

Good Water Good Farming

Reducing phosphorus loss

Phosphorus (P) is a valuable nutrient for pasture growth. Unfortunately, when it reaches a creek, it causes algal growth. If there is too much phosphorus and nitrate in the creek, there will be an algae problem.

Reducing the amount of phosphorus leaving your farm in creeks, drains, and leaching through the soil will help you adhere to water quality limits, improve the health of local waterways, and keep the phosphorus in the soil for plant growth.

There are short-term and long-term solutions for reducing the loss of phosphorus to waterways.

Low rate effluent application - dairying

Stock effluent contains large amounts of phosphorus. Ensuring that it won't run off or leach means only applying effluent at rates which can be taken up by soil. For sloping properties, low-rate application is recommended. If you are on flat land, low-rate application will still help reduce phosphorus loss.

Low-rate irrigators apply effluent at a rate of 3-4 mm an hour. Centre pivots can apply at a rate of 75mm an hour at the outer spans of the pivot. This is equivalent to the rate of a thunderstorm and will result in surface flow.

The depth of application is the total amount of water applied in an irrigation run. Work out how much water your soils can hold, and only apply a total depth that can be held within the soil profile. You should have a soil moisture probe on your farm. In South Otago you can use the ORC website for soil moisture information.

If your soils can hold 40mm of liquid, and they are at 35mm soil moisture content then you can only add 5mm. If your application rate is 4mm/hour, then your soil will be at field capacity in just over an hour.

Sediment traps and wetlands

The use of sediment traps, especially near farm tracks and dairy lanes, can help reduce phosphorus loss to creeks as it binds to soil particles. As the particles drop out of the water in the trap, so does sediment. This is a cheap and easy way to reduce phosphorus loss.

Fencing waterways

Keeping stock out of waterways means they cannot cause pugging or erosion, which means phosphorus bound to soils is released to the waterway.

Stopping stock access also means stock can no longer deposit manure directly into water. Manure is high in phosphorus, bacteria and ammonia, so restricting access is an ideal way to improve water quality.

Fencing off creeks and drains, and ensuring there is a buffer strip of rank grass or plantings reduces phosphorus loss considerably. The vegetation in the buffer acts as a filter and takes up phosphorus moving towards your waterway.

Under the Otago Water Plan, stock must not cause damage to waterways.

All creeks and drains where land is being intensively farmed, especially involving cattle and deer, should be fenced.



Optimum Olsen phosphorus values

Soils with excessive Olsen phosphorus values will leach P at higher levels.

A level of 25-30 will ensure you achieve yields at around 95% of optimum. While 100% optimum yields are unobtainable, the amount of investment required to get phosphorus levels up to 97% optimum yield could be considerable, and may put water quality at risk.

Soil group	Relative pasture production		Critical level
	Olsen P 25	Olsen P 50	
Volcanic	92 (88-94)	99 (98-100)	32 (27-38)
Sedimentary	95 (93-97)	100	30 (26-32)
Recent Soils	97 (96-98)	99 (98-100)	25 (20-30)

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Low solubility fertiliser options

Using Serpentine phosphorus, a less soluble form of P, as a fertiliser option will decrease the risk of phosphorus loss and won't affect yields. Ask your fertiliser representative about its use.

Alum in your effluent pond - dairy

While effluent shouldn't be reaching water, to improve the chances of phosphorus from effluent staying in your soils, applying alum to your effluent pond could be a good option.

Alum is a by-product of refining bauxite to useable aluminium and will change the phosphorus in effluent to a less soluble form. This will reduce the risk of runoff to waterways. Ask your fertiliser rep. about pricing and application rates.

Irrigation management/set up

If you are irrigating in a water-short area of Otago, ensure you apply the right volume of water at a rate which the soil can hold.

Over-irrigation causes runoff to waterways, and allows water to move below the root zone, eventually entering groundwater or waterways taking your valuable phosphorus with it.

Use best practice coupled with soil moisture meter readings to schedule irrigation.

Variable rate irrigation is a good option for centre pivots. It will allow you to apply the right amount in the right place (down to the scale of a water trough!) and you can even choose no-irrigation areas such as creeks and lanes. Existing pivots can be retro-fitted too.



For more information on the effectiveness and costs of reducing phosphorus loss contact an ORC land resources officer

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