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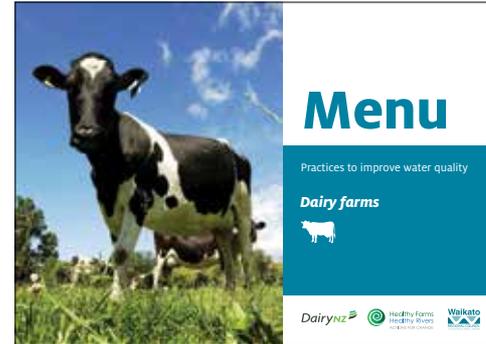
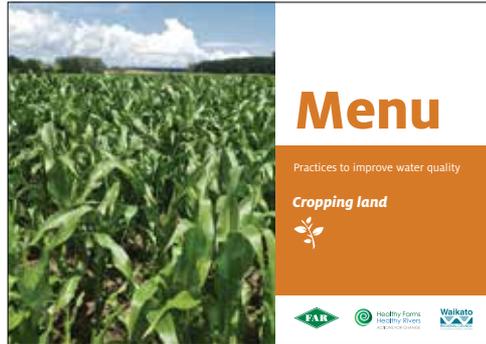
Menu

Practices to improve water quality

Drystock farms



Also available at www.waikatoregion.govt.nz/menus





This menu has been developed by Waikato Regional Council and the Upper Waikato Primary Sector Partnership, a group of representatives from agricultural industry organisations working in the Upper Waikato catchment. The group aims to work together to help farmers improve nutrient efficiency and reduce losses.

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Menu of practices to improve water quality: drystock farms



About this menu

This menu provides a range of practices for drystock farms, mainly hill country sheep, beef and deer, to improve nutrient management and reduce impacts on water quality. It is designed to help identify the best options for your individual circumstances. The practices listed are generally a step ahead of current regulatory expectations. They will also help you to better meet future sustainability challenges.

The menu should be used in conjunction with your consultant or your Land and Environment Plan.

The starting point for using this menu is a nutrient budget and a land environment plan which includes farm goals, management approaches and feed supply. These tools will help identify the water quality improvement practices that best fit your farm, taking into account flow on effects on feed budgets and other farm policies. Looking at the big picture will help ensure changes in one area do not create deficits or unbudgeted costs in another.

What's the issue?

Farmers, iwi, industry, local government and others have already done much to improve water quality, and continue to do so. However, more is needed to meet community desires for fresh water.

Water quality varies across the Waikato region from excellent to poor. This is largely due to variations in land use type and intensity, and also due to geology. In less developed parts of the region conditions are excellent and there have been few signs of deterioration. But water quality is poorer in intensively-farmed areas. In some areas, urban and other non-agricultural point sources also contribute to poor water quality.

In waterways across the region, slowly but steadily rising levels of nitrogen over the last 20 years are cause for concern. Nitrogen in groundwater can take decades to emerge into surface water, and this indicator of water quality will worsen before it improves. Levels of micro-organisms are moderate to high, but stable. Sediment levels are high in places, and phosphorus levels vary.

Water quality benefits

To help determine the most effective water quality improvement practices for your farm, each practice's likely water quality benefits are rated. The ratings are based on latest research and indicate likely effectiveness in reducing the amount of nitrogen (N), phosphorus (P), sediment and micro-organisms entering waterways.

Topography and management regimes vary from farm to farm, as do the need for and effectiveness of each practice listed in the menu. The ratings are an indicative best estimate and assume generally accepted industry good practice is followed.

Likely water quality benefits: estimated reduction (at whole farm scale) in contaminant reaching waterways

	Nitrogen (N)	Phosphorus (P)	Sediment	Micro-organisms
Low 	Less than 10%		Less than 20%	
Medium 	From 10 to 25%		From 20 to 50%	
High 	More than 25%		More than 50%	

Farm business impacts

Each practice's potential cost and economic benefit to the farm business are also rated. Individual farm circumstances will influence costs and benefits. However, this menu can help you identify a short list of practices for the farm management team (and consultant if you use one) to consider in more detail. Many of the practices' cost ratings are different to their benefit ratings. For example, a low cost practice may provide a high farm benefit. Also, some of the benefits may take some time to be realised.

Potential impact on farm business

	Cost	Benefit
Low 	Limited input of farmer time and expenditure. Limited practice change required.	Little change to farm profit as a result of this practice, or may require small changes to farm infrastructure.
Medium 	Moderate input of farmer time and expenditure. Some practice change required.	Practice likely to result in a moderate increase in profitability or improved management.
High 	Significant input of farmer time and significant expenditure. Significant practice change required.	Very profitable practice or results in improved management e.g. large reduction in farm operational costs.

To copy mitigations into your farm environment plan go to www.farmmenus.org.nz.

