

OVERSEER

FARM IMPACT REPORT

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Bellevue Dairy Farm

360 Papatotara Road, Papatotara 9691, New Zealand

BEFORE

Year ending 2020

Analysis type

Year end

Model version

6.4.3

AFTER

2026 Plan

Analysis type

Predictive

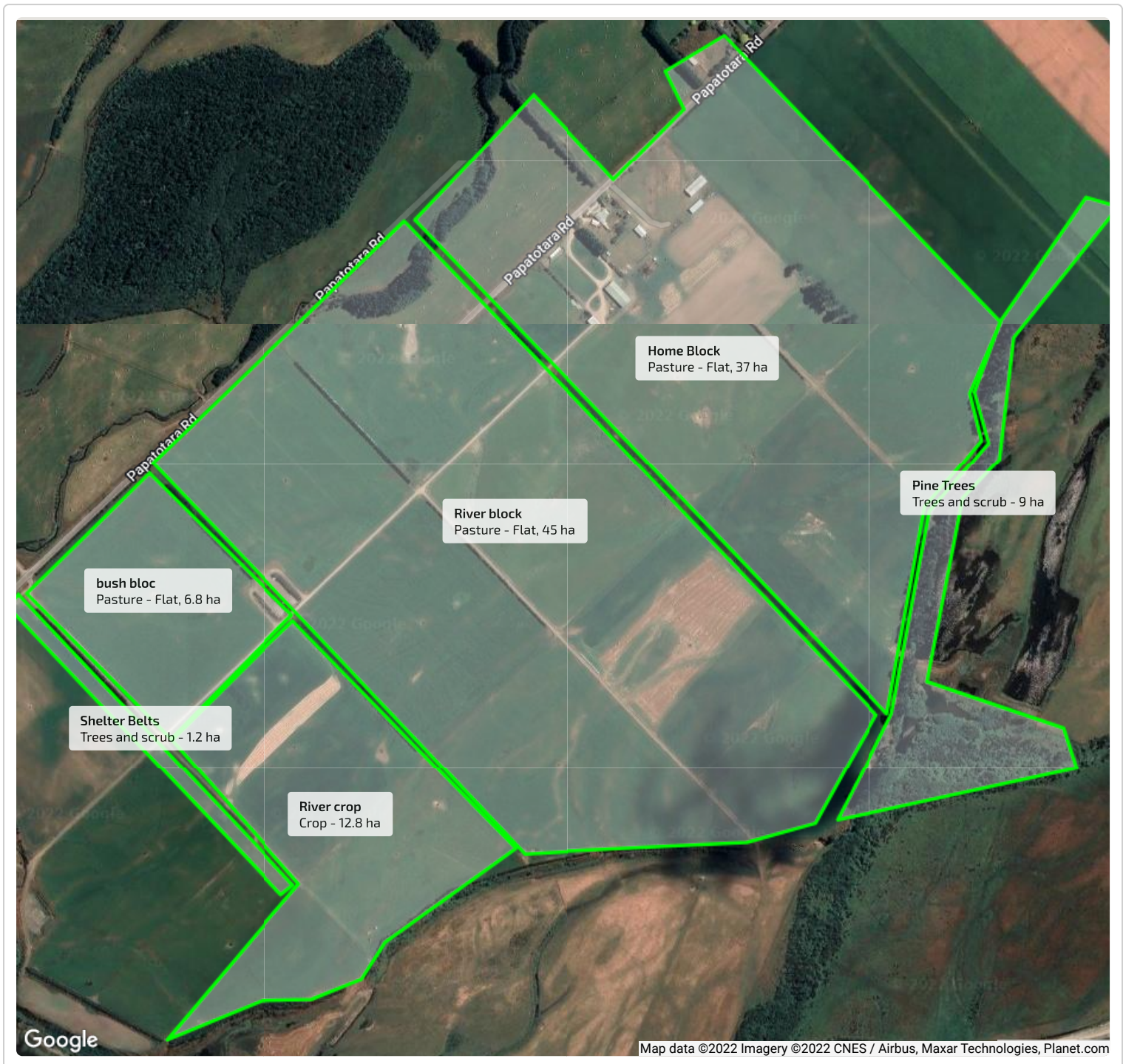
Model version

6.4.3

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FARM MAP



CHANGES BETWEEN THE YEARS 2020 AND 2026

PHYSICAL

- Farm area has increased by 20.0 ha (13%).
- Productive area has increased by 6.8 ha (7%).

NUTRIENTS

- N loss per ha has decreased by 8.0 kg/ha (15%).
- P loss per ha has decreased by 0.1 kg/ha (14%).
- N Surplus has decreased by 12.0 kg/ha (8%).
- N lost in drainage has decreased by 1.1 N ppm (8%).

GHG

- GHG emissions per ha has decreased by 1,541 kg/ha (14%).
- Methane emissions per ha has decreased by 1,081 kg/ha (14%).
- Nitrous oxide emissions per ha has decreased by 357 kg/ha (15%).
- Carbon dioxide emissions per ha has decreased by 103 kg/ha (12%).

ANIMALS

- Average pasture production per ha has decreased by 1,727 kg DM/ha (8%).

IRRIGATION

- Irrigated area has decreased in the months March (14 ha)
- Irrigation system changes by area: Linear and centre Pivot has decreased by 14.4 ha (20%).
- Irrigation management changes by area: Trigger point; fixed depth applied has decreased by 14.4 ha (20%).

