



# Memo: KapAg Ltd

To	Lynette Baish	Senior Policy Analyst
		Horizons Regional Council
From	Terry Parminter	KapAg
CC		
Date	1 <sup>st</sup> May 2018	
Reference	Regional Macro-economic Report	

Hi Lynette,

The following is an interim report providing information for the macro-economic analyses being undertaken. These are for all types of dairying, arable cropping and those horticultural activities deemed to be 'commercial vegetable growing' in the One Plan (2014).

## 1. The purpose:

The economic analyses compare district economic performance in response to three policy situations:

- (i) Before undertaking management changes to achieve One Plan nitrogen-loss requirements
- (ii) After undertaking management changes to achieve One Plan nitrogen-loss requirement in Table 14.2
- (iii) After undertaking management changes to achieve One Plan nitrogen-loss requirement in a proposed revision of Table 14.2(R).

The industries being considered in this report are:

- Dairying in the Upper Manawatū Catchment of the Tararua District
- Dairying in the Coastal Rangitikei Catchment of the Rangitikei (part) and Manawatū Districts (part)
- Horticulture in the Horowhenua District

The information sources are shown in Table 1.

**Table 1.** The information sources used in this report

	Nitrogen losses	Gross margins	P&L accounts	
Dairy-Upper Manawatū	1	1	1	
Dairy-Rangitikei	1	1	1	
Arable-with livestock	1, 2	1, 2	1, 2	
Market gardens	2,3	2,3	2	
Intensive vegetables	2,3	2,3	2	
Potatoes	1,2	1,2	1,2	
Covered vegetables	3	3	3	

1. Impact of changes to nitrogen loss allowances on dairying in the Upper Manawatū Catchment, Parminter, 2018.
2. Farm scale economic impact analysis of One Plan intensive land use provisions, AgriBusiness Group, 2017.
3. Pers. comm.: Stuart Ford (Agribusiness Ltd), Gillian Mangin (MPI), Annette Carey (MPI)

A comparison between the original Table 14.2 in the One Plan (2014) and a possible revised Table 14.2 is shown in Figure 1.

**Figure 1.** Nitrogen leaching maximums from “Sensitivity of values in Table 14.2 of the ‘One Plan (2014)’ to a change in the version of OVERSEER. Part B”.

**Table 6:** Original cumulative N leaching maximums (kg N/ha/yr) by LUC Class from Table 14.2 of Horizons Regional Council’s One Plan.

	LUC I	LUC II	LUC III	LUC IV	LUC V	LUC VI	LUC VII	LUC VIII
Year 1	30	27	24	18	16	15	8	2
Year 5	27	25	21	16	13	10	6	2
Year 10	26	22	19	14	13	10	6	2
Year 20	25	21	18	13	12	10	6	2

**Table 7:** Revised cumulative N leaching maximums (kg N/ha/yr) by LUC Class, revised using OVERSEER® v6.2.3.

	LUC I	LUC II	LUC III	LUC IV	LUC V	LUC VI	LUC VII	LUC VIII
Year 1	50	44	36	26	23	22	11	3
Year 5	45	41	32	23	19	15	8	3
Year 10	43	36	29	20	19	15	8	3
Year 20	42	34	27	19	17	15	8	3

## 2. Dairy – Upper Manawatū

There are 133 dairy farms in the Upper Manawatū catchment. In the One Plan (2014) dairy farming is defined as, “...using any area of land greater than 4 ha for the farming of dairy cattle for milk production. This includes land used as a dairy cattle grazing runoff but excludes any dairy grazing arrangement ... with a third party ... for the purpose of temporary grazing.” These farms have been clustered into the following groups:

### Cluster Farm #1

The results in Figures 2 and 3 apply to 21% of the dairy farms in the catchment.

**Figure 2.** A summary of the profit and loss account for Cluster Farm #1 applying the original Table 14.2 from the One Plan (2014)

