a series of containers out under the irrigator and measuring the depth of effluent collected. Travelling irrigators should be set to run as fast as possible. Stationary irrigators should be shifted very frequently. The old pot spreader that granddad used when he was milking a couple dozen cows (photo below) is inadequate for a farm milking more than a few goats.

**Figure 1: The old pot spreader**



Figure 2: Travelling irrigator



## The right time

Applying effluent when the grass is actively growing allows pastures to make the best use of the nutrients applied. Applying when soils are overly wet can damage pasture and soil life and cause ponding, leaching and runoff. If you irrigate straight out of a small sump then you have to irrigate daily regardless of conditions. Having effluent storage gives you the flexibility to apply effluent when conditions are right.

There is a lot of information out there about land application of effluent. It is of course mostly based on dairy cow systems but the principles are the same. It is only the amount of effluent and nutrient content that is different. We recommend the booklet *A guide to managing farm dairy effluent*, available from your regional council.

## Best management practices for land application – the short list

### Making the most of the system you have now

- Apply effluent at the lowest possible rate- speed up your travelling irrigator or shift your stationary irrigator more frequently
- Avoid spreading effluent too close to drains or waterways
- Minimise the amount of effluent by diverting away clean rainwater from your shed and yards
- Regularly maintain your irrigation system. Make sure that pipes and sprinklers are not blocked or damaged and that the pump is in good working order

### Improving your effluent system

- Increase the amount of land area that you can irrigate on
- If your irrigator is inadequate for the number of goats you milk now, get something better
- Get some effluent storage built into your system. Make sure it is sealed, and fenced off

# A regulatory point of view

## Environment Waikato's perspective

### Effluent application rules for land application

Irrigating dairy farm effluent is a Permitted Activity (no consent required) only if the following conditions are met. Otherwise you require a resource consent.

#### You MUST NOT:

- Allow any effluent to enter water (streams, drains or groundwater)
- Exceed an application rate of 150kg N per hectare per year (applied to grazed pasture) or 200kg N per hectare per year (applied to maize silage)
- Exceed an application depth of 25 millimetres per application
- Irrigate in a manner that causes an objectionable odour beyond your boundary or may affect the health of others

#### You MUST:

- Have enough storage so that you don't have to irrigate onto wet soils
- Manage your storage so that it never overflows
- Ensure that all storage is properly sealed
- Be able to provide information to show you are complying with the rules, if requested

This is a summary of Rule 3.5.5.1 of the Waikato Regional Plan. For full information, visit [www.ew.govt.nz](http://www.ew.govt.nz) or contact Environment Waikato's Freephone 0800 800 401. If you require the assistance of a consultant check out [www.envirodirect.co.nz](http://www.envirodirect.co.nz) for a list.

If effluent irrigation does not comply with the rules, then contractors, relief staff, workers, managers, sharemilkers and owners may all be liable. Employers must take all reasonable steps to ensure staff and contractors meet these responsibilities.

## Nutrient management rules

- A nutrient management plan must be used to plan fertiliser application where fertiliser is to be applied to an area of land that has also had farm animal effluent applied to it within the preceding 12 months
- Any land receiving over 60 kgN/ha/year now requires a nutrient management plan.

A nutrient management plan must, as a minimum record the following information for at least nitrogen (N) and phosphorus (P) (in units of kg/ha per year):

- Inputs from fertiliser
- Inputs from other sources such as manures, green crops and soil mineralisation
- Outputs in product
- Results of soil testing for levels of available N and Olsen P
- Documentation of consideration given to climatic and soil conditions for the life of the crop to account for the effects of rainfall and irrigation on the potential for N leaching through the soil into ground and P runoff in surface water
- Practices that will be implemented to reduce nutrient and sediment losses from the property and to avoid, remedy or mitigate adverse effects on the environment

A computer modelling tool like OVERSEER™ can be used to produce a nutrient budget that will give useful guidance when preparing a nutrient management plan to meet these conditions. The OVERSEER program is being updated for goat farming and should become available in 2011.