ACTIONS

ANALYSIS	ACTIONS
2026 Plan	1. Reduce cow numbers over the winter

GREENHOUSE GAS EMISSIONS

	BEFORE	AFTER	CHANGE
Total GHG emissions (eCO2/tonnes/yr)	1,614.6	1,567.9	(-2.9%) -46.7 ↓
Methane (eCO2/tonnes/yr)	1,153.5	1,123.5	(-2.6%) -30 ↓
N2O (eCO2/tonnes/yr)	341.9	326.7	(-4.4%) -15.2 ↓
CO2 (eCO2/tonnes/yr)	119.3	117.6	(-1.4%) -1.7 ↓
Tree and scrub area (ha)	17	10.2	(-40%) -6.8 ↓

eCO2 FOOTPRINT

	BEFORE	AFTER	CHANGE
Dairy (kg/cow)	3,858	4,027	-

FORESTS

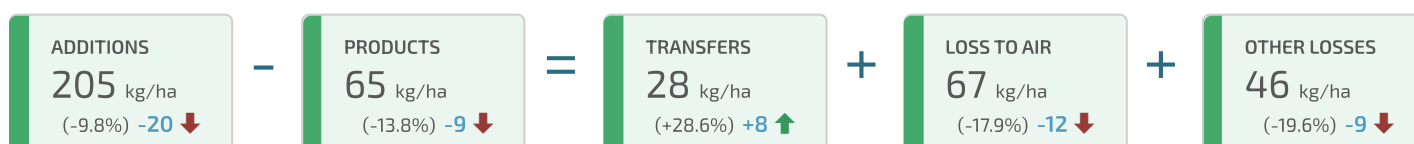
		BEFORE	AFTER	CHANGE
Pinus Radiata (harvested)	Sequestration (tonnes)	1,940.4	1,940.4	-
Pinus Radiata	Area (ha)	5.7	10.2	(+78.9%) +4.5 ↑
	Sequestration (tonnes)	535.5	549	(+2.5%) +13.5 ↑
Exotic softwoods	Area (ha)	4.5	-	(-100%) -4.5 ↓
	Sequestration (tonnes)	13.5	-	(-100%) -13.5 ↓
Indigenous forest	Area (ha)	6.8	-	(-100%) -6.8 ↓
	Sequestration (tonnes)	2,191.64	-	(-100%) -2,191.64 ↓
Total	Area (ha)	17	10.2	(-40%) -6.8 ↓
	Sequestration (tonnes)	4,681.04	2,489.4	(-46.8%) -2,191.64 ↓

NUTRIENTS

		BEFORE	AFTER	CHANGE
Nitrogen	Total loss (kg)	8,158	7,782	(-4.6%) -376 ↓
	Loss/ha (kg/ha)	54	46	(-14.8%) -8 ↓
	NCE (%)	33	32	(-3%) -1 ↓
	N Surplus (kg/ha)	152	140	(-7.9%) -12 ↓
Phosphorus	Total loss (kg)	104	103	(-1%) -1 ↓
	Loss/ha (kg/ha)	0.7	0.6	(-14.3%) -0.1 ↓
	P Surplus (kg/ha)	27	24	(-11.1%) -3 ↓

NITROGEN

Nutrients are brought onto the farm and taken up by plants that are eaten by animals. Animals move around the farm and deposit nutrients in the form of urine and dung. Nutrients are removed in the form of products (meat, crops and milk). The difference between the nutrients added and products removed is the N surplus. Remaining nutrients undergo various biological processes, are lost to the atmosphere and when drainage occurs may leach or runoff from the farm.



- 1 - Nitrogen surplus is total additions minus product removed (140 kg/ha)
- 2 - The numbers in the nutrient budget have been rounded and so may not balance exactly

NITROGEN BROUGHT ONTO FARM

Nutrients added to the farm via supplements, climate, fertiliser and effluent.

		BEFORE	AFTER	CHANGE
Fertiliser, lime and other	Nutrients added to the farm in fertiliser. Includes synthetic, organic, lime and imported pig/dairy effluent.	60	53	(-11.7%) -7 ↓
Rain/clover fixation	Nutrients from rainfall and fixation of atmospheric nitrogen by legumes/clover.	161	148	(-8.1%) -13 ↓
Supplements	Nutrients from supplements imported onto the farm.	4	4	-
Total		225	205	(-8.9%) -20 ↓

NITROGEN REMOVED AS PRODUCT

Nutrients removed from the farm as product and as supplements. The difference between this and nutrients added is then susceptible to leaching or runoff from the farm.

		BEFORE	AFTER	CHANGE
As product	Nutrients leaving the farm as product (crops, milk, meat etc.).	74	65	(-12.2%) -9 ↓
Total		74	65	(-12.2%) -9 ↓

TRANSFER OF NUTRIENTS

The biological processes that change nutrients available on farm. These nutrients are not taken up by plants and so are removed from the nutrient pool. Also includes the balance of the nutrients in supplements that are transferred to/from storage.

		BEFORE	AFTER	CHANGE
Organic pool	Mineralisation plus immobilisation. Mineralisation (decomposing organic nutrients from cultivation of crops) adds nutrients and so is a negative number, immobilisation (nutrients taken up by soil organisms) removes nutrients and so is positive. If more is mineralised than immobilised the number is negative.	4	13	(+225%) +9 ↑
Inorganic soil pool	Change in plant available nutrients based on soil tests.	12	10	(-16.7%) -2 ↓
Root and stover residuals	Difference in nutrient amount between the beginning and end of the year in stolons and roots added as residue.	11	10	(-9.1%) -1 ↓
Standing plant material	Difference in nutrient amount between the beginning and end of the year in the standing crop.	-7	-5	(-28.6%) +2 ↑
Total		20	28	(+40%) +8 ↑

NITROGEN LOST TO THE ATMOSPHERE

The nutrients lost into the atmosphere through volatilisation and denitrification.

