

Land management on Canterbury dairy farms

Managing land to reduce sediment and phosphorus loss



DairyNZ 

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The land is one of dairy farmers' greatest assets and managing it productively and sustainably will increase farm value and reduce the amount of soil lost to waterways.

Land is lost through erosion, which decreases the amount of nutrient-rich topsoil available for grass or crop growth, subsequently reducing profit and production. Erosion can result in sediment, phosphorus and bacteria entering waterways, potentially having a negative effect on water quality.

Most sediment and phosphorus is lost from relatively small areas on-farm – referred to as critical source areas (CSAs). Managing these areas well is the best way to reduce sediment and phosphorus loss. Actions and advice throughout this guide will help you achieve this.

This guide covers six high priority areas for improved land management in Canterbury. These areas include:

Erosion | Waterways | Cultivation & re-grassing | Grazing crops | Laneways | Pugging

Many actions to land improvement offer multiple on-farm benefits, indicated throughout the guide by the following icons.

On-farm benefits:



Environmental



Animal health



Farm profit

What are critical source areas?

Critical source areas (CSAs) are small, low-lying parts of farms such as gullies and swales, where runoff accumulates in high concentration. Runoff carries much of the sediment and phosphorus lost from a farm through dung, fertiliser and eroded or exposed soil.

In heavy rain, CSAs act like a highway carrying sediment and phosphorus to waterways.




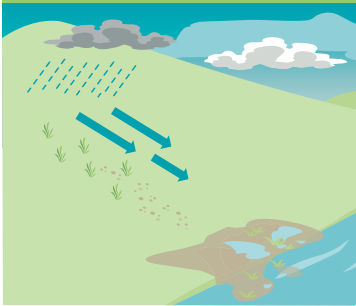
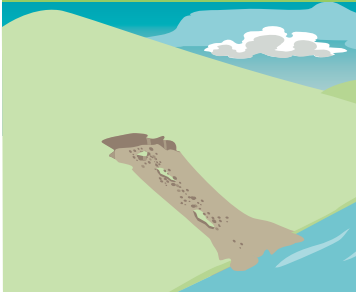
Canterbury environmental policy

Environment Canterbury has released industry-agreed good management practices as part of the Matrix of Good Management project. All farmers will be expected to operate under the agreed good management practices by 2017. This guide provides key steps to achieving good practice for land management.

For more information and a list of good management practices, visit dairynz.co.nz/canterbury-environmental-policy.

Erosion control

Actions to reduce erosion

EROSION TYPE	WHERE	ACTIONS TO AVOID OR MINIMISE EROSION
<p><i>Wind erosion</i></p> 	<p>All land where there is exposed soil and dry windy conditions. This is particularly problematic with loess soil on the Canterbury plains.</p>	<ul style="list-style-type: none"> • Place shelter belts at right angles to the prevailing winds. Aim to block about 50% of the wind to prevent wind eddying or funnelling on the downward side of the shelter. • Use minimum tillage or no tillage cultivation practices to retain topsoil. • Avoid cultivating crops during dry weather or strong winds to minimise soil loss. • Do not over cultivate soils. This will leave them more vulnerable to wind erosion.
<p><i>Sheet, rill and gully erosion (movement of soil overland in sheets or channels)</i></p> 	<p>Any sloping surface. Sheet erosion will remain relatively unseen in many cases, however, gully erosion is very active and visible.</p>	<ul style="list-style-type: none"> • Exclude stock from critical source areas. Vegetative cover acts as a buffer to slow and capture runoff. • Fence and plant riparian areas such as drains, streams and wetlands to create a buffer to slow and capture runoff before it can enter waterways. • Use cut-offs on laneways to direct water into paddocks and prevent rills from occurring on steep sections of the laneway. • Avoid over grazing as this will increase the potential for runoff. • Select cropping paddocks carefully, limiting cropping on steep slopes and critical source areas.
<p><i>Mass movement (earthflow, slips and slumps)</i></p> 	<p>Usually on steep land but can occur in moderate to gentle sloping areas.</p>	<ul style="list-style-type: none"> • Erosion control planting with hybrid willow species or poplars, will help to stabilise hill country and remediate existing slips with their root structure. • Use lighter stock classes or lower stocking rates to reduce pressure on steeper land. • In severe cases, destocking and retirement of land, or land use change to plantation forestry or native trees, may be the best option.

