Dairy Trust
TARANAKI

GIBSON FARM

OPEN DAY 2023

REDUCING ENVIRONMENTAL FOOTPRINT

WHILE STAYING PROFITABLE

STEP CHANGE TRIAL – YEAR 3

AGENDA

11.00am Introduction & Trial Overview – Jason Rolfe, Mags Bremer

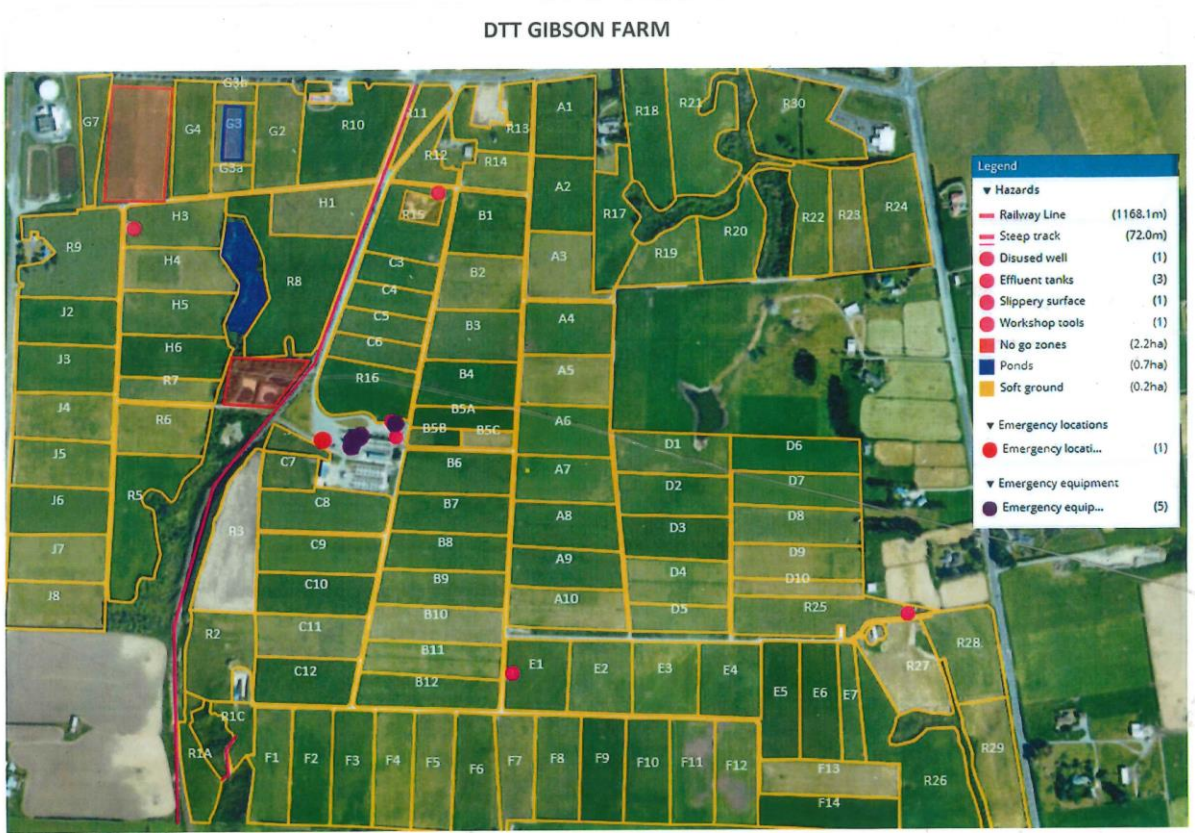
11.15am Partner Farmer's Journey – Donna + Phil Cram

11.30am Information Sessions – split into groups

12.45pm Summary and Questions

1.15pm Lunch

HEALTH AND SAFETY



Slippery races when wet
Vehicles and machinery may be operating
Electric fences are on
Any accidents or near misses to be reported to DTT or DairyNZ staff
Meeting point: at assembly point on car park
First Aid kits located in the DTT office and the cow shed office
First Aid lead: Katie Starsmore (DairyNZ)

DAIRY TRUST TARANAKI – GIBSON FARM

Session 1: Production figures – paddock C9

Mags Bremer - DTT

Session 2: Botanicals and plantain – paddock B11

Alisha Harrop - DTT, Bruce Patterson – Barenbrug

Session 3: Financials and emissions – calf shed

Jason Rolfe – DTT, Chris Glassey - DairyNZ

Trial Objective and Overview

The purpose of the Step Change Trial was to create change and to help all dairy farmers focus on reducing environmental footprint (GHG and water quality) while maintaining profit.