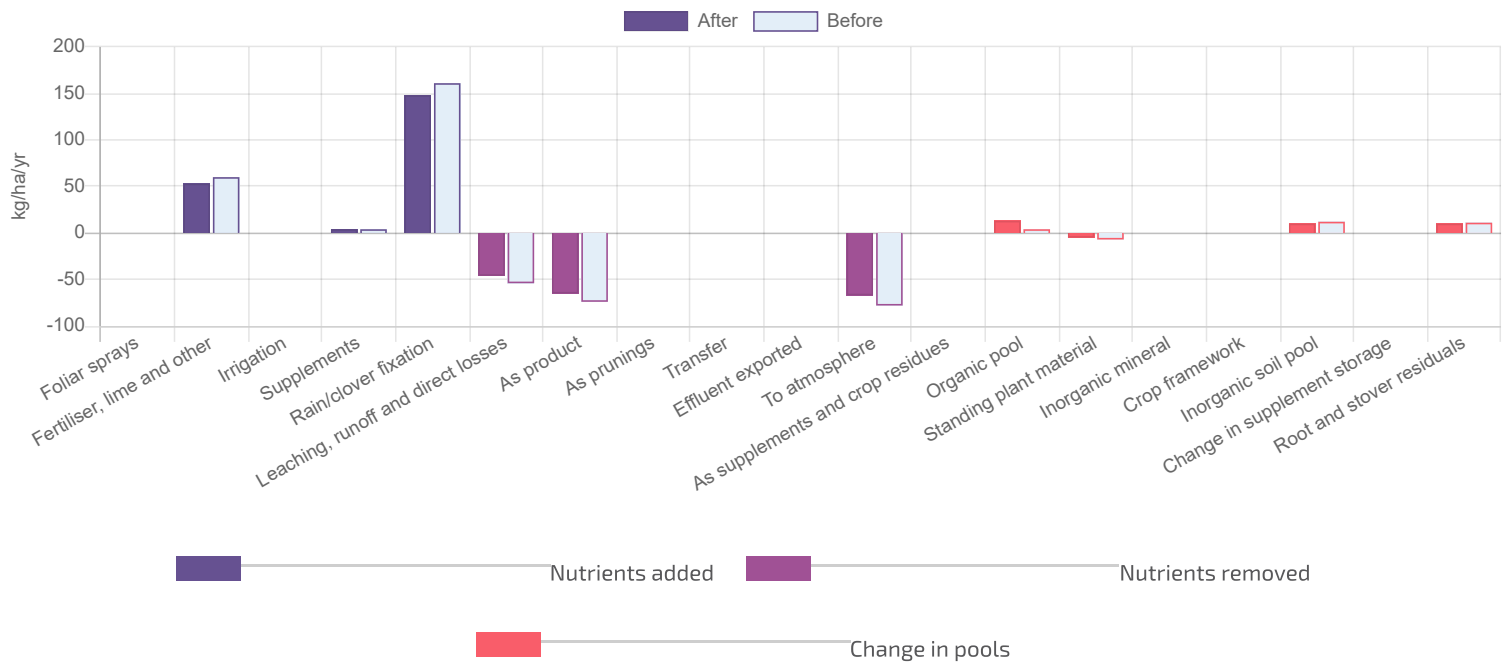
		BEFORE	AFTER	CHANGE
Denitrification - background	Background conversion of nitrate to nitrogen gas.	4	3	(-25%) -1 ↓
Volatilisation - other	Background loss of nitrogen to the atmosphere as ammonia.	10	8	(-20%) -2 ↓
Volatilisation - urine	Loss of nitrogen in urine to the atmosphere as ammonia.	49	41	(-16.3%) -8 ↓
Denitrification - urine	Conversion of nitrate from urine to nitrogen gas.	14	13	(-7.1%) -1 ↓
Volatilisation - fertiliser	Loss of nitrogen in fertiliser to the atmosphere as ammonia.	2	2	-
Total		79	67	(-15.2%) -12 ↓

OTHER NITROGEN LOST FROM THE FARM

The nutrients lost from runoff, leaching or directly into water. This is where the excess nutrients runoff or drain from the farm due to water movement (drainage), or are deposited directly into water ways.

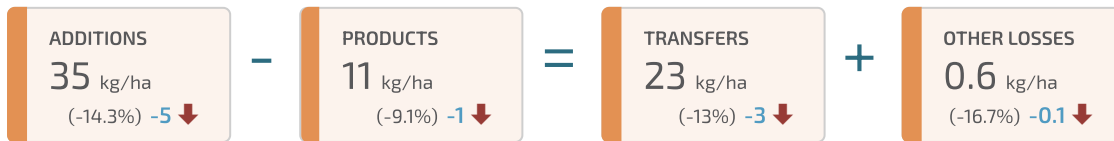
		BEFORE	AFTER	CHANGE
Leaching - urine patches	Nutrients from urine that has leached below the root zone.	42	34	(-19%) -8 ↓
Leaching - other	Nutrients from other sources (not urine) that has leached below the root zone.	13	12	(-7.7%) -1 ↓
Total		55	46	(-16.4%) -9 ↓

NITROGEN MOVEMENTS



PHOSPHORUS

Nutrients are brought onto the farm and taken up by plants that are eaten by animals. Animals move around the farm and deposit nutrients in the form of urine and dung. Nutrients are removed in the form of products (meat, crops and milk). The difference between the nutrients added and products removed is the P surplus. Remaining nutrients undergo various biological processes, are lost to the atmosphere and when drainage occurs may leach or runoff from the farm.



1 - Phosphorus surplus is total additions minus product removed (24 kg/ha)

2 - The numbers in the nutrient budget have been rounded and so may not balance exactly

PHOSPHORUS BROUGHT ONTO FARM

Nutrients added to the farm via supplements, climate, fertiliser and effluent.