⌘	Initial·Farm⌘	Year·1⌘	Year·5⌘	Year·10⌘	Year·20⌘	⌘
Area·of·Milking·Platform·(ha)⌘	116⌘	⌘	⌘	⌘	⌘	⌘
Total·Cows⌘	340⌘	230⌘	180⌘	150⌘	150⌘	⌘
Stocking·Rate·(cows/ha)⌘	2.9⌘	2.0⌘	1.6⌘	1.3⌘	1.3⌘	⌘
Stocking·Rate·(SU/ha)⌘	24.3⌘	14.6⌘	14.4⌘	12.7⌘	12.0⌘	⌘
Farm·Labour·(FTE)⌘	2.5⌘	2.0⌘	1.5⌘	1.5⌘	1.5⌘	⌘
Nitrogen·Leaching⌘	41⌘	22⌘	19⌘	17⌘	16⌘	⌘
Pasture·Consumption⌘	12540⌘	8056⌘	6386⌘	5417⌘	5313⌘	⌘
Production·(kgMS/cow)⌘	321⌘	316⌘	329⌘	349⌘	370⌘	⌘
Production·(kgMS/ha)⌘	942⌘	626⌘	511⌘	451⌘	478⌘	⌘
Total·Milk·solids·(kgMS/yr)⌘	109,269·⌘	72,616⌘	59,220⌘	52,350⌘	55,500⌘	⌘
Milk·as·a·proportion·of·farm·income·(%)⌘	94⌘	87⌘	81⌘	79⌘	79⌘	⌘
Gross·Farm·Income⌘	\$758,229·⌘	\$541,804⌘	\$474,070·⌘	\$431,395·⌘	\$459,220⌘	⌘
Farm·Working·Expenses⌘	\$523,876·⌘	\$431,746·⌘	\$376,351·⌘	\$342,975·⌘	\$353,342·⌘	⌘
Operational·profit⌘	\$234,352·⌘	\$110,058·⌘	\$97,719·⌘	\$88,420·⌘	\$105,878·⌘	⌘
Capital·Adjustments⌘	·-⌘	\$20,676·⌘	\$29,095·⌘	\$33,796·⌘	\$31,971·⌘	⌘
*Surplus·/·Deficit⌘	\$234,352·⌘	\$130,734·⌘	\$126,814·⌘	\$122,216·⌘	\$137,848·⌘	⌘
Profit·per·unit·area·(\$/ha)⌘	\$1,934⌘	\$902⌘	\$765·⌘	\$724⌘	\$868·⌘	⌘

\*No·drawings,·depreciation,·tax·or·principal·payments·included¶

For the regional analysis the figures for use are an initial farm Earnings Before Interest and Tax (EBIT) of \$241,017 and a final EBIT of \$117,909 in year twenty. In Figure 3 the final EBIT is \$221,161

**Figure 3.** A summary of the profit and loss account for Cluster Farm #1 applying the revised Table 14.2 from the One Plan (2014)

¤	Initial-Farm¤	Year-1¤	Year-5¤	Year-10¤	Year-20¤
Area-of-Milking-Platform- (ha)¤	116¤	¤	¤	¤	¤
Total-Cows¤	340¤	325¤	270¤	250¤	235¤
Stocking-Rate-(cows/ha)¤	2.9¤	2.8¤	2.3¤	2.2¤	2.0¤
Stocking-Rate-(SU/ha)¤	24.3¤	¤	¤	¤	¤
Farm-Labour-(FTE)¤	2.5¤	2.5¤	2.0¤	2.0¤	2.0¤
Nitrogen-Leaching¤	41¤	32¤	28¤	25¤	24¤
Pasture-Consumption¤	12540¤	11926¤	10392¤	9605¤	9488¤
Production-(kgMS/cow)¤	321¤	325¤	340¤	360¤	400¤
Production-(kgMS/ha)¤	942¤	911¤	791¤	776¤	810¤
Total-Milksolids-(kgMS/yr)¤	109,269¤	105,625¤	91,800¤	90,000¤	94,000¤
Milk-as-a-proportion-of- farm-income-(%)¤	94¤	94¤	92¤	90¤	91¤
Gross-Farm-Income¤	\$758,229¤	\$732,863¤	\$650,010¤	\$648,220¤	\$671,920¤
Farm-Working-Expenses¤	\$523,876¤	\$500,325¤	\$454,341¤	\$455,754¤	\$447,684¤
Operational-profit¤	\$234,352¤	\$232,537¤	\$195,669¤	\$192,466¤	\$224,236¤
Capital-Adjustments¤	-¤	\$2,413¤	\$11,401¤	\$13,701¤	\$13,821¤
*Surplus/-Deficit¤	\$234,352¤	\$234,950¤	\$206,167¤	\$206,167¤	\$238,057¤
Profit-per-unit-area-(\$/ha)¤	\$1,921¤	\$1,906¤	\$1,604¤	\$1,578¤	\$1,838¤

\*No-drawings, depreciation, tax-or-principal-payments-included¶

## Cluster Farm #2

The results in Figures 4 and 5 apply to 8% of the farms in the catchment.