Tell us what you think and register for updates

This menu reflects current knowledge and future editions will be produced as knowledge develops. We value your feedback, so if you have any concerns or suggestions, please contact a Waikato Regional Council Agricultural Advisor on freephone 0800 800 401 or info@waikatoregion.govt.nz.

To automatically receive future editions of this menu, please register at www.waikatoregion.govt.nz/menus.

Management area	On farm practice	Likely water quality benefit				Potential impact on farm business		Factors to consider
		N	P	Sediment	Micro-organisms	Cost	Benefit	
Whole farm planning	Undertake a Land and Environment Plan (LEP) to understand farm resources and risks					\$ - \$\$	\$\$\$	Involves assessment of farm resources, stocking policies and farm business risks – see www.beeflambnz.com/farm/tools-resources/land-and-environment-planning-toolkit/ for more information. A good starting point that will help clarify the most useful practices to consider. Should include industry good practices and a risk assessment of current practices.
	Match land use to land capability	L	M	M	L	\$\$	\$\$	Graze sheep on steeper paddocks and restrict cows to easier slopes if possible. Consider afforestation (native, plantation or pole planting) as an alternative, especially where there is a high risk of erosion.
Nutrient management	Do a whole farm nutrient budget					\$	\$\$	Farm consultant/advisor should use OVERSEER® ¹ (use most recent version) to create a nutrient budget for the whole farm. ¹
	Apply N fertiliser in accordance with feed budget, climatic conditions and soil temperatures greater than 7°C	-	-	-	-	-	-	Refer to the Fertiliser Association’s Code of Practice for Nutrient Management www.fertiliser.org.nz .
	Keep Olsen P at agronomic optimum (using soil testing)	-	H	-	-	\$	\$\$\$	Avoiding unnecessary application of P will reduce costs. Optimum level will depend on soil type. To minimise run off, apply P fertiliser when good soil moisture and no large rainfall events forecast. Consider use of lower solubility P fertiliser if soil conditions allow.

¹ The OVERSEER® nutrient budgeting programme assumes many ‘low’ rated practices are already in place. If these practices haven’t been implemented, OVERSEER® is likely to underestimate nutrient losses. Adopting these practices over time may result in little change to your OVERSEER® nutrient budget even though you are achieving positive change on the ground.

Management area	On farm practice	Likely water quality benefit				Potential impact on farm business		Factors to consider
		N	P	Sediment	Micro-organisms	Cost	Benefit	
Managing nitrogen losses	Reduce number of old cattle (R3s) to reduce large urine spots	M	M	M	-	\$	\$\$	Male stock also distribute urine more widely, so urine patches are less concentrated. Would also lower live weight on farm for winter wet periods with benefits for soil health and water quality.
	Increase sheep to cattle ratios to reduce large urine spots (and soil damage)	M	M	M	-	\$\$	\$	Effectiveness depends on farm contour. Profitability of change depends on sheep vs beef schedules and capital stock sales required. Altering ratios may increase management challenge for pasture quality, with fewer cattle to manage long rank pasture.
Stock management	Increase lambing percentage	L	L	-	-	\$\$	\$\$\$	May involve higher ewe live weights at mating and improved feeding at lambing. Lambing percentage can be increased by improved genetics and maintaining ewe condition through pregnancy and lactation.
	Increase rate of cattle finishing	M	L	-	-	\$\$	\$\$\$	Minimises numbers of older cattle wintered on farm and reduces period of time on maintenance feed.
Stock management to reduce erosion and soil damage	Rotational grazing	L	M	M	M	\$	\$\$	Keeping animals moving onto fresh pasture reduces stress and pacing when wet weather hits. Could also use break fencing to reduce soil damage during wet periods.
	Match stock management to land use capability	L	H	H	M	\$\$	\$\$	Preventative approach where heavy animal classes are run on flatter contour off the hills where possible. Requires information on land use capability (may be a cost). Requires contour fencing for greatest benefit.
	Graze wetter paddocks earlier in the winter rotation	-	M	M	L	\$	\$\$	Requires forward planning. May not be possible if targeted paddocks are across the whole farm. Benefits will depend on soil type.