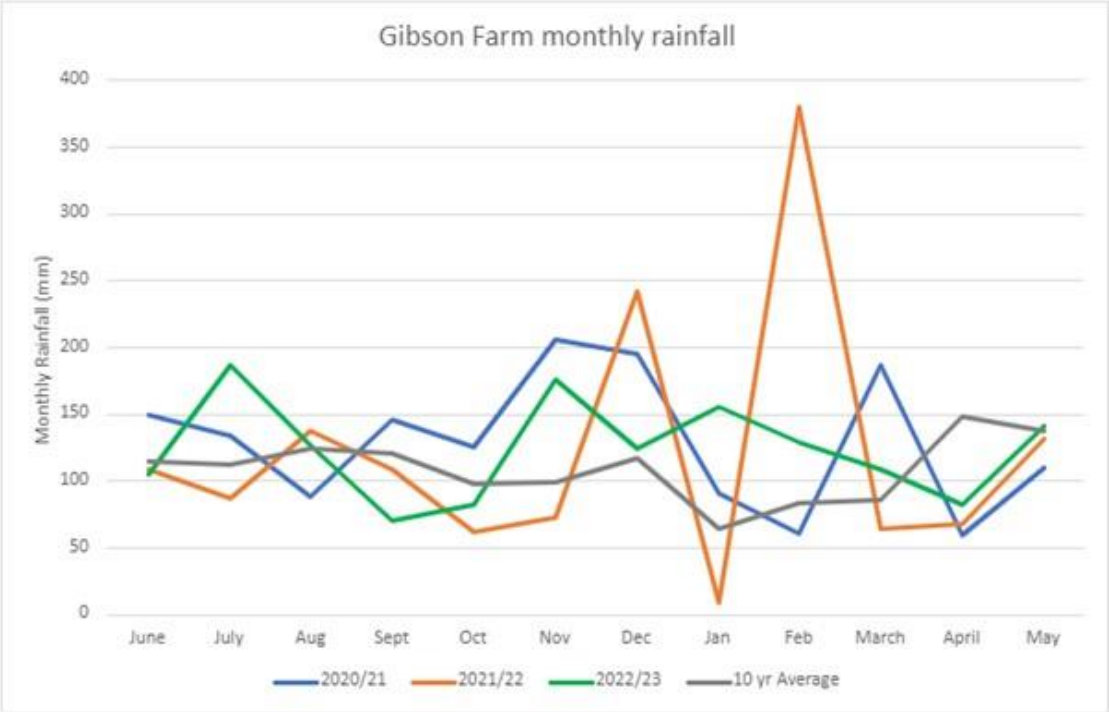
The study compared two farmlets, one based on current farming practices (control farmlet = current) and the other (trial farmlet = future) expected to achieve reduced GHG emissions and N-surplus targets likely to be required by the Zero Carbon Bill and the Essential Freshwater Accord.

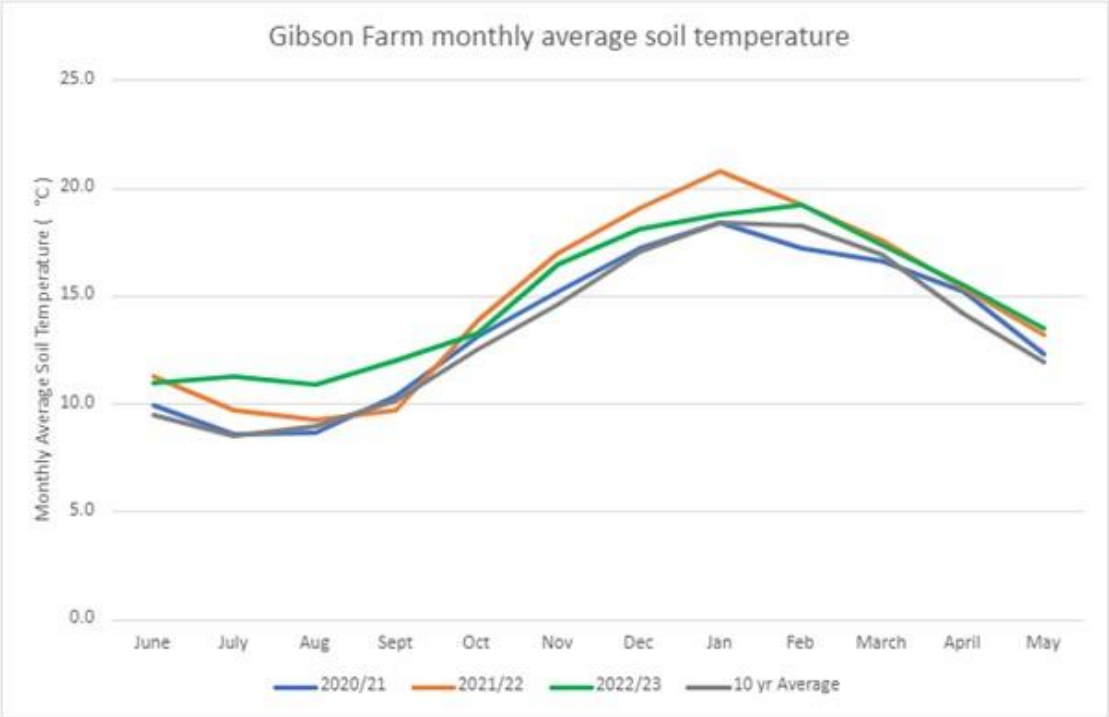
To offset some of the reduced N-inputs and further help with reduction of N-loss, the future farmlet has been undersown with clover and plantain. A third of the farm has been undersown each year with 8kg/ha plantain and 2kg/ha clover. This has been topped up annually with 2kg/ha plantain and 2kg/ha clover. The farmlets were randomised in 2020.