**Figure 4.** A summary of the profit and loss account for Cluster Farm #2 applying Table 14.2 from the One Plan (2014)

	Initial·Farm	Year·1	Year·5	Year·10	Year·20
Area·of·Milking·Platform·(ha)	112				
Total·Cows	336	230	210	170	150
Stocking·Rate·(cows/ha)	3.0	2.1	1.9	1.5	1.3
Stocking·Rate·(SU/ha)	22.7	15.9	14.4	11.8	10.9
Farm·Labour·(FTE)	2.5	2.0	2.0	1.5	1.5
Nitrogen·Leaching	42	24	22	19	18
Pasture·Consumption	12,429	8,872	8,017	6,597	6,067
Production·(kgMS/cow)	369	390	380	390	425
Production·(kgMS/ha)	1107	801	713	592	569
Total·Milk·solids·(kgMS/yr)	123,984	89,700	79,800	66,300	63,750
Milk·as·a·proportion·of·farm·income·(%)	94	94	82	79	79
Gross·Farm·Income	\$853,136	\$680,750	\$634,040	\$543,450	\$523,795
Farm·Working·Expenses	\$476,014	\$399,335	\$389,911	\$320,232	\$312,253
Operational·profit	\$377,122	\$281,415	\$244,129	\$223,218	\$211,542
Capital·Adjustments	·-	\$16,726	\$21,456	\$31,913	\$34,438
*Surplus·/·Deficit	\$375,372	\$298,141	\$244,129	\$223,218	\$211,542
Profit·per·unit·area·(\$/ha)	\$2,387	\$1,839	\$1,596	\$1,459	\$1,383

\*No·drawings,·depreciation,·tax·or·principal·payments·included¶

For Cluster Farm #2 the initial year has an EBIT of \$402,972 and in the final year of the original Table 14.2 it is \$211,542. In the final year of the revised table it is \$376,806.

**Figure 5.** A summary of the profit and loss account for Cluster Farm #2 applying Table 14.2 from the One Plan (2014)

⌘	Initial·Farm⌘	Year·1⌘	Year·5⌘	Year·10⌘	Year·20⌘	⌘
Area·of·Milking·Platform·(ha)⌘	112⌘	⌘	⌘	⌘	⌘	⌘
Total·Cows⌘	336⌘	336⌘	326⌘	310⌘	260⌘	⌘
Stocking·Rate·(cows/ha)⌘	3.0⌘	3.0⌘	2.9⌘	2.8⌘	2.3⌘	⌘
Stocking·Rate·(SU/ha)⌘	22.7⌘	⌘	⌘	⌘	⌘	⌘
Farm·Labour·(FTE)⌘	2.5⌘	2.5⌘	2.5⌘	2.5⌘	2.0⌘	⌘
Nitrogen·Leaching⌘	42⌘	37⌘	34⌘	30⌘	28⌘	⌘
Pasture·Consumption⌘	12,429⌘	12,078⌘	11,343⌘	10,999⌘	10,168⌘	⌘
Production·(kgMS/cow)⌘	369⌘	357⌘	366⌘	362⌘	425⌘	⌘
Production·(kgMS/ha)⌘	1107⌘	1071⌘	1066⌘	1002⌘	987⌘	⌘
Total·Milk·solids·(kgMS/yr)⌘	123,984⌘	119,949⌘	119,349⌘	112,240⌘	110,500⌘	⌘
Milk·as·a·proportion·of·farm·income·(%)⌘	94⌘	94⌘	94⌘	94⌘	93⌘	⌘
Gross·Farm·Income⌘	\$853,136⌘	\$826,909⌘	\$822,109⌘	\$773,560⌘	\$771,950⌘	⌘
Farm·Working·Expenses⌘	\$476,014⌘	\$499,045⌘	\$488,559⌘	\$430,573⌘	\$396,144⌘	⌘
Operational·profit⌘	\$377,122⌘	\$327,864⌘	\$333,550⌘	\$342,987⌘	\$375,806⌘	⌘
Capital·Adjustments⌘	-⌘	-\$1,677⌘	-\$617⌘	-\$600⌘	\$7,846⌘	⌘
*Surplus·/-·Deficit⌘	\$377,122⌘	\$326,187⌘	\$332,933⌘	\$342,387⌘	\$383,652⌘	⌘
Profit·per·unit·area·(\$/ha)⌘	\$2,387⌘	\$2,075⌘	\$2,111⌘	\$2,171⌘	\$2,379⌘	⌘

\*No·drawings,·depreciation,·tax·or·principal·payments·included¶

### Cluster Farm #3

The results in Figure 6 apply to 14% of the farms in the catchment. In the initial year the EDIT is \$186,149. After applying the original Table 14.2 in the One Plan (2014) this drops and then increases in Year 20 to \$209,676. Applying the revised Table 14.2 does not affect this farm as in the initial year it is already below the required maximums for leaching nitrogen.

