

Effluent slurries, sludge, and solids spreading (6-28)

Vehicle spreading equipment is commonly used for applying effluent from the following sources:

- pond sludge
- stone traps
- sludge beds
- solids separators
- scraped feed pads
- wintering pads or barns, and feed residues

Spreading effluent solids requires specialist machinery which is suited to the type of effluent being spread. Using a local contractor to spread the effluent solids may be an option. Alternatively, you can hire or purchase the machinery to do it yourself.

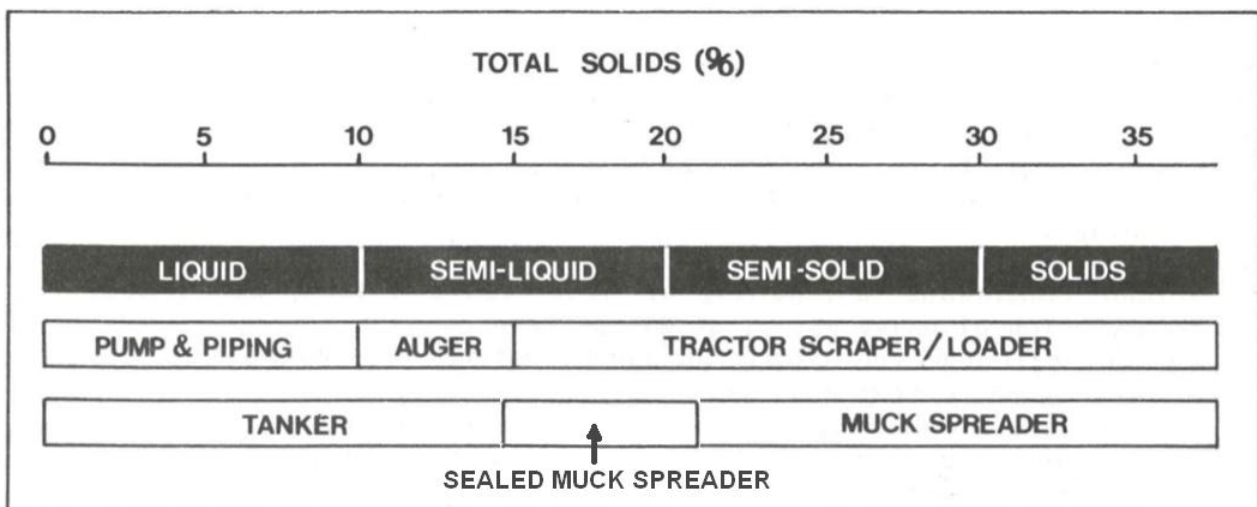
Vehicle spreading provides the flexibility to apply effluent in areas where the effluent irrigation system cannot reach. It can also be used for a nutrient boost prior to sowing a crop or applied on silage and hay paddocks.

Consistency of effluent solids

Effluent solids are commonly characterised by their physical consistency as shown in the diagram below. There is some variation in how solids can be handled based on the size of the solid particles and the solids percentage, as follows:

- Effluent high in sand or long feed fibre content is easier to load with a tractor
- Slurry tankers can generally pump and spread effluent less than 15% solids
- Muck spreaders are best at handling effluent above 20% solids
- The effluent between 15-20% solids is generally the most difficult to handle with loading equipment, and requires a sealed muck spreader.

When travelling along public roads all effluent must be contained so a sealed spreader may be required.



Desludging effluent storage tanks and ponds

From time to time effluent storage facilities may need to be desludged to remove the solid build up in the bottom of the storage facility. This can be largely avoided with an effective stirring system, continuously agitating the entire storage facility. This will keep all solids in suspension and remove the need for desludging. Special care needs to be taken with stirrers and imported clay liners. Consult your effluent system designer for advice on your system.

Loading effluent from storage to the spreader

Make sure effluent loading sites and fencing allow vehicle access. Ensure that all pond banks and bunker walls are designed to take the additional weight and force of the machinery that will be working on, against or near them. Ensure all staff and contractors are aware of the hazards with the equipment and facilities, including damaging the liner.

