FARM-SCALE MODELLING OF MITIGATION OPTIONS

AgResearch Invermay
Richard Muirhead
Ross Monaghan
Chris Smith (Overseer)
John Stantiall (Farmax)

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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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FARM-SCALE MODELLING

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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FARM-SCALE MODELLING

What you selected to model

1. Current policy

2. Easy + Medium GMP options

3. Hard GMP options

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GMPs Dairy

GMP	Target	Effectiveness	Bundle
Stock exclusion from streams, wetlands	P, *E. coli*, NH_4-N, sediment	High for *E. coli*	1
Efficient water irrigation	**N**	L	2
Optimal P fertility & fert form	P	?	2
Enlarged effluent area	**N**	L	2
Deferred and/or low rate effluent irrigation	*E. coli*, P	?	1
Early re-establishm. of summer crops	**N**	L	2
Diverting laneway runoff	*E. coli*, **P,** NH_4	L-H	2
Reduced use of fertiliser N	**N**	M	2
Facilitated or constructed wetlands	**N, sediment**, *E. coli*	L-M	2
Autumn substitution of N-fertilised pasture with low N feeds	**N**	L	2
Split grass/clover swards	**P**	L-M	3

Decreasing cost effectiveness

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GMPs Sheep-beef-etc

L Low, 0 - 10%

M Medium, 10 – 20%

H High, > 20%

GMP	Target	Effectiveness	Bundle
Cattle exclusion from streams, wetlands	P, *E. coli*, NH_4-N, sediment	High for *E. coli*	1
Protection of CSAs on grazed forage crops	**Sediment, P *E. coli***	H	2
Efficient water irrigation	**N**	L	2
Low solubility P fertiliser to sloping land	**P**	L	2
Early re-establishment of summer crops	**N**	L	2
Facilitated or constructed wetlands	**N, sediment**, *E. coli*	L-M	2
Catch crops following winter crops?	**N**	L	2
Planted buffer strips	**Sediment, P**	M	3
Sediment traps	**Sediment, P**	?	3

Decreasing cost effectiveness

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GMPS
DAIRY SUPPORT

L   Low, 0 - 10%

M   Medium, 10 – 20%

H   High, > 20%

GMP	Target	Effectiveness	Bundle
Stock exclusion from streams, wetlands	P, *E. coli*, NH_4-N, sediment	High for *E. coli*	1
Protection of CSAs on grazed forage crops	**Sediment, P, *E. coli***	*H*	2
Optimal P fertility & fertilizer form	**P**	?	2
Early re-establishment of cropped land	**N**	L	2
Catch crops following winter crops?	**N**	L	2
Reduced use of fertilizer N	**N**	L	2
Facilitated or constructed wetlands	**N, sediment**, *E. coli*	L-M	2
Reduce % as cattle Sus	**N**	M	2
Duration-controlled crop grazing	**N,** sediment	L	3
Off-paddock wintering	**N,** sediment	H	3
Sediment traps	**Sediment, P**	L	3
Planted buffer strips	**Sediment, P**	L	3

Decreasing cost effectiveness

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DAIRY FARMS – CUMULATIVE % CHANGE

Farm	Nitrogen		Phosphorus		E. coli		Profit	
	M1	M2	M1	M2	M1	M2	M1	M2
Low Rain, High Prod.	0	-45	0	-18	-28	-28	-1	-26
Low Rain, Mod. Prod.	-6	-24	-13	-7	-28	-28		
Mod. Rain	0	-14	0	-17	-28	-28	-3	-4
High Rain	-2	-10	-6	-6	-21	-21		
Irrigated	0	-21	-10	-20	-28	-28		
Organic	0	-53	0	-38	-21	-21		

SHEEP & BEEF FARMS – CUMULATIVE % CHANGE

Farm	Nitrogen		Phosphorus		*E. coli*		Profit	
	M1	M2	M1	M2	M1	M2	M1	M2
Dry, finishing	0	-10	0	0	0	0		
Wet, breeding	0	-9	0	0	0	0		
Wet, finishing	0	-5	0	-20	0	0		
S&B finishing	0	-11	0	-22	0	0		
Irr. S&B trading	0	-20	0	-33	0	0		
Trading, 20% crop	0	-20	0	-17	0	0		

SHEEP & BEEF FARMS – CUMULATIVE % CHANGE

Farm	Nitrogen		Phosphorus		*E. coli*		Profit	
	M1	M2	M1	M2	M1	M2	M1	M2
Breeding, sum. dry	0	0	0	0	0	0		
Fin. Beef + 65% crop	0	-5	0	0	0	0		
Dairy S. 15% crop, sum. dry	0	-7	0	0	0	0		
Dairy S. 48% crop, sum. wet	0	-18	0	0	0	0		

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SUMMARY

Mitigations bundles 1 & 2 applied so far

Nutrient reductions in the 0 – 53% range

E. coli reductions in the 21 – 28% range on Dairy Farms only

Costs reductions, only 2 farms, in the 1 – 26% range

Current Policy
    Fencing is already implemented on all farms
    Dairy farms will need upgrades to FDE systems

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