**Figure 6.** A summary of the profit and loss account for Cluster Farm #3 applying Table 14.2 from the One Plan (2014)

	Initial·Farm	Year·1	Year·5	Year·10	Year·20
Area·of·Milking·Platform·(ha)	99				
Total·Cows	256	256	256	240	175
Stocking·Rate·(cows/ha)	2.6	2.6	2.6	2.4	1.8
Stocking·Rate·(SU/ha)	18.5	17.5	17.4	15.9	13.6
Farm·Labour·(FTE)	2.0	2.0	2.0	2.0	1.5
Nitrogen·Leaching	28	24	22	19	17
Pasture·Consumption	9158	8815	8582	8310	6969
Production·(kgMS/cow)	340	331	323	323	425
Production·(kgMS/ha)	880	855	834	782	752
Total·Milk·solids·(kgMS/yr)	87,145	84,630	82,579	77,418	74,400
Milk·as·a·proportion·of·farm·income·(%)	94%	94%	94%	94%	89%
Gross·Farm·Income	\$·602,603	\$·586,255	\$·572,924	\$·537,037	\$·546,180
Farm·Working·Expenses	\$·416,454	\$·424,637	\$·427,288	\$·400,239	\$·336,504
Operational·profit	\$·186,149	\$·161,618	\$·145,636	\$·136,798	\$·209,676
Capital·Adjustments	~	\$·1,083	\$·468	\$·2,488	\$·9,114
*Surplus·/·Deficit	\$·186,149	\$·160,535	\$·145,168	\$·139,286	\$·218,790
Profit·per·unit·area·(\$/ha)	\$·1,293	\$·1,122	\$·1,011	\$·950	\$·1,456

\*No·drawings,·depreciation,·tax·or·principal·payments·included¶

¤	Initial·Farm¤	Year·1¤	Year·5¤	Year·10¤	Year·20¤	¤
Area·of·Milking·Platform·(ha)¤	99¤	¤	¤	¤	¤	¤
Total·Cows¤	256¤	253¤	243¤	235¤	235¤	¤
Stocking·Rate·(cows/ha)¤	2.6¤	2.6¤	2.5¤	2.4¤	2.4¤	¤
Stocking·Rate·(SU/ha)¤	18.5¤	18.5¤	18.4¤	18.4¤	18.8¤	¤
Farm·Labour·(FTE)¤	2.0¤	2.0¤	2.0¤	2.0¤	2.0¤	¤
Nitrogen·Leaching¤	28¤	28¤	28¤	28¤	28¤	¤
Pasture·Consumption¤	9,158¤	9,162¤	9,134¤	9,099¤	9,098¤	¤
Production·(kgMS/cow)¤	340¤	349¤	374¤	396¤	425¤	¤
Production·(kgMS/ha)¤	880¤	891¤	919¤	939¤	1,008¤	¤
Total·Milk·solids·(kgMS/yr)¤	87,145¤	88,250¤	91,000¤	93,000¤	99,800¤	¤
Milk·as·a·proportion·of·farm·income·(%)¤	94¤	94¤	95¤	95¤	95¤	¤
Gross·Farm·Income¤	\$·602,603¤	\$609,705¤	626,060\$¤	\$637,580¤	\$681,780¤	¤
Farm·Working·Expenses¤	\$·416,454¤	\$415,896¤	\$414,398¤	\$410,092¤	\$431,636¤	¤
Operational·profit¤	\$·186,149¤	\$193,809¤	\$211,662¤	\$227,488¤	\$250,144¤	¤
Capital·Adjustments¤	--¤	\$782¤	\$1,116¤	-\$1,312¤	-\$4,372¤	¤
*Surplus·/·Deficit¤	\$·186,149¤	\$193,027¤	\$210,546¤	\$226,177¤	\$245,773¤	¤
Profit·per·unit·area·(\$/ha)¤	\$·1,293¤	\$1,346¤	\$1,470¤	\$1,580¤	\$1,737¤	¤

\*No·drawings,·depreciation,·tax·or·principal·payments·included¶



## Cluster Farm #4

The results in Figures 7 and 8 apply to 13% of the farms in the catchment.

**Figure 7.** A summary of the profit and loss account for Cluster Farm #4 applying the original Table 14.2 from the One Plan (2014)

	Initial-Farm	Year-1	Year-5	Year-10	Year-20
Area-of-Milking-Platform·(ha)	131				
Total-Cows	385	380	350	320	300
Stocking-Rate·(cows/ha)	2.9	2.9	2.7	2.4	2.3
Stocking-Rate·(SU/ha)	25.3	20.9	19.8	18.5	17.4
Farm-Labour·(FTE)	2.5	2.5	2.5	2.5	2.5
Nitrogen-Leaching	46	24	21	19	18
Pasture-Consumption	11794	9349	8772	8030	7445
Production·(kgMS/cow)	387	381	404	425	425
Production·(kgMS/ha)	1137	1105	1079	1038	973
Total-Milksolids·(kgMS/yr)	149,000	144,715	141,300	136,000	127,500
Milk-as-a-proportion-of-farm-income·(%)	95	95	95	95	95
Gross-Farm-Income	\$1,022,800	\$994,168	\$·967,990	\$·929,520	\$871,190
Farm-Working-Expenses	\$608,739	\$620,084	\$631,711	\$621,593	\$610,907
Operational-profit	\$414,061	\$·374,084	\$·336,279	\$·307,927	\$·260,283
Capital-Adjustments	--	\$·1,574	\$·5,198	\$·9,428	\$·13,738
*Surplus-/·Deficit	\$414,061	\$·375,657	\$·341,477	\$·317,356	\$·274,021
Profit-per-unit-area·(\$/ha)	\$2,407	\$2,175	\$1,955	\$1,790	\$1,513

*\*No-drawings,·depreciation,·tax-or-principal-payments-included¶*

For Cluster Farm #4 the initial year has an EBIT of \$414,061 and in the final year of the original Table 14.2 it is \$260,283. In the final year of the revised table it is \$274,137.