		BEFORE	AFTER	CHANGE
Fertiliser, lime and other	Nutrients added to the farm in fertiliser. Includes synthetic, organic, lime and imported pig/dairy effluent. ¹	39	34	(-12.8%) -5 ↓
Supplements	Nutrients from supplements imported onto the farm.	1	1	-
Total		40	35	(-12.5%) -5 ↓

PHOSPHORUS REMOVED AS PRODUCT

Nutrients removed from the farm as product and as supplements. The difference between this and nutrients added is then susceptible to leaching or runoff from the farm.

		BEFORE	AFTER	CHANGE
As product	Nutrients leaving the farm as product (crops, milk, meat etc.).	12	11	(-8.3%) -1 ↓
Total		12	11	(-8.3%) -1 ↓

TRANSFER OF NUTRIENTS

The biological processes that change nutrients available on farm. These nutrients are not taken up by plants and so are removed from the nutrient pool. Also includes the balance of the nutrients in supplements that are transferred to/from storage.

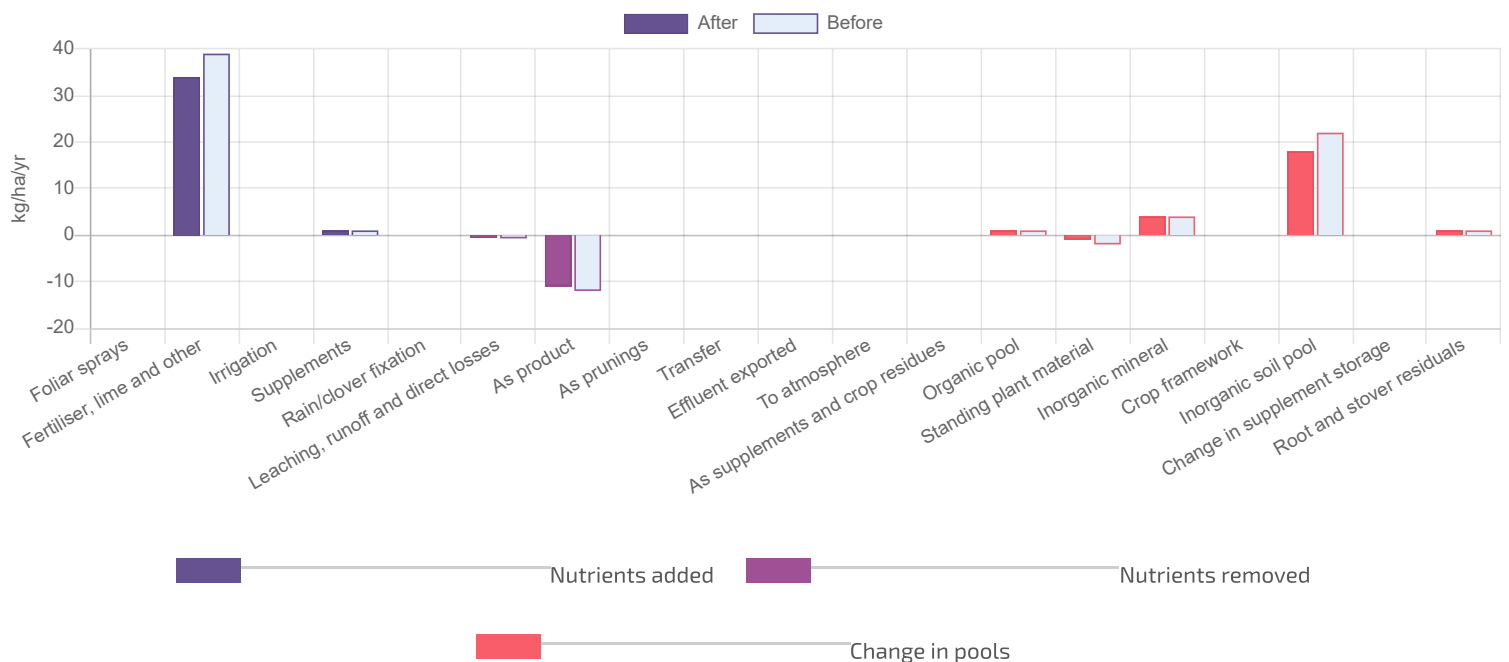
		BEFORE	AFTER	CHANGE
Inorganic mineral	Nutrients adsorbed on (adhered to) clay minerals and undissolved lime.	4	4	-
Organic pool	Mineralisation plus immobilisation. Mineralisation (decomposing organic nutrients from cultivation of crops) adds nutrients and so is a negative number, immobilisation (nutrients taken up by soil organisms) removes nutrients and so is positive. If more is mineralised than immobilised the number is negative.	1	1	-
Inorganic soil pool	Change in plant available nutrients based on soil tests.	22	18	(-18.2%) -4 ↓
Root and stover residuals	Difference in nutrient amount between the beginning and end of the year in stolons and roots added as residue.	1	1	-
Standing plant material	Difference in nutrient amount between the beginning and end of the year in the standing crop.	-2	-1	(-50%) +1 ↑
Total		26	23	(-11.5%) -3 ↓

OTHER PHOSPHORUS LOST FROM THE FARM

The nutrients lost from runoff, leaching or directly into water. This is where the excess nutrients runoff or drain from the farm due to water movement (drainage), or are deposited directly into water ways.