Benefits of reducing erosion



Keeping topsoil in paddocks is beneficial for grass growth and therefore milk production. Shelter belts not only reduce wind erosion, but can increase dry matter production, particularly under north-westerly wind conditions.



Erosion-control trees such as hybrid willows and poplars can provide shade and shelter for stock.



Water quality is improved by reducing the movement of bacteria, sediments and associated nutrients into waterways.

Waterway management

Fencing waterways to exclude stock, building crossings and carrying out riparian planting, helps to prevent nutrients, sediment and bacteria from entering waterways.

Actions for stock exclusion and riparian management

- Exclude stock from all waterways; this includes drains and wetlands.
- Install bridges or culverts at crossing sites.
- Erect temporary electric fencing around critical source areas, such as swales, gullies and shallow depressions to prevent stock access during wet conditions.
- Create a drain batter of 45° or less to protect against bank erosion.

The benefits of stock exclusion and riparian planting



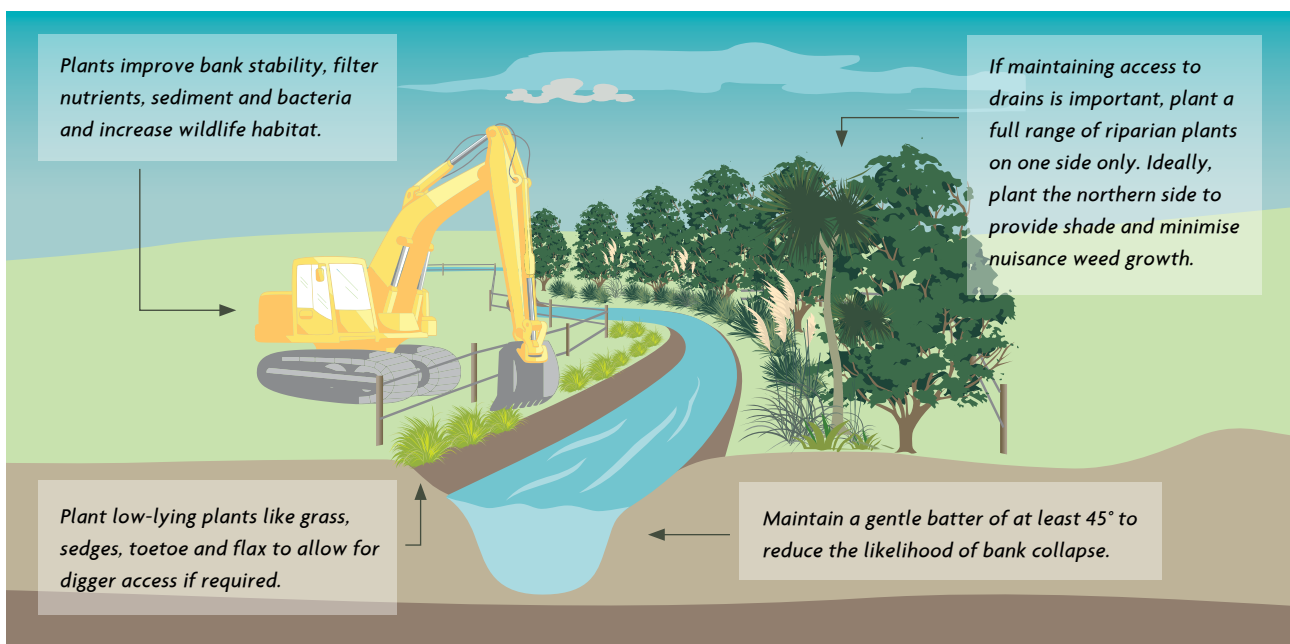
Direct deposition of faecal material and sediment into waterways is prevented. Riparian plants filter sediment, phosphorus and bacteria in runoff, reducing the amount entering the water.