Step Change Trial - Measurements

- Milk production
- Liveweight and BCS and animal health
- Mating and calving information
- Pasture and crop production
- Supplements – all supplements harvested and fed
- Pasture botanicals
- Emissions modelling in Overseer

CLIMATE

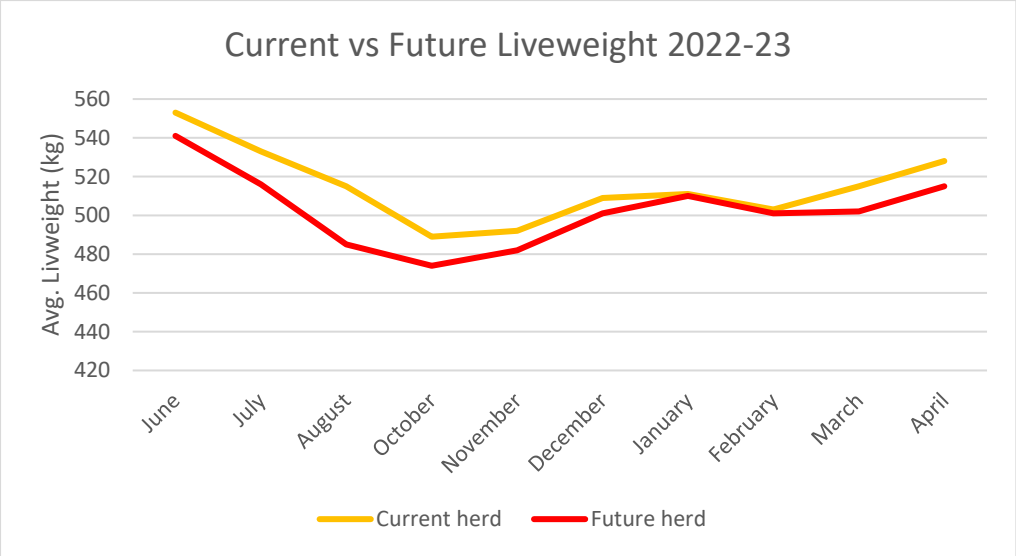


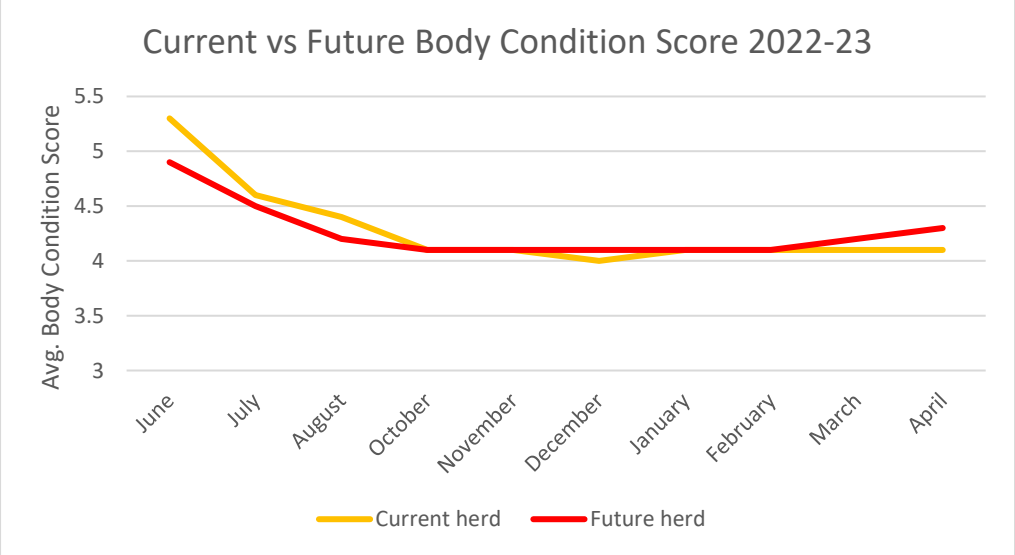


ANNUAL TOTALS	2020/21	2021/22	2022/23	10 YR AVG
RAINFALL (MM)	1552	1471	1488	1306
Soil temp (^{O}C)	13.6	14.7	14.8	13.4

RESULTS YEAR 3

PRODUCTION	CURRENT	FUTURE
kgMS/ha	1,211	1,095
kgMS/cow	408	432
Days in milk	274	295
Average kgMS/cow/day	1.49	1.46
kgLWT (Dec)	509	501
kgMS as % liveweight	80	87
Comparative stocking rate (kgLWT/tDM)	79	74