		BEFORE	AFTER	CHANGE
Runoff	Nutrients lost during runoff (over land).	0.2	0.2	-
Leaching - other	Nutrients from other sources (not urine) that has leached below the root zone.	0.5	0.4	(-20%) -0.1 ↓
Total		0.7	0.6	(-14.3%) -0.1 ↓

PHOSPHORUS MOVEMENTS



PHYSICAL CHARACTERISTICS

		BEFORE	AFTER	CHANGE
Land area	Farm area (ha)	150	169.8	(+13.2%) +19.8 ↑
	Productive block area (ha)	94.8	101.6	(+7.2%) +6.8 ↑
Climate	Average temperature (°C)	10.5	10.5	-
	Average rainfall (mm)	1,171	1,171	-
	Average PET (mm)	737	737	-

FARM SOILS

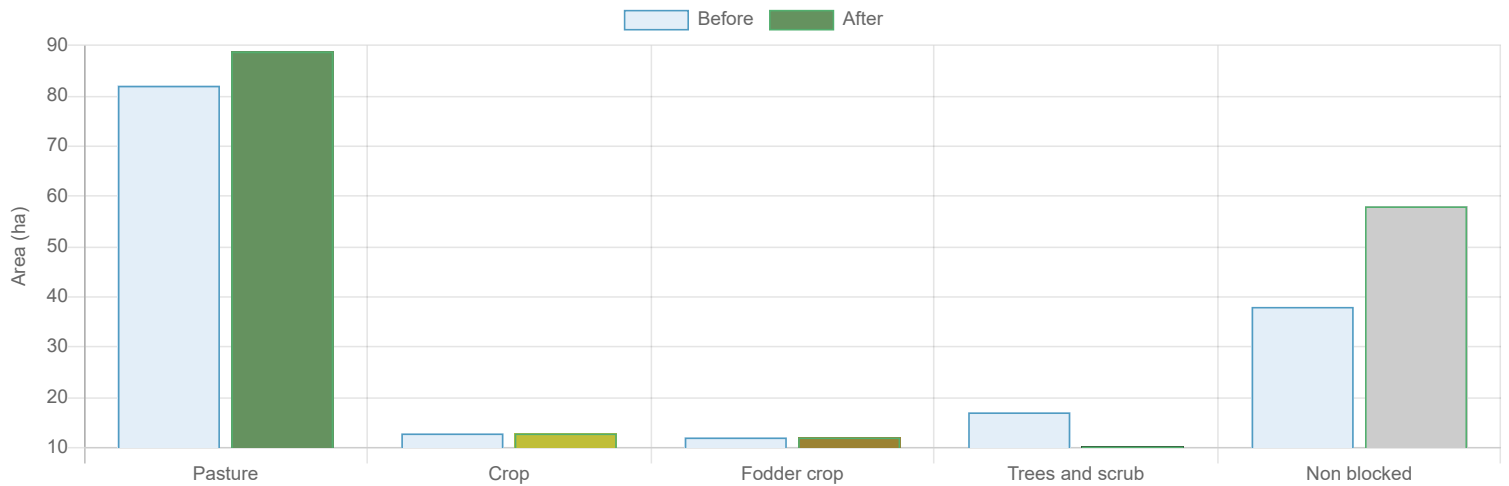
		BEFORE	AFTER	CHANGE
Sedimentary/Brown Glene_4a.1	Area (ha)	50.2	48	(-4.4%) -2.2 ↓
	Properties modified	No	No	-
Volcanic/Allophanic Papat_2c.2	Area (ha)	44.6	53.6	(+20.2%) +9 ↑
	Properties modified	No	No	-

1 - Olsen P is calculated using soil test results, proportioned by the area of the farm that this soil covers.

BLOCK TYPES

		BEFORE	AFTER	CHANGE
Pasture	Area (ha)	82	89	(+8.5%) +7 ↑
	Pasture grown (T/DM/Yr)	2,290	2,220	(-3.1%) -70 ↓
	Pasture intake (T/DM/Yr)	1,947	1,887	(-3.1%) -60 ↓
Crop	Area (ha)	13	13	-
	Pasture grown (T/DM/Yr)	274	245	(-10.6%) -29 ↓
	Pasture intake (T/DM/Yr)	233	208	(-10.7%) -25 ↓
Fodder crop	Area (ha)	12	12	-
	Pasture grown (T/DM/Yr)	51	45	(-11.8%) -6 ↓
	Pasture intake (T/DM/Yr)	43	38	(-11.6%) -5 ↓
Trees and scrub	Area (ha)	17	10	(-41.2%) -7 ↓
Non blocked	Area (ha)	38	58	(+52.6%) +20 ↑
Total area	(ha)	150	170	(+13.3%) +20 ↑

EFFECTIVE AREA BY BLOCK TYPE



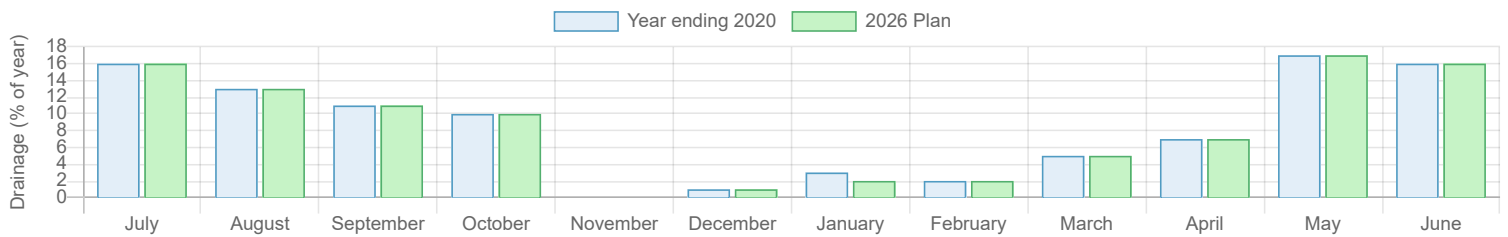
DRAINAGE

! Drainage indicates the amount of water draining below the root zone of typical crops or pastures (60cm). Drainage occurs when the amount of water (from rainfall and irrigation) exceeds the water holding capacity of the soil. When water drains it can take any excess nitrogen below this root zone and so risks leaching from the farm into the water table below.