**Figure 8.** A summary of the profit and loss account for Cluster Farm #4 applying the revised Table 14.2 from the One Plan (2014)

¤	Initial·Farm¤	Year·1¤	Year·5¤	Year·10¤	Year·20¤	¤
Area·of·Milking·Platform·(ha)¤	131¤	¤	¤	¤	¤	¤
Total·Cows¤	385¤	380¤	380¤	370¤	355¤	¤
Stocking·Rate·(cows/ha)¤	2.9¤	2.9¤	2.9¤	2.8¤	2.7¤	¤
Stocking·Rate·(SU/ha)¤	25.3¤	22.6¤	21.7¤	20.7¤	20.0¤	¤
Farm·Labour·(FTE)¤	2.5¤	2.5¤	2.5¤	2.5¤	2.5¤	¤
Nitrogen·Leaching¤	46¤	30¤	27¤	24¤	22¤	¤
Pasture·Consumption¤	11794¤	10209¤	9764¤	9207¤	8565¤	¤
Production·(kgMS/cow)¤	387¤	390¤	390¤	390¤	399¤	¤
Production·(kgMS/ha)¤	1137¤	1131¤	1131¤	9207¤	1081¤	¤
Total·Milk·solids·(kgMS/yr)¤	149,000·¤	148,222¤	148,222¤	148,115¤	141,553¤	¤
Milk·as·a·proportion·of·farm·income·(%)¤	95¤	95¤	95¤	95¤	95¤	¤
Gross·Farm·Income¤	\$1,022,800·¤	\$1,013,928¤	\$1,016,963¤	\$1,015,368¤	\$970,375¤	¤
Farm·Working·Expenses¤	\$608,739·¤	\$632,607¤	\$654,773¤	\$647,681¤	\$674,383¤	¤
Operational·profit¤	\$414,061·¤	\$381,320¤	\$362,190¤	\$367,686¤	\$295,992¤	¤
Capital·Adjustments¤	·-¤	\$662¤	\$482¤	\$1,394¤	\$4,682¤	¤
*Surplus·/·Deficit¤	\$414,061·¤	\$381,942¤	\$362,672¤	\$369,080¤	\$300,674¤	¤
Profit·per·unit·area·(\$/ha)¤	\$2,407¤	\$2,221¤	\$2,109¤	\$2,146¤	\$1,748¤	¤

\*No·drawings,·depreciation,·tax·or·principal·payments·included¶

## Cluster Farm #5

The Cluster #5 farm results are shown in figures 9 and 10. They apply to 44% of the farms in the catchment.

**Figure 9.** A summary of the profit and loss account for Cluster Farm #5 applying the original Table 14.2 from the One Plan (2014)

¤	Initial-Farm¤	Year-1¤	Year-5¤	Year-10¤	Year-20¤	¤
Area-of-Milking-Platform- (ha)¤	108¤	¤	¤	¤	¤	¤
Total-Cows¤	270¤	185¤	155¤	120¤	100¤	¤
Stocking-Rate-(cows/ha)¤	2.5¤	1.7¤	1.4¤	1.1¤	0.9¤	¤
Stocking-Rate-(SU/ha)¤	21.5¤	14.9¤	12.6¤	10.4¤	9.4¤	¤
Farm-Labour-(FTE)¤	2.5¤	2.5¤	1.5¤	1.5¤	1.5¤	¤
Nitrogen-Leaching¤	39¤	22¤	19¤	17¤	16¤	¤
Pasture-Consumption¤	11007¤	7150¤	5957¤	4779¤	4237¤	¤
Production-(kgMS/cow)¤	336¤	340¤	358¤	380¤	425¤	¤
Production-(kgMS/ha)¤	840¤	582¤	514¤	422¤	394¤	¤
Total-Milksolids- (kgMS/yr)¤	90,720¤	62,900¤	55,490¤	45,600¤	42,500¤	¤
Milk-as-a-proportion-of- farm-income-(%)¤	90¤	91¤	87¤	82¤	81¤	¤
Gross-Farm-Income¤	\$628,140¤	\$447,580¤	\$414,820¤	\$363,440¤	\$340,210¤	¤
Farm-Working-Expenses¤	\$453,423¤	\$398,252¤	\$345,388¤	\$324,969¤	\$326,074¤	¤
Operational-profit¤	\$174,717¤	\$49,328¤	\$69,432¤	\$38,471¤	\$14,136¤	¤
Capital-Adjustments¤	--¤	\$15,642¤	\$20,505¤	\$26,552¤	\$29,242¤	¤
*Surplus-/Deficit¤	\$174,717¤	\$64,971¤	\$89,937¤	\$65,023¤	\$¤	¤
Profit-per-unit-area- (\$/ha)¤	\$1,533¤	\$433¤	\$609¤	\$337¤	\$124¤	¤

\*No-drawings, depreciation, tax or principal payments included¶

For Cluster Farm #5 the initial year has an EBIT of \$174,717 and in the final year of the original Table 14.2 it is \$14,136. In the final year of the revised table it is \$117,302.

