

Effective nutrient management on deer farms

It pays to keep nutrients on the farm

If soil nutrients enter waterways they can become an environmental problem. It makes sense to keep them on the farm, helping to grow more venison and velvet.

There's also a legal incentive. Regional councils and central government are tightening rules and regulations designed to improve water quality. As part of this, from 2025 deer must be excluded from waterways on land with less than a 16 degree slope.

Fortunately, there are many strategies deer farmers can take to prevent or reduce the loss of nutrients from their farms.

Compiling a Level 2 Land & Environment Plan (LEP) is a good way to manage nutrients and is likely to become compulsory under many proposed regional council plans.

What nutrients go in and out of your farm?

The key macronutrients in a farm system are nitrogen (N), phosphorus (P) and potassium (K). Together with organic carbon (C) and trace elements, these nutrients are essential for healthy plant and animal growth.

Nutrients enter the farm system from natural soil processes, the fixing of N by legumes, the application

Key points

- Soil nutrients are essential for profitable deer farming. But if they escape into waterways, along with sediment and disease-causing soil organisms, they can reduce water quality and impact on human health.
- There are many strategies and tools deer farmers can use to reduce or minimise nutrient loss while still maintaining productivity.
- Nitrate leaching from deer is less than from dairy or cattle due to more efficient cycling of nitrogen in deer excreta.
- Deer are less likely than cattle to defecate in water. However wallowing and fence pacing needs to be managed to reduce potential nutrient losses.
- Use nutrient budgets to inform decisions on how best to manage nutrients on your farm.
- Consider doing a Level 2 Land & Environment Plan for your farm. It will help you to manage nutrients. Learn how at a Beef + Lamb NZ farmer workshop.



Photo: Tony Pearce

Leaching rates of N are likely to be higher in winter when plant uptake (and growth) is slower and the ground is wet

of fertiliser and via bought-in feed. They are then cycled through crops, pastures and animals.

N and P are the principal nutrients that cause problems in waterways. At excess levels they cause weed and algae growth, leading to low oxygen levels, poor water quality and damage to ecosystems.

Because N is soluble, surplus N in the soil will leach to ground water and move in water run-off. Plant uptake of water run-off and more efficient utilisation of applied N is key to managing this nutrient.

A small portion of N can also be lost to the atmosphere as gas, either by volatilisation (hot weather) or by denitrification (water-logged soils).

P attaches to soil particles and is less water soluble, so it mainly reaches waterways in sediment run-off. Research has shown that most P is lost from 'hot-spots' which make up only a small part of a catchment.

Sediment and P run-off is also a major risk when feeding crops like brassicas and beets over winter.

In waterways, sediment suffocates aquatic life and reduces the flow capacity of streams.

Superphosphate contains traces of cadmium that accumulates in the soil. On farms with a long history of superphosphate use, soil cadmium levels should be monitored. High levels of cadmium in produce may limit market access, because of its possible effects on human health.

Deer are different to cattle, sheep

Deer faecal pellets have lower concentrations of P and N than cattle manure and deer are less likely than cattle to defecate in water.

However, deer have two behaviours (wallowing and fence pacing) that require good management to reduce potential nutrient losses.

Wallowing in wet or damp shallow depressions or soft-bottomed streams, can erode stream and pond banks.

In 2000, Environment Southland measured the effect of deer wallowing on water quality. They showed that the concentrations of ammoniacal-N and suspended solids in a waterway downstream of a deer wallow were about 25-35 times higher, respectively, than upstream of the wallowing site. Ref: bit.ly/NZGA_deer

Fence pacing can damage pasture, expose soil and make it vulnerable to erosion and loss of phosphate. This escalates in wet weather.

Deer Facts have been published on managing wallows and reducing fence pacing. See the links at the end of this Deer Fact.

Measuring nutrients

Measurement is the only way to find out the nutrient status of your soils. If nutrient levels are too low, you will be missing out on productive potential. If they're too high, you are wasting money and putting water quality at risk.

A basic nutrient budget is easy to do. Enter the units of P and N applied via fertiliser, fixed by clover or purchased in feed, and deduct the nutrients removed through stock sales, feed transfer and soil losses.

It is not realistic to achieve a zero N budget (inputs = outputs) but the higher

the surplus N, the more risk of loss to the environment. Loss depends on soil types, rainfall, slope and pasture covers and types.