Fencing will reduce the chance of animals getting stuck in wetlands and drains. It also helps ensure they drink from troughs and receive minerals added to stock water.



The amount of sediment entering waterways is reduced, cutting down the need to clear and maintain drains.



PLANTING IN CANTERBURY

For information about suitable plants, download or order *Getting riparian planting right in Canterbury* from dairynz.co.nz/waterways.



Cultivation and re-grassing

Cultivation timing, paddock selection and cultivation method all influence the amount of sediment, bacteria and nutrients that run off crop paddocks.

Actions when planning crops

- Choose a tillage method that minimises soil loss from your paddocks – direct drilling or broadcasting is recommended.
- Select a crop that will minimise the risk of soil loss on slopes. Turnips can be sown into a light grass or kale mix which makes them more appropriate on steeper land than fodder beet, which needs to be sown into bare soil to reduce competition.
- Plant crops on flatter paddocks that don't contain large critical source areas and aren't prone to flooding.

Actions for good practice cultivation

- Avoid cultivation during very dry periods and north-westerly winds as this increases the risk of soil loss through wind erosion.
- Avoid cultivation during very wet periods as this increases the risk of soil loss through sheet and rill erosion and the risk of compaction and damage to the soil structure.
- Avoid cultivating critical source areas and areas of the paddock that will hold water in winter. Leave them in grass to filter runoff from crop paddocks.
- Where practical and safe, cultivate across slopes rather than up and down. The lines of crop will act as buffers and prevent water creating erosion channels down the paddocks. In areas where it is not safe to cultivate across paddocks, consider leaving these as pasture. Alternatively, at the bottom of the slope, leave a grass buffer strip or cultivate at a different angle to slow down any runoff (figure 1).
- Leave ungrazed, uncultivated strips along the edge of waterways to slow down runoff and trap sediments before they leave the paddock.

The benefits of good cultivation practice

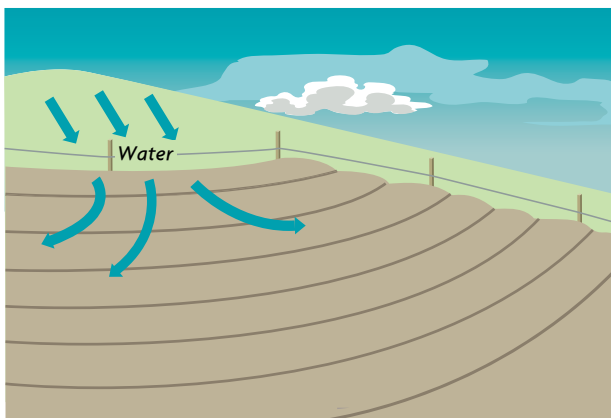


Reduces the amount of sediment and runoff that reaches waterways.

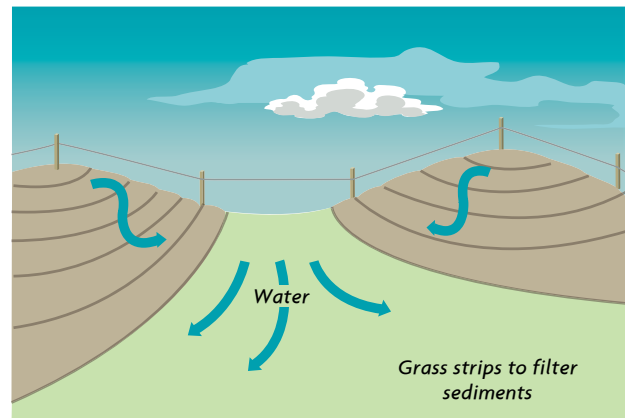


Valuable topsoil, fertiliser and crops are kept in the paddock. The risk of crop loss at establishment through erosion is reduced.