Management area	On farm practice	Likely water quality benefit				Potential impact on farm business		Factors to consider
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Stock management to reduce erosion and soil damage (cont.)	Strip graze towards waterways, rather than away from them	L	M	M	L	\$	\$	Applies to grazed paddocks in wet weather with overland flow that converges to form small channels of running water. Have as large a grass strip as possible between the winter grazed strip and the waterway, for as long as possible. Benefits will depend on fertility, slope and feed type. There may be local rules that set the minimum width.
	Separate deer mobs to reduce pacing on fencelines	L	M	H	M	\$\$ - \$\$\$	\$\$	Can lower impacts but will not fully prevent damage. Refer to the NZ Deer Farmers' Landcare Manual for more information, available in hard copy from Deer Industry New Zealand.
Planting to reduce erosion	Plant spaced poplars or other poles on steep country	-	L	M	-	\$\$	\$\$	Fast growing poplar or willow poles effective on southern faces or erodible/wet slopes while still allowing grazing. Mixed agroforestry is drought tolerant and provides an alternate feed source.
	Plant deer fencelines to reduce pacing behaviour	L	M	H	M	\$\$ - \$\$\$	\$\$	Can lower impacts but will not fully prevent damage. Refer to the NZ Deer Farmers' Landcare Manual for more information, available in hard copy from Deer Industry New Zealand.
	Afforestation of steep southern faces (above Land Use Capability 6e)	M	M	M	-	\$\$ - \$\$\$	\$ - \$\$	Protects areas of greatest erosion risk and replaces low growing slopes with long term productive investment. Best suited to areas with large weed burdens and minimal profitability. Profitability depends on forestry regime and market. Any afforestation plan should include a harvest plan to ensure all land is harvestable.

Management area	On farm practice	Likely water quality benefit				Potential impact on farm business		Factors to consider
		N	P	Sediment	Micro-organisms	Cost	Benefit	
Managing critical source areas - hotspots (high sediment, phosphorus or faecal loads coming from small areas of high run off)	Reduce run off from tracks, races and yards (using cut-offs and shaping)	L	M	M	M	\$	\$\$	Cost and effectiveness depends on contour of farm (higher risk of soil loss on steeper land but will also require more work). Requires regular maintenance but can reduce water damage and long term track maintenance costs.
	Fence out dams, plant around margins and pipe water to troughs	L	M	L	L	\$\$	\$\$	Extends the life of the dam. Watch for faulty ballcocks and overflowing water. Planting around the dam will keep water cooler in summer, but do not plant on dam wall. Benefits will depend on water quality of dams, but can provide significant production gains.
	Fence and plant permanent wet and boggy areas and springs	L	L	L	L	\$\$	\$\$	Benefits will be proportional to the number and use made of springs. Co-benefits could include reduced stock losses and ease of mustering.
	Space planting of trees	L	M	M	M	\$\$	\$\$	Stabilises hill slopes and reduces erosion risk. Potential for drought fodder, depending on species planted. Co-benefits include shade and shelter.
	Fence and plant out unproductive steeper slopes	-	H	H	L	\$\$\$	\$\$	Planted steeper slopes will slow water movement and reduce potential for erosion. Will reduce weed control and lower fertiliser expenditure.
	Direct stockyard run off to paddock	L	M	M	H	\$	\$\$	To stop direct run off into streams and drains.
	Move water troughs and gateways away from areas of high water flow	L	M	M	M	\$	\$	These areas of concentrated stock use have high nutrient loads and reduced vegetative cover, so are higher risk for run off. Cost and effectiveness depends on contour of farm (higher risk of soil loss on steeper land but greater benefit).



Management area	On farm practice	Likely water quality benefit				Potential impact on farm business		Factors to consider
		N	P	Sediment	Micro-organisms	Cost	Benefit	
Riparian management	Fence stock out of waterways	L	M	L	H	\$ - \$\$	\$\$	Fencing could range from permanent 8 wire to temporary electric fencing during grazing periods, depending on individual farm needs and preferences. Two wire electric with sheep under grazing may be appropriate where exclusion of large stock is the priority. Provide a minimum setback of at least 3m. Fencing adds capital value, reduces stock losses and benefits animal health. Can also be used to improve subdivision and pasture utilisation. Costs include reticulated water.
	Put in culverts or bridges at regular stock crossings	L	M	H	H	\$ - \$\$\$	\$\$\$	Cost will depend on whether culvert or bridge is required. Bridges also require resource consent. Improved crossings reduce stock and vehicle travel time.
	Improve on farm infrastructure to keep stock out of waterways (reticulate stock water, improve stock crossings, plant shade trees away from water)	L	M	M	H	\$\$ - \$\$\$	\$\$	These improvements all add capital value to the farm and provide animal health and welfare benefits alongside water quality benefits. Important to locate new troughs away from areas of high water flow and high stock traffic e.g. gateways.
	Manage or retire bogs and swampy areas	M	H	M	M	\$\$	\$\$	Controlled summer grazing of swampy areas can be useful for keeping weeds down. Keeping stock out of swampy areas and wetlands will reduce stock losses and mustering time. If they are areas with high stock traffic and high water flows, excluding stock will be highly effective in reducing P losses to waterways.
	Provide deer wallows away from waterways	L	M	H	H	\$\$	\$	May involve use of sediment traps or buffers to filter run off from wallows before it reaches waterways.