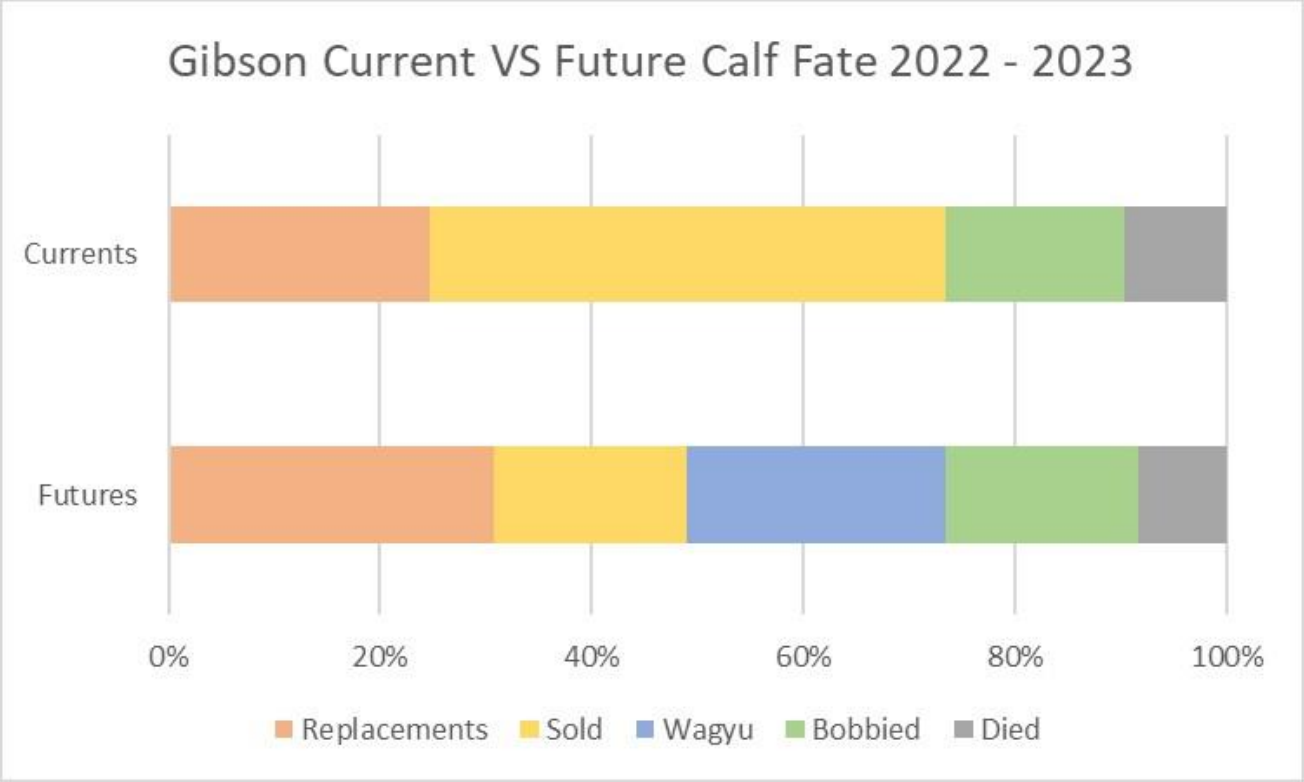




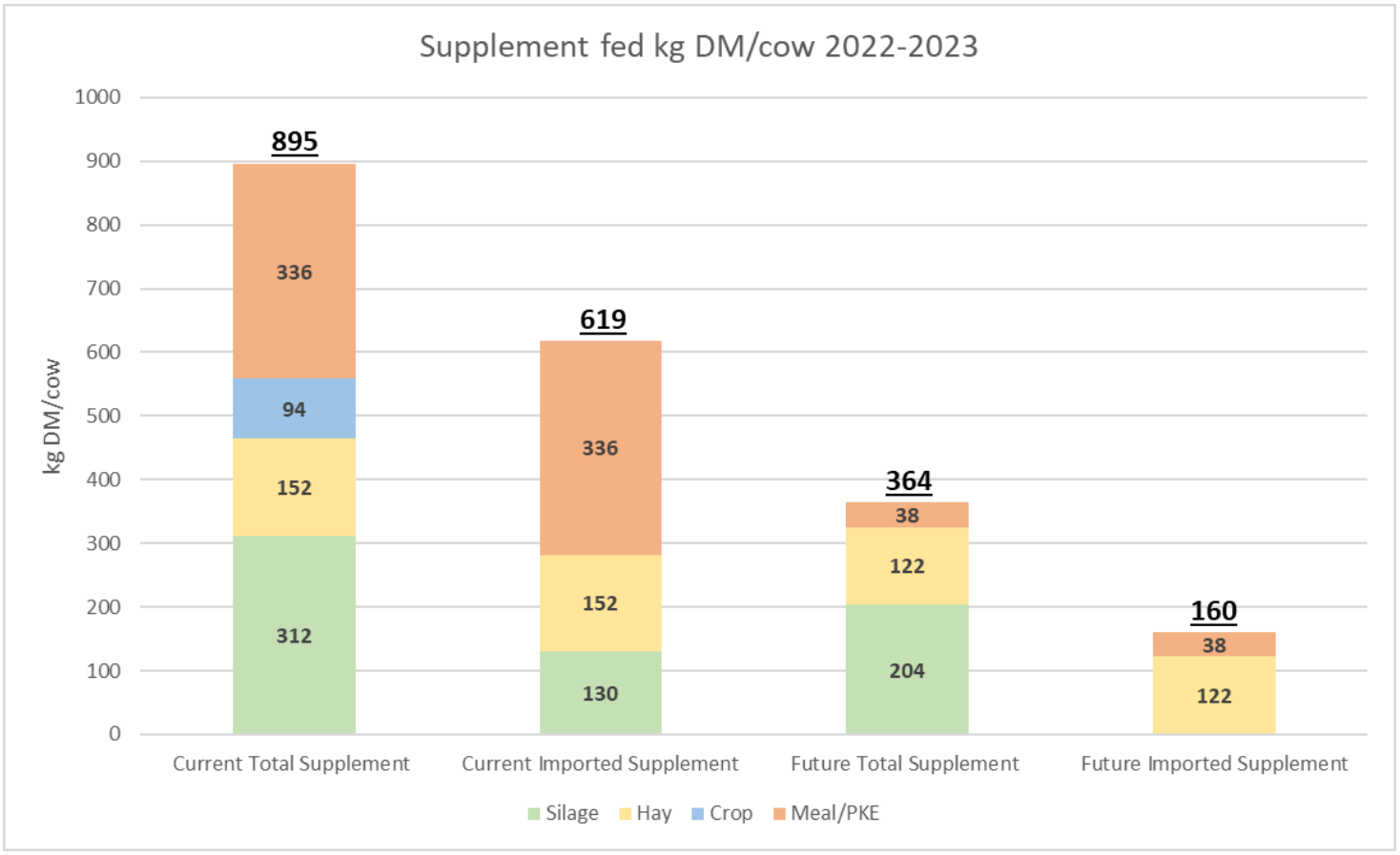
MATING PROGRAMME

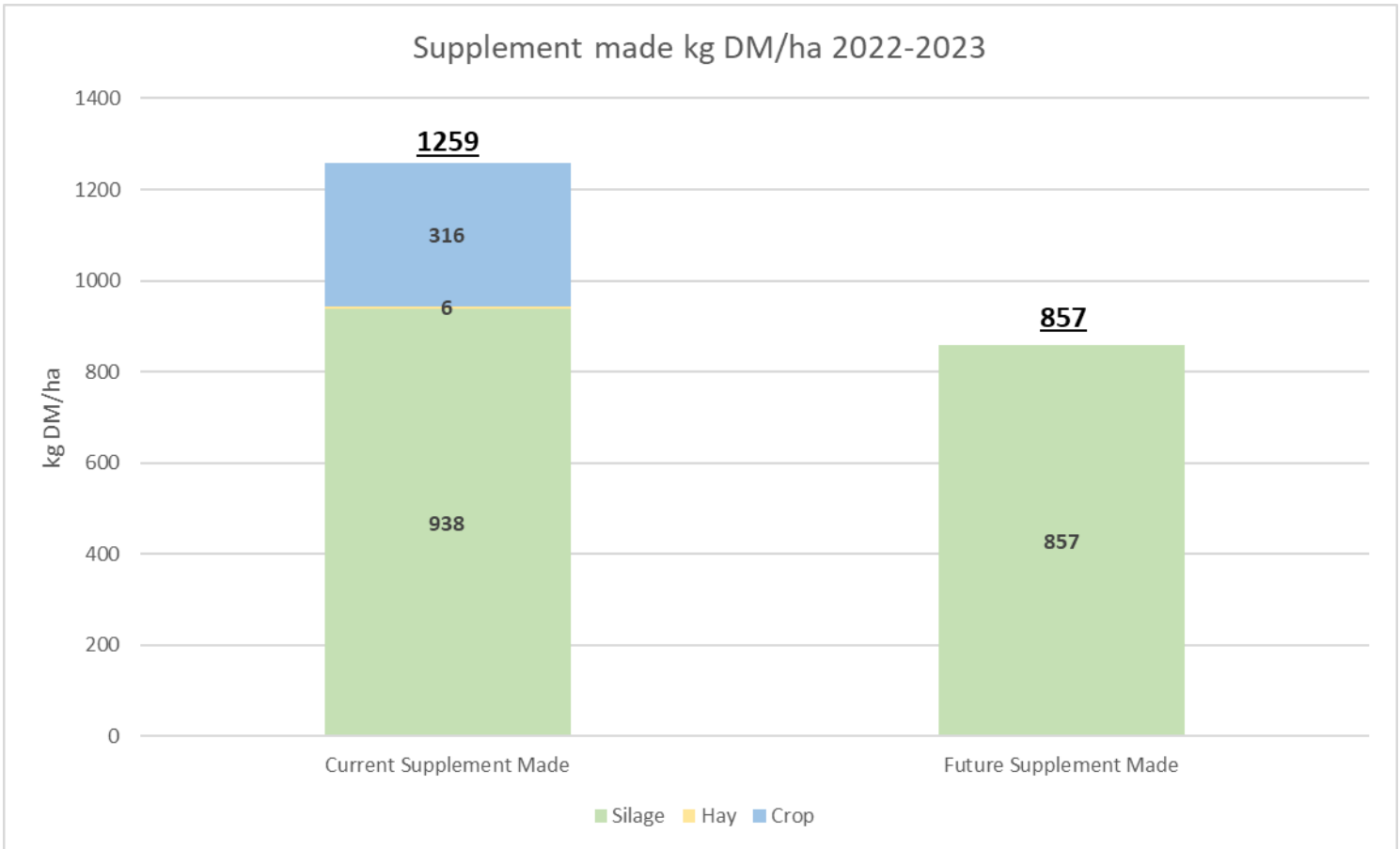
Current herd: Start 10th Oct, duration 10 weeks, all AB. First 6 weeks Friesian forward pack, bottom 10% to short gestation (SG) Hereford, followed by 4 weeks SG Hereford.