**Figure 10.** A summary of the profit and loss account for Cluster Farm #5 applying the revised Table 14.2 from the One Plan (2014)

¤	Initial·Farm¤	Year·1¤	Year·5¤	Year·10¤	Year·20¤	¤
Area·of·Milking·Platform·(ha)¤	108¤	¤	¤	¤	¤	¤
Total·Cows¤	270¤	261¤	230¤	230¤	230¤	¤
Stocking·Rate·(cows/ha)¤	2.5¤	2.5¤	2.5¤	2.5¤	2.5¤	¤
Stocking·Rate·(SU/ha)¤	¤	20.4¤	18.7¤	18.5¤	18.5¤	¤
Farm·Labour·(FTE)¤	2.5¤	2.5¤	2.5¤	2.5¤	2.5¤	¤
Nitrogen·Leaching¤	39¤	32¤	28¤	25¤	24¤	¤
Pasture·Consumption¤	11007¤	10423¤	9163¤	9036¤	8775¤	¤
Production·(kgMS/cow)¤	336¤	335¤	358¤	372¤	372¤	¤
Production·(kgMS/ha)¤	840¤	809¤	762¤	793¤	793¤	¤
Total·Milk·solids·(kgMS/yr)¤	90,720¤	87,420¤	82,340¤	85,620¤	85,620¤	¤
Milk·as·a·proportion·of·farm·income·(%)¤	90¤	94¤	94¤	95¤	95¤	¤
Gross·Farm·Income¤	\$628,140¤	\$605,170¤	\$567,510¤	\$588,830¤	\$588,830¤	¤
Farm·Working·Expenses¤	\$453,423¤	\$447,694¤	\$435,777¤	\$443,789¤	\$456,394¤	¤
Operational·profit¤	\$174,717¤	\$157,476¤	\$131,733¤	\$145,041¤	\$132,436¤	¤
Capital·Adjustments¤	·-¤	\$1,606¤	\$5,850¤	\$4,866¤	\$4,866¤	¤
*Surplus·/·Deficit¤	\$174,717¤	\$159,082¤	\$137,583¤	\$149,907¤	\$137,302¤	¤
Profit·per·unit·area·(\$/ha)¤	\$1,533¤	\$1,367¤	\$1,104¤	\$1,230¤	\$1,119¤	¤

\*No·drawings,·depreciation,·tax·or·principal·payments·included¶

### 3. Dairy – Upper Manawatū Summary

For the dairy farms in the Upper Manawatū catchment the average milk solids production is 927 kg milk solids per hectare per year (kgMS/ha/yr). Applying the original Table 14.2 that drops to 566 kgMS/ha/yr. Applying the revised Table 14.2 it drops to 848 kgMS/ha/yr.

## 4. Dairy - Rangitikei

The Manawātū Wanganui Regional Council estimates that there are 111 dairy farm consents required to be issued in the Coastal Rangitikei sub-catchment. Seventy six consent applications have already been approved. On average these farms are estimated to be leaching 24 kgN/ha in their base year.

Controlled consents can be issued by the Regional Council when the One Plan (2014) requirements, including the nitrogen caps in Table 14.2 are fully met or exceeded. Applying the original Table 14.2 nitrogen caps, 68% of the dairy farmers in the Rangitikei River catchment could have applied for a controlled consent. Applying the revised Table 14.2(R), 90% could apply for a controlled consent. In regard to their low level of nitrogen leaching, these farms appear to be similar to Cluster Farm 3 from the Upper Manawātū and they could be included in those results.

## 5. Dairy – Rangitikei Summary

Including the 111 Rangitikei catchment dairy farms with the 126 dairy farmers from the Upper Manawātū catchment changes the initial over-all production average to 905 kgMS/ha/yr. Applying the original Table 14.2 reduces this to 653 kgMS/ha/yr. Using the revised Table the reduction would be down to 863 kgMS/ha/yr.