Using the OVERSEER® nutrient budget model

Overseer software can model the impact of farming practices on nutrient use and flows. Overseer identifies maintenance fertiliser nutrient requirements, generates a nutrient budget and can compare mitigation scenarios. It is advisable to use the services of someone trained/certified in Overseer before using it to make decisions. The programme is continually being refined. See <https://www.overseer.org.nz/>

The value of using a model for nutrient budgeting is to provide an indication of significant sources of losses (e.g. winter grazing paddocks, free draining soils with high moisture) and possible reductions of these losses once alternative management practices are made (e.g. changing stock classes on high risk paddocks).

Start with a Land & Environment Plan

Having a Land & Environment Plan (LEP) is an effective way to demonstrate to council staff and the wider community that you are farming in a sustainable and environmentally responsible manner.

Creating a LEP involves documenting farm features, breaking the farm into land management units, identifying their environmental risks and planning mitigation actions.

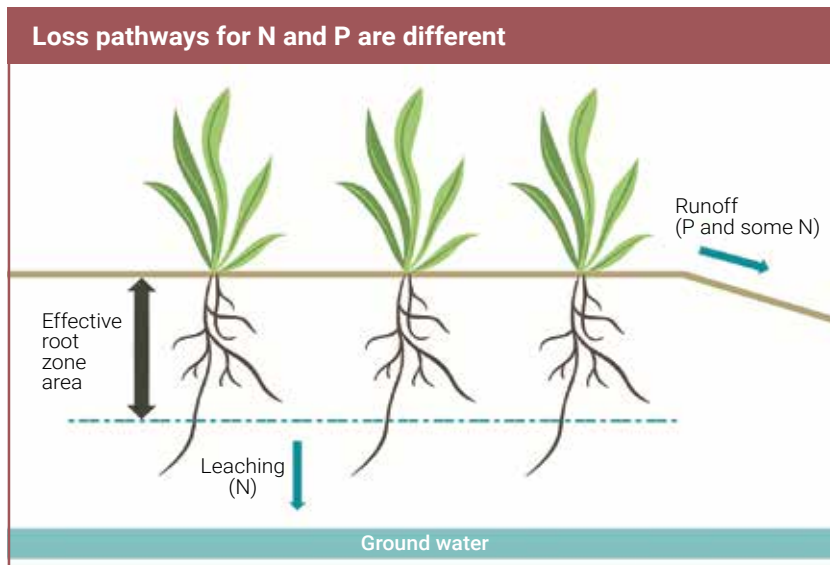
In 2017, as part of the P2P programme, the 2012 Deer Industry Landcare Manual was being repackaged as an Environmental Code of Practice (ECoP), to provide advice for deer farmers developing an LEP.

If you run sheep or beef cattle, as well as deer, consider signing up for a LEP workshop with Beef + Lamb New Zealand.

Practical things you can do

You don't need to be a computer whizz to reduce nutrient loss on your farm.

- Stock paddocks appropriately, based on the slope, ground cover, weather and soil conditions. Avoid over-stocking.
- Remove stock from bare and waterlogged soils during heavy rain.
- Exclude stock from riparian areas and plant these areas with grasses, flaxes, shrubs and other vegetation to help protect stream banks from erosion. The riparian vegetation, particularly dense ground cover, will intercept



DairyNZ Limited 2013

P, harmful organisms and sediment, reducing the amount that reaches waterways.

- Consider installing culverts or bridges for stock where they frequently cross waterways.
- Exclude deer from erosion hot-spots.
- Prevent deer from wallowing in areas connected to waterways, by fencing them off and planting. Consider creating artificial wallows in 'safe' areas of the paddock that aren't connected to a waterway.
- Graze winter crops so as to reduce the risk of run-off (see Grazing strategies to reduce nutrient loss, below).
- Consider constructing a bund and sump to hold run-off from silage pits. See the *Deer Fact: Protecting waterways from wallow and feed pad run-off*.
- Reduce fence pacing by meeting the nutritional and social needs of deer. Consider separating mobs visually using tree plantings or altering placement of fence lines. Use electric outriggers or wands to keep deer away from fence lines. If using electric tape or wires to create a temporary fence, train the deer to an electric fence beforehand. See the *Deer Fact: Fence pacing: costs and solutions*
- Check your streams under different flow conditions. Are they being clogged by plants, do they change colour after rain, is there sediment flowing from tracks, culverts or bridges, are banks slumping or eroding? A yes to these suggests that water quality could be improved.
- Consider stream water quality monitoring, using the SHMAK system developed by NIWA in partnership with Federated Farmers. (Link at end of this *Deer Fact*).

Fertiliser application

Apply fertiliser (especially N) at a rate plants can take up and at a time when they are growing vigorously (not waterlogged). Spring/summer is best.

Apply 20-50 kg N/ha when pasture is 50 mm high (1600-

1800 kg DM) – 50 kg N/ha per application is considered the maximum. Refer to local regulations for N application limits.