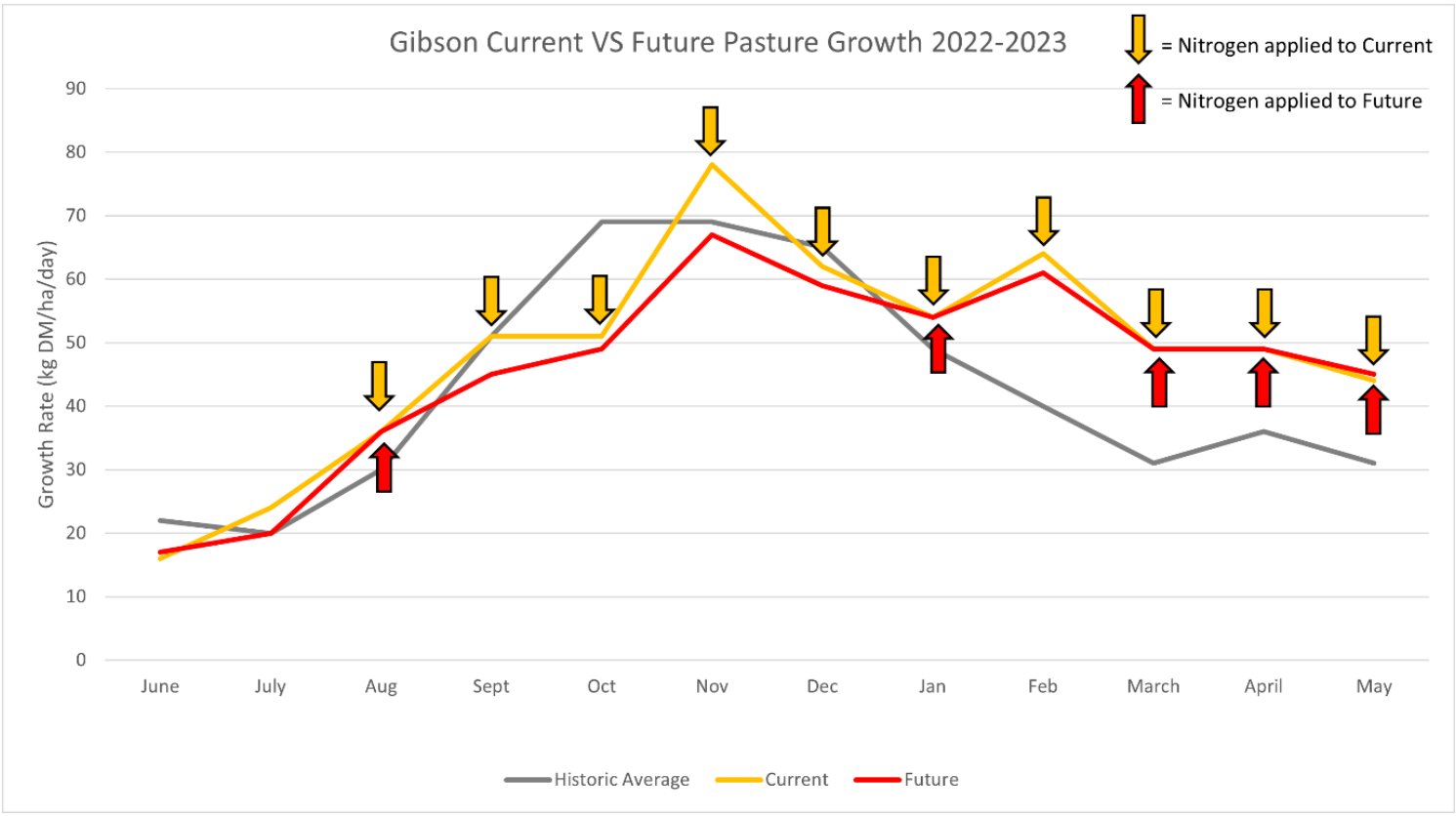
Future herd: Start 1st Oct, duration 9 weeks, all AB. First 3 weeks sexed semen to the top 60% of cows for BW, Friesian forward pack for the remaining cows, followed by 6 weeks of SG Hereford.