The model uses a 30 year average climate for each block's location. The following graph shows the percentage of annual drainage that occurs each month using this average climate. This provides an indication of when the highest leaching risk is for the farm when under average conditions.

		BEFORE	AFTER	CHANGE
Drainage	Average drainage at 60cm (mm)	487	487	-
	Nitrogen concentration in water drained (ppm)	13.9	12.8	(-7.9%) -1.1 ↓

WHEN DRAINAGE AT 60CM OCCURS



! The selected analysis does not contain any wetland information

CROPS

		BEFORE	AFTER	CHANGE
Plantain	Area (ha)	31.6	31.6	-
	Pasture grown (T/DM/Yr)	880	788	(-10.5%) -92 ↓
	Pasture intake (T/DM/Yr)	748	669	(-10.6%) -79 ↓
Ryegrass/white clover	Area (ha)	38.4	38.4	-
	Pasture grown (T/DM/Yr)	1,075	963	(-10.4%) -112 ↓
	Pasture intake (T/DM/Yr)	914	818	(-10.5%) -96 ↓
Lucerne	Area (ha)	-	6.8	(+100%) +6.8 ↑
	Pasture grown (T/DM/Yr)	-	170	(+100%) +170 ↑
	Pasture intake (T/DM/Yr)	-	144	(+100%) +144 ↑
Maize silage	Area (ha)	12	12	-
	Yield (T dry matter)	240	240	-
Pasture	Area (ha)	12.2	12.2	-

ANIMALS

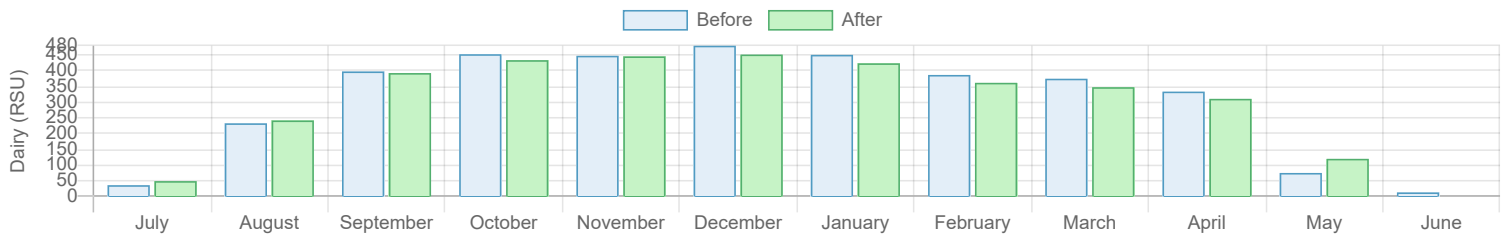
		BEFORE	AFTER	CHANGE
RSU	Total RSU (RSU)	3,681	3,579	(-2.8%) -102 ↓
	RSU per farm area (RSU)	24.54	21.08	(-14.1%) -3.46 ↓
	RSU per productive area (RSU)	38.83	35.23	(-9.3%) -3.6 ↓
Production	Total liveweight brought (kg/ha grazed)	531	456	(-14.1%) -75 ↓
	Total liveweight reared (kg/ha grazed)	104	90	(-13.5%) -14 ↓
	Total liveweight sold (kg/ha grazed)	603	518	(-14.1%) -85 ↓
	Milk production per cow (kg milk solids / cow)	380.2	408.8	(+7.5%) +28.6 ↑
	Milk solids (kg/ha grazed)	1,994	1,841	(-7.7%) -153 ↓
	Milking herd size (peak cows/ha grazed)	5.2	4.5	(-13.5%) -0.7 ↓

ENTERPRISE RSU

		BEFORE	AFTER	CHANGE
Dairy	Total RSU (RSU)	3,681	3,579	(-2.8%) -102 ↓
	RSU per farm area (RSU/ha)	24.54	21.08	(-14.1%) -3.46 ↓
	RSU per grazed area (RSU/ha)	44.9	40.31	(-10.2%) -4.59 ↓

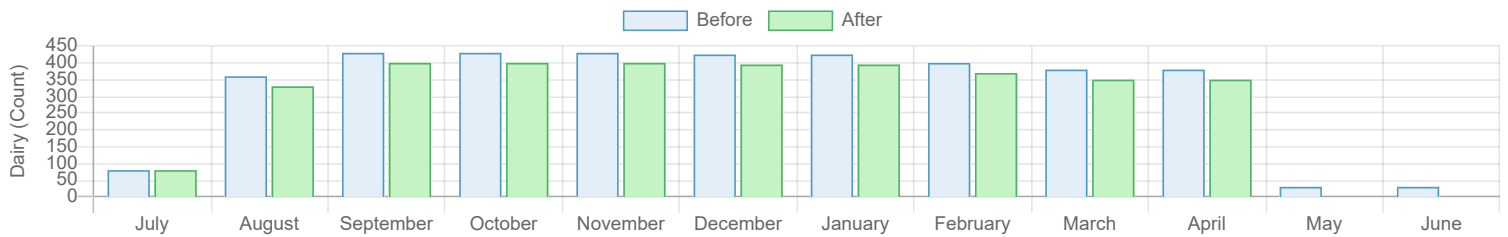
ENTERPRISE RSU BY MONTH

DAIRY (RSU)



ENTERPRISE STOCK NUMBERS BY MONTH

DAIRY (COUNT)