Do not use excavation equipment (e.g. diggers) for desludging ponds lined with plastic/rubber/imported clay or similar liner due to the risk of damaging the liner.

Do inform anyone doing any maintenance work on the pond what kind of liner is present. A damaged liner can be an expensive mistake. See page four for more advice about preventing damage when using contractors.

Slurry tankers draw effluent from a holding pond using a PTO pump (caution: the suction pipe should not be allowed to rest on synthetic liners as it may suck a hole in it). The effluent must be stirred well to mix the various layers into liquid slurry before removing it from storage. Stirrers consist of a spinning arm or heavy propeller driven by a PTO (caution: wave action created by pond stirrers can damage clay liners).

Excavation equipment or tractor front end loaders may be used for emptying effluent solids bunkers. Ensure these are not used or come into contact with clay, synthetic, or similar liners that may be damaged. Ensure that all vehicle access is designed and fit to hold the weight of the fully loaded equipment. Where a concrete ramp may be used for driving into a bunker or sludge bed, a 1:4 gradient is recommended with extra ribbing and a rough concrete finish for traction.

Nutrient Values

Effluent solids have a higher nutrient content than liquid effluent, so application rates need to be lower. Ideally you should take a mixed sample of effluent for testing to work out the exact nutrient loading during application. To calculate the required area and spreading rate to meet regional council regulations, use the *DairyNZ FDE Spreading Calculator* available on the website.

Allow for at least a 10-day stock-withholding period before grazing

DairyNZ – Farm Dairy Effluent (FDE) Spreading Calculator

An online calculator has been developed to easily calculate the depth or volume of effluent to apply to land in three simple steps. The information generated allows for accurate effluent solids management because farm specific lab results can be used, or industry test figures (if the farmer doesn't have their own lab sample results). This allows farmers to ensure provision of enough area to spread onto for strategic nutrient use and for environmental reasons (as well as meeting regional council rule and consent conditions). In addition, the information can be used to provide very clear and specific instructions for the person operating the spreading machinery. The calculator can generate information such as the required area (ha) for spreading and the vehicle travelling speeds to achieve the desired application of nutrients.

The example screenshot below, shows that to apply 50 Kg N/ha the effluent will need to be applied at either 11 mm or 111 m³/ha.

The information from the *FDE Spreading Calculator*, can be used with the DairyNZ *Effluent Spreading Contractor's Communication Form* (found on www.compliancetoolkit.co.nz under *Create a Form > Sharemilkers and Contractors*). This template can be used for capturing the above depth/volume information and other details to provide clear written instructions for the person applying the solids if they are a contractor.

DairyNZ Farm Dairy Effluent (FDE) Spreading Calculator

Quick Calculator

Use this calculator before applying effluent to land. You can estimate the nutrient loading and recommended application rates to achieve your nutrient requirements. Complete the green boxes below.

Step one:
Select an option 1-8 from the blue box which matches your effluent type.

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Effluent Type	Effluent Description	If you have tested your own effluent sample insert the results into the calculator to the right.			
		DM%	%N	%P	%K
1	Your Lab Test Results	18.7	0.5	0.12	0.5
2	Farm Dairy Effluent	0.8	0.045	0.006	0.035
3	Feed Pad -Slurry	4	0.15	0.03	0.1
4	Feed Pad- Liquid (post separation)	0.3	0.025	0.003	0.03
5	Feed Pad- Solids (post separation)	20	0.45	0.08	0.2
6	Stand Off Pad Solids	25	0.2	0.15	0.2
7	Wintering Pad Scrapings	15	0.2	0.03	0.075
8	Wintering Shelter Bunker	20	0.5	0.2	0.75

These nutrient values are taken from the DairyNZ Facts and Figures Guide book and work done by AgResearch and DairyNZ. They are provided to give an estimate of nutrient concentration in effluent for land application. Accurate calculations can only be derived by obtaining a representative sample of the effluent being applied and having them tested for nutrient content.