Management area	On farm practice	Likely water quality benefit				Potential impact on farm business		Factors to consider
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Riparian management (cont.)	Riparian planting	L M if swampy	M	M	M	\$\$\$	\$	Effectiveness improves with a grass margin to help filter run off, especially on steeper slopes. Effectiveness of planting depends on species. Ongoing weed and pest management is an added cost but reduces with time. Can improve bank stability, provide habitat for wildlife and instream shade for fish and insects.
	Sediment trap (an engineered structure to slow water flows, reduce energy, filter sediment and allow grass growth e.g. decanting dam, detainment bunds)	L	M	M	L	\$\$\$	\$ - \$\$\$	Most useful where steady flow of run off to waterways during wet periods and sediment/P is an issue. Detainment bunds designed to allow ponding for no more than three days to maintain pasture. Require water storage of around 120m ³ /ha of draining catchment. Can be costly where not using existing structures. Requires sound engineering design and ongoing maintenance.
Cropping management	Reduce soil cultivation by adopting strip tillage or direct drilling	L	H	H	-	\$	\$\$	Effective for reducing run off and soil loss, and improving soil quality and infiltration. Soils grazed over the winter may be compacted or pugged, requiring more cultivation or resulting in rough paddocks. Requires modified planter machinery to deliver good seed placement for even plant establishment. Additional expenditure might be required for insect pest control. FAR trials show a benefit of \$200/ha to direct drilling if crop establishment costs and yields are similar.
	Cultivate along contours (rather than up and down the slope) where slopes greater than 3°	L	H	H	-	\$	\$\$	Slows down run off and reduces erosion. Row orientation should follow contour. Avoid cropping on steep land.



Management area	On farm practice	Likely water quality benefit				Potential impact on farm business		Factors to consider
		N	P	Sediment	Micro-organisms	Cost	Benefit	
Cropping management (cont.)	Establish autumn pastures early	M	L	L	-	\$	\$	May not be feasible if pasture establishment is limited by a lack of soil moisture. N benefit will be proportional to the area cultivated.
	Use low N crops	M	-	-	-	\$	\$	Fodder beet and radish have a low N content and will lower urinary N deposition. Benefit may not apply if stocking rate is increased.
	Use winter active crops	H	-	-	-	\$	\$	Winter active crops (oats, rape, Italian rye) may reduce N leached over winter.
	Maintain buffer strips on sloping cropping paddocks	-	H	H	M	\$\$	\$	Reduces risk of soil loss from unexpected rain events on cultivated paddocks where there is a risk of erosion. Benefit will be proportional to area cultivated
	Actively manage grazing of winter crop areas to reduce risk of N leaching, run off, soil loss and compaction	L	M	M	M	\$\$	\$\$\$	Graze from top to bottom of paddock contour. Avoid leaving stock on during wet periods, for long periods, or concentrated on small sections of the crop.
	Use placement tools e.g. GPS guidance, crop sensing, where possible	H	H	-	-	\$\$\$	\$\$\$	Delivers more precise nutrient inputs for expected crop yield. Likely to become more widely used as tractors are upgraded over time.
	Include grass buffer strips (2m or more) for cultivated land next to waterways	L	M	L	-	\$\$	\$	Effective for filtering run off and reducing the risk of fertiliser loss during spreading. More benefit on greater slope but wider buffer required. May require weed management but can provide habitat for beneficial predatory insects, reducing need for pest control. Light grazing with sheep or young cattle during dry periods can be useful to manage weeds.

Management area	On farm practice	Likely water quality benefit				Potential impact on farm business		Factors to consider
		N	P	Sediment	Micro-organisms	Cost	Benefit	
Irrigation water application	Measure and record soil moisture and rainfall to develop a soil water budget	-	-	-	-	\$	\$	There is value in collecting and using farm data to inform management decisions. Note local evapotranspiration data is needed to complete the water budget.
	Use water budget to schedule irrigation	Depends on irrigation type and farm system				\$\$	\$\$\$	Water scheduling increases water efficiency. Benefits depend on current practice, soil type and farm system . Seek professional advice on water scheduling.
	Do not exceed soil water infiltration rate	Depends on irrigation type and farm system				\$	\$\$	Benefits depend on current practice, soil type and farm system . Seek professional advice to avoid drainage.
	Maintain irrigation equipment	Depends on irrigation type				\$\$	\$\$	Check pipes are not leaking and nozzles are working well.
Farm training	Embed environmental management into farm practices by training and incentivising staff	-	-	-	-	\$	\$	Level of benefit will depend on staff members' experience in environmental practice.
	Encourage staff to attend Land and Environment Planning workshops	-	-	-	-	\$	\$\$\$	Level of benefit will depend on the staff members experience in environmental practice.

Please note: This document assumes generally accepted industry good practice is followed in all aspects of farm management.



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