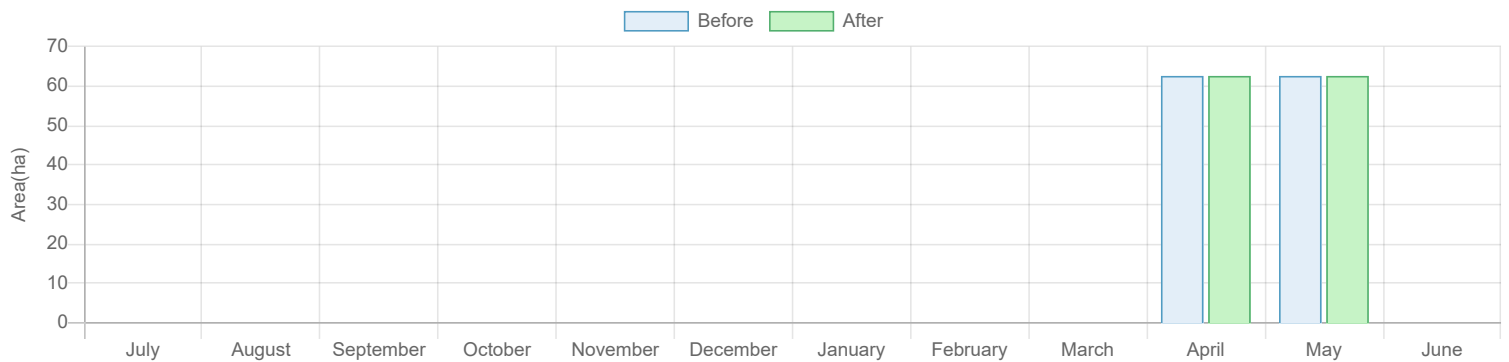


EFFLUENT

		BEFORE	AFTER	CHANGE
Area receiving liquid	Total area (ha)	32	32	-
	Pastoral area receiving liquid (ha)	32	32	-
	% of farm pastoral area (%)	45	41	(-8.9%) -4 ↓
	Average liquid effluent (N/ha/yr)	81	77	(-4.9%) -4 ↓
	Average fertiliser (N/ha/yr)	94	94	-
	Average other (N/ha/yr)	4	4	-
Source of N in effluent blocks	Effluent from farm dairy (%)	82	82	-
	Solids (%)	18	18	-
Area of farm to apply all effluent to achieve rates of	150 kg N/ha/yr - Liquid (ha)	17	16	(-5.9%) -1 ↓
	150 kg N/ha/yr - Solid (ha)	7	7	-
	150 kg N/ha/yr - Total (ha)	24	23	(-4.2%) -1 ↓
	Maintenance K (ha)	39	44	(+12.8%) +5 ↑
	100 kg K/ha/yr (ha)	43	41	(-4.7%) -2 ↓

EFFLUENT SOLIDS BY MONTH

SOLIDS APPLICATION AREA BY MONTH



FEED

		BEFORE	AFTER	CHANGE
RSU	Total (RSU)	3,683	3,581	(-2.8%) -102 ↓
	Crops (RSU)	174	176	(+1.1%) +2 ↑
	Pasture (RSU)	3,461	3,359	(-2.9%) -102 ↓
	Imported other supplements (RSU)	36	35	(-2.8%) -1 ↓
	Imported fodder supplements (RSU)	12	11	(-8.3%) -1 ↓

RSU - DAIRY

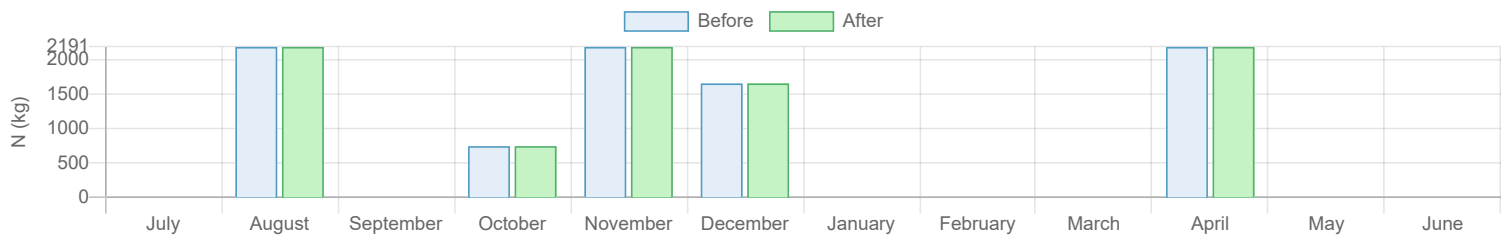
	BEFORE	AFTER	CHANGE
Total (RSU)	3,683	3,581	(-2.8%) -102 ↓
Crops (RSU)	174	176	(+1.1%) +2 ↑
Pasture (RSU)	3,461	3,359	(-2.9%) -102 ↓
Imported other supplements (RSU)	36	35	(-2.8%) -1 ↓
Imported fodder supplements (RSU)	12	11	(-8.3%) -1 ↓

