South East Dairy Effluent Guidelines

Management of the effluent spreading area

Guideline No 14.

It is important to effectively manage the effluent spreading area so as to minimise the risk of nutrient pollution in water sources. The effluent spreading area should also be managed differently to the rest of the farm.

To maximise the potential benefits of irrigating with dairy effluent, you will need to consider the following issues:-

- *Maximising Nutrient Removal*
- *The Nitrogen Budget*
- *Preventing Loss of Nutrients Below the Root Zone*
- *Minimise Disease Risks*

The effluent spreading area is the area on which the effluent collected at the dairy shed is spread. The area used may vary each time effluent is spread, for example when a waste tanker is used. It could also be a permanent area, where an irrigation sprinkler system is used for spreading the effluent.

The effluent spreading area, particularly where the same area is used for a prolonged period, must be managed to avoid soil and water degradation that will occur if the area is not managed carefully. The effluent spreading area will usually need to be managed differently from the rest of the farm.

The management of the effluent spreading area should aim to:-

- Maximise the removal of nutrients harvested in agricultural produce.
- Balance the amount of nitrogen spread with the amount removed on an annual basis.
- Prevent runoff of nutrients.
- Prevent loss of nutrients below the root zone of the crop or pasture.
- Minimise disease risks to humans and livestock.

Maximising nutrient removal

The nutrients removed from the effluent spreading area can be maximised by growing crops or pastures that can utilise high nutrient levels and produce high dry matter yields. The growth must then be harvested in order to remove the nutrients from the effluent spreading area.

Harvesting of crops or pasture grown can be done by:

- Grazing livestock to remove nutrients in live weight gain or other produce such as milk or wool. An intensive grazing rotation on the effluent spreading area with a withholding period of at least 14 days can be employed. The withholding period allows for some of the pathogens in the effluent to be killed by the environment and allows the pasture to become more attractive to the stock after spreading the effluent.
- Harvesting the crop for green chop, hay or silage. In most cases this will remove more nutrients in harvested product than the grazing of livestock would achieve.

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- Grazing livestock in rotation and closing the rotation to allow some or all of the effluent spreading area to be cut for hay or silage. As the growth of the crop or pasture speeds up in spring some of the effluent spreading area may be able to be closed to grazing and be cut for hay or silage. In most cases this will remove more nutrients in harvested product than the grazing of livestock alone would achieve.

Balancing nitrogen – the nitrogen budget

The nitrogen budget is covered in more detail in the ***South East Dairy Effluent Guidelines No.16 – Nitrogen Budget.*** The nitrogen budget for the effluent spreading area can be calculated using the "Nitrogen Budget Calculator" spreadsheet, which is supplied on the CD with these guidelines.

This spreadsheet model is written in Excel and requires Microsoft® Windows 95 or later running Microsoft® Excel 97 or later.

If you are unable to run this spreadsheet model, contact your dairy field officer, dairy consultant, PIRSA or the EPA who may be able to assist with processing your data.

Preventing loss of nutrients Below the root zone

The major nutrient of concern in the South East of South Australia is nitrogen. Studies in the South East have shown that Nitrate levels in groundwater in some areas already exceed the drinking water guidelines set by the National Health and Medical Research Council.

To avoid further degradation of the valuable groundwater resource it is essential that nitrogen is captured in the root zone of crops and pastures. Nutrients that move below the root zone are no longer available to plants and will eventually end up in groundwater.

To ensure that crops and pastures are able to utilise the nitrogen applied in effluent, the management of effluent spreading is critical.

The key point which must be observed in the timing of any spreading of effluent:

Plants must be able to readily utilise the nutrients spread in the effluent.

If plants are unable to use the nutrients readily, then spreading should be delayed until plant growth conditions are favourable and the nutrients in the effluent can be readily used by the plants.

The most common conditions when effluent spreading should be avoided are:

1. Effluent must **NOT** be spread on land, which is waterlogged or flooded. Plants are unable to utilise the nutrients in effluent while they are flooded or water logged and the likelihood of nutrients running off into other areas is greatly increased.
2. Effluent must **NOT** be spread on land when the crops or pastures are not actively growing. Plants that are not actively growing are unable to utilise the nutrients, which are applied in the effluent. This increases the opportunity for these nutrients to be moved off the area in surface water or pass below the root zone.

