

FARM-SCALE MODELLING OF MITIGATION OPTIONS

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FARM-SCALE MODELLING

Purpose

Modelling effect of mitigations at the farm-scale

To be used in the wider catchment-scale scenario modelling

Aim is to give a sense of what can be achieved on farm land and at what cost

Applies to existing land use and for land use change

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How it will be done

Take the 16 base farms

Apply 3 bundles of mitigations

Model the farm-scale reductions in N, P, Sediment and *E. coli* losses and costs of implementing the mitigations

Outputs will vary for each farm

Why 3 bundles? = cost constraints

Why bundle mitigations = to include more options

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What do we need today?

Select the aims of the 3 mitigation bundles from the following list

Current policy

Easy GMP options

Medium GMP options

Hard GMP options

Reduced stocking rate options*

Easy to Hard GMPs developed with input from DairyNZ, B+LNZ, fertiliser reps, farmers, Council staff, consultants...

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Current policy

Stock exclusion-dairy, dairy support, beef, deer, pigs (not sheep) everywhere except hill country

Collected animal effluent- discharged to land, not within 20m of waterbody, no ponding, storage required

Cultivation and breakfeeding- not within 5m of waterbody (*Not modelled*)

This will give you “current trajectory” with no further policy required

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Easy GMP options

Simple

Cost effective

Proven

Basis for other options

Farmers should already be doing i.e. “Clean Streams Accord”

Policy response – simple rules

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Medium GMP options

More difficult or require farm-system change

Require capital input

Less proven

Infrastructure

Landscape features

May not be applied everywhere

May take longer to adopt

Policy response – May require education component

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Hard GMP options

Very difficult

Costly

Unproven

May not be applied everywhere

May take much longer to adopt

Policy response – May require significant research and education component

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Reduced stocking rate options*

* Could be included in other bundles

May happen as a response to current dairy payout

Another option – marketing potential?

GMPs Dairy

L Low, 0 - 10%

M Medium, 10 – 20%

H High, > 20%

Decreasing cost effectiveness ↓

GMP	Target	Effectiveness	Bundle
Stock exclusion from streams, wetlands	P, <i>E. coli</i> , NH ₄ -N, sediment	High for <i>E. coli</i>	Current Policy
Efficient water irrigation	N	L	Easy
Optimal P fertility & fert form	P	?	Easy
Enlarged effluent area	N	L	Easy
Deferred and/or low rate effluent irrigation	<i>E. coli</i> , P	?	Current Policy
Early re-establishm. of summer crops	N	L	Easy
Diverting laneway runoff	<i>E. coli</i> , P, NH ₄	L-H	Easy
Reduced use of fertiliser N	N	M	Medium
Facilitated or constructed wetlands	N, sediment, <i>E. coli</i>	L-M	Medium
Autumn substitution of N-fertilised pasture with low N feeds	N	L	Medium
Split grass/clover swards	P	L-M	Hard

GMPs Sheep-beef-etc

L Low, 0 - 10%

M Medium, 10 – 20%

H High, > 20%

Decreasing cost effectiveness ↓

GMP	Target	Effectiveness	Bundle
Cattle exclusion from streams, wetlands	P, <i>E. coli</i> , NH ₄ -N, sediment	High for <i>E. coli</i>	Current Policy
Protection of CSAs on grazed forage crops	Sediment, P <i>E. coli</i>	H	Easy
Efficient water irrigation	N	L	Easy
Low solubility P fertiliser to sloping land	P	L	Easy
Early re-establishm. of summer crops	N	L	Easy
Facilitated or constructed wetlands	N, sediment, <i>E. coli</i>	L-M	Medium
Catch crops following winter crops?	N	L	Medium
Planted buffer strips	Sediment, P	M	Hard
Sediment traps	Sediment, P	?	Hard

GMPS

DAIRY SUPPORT

L Low, 0 - 10%

M Medium, 10 – 20%

H High, > 20%

Decreasing cost effectiveness ↓

GMP	Target	Effectiveness	Bundle
Stock exclusion from streams, wetlands	P, <i>E. coli</i> , NH ₄ -N, sediment	High for <i>E. coli</i>	Current Policy
Protection of CSAs on grazed forage crops	Sediment, P, <i>E. coli</i>	H	Easy
Optimal P fertility & fert form	P	?	Easy
Early re-establishm. of cropped land	N	L	Easy
Catch crops following winter crops?	N	L	Medium
Reduced use of fertiliser N	N	L	Medium
Facilitated or constructed wetlands	N, sediment, <i>E. coli</i>	L-M	Medium
Reduce % as cattle Sus	N	M	Medium
Duration-controlled crop grazing	N, sediment	L	Hard
Off-paddock wintering	N, sediment	H	Hard
Sediment traps	Sediment, P	L	Hard
Planted buffer strips	Sediment, P	L	Hard

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