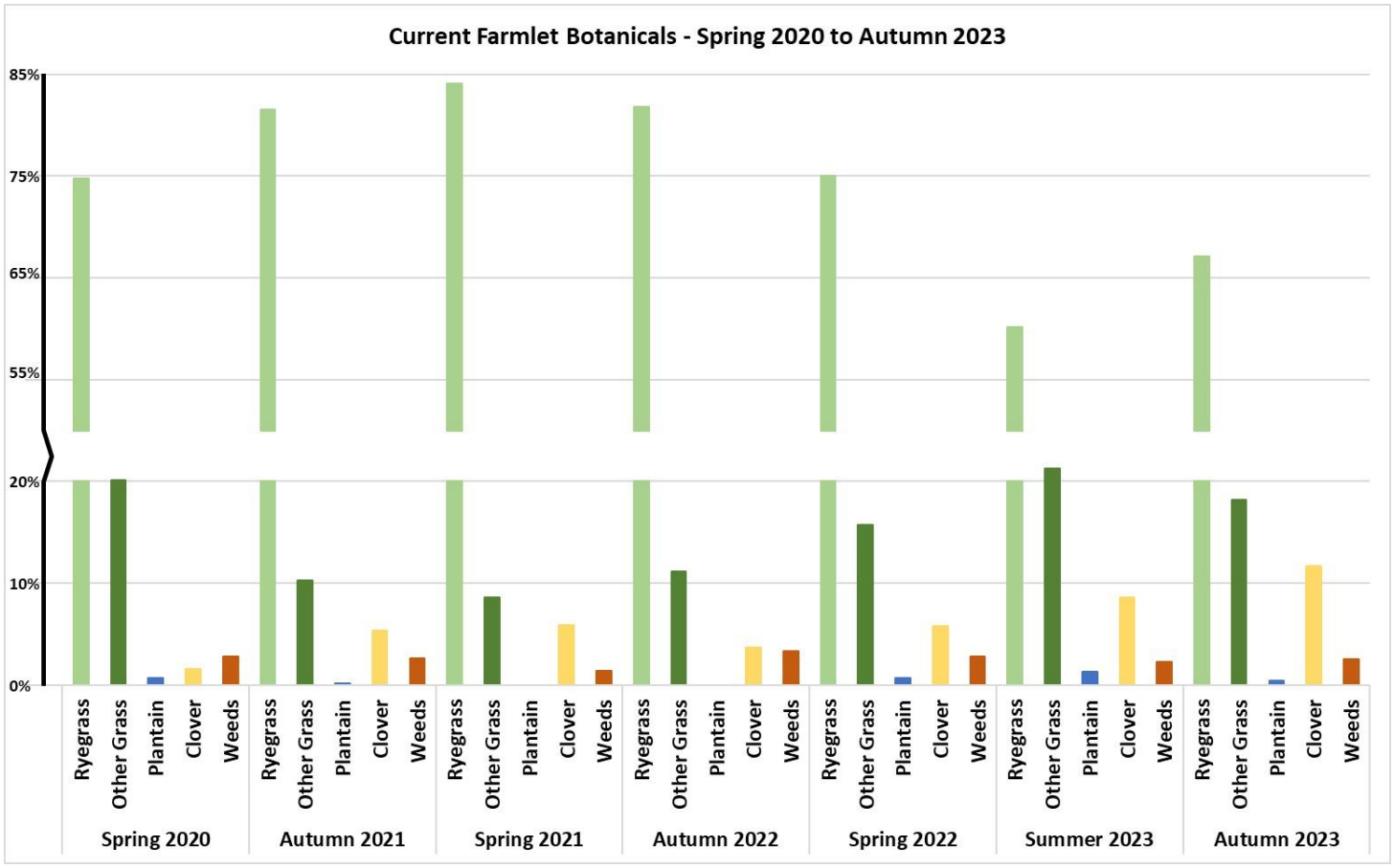
FEED	CURRENT	FUTURE
Cows/ha	2.97	2.53
KgN/ha	141	70
Pasture grown (tDM/ha)	17.5	16.6
Imported feed (tDM/ha)	1.8	0.4
Total feed offered (tDM/ha)	19.3	17
Estimated feed eaten (tDM/ha)	15.3	13.2
Utilisation (%)	79	78