Figure 1. Cultivate across slopes where possible to reduce soil loss by redirecting water flows.



Leaving grass strips undisturbed in gully/swale areas helps to trap sediments.



Grazing crops

Large losses of sediment originate from winter forage crop areas. Much of this sediment comes from critical source areas where overland flow is high.

Benefits of good winter crop grazing practice



Strategic grazing and management of critical source areas can reduce losses of sediment and phosphorus by 80-90%.



Avoiding wet areas as much as possible is important for maintaining teat health and improving general cow wellbeing.



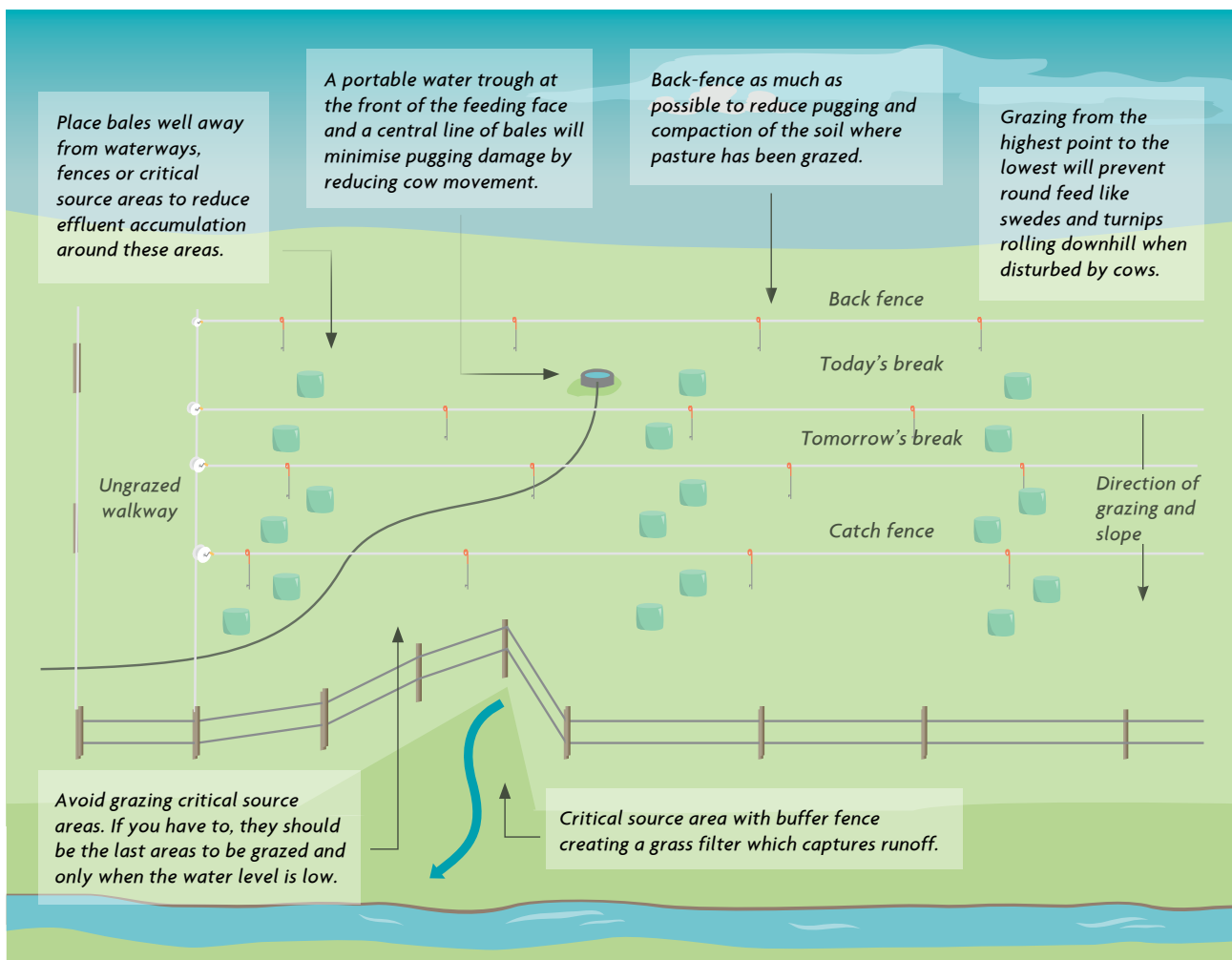
Soils that are seriously pugged in spring produce about 40% less dry matter than undamaged pasture the following season.