Step two:
Select a spreading option to base the calculations on. Either a desired nutrient loading (kg N/ha), OR a desired application depth (mm).

kg N/ha

50	kg N/ha	To achieve this N loading you need to apply the application rate or depth in the grey box below.
Application Rate	Application Depth	If your application depth is too high for your regional council rules or effluent consent try a lower N loading.
111.1 m ³ /ha	11.11 mm	
Also applying		
Phosphorus	Potassium	
6.7 kg P/ha	38.9 kg K/ha	

A screenshot of the DairyNZ FDE Spreading Calculator

Effluent application

Any equipment used for spreading effluent is heavy when fully laden and can cause compaction damage to the pasture and soil, especially around gate entrances. Consideration should be given to the ability of your soil type to support this machinery, and the safety of the driver. Caution: for safety reasons, towing heavy liquid loads, particularly if there are any slopes involved, should be done by a skilled and experienced driver.

Spreading effluent to land should only occur when there is a soil water deficit.

Factors to consider when choosing the spreading method and type of spreading equipment

- Solids content of the effluent
- Nutrient value of the effluent
- Soil condition and compaction issues for spreading equipment
- Distance to travel between effluent storage to application area (is this along a road?)
- Council rules and consent conditions for applying effluent to land
- Application to pasture or cropping land.

Options, pricing, and considerations before spreading

Using contractors

Contractors generally charge in two ways for cleaning ponds and spreading effluent onto land:

- An hourly rate from the time pumping starts until it finishes, or
- An hourly rate from the time of arrival to the time of leaving the farm gate.

Full responsibility for meeting council rules and consent conditions cannot be passed over to a contractor. In the past both farmers and contractors have been prosecuted for breaching the RMA due to effluent reaching waterways. You must clearly document what is required of the contractor to work within the rules on your farm.

If you use contractors on a regular basis it is recommended that you draw up a services contract. Federated Farmers have Contractor templates available to purchase on their website www.fedfarm.org.nz.

Communication is important to make sure all of your requirements and instructions are met. The DairyNZ Compliance Toolkit www.compliancetoolkit.co.nz has an *Effluent Spreading Contractor's Communication Form* (found under *Create a Form > Sharemilkers and Contractors*). This template is for capturing the information to give to contractors, including; information about the pond liner, the depth or volume of effluent to apply (from the *FDE Spreading Calculator*) and any areas where spreading effluent should be avoided.

Purchasing equipment

Costs vary widely for a vehicle spreading system, depending on which equipment is purchased. You need to cost out the following:

- Vehicle spreader – should include hydraulic brakes for large machinery
- Tractor size – requirements will depend on the spreader size and weight
- Labour requirement
- Loading equipment – either PTO pump for tanker or loader for muck spreader, and
- Stirring equipment – when using a slurry tanker, mix effluent well before pumping

Equipment hire

Vehicle spreading equipment can be hired in some areas. Standard hire rates are usually per day (24hrs) plus fuel. Ask for clarification about how equipment is charged for when hiring.

When using contractors or hiring equipment, make sure that the equipment has been cleaned before use on your farm, to prevent diseases transferring from one property to another.

Spreading equipment and methods

Slurry Tankers



Ideal for liquid and running effluent
Wide spreading width
Heavy machine requires large tractor
Options available to direct effluent onto soil surface to reduce odour drift

Beater and Twin Disc Spreaders



Wide spreading pattern
Beaters break up solid clumps
Enclosed but not sealed for liquid
Relatively good spread uniformity

Side Slinger Auger Spreaders



Variable spread width
Often poor spread uniformity
Beaters break up solid clumps
Spreaders often sealed depends on specific design

Side Slinger Chain and Flail Spreaders



Often relatively in-expensive unit
Sealed base of unit can hold liquids
Narrow spreading distance
Poor spread uniformity

Rear Twin Beater Spreader



Narrow spreading width
Beaters break up solid clumps
Enclosed but not sealed for liquid
Variable spread uniformity

Sealed Muck Spreader



Wide spreading width
Beaters break up solid clumps
Fully sealed unit can spread semi liquid effluent