## 6. Dairy – Industry Adaptation Over 20 years

Over the next twenty years the dairy industry can be expected to adapt to the environmental and policy pressures identified in the previous figures. It is unlikely that the projected reductions in production and profitability will occur to the full extent of the numbers shown. Over the next twenty years three trends in particular are expected to emerge:

- Increasing production per cow to maintain farm production and increase productivity. This has been included in the figures.
- Increasing the size of low-input farms to achieve greater economies of scale. For example it is expected that the farms in Cluster #5 will increase from a typical milking platform of 108ha to about 160ha or more. Herd sizes (cows per farm) may stay the same but production per cow continue to increase from 336 kgMS/cow/yr to 410 kgMS/cow/yr or more. These changes will enable dairy farms to maintain a similar level of profitability (EBIT) and keep their nitrogen leaching below 25 kgN/ha/yr.
- Farms like Cluster Farm #4 and examples in the other clusters are similar to the System Four farm in the previous report. In that report, by introducing part-time housing for the cows, for most of the year, cows were still able to be grazed outside for most of the year in an intensive dairy system. These farms are expected to be able to maintain the existing farms operational profit (EBIT) and reduce their nitrogen leaching to below 20 kgN/ha/yr.

## 7. Horticulture-Introduction

Not all horticultural crops are required to meet the nitrogen caps in the One Plan (2014) and that are shown in Figure 1. In the One Plan “commercial vegetable growing” is defined as “...using an area of land greater than 4ha for producing vegetable crops for human consumption. It includes the whole rotation cycle, being the period of time that is required for the full sequence of crops, including any pasture phase in the rotation. Fruit crops, vegetables that are perennial, dry field peas or beans are not included. [Table 14.2] only applies to all arable crops and commercial vegetable production.

In the 2012 census the following horticultural enterprises were operating in the Horowhenua, shown in Table 2.

**Table 2.** Horticultural production in the Horowhenua (2012)

Crop	Area (ha)	Typical Annual Applications of Nitrogen
Outdoor vegetables		
Potatoes	452	Main crop: 150-250 kgN/ha Process: 300-400 kgN/ha
Broccoli	444	150-250 kgN/ha
Lettuce	273	150-250 kgN/ha
Onions	203	100-150 kgN/ha
Cabbage	140	150-250 kgN/ha
Cauliflower	124	150-250 kgN/ha
Pumpkin	85	30-150 kgN/ha
Squash	50	30-150 kgN/ha
Carrots	7	25-45 kgN/ha
Sweetcorn	5	70-150 kgN/ha
Tomatoes (outdoor)	1	50-130 kgN/ha
Other field vegetables	40	
Indoor vegetables and herbs	0.4	1000-3700 kgN/ha
Fruit		
Apples	24	25-75 kgN/ha
Olives	17	0
Strawberries	15	10-30 kgN/ha
Pears	13	25-75 kgN/ha
Kiwifruit	7	100-200 kgN/ha
Feijoas	5	0
Hazel nuts	4	0
Plums	3	0-100 kgN/ha
Other fruit		

Since these figures were obtained the areas of asparagus (90 kgN/ha) and blue berries (100-250 kgN/ha) have increased in the Horowhenua.

## 8. Arable with Livestock

There are two sources of information on the response of arable farming to the introduction of nitrogen loss limits in Table 14.2 of the One Plan (2014). In the One Plan “cropping” is defined as, “... using an area of land in excess of 20 ha to grow crops [including] cereal, coarse grains, oilseed, peanuts, lupins, dry field peas or dry field beans. This definition does not include crops fed to animals or grazed on by animals on the same property”.

In Agribusiness (2017) a 210ha property was modelled in a three year rotation: grain (10ha), pasture (180ha), potatoes (10ha). The results are shown in Table 2. The good practice mitigations include constraining the timing of nitrogen applications to reduce losses. Also reducing the amount of nitrogen applied to 70% of conventional practice resulting in reduced crop yields. The changes due to livestock removal were added to those from implementing good practices.

**Table 2.** Financial results from modifying arable farming practices based on Agribusiness (2017)

	Initial Year	Good practice mitigations	Livestock removed
Gross farm revenue	523,860	405,735	275,055
Farm operating expenses	203,268	189,918	178,805
Cash operating surplus	320,592	215,817	96,250
Net cash position	156,716	68,896	64,864
Nitrogen loss to water (estimated using Overseer®; kgN/ha/yr)	23	20	19

Not that the information in the last column has been calculated from the supplied information.

In Parminter (2017) two arable enterprises were modelled. One of these models of a property of 100ha effective included livestock. The results are shown in Table 3.

**Table 3.** Financial results from modifying arable farming practices based on Parminter (2017)

	Initial Year	Good practice mitigations	Livestock removed
Gross farm revenue	553,971	N/A	397,380
Farm operating expenses	371,066		300,810
Cash operating surplus	182,905		96,570
Net cash position	-	-	-
Nitrogen loss to water (estimated using Overseer®; kgN/ha/yr)	45		20

The nitrogen reductions in both models are sufficient to meet the nitrogen reductions required in Table 14.2 on classes I and II land. In the original table these required reaching a maximum after twenty years of 21 kgN/ha/yr. In the revised table the maximum was 34 kgN/ha/yr.