FARMER'S TIP

"We select lighter free-draining paddocks for wintering cows to limit pugging, but are aware this can increase nutrient leaching, so we reduce stocking rate to match feed supply and limit environmental damage."

Dave Ashby, Cust

Strategic grazing of forage crops



For more information on strategic winter forage grazing visit dairynz.co.nz/grazing-management.

Laneways

Laneways used for moving stock can create channels that transport sediment, bacteria and nutrients into waterways.

Actions to improve laneways



- A gradual camber of 3-8% will ensure cows use the entire width of the laneway and will allow water to drain.



- A speed bump forces water away from the laneway surface and prevents the loss of laneway material.



- If you have an existing laneway next to a waterway, ensure it slopes away from the water towards a paddock or sediment trap.



- Avoid large shady areas which prevent laneways from drying out. This may be as simple as planting on the southern side of the laneway or thinning existing shelter trees.



- Regular cut-outs that direct water to adjacent paddocks will reduce wet patches along the laneway edge.
- Cows walking single file is a sign that the laneway requires maintenance or may have a poor camber. This can lead to increased sediment runoff.

Benefits of good laneway construction



Well-constructed laneways with a gradual camber and cut-off drains that direct water to paddocks will be less likely to send sediment into waterways.



Correctly designed and constructed laneways will help to reduce lameness issues.



A well maintained laneway can increase milk production with improved cow health and cow flow.

Pugging prevention

Soils are prone to pugging in wet weather. Pasture management has a big impact on how susceptible paddocks are to pugging.

Actions to minimise pugging

- Avoid grazing at risk paddocks when wet to prevent pugging. If necessary, try to select paddocks better suited to wet weather grazing, such as paddocks that dry out quicker.
- Well-fed and sheltered animals will move around the paddock less, reducing the risk of pugging.
- Resting and re-sowing paddocks that have been pugged will reduce the impact on future pasture growth.
- On-off grazing can be an effective tool to reduce pugging damage.
- Put wet weather management policies in place to minimise soil damage.

Stand-off paddocks should only be used as a last resort, when all other options have been exhausted.

Benefits of reducing pugging



Reduces the risk of sediment, phosphorus and bacteria entering water.



Off-paddock infrastructure can take pressure away from paddocks and can enhance cow wellbeing during wet periods.



An area of seriously pugged pasture in spring will produce about 40% less dry matter than undamaged pasture through the following season.

TIP

It is recommended that a cost benefit analysis is carried out before committing to off-paddock infrastructure. For more information visit dairynz.co.nz/standoff.

Environment Canterbury – working with farmers

Do you need help understanding Farm Environment Plans, identifying nutrient loss risks on farm or navigating the new rules on water quality?

We have a team of Land Management Advisors that can help you understand what these issues mean to you in a practical manner.

We are available for on-farm visits at no cost to you.
Call Customer Service on (03) 353 9007 or 0800 324 636
(EC INFO) ecinfo@ecan.govt.nz for more details.



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