Do not apply fertiliser to waterways or before forecast heavy rain. Ask spreading contractors for proof of placement maps.

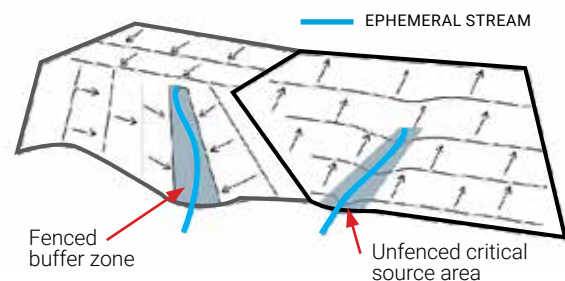
Consider encouraging a greater legume content in your pastures. Deer grow rapidly on a legume-rich diet and N from plants is less liable to volatilise (release gas to the air) than N via the bag. One tonne of legume dry matter can fix 30 units N/hectare.

Grazing strategies to reduce nutrient loss

Winter crops

If possible, select paddocks without waterways for winter crops. This includes those with ephemeral (temporary) streams created by winter rainfall.

Recommended grazing patterns to reduce nutrient and sediment losses



GOOD PRACTICE

Reduced N, P and sediment losses

POOR PRACTICE

High N, P and sediment losses

Adapted from *Reducing overland flow and sediment losses from winter forage crop paddocks grazed by dairy cows*, AgResearch 2013

CASE STUDY

Grant Charteris, Hawkes Bay

Grant Charteris has created two small catchment dams in the main gully on his farm to improve nutrient management. Originally the creek had a fence on one side, so cattle could access the streams. Often the creek would flood and damage the fence. The creek bank was eroded at some points and bank trampling meant sediment would run downstream during high rainfall.

Charteris decided to deer fence both sides of the waterway, leaving ungrazed space on the valley floor. Two catchment dams were built to let sediment settle out. The areas around the dams were planted in trees, shrubs and wetland plants. The surrounding paddocks are ready to stock with velveting stags. For more, see www.landcare.org.nz/SustainableDeer



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If there is a waterway, fence it off to keep deer out (this may be a temporary electric tape or livestrand fence).

Consider using minimum tillage techniques to prepare the seedbed – it reduces run-off compared to full cultivation. Drill crops across, rather than up and down, slopes to reduce runoff.

Leave high-risk areas such as gullies and swales (marshy hollows) unplanted, ungrazed and fenced off. If they are to be cropped, leave grazing to the end of winter when a 'last bite' may be needed and when the weather and soil conditions are more likely to be better. This last bite should be an 'in and out' graze, giving the animals just enough time to eat the crop and no more.

Break-fence crops across the slope and feed them starting with the break at the top of the hill. Move breaks downhill towards the buffer strip between the edge of the crop

and any waterway. Dairy research shows this buffer strip reduces P and sediment losses by up to 80% and P losses by between 60–70%. N losses are also reduced.

Paddocks used for cut & carry crops should be treated the same way, with a buffer strip between the crop and any waterway. Heavy machinery can cause damage to paddocks and increase the chance of run-off if wet. For fodder beet, consider lifting and feeding out in a separate area.

Hill country

It is not necessary to fence off streams in steeper hill country under typical low stocking rate grazing systems. But if deer are to be intensively grazed in an area for a short period, consider temporary electric fencing to protect waterways, so long as they have been trained to an electric fence beforehand.

CASE STUDY

Lyal Cullen, South Canterbury

Streams on Lyal Cullen's farms have been fenced off and there is now dense vegetation along the riparian strips.

For several years Cullen has monitored water quality in his main stream. He started with testing pH and water discolouration but recently has started testing for P and N content in all streams where they enter and exit the farm.

This is to inform his nutrient budget and to meet regional council requirements. He also wanted to see if any leaching below the self-feeding silage pit was reaching the stream (it wasn't).

Cullen pre-sprays before he plants trees and shrubs so they get a good start and follows up with release sprays until they are established.

More case studies

Fifteen movie clips have been created by the NZ Landcare Trust Sustainable Farming Fund project to promote environmental best practice on deer farms. All 15 videos can be found at www.landcare.org.nz/SustainableDeer_



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More >>

Deer Fact: Fence pacing: costs and solutions

Deer Fact: Protecting waterways from wallow and feed pad run-off

The NZ Deer Farmers' Landcare Manual (2012)

Environmental impacts of intensive deer farming in New Zealand – a review, NZ Grassland Association, 2015

SHMAK Stream Health Monitoring and Assessment Kit: bit.ly/SHMAK-stream