FERTILISER

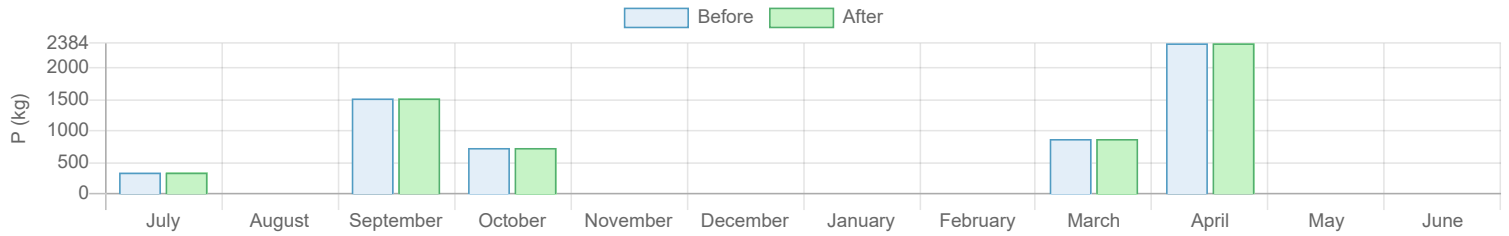
		BEFORE	AFTER	CHANGE
Synthetic N	Pasture (kg)	6,599.207	6,599.207	-
	Pasture (kg/ha)	94	94	-
Synthetic N	Fodder crop (kg)	1,104	1,104	-
	Fodder crop (kg/ha)	92	92	-
Synthetic N	Crop (kg)	1,305.6	1,305.6	-
	Crop (kg/ha)	102	102	-
Synthetic P	Pasture (kg)	5,118.963	5,118.963	-
	Pasture (kg/ha)	73	73	-
Synthetic P	Fodder crop (kg)	384	384	-
	Fodder crop (kg/ha)	32	32	-
Synthetic P	Crop (kg)	345.6	345.6	-
	Crop (kg/ha)	27	27	-

FERTILISER NUTRIENTS BY MONTH

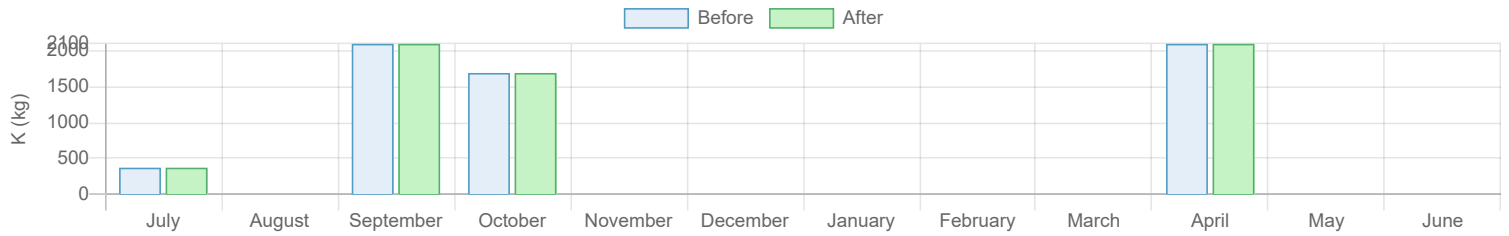
N (KG)



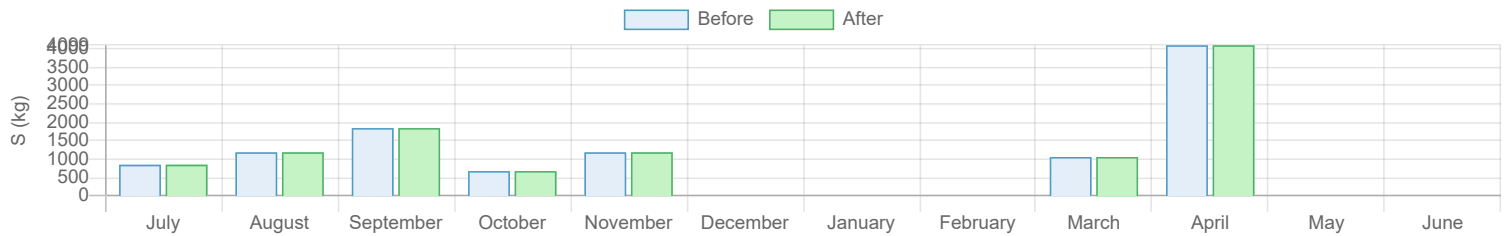
P (KG)



K (KG)



S (KG)



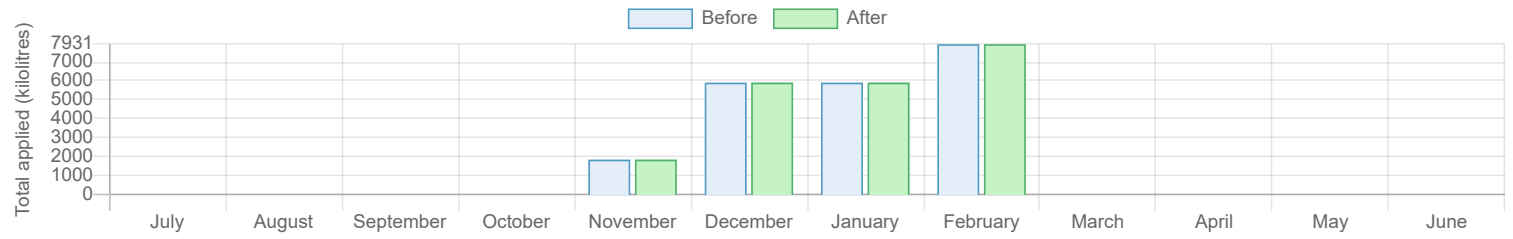
IRRIGATION

	BEFORE	AFTER	CHANGE
Total irrigated area (ha)	14.4	14.4	-
Linear and centre Pivot (ha)	14.4	14.4	-

SOIL MOISTURE ASSESSMENT TYPE USAGE	BEFORE	AFTER	CHANGE
Trigger point; fixed depth applied (%)	100	100	-

IRRIGATED AMOUNTS BY MONTH

TOTAL APPLIED (KILOLITRES)



IRRIGATED AREA BY MONTH