## 9. Market Gardens

Market gardens were modelled in the Agribusiness report (2017). The results for a 20ha property are shown in Table 3. It is not known how many growers fit this definition but possibly about thirty (HortNZ pers. comm. 2018).

**Table 3.** Financial results from modifying market garden practices based on Agribusiness (2017)

	Initial Year	Good practice mitigations	Cut'n carry offset
Gross farm revenue	960,980	579,492	1,004,540
Farm operating expenses	580,568	430,698	619,749
Cash operating surplus	380,412	148,794	384,791
Net cash position	196,572	-9627	113,333
Nitrogen loss to water (estimated using Overseer®; kgN/ha/yr)	61	49	30

The use of the “cut'n carry offset” was not included the good practice mitigations in the third column.

The good practice mitigations include constraining the timing of nitrogen applications to reduce losses. Also reducing the amount of nitrogen applied to 70% of conventional practice resulting in reduced crop yields. A Cut'n carry offset is required to bring nitrogen loss levels below the maximum required for class I and II land in the revised Table 14.2 in the One Plan (2014). However, the amount offset land used here (35ha) is insufficient to realise the nitrogen loss limits in the original Table 14.2.

## 10. Intensive Vegetables

Intensive Vegetables were modelled in the Agribusiness report (2017) for a 105ha property. The results are shown in Table 4. It is not known how many growers fit this definition but possibly about fifteen (HortNZ pers. comm. 2018).

**Table 4.** Financial results from modifying intensive vegetable practices based on Agribusiness (2017)

	Initial Year	Good practice mitigations	Cut'n carry offset
Gross farm revenue	2,557,680	1,639,440	2,804,520
Farm operating expenses	1,927,017	1,479,939	1,908,337
Cash operating surplus	630,663	159,501	896,183
Net cash position	404,773	30,473	357,189
Nitrogen loss to water (estimated using Overseer®; kgN/ha/yr)	69	60	30

The use of the “cut'n carry offset” was not included the good practice mitigations in the third column.

The good practice mitigations include constraining the timing of nitrogen applications to reduce losses. Also reducing the amount of nitrogen applied to 70% of conventional practice resulting in reduced crop yields. A Cut'n carry offset is required to bring nitrogen loss levels below the maximum required for class I and II land in the revised Table 14.2 in the One Plan (2014). However, the amount offset land used here (170ha) is insufficient to realise the nitrogen loss limits in the original Table 14.2. That would require either more off-set land purchased or the addition of the good practice mitigations.



## 11. Potatoes

This section draws on Parminter (2017). Potatoes were included in the Agribusiness report (2017) as part of the arable example used earlier in this report. There are about five growers in Horowhenua affected by these policies.

The results for a 200ha effective area farm are shown in Table 5. In this example, there are no livestock being farmed on the property, instead forage crops are conserved in mid spring and sold as baleage.

**Table 5.** Financial results from modifying potato growing practices based on Parminter (2017)

	Initial Year	Good practice mitigations	
Gross farm revenue	2,151,972	1,010,788	
Farm operating expenses	1,513,550	779,362	
Cash operating surplus	638,422	231,426	
Net cash position	-	-	
Nitrogen loss to water (estimated using Overseer®; kgN/ha/yr)	50	19	

The good practice mitigations include reducing the area sown in potatoes from 100ha to 10ha and including additional grain crops in the rotation to take up surplus available nitrogen. In both the situations modelled there have been forage crops included in the rotations but the area for this has been reduced in the good practice model.

The final result is below 20 kgN/ha/yr loss and that is sufficient for class I and II land in the original Table 14.2 and the revised Table 14.2.

## 12. Covered Vegetables

No work was carried out for covered vegetables.

### **13. Horticulture Summary**

The horticultural section of this report also includes arable with livestock.

The average arable property has an EBIT of \$251,750 or \$1,228/ha in their initial management. To meet the original specifications in Table 14.2 EBIT would drop to \$96,410 or \$470/ha. There is expected to be no change to their EBIT if they are required to meet the revised table.

For commercial vegetable growers (potatoes, intensive vegetables and market gardens) the average EBIT is \$481,288. After twenty years the average EBIT is expected to drop to \$160,269 following the introduction of all the good practices being applied. In general, these are still not sufficient to meet the nitrogen loss requirements of the original Table 14.2.

It is suggested that the only way for horticultural growers to meet the requirements of the original Table 14.2 is for them to use off-set parcels of land for alternative uses as part of their enterprises. These include berries, asparagus, and cut'n-carry forage cropping and/or including more grain crops in their rotations.

At present three growers are producing vegetables under cover. In comparison to field production these strategies would have an average EBIT of \$555,255. Using hydroponics, soilless media, or grow-bags under cover can provide an alternative, but more expensive, way of producing vegetables with a minimum nitrogen loss on the actual growing site.