   Plant growth will be slow in winter due to cold winter temperatures. High rainfall at this time of the year also increases the risk of nutrients being flushed below the root zone before they can be utilised by the plants.

   Refer to South East Dairy Effluent Guideline No. 7 – Temperature and Pasture Growth.

3. Effluent must **NOT** be irrigated onto crops or pastures at times when sound irrigation practice indicates that the plants will be unable to utilise the water or nutrients applied. This means that for those months of the year when rainfall exceeds evaporation and plants do not require additional irrigation for maximum production, irrigation of effluent should be avoided.

   In the South East, average rainfall exceeds evaporation in some areas from mid-April through to mid-October, or a period of 180 days. During this period the irrigation of effluent should be avoided, which means that the effluent produced at the dairy during this period should be stored in a pond system and spread from late October through to mid-April. Winter storage ponds should be empty by April each year.

   Refer to *South East Dairy Effluent Guidelines No. 6 – Rainfall and Evaporation*.

Development of an Irrigation Management Plan

Dairies that wish to spread effluent over the winter period between May and October will need to develop an Irrigation Management Plan (IMP) for the effluent irrigation area, which will demonstrate the feasibility of the irrigation practice. The IMP should be prepared to EPA standards as outlined in Guideline No.12, and include the water balance incorporating climate variables, proposed application rates, average evapotranspiration and percolation rates and the nutrient balance. This should be planned on a monthly basis.

Refer to *South East Dairy Effluent Guideline No. 12 – Irrigation Management Plans*.

Minimise disease risks

Dairy shed effluent contains bacteria, viruses, parasite eggs and cysts. Most of these are harmless but some are potentially dangerous and can survive for lengthy periods in moist and shaded environments.

Most notable among these are *Salmonella* sp, *Yersinia* sp, worm eggs, coccidia and *Cryptosporidium* spores, as well as the organism *Mycobacterium paratuberculosis* which causes Johne's disease.

Adult cattle generally have a high resistance and may develop some immunity to infection from dung borne organisms. If effluent is spread on the farm of origin it is likely that adult cattle will have already been exposed to the organisms it contains. Young cattle and calves are more at risk because they have not had time to develop their immune systems. It is for this reason that young cattle should be kept separate from adults and not allowed access to areas where effluent has been spread within the past 12 months.

Under the national Dairy BJD Assurance Score system and Dairy ManaJD dairy herds will need to rear their calves under a nationally agreed plan which includes the requirements:

- Management of the calf rearing area should ensure that no effluent from animals of susceptible species comes into contact with the calf, and
- Calves up to 12 months old should not be reared on pastures that have had adult stock, or stock known to have carried BJD during the last 12 months.

Management practices can help to reduce the animal health risk of spreading effluent. These practices could include the following:

- Graze pastures low before spreading effluent so they will not need to be grazed for several weeks after effluent spreading. This allows time for rain to wash microbes and contaminants off the foliage and ensures that sunlight can penetrate to the soil surface.
- Spread effluent in hot and dry weather so that ultraviolet radiation and drying both help reduce the survival of microbes.
- Storage of effluent will help kill dangerous microbes.
- Dilution of effluent with a large volume of water will reduce the concentration of microbes applied to the pasture.
- Use crops that will be mechanically harvested at maturity such as millet, sorghum or maize.
- Watch for signs of Nitrate poisoning in grazing stock. Effluent, particularly fresh effluent is high in nitrogen and can cause problems in heavily fertilised pastures. Signs include increased respiration and heart rate, trembling and weakness, brown conjunctival and mucous membranes, brown blood, unco-ordination, collapse and sudden death.

Dairy shed effluent should not be a health risk to humans as long as usual hygiene practices are employed.

These include:

- Not smoking, eating or drinking while working.
- Washing hands and clothing when finished.
- Avoiding the spray mist from sprinklers.