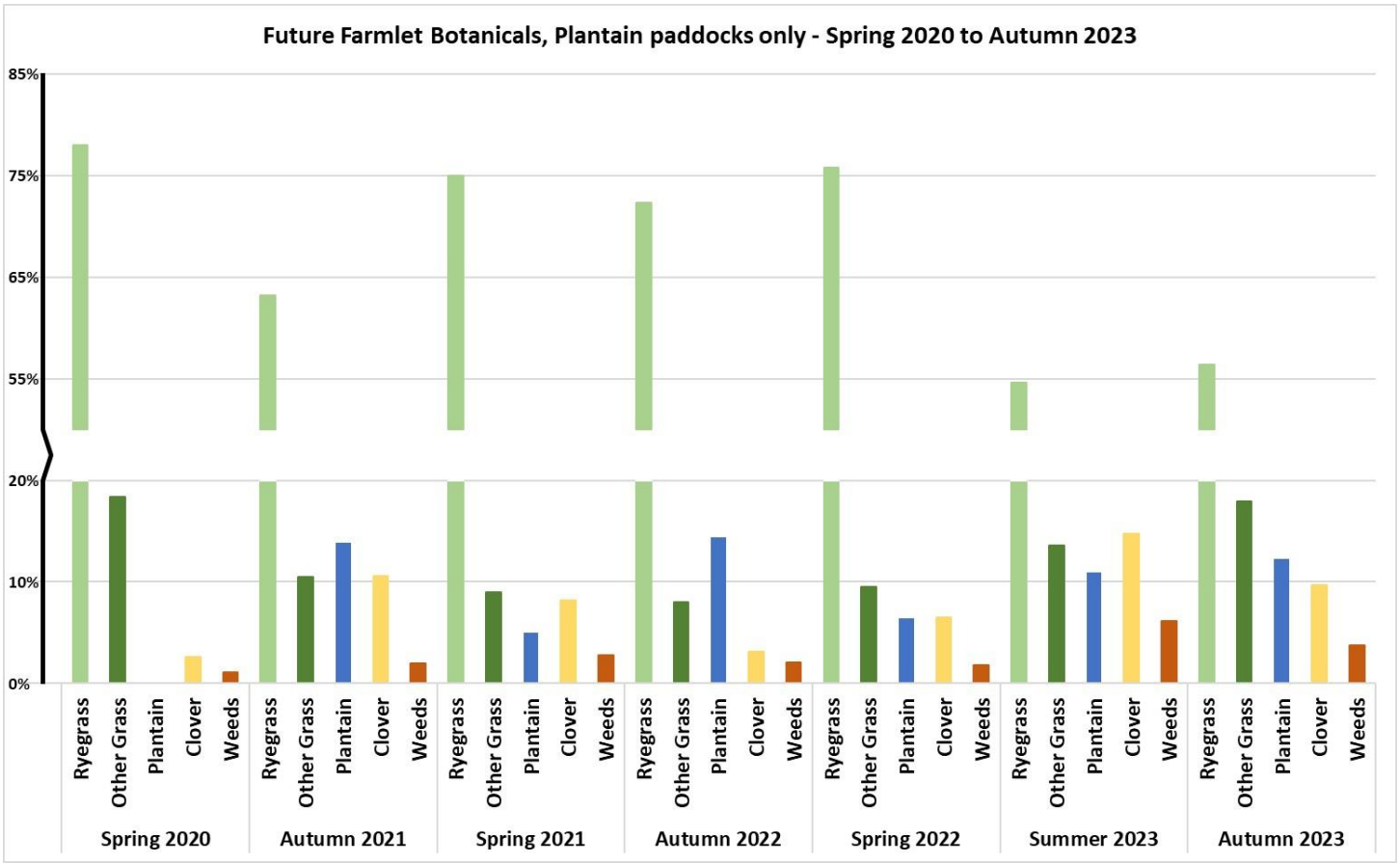

Supplement fed kg DM/cow 2022-2023
kg DM/cow
1000
900
800
700
600
500
400
300
200
100
0
895
336
94
152
312
619
336
152
130
364
38
122
204
160
38
122
Current Total Supplement
Current Imported Supplement
Future Total Supplement
Future Imported Supplement
Silage
Hay
Crop
Meal/PKE


Supplement made kg DM/ha 2022-2023
kg DM/ha
1400
1200
1000
800
600
400
200
0
1259
316
6
938
857
857
Current Supplement Made
Future Supplement Made
Silage
Hay
Crop


Gibson Current VS Future Pasture Growth 2022-2023
= Nitrogen applied to Current
= Nitrogen applied to Future
Growth Rate (kg DM/ha/day)
90
80
70
60
50
40
30
20
10
0
June
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
March
April
May
Historic Average
Current
Future

PASTURE BOTANICAL





ECONOMICS

	Current	per ha	Future	per ha
Milk Solids Production	66,025	1211	59,679	1095

Income

Milk Solids Income $8.30	548,008	10,055	495,336	9,089
Stock Sales	52,952	970	83,610	1,532
Total Income	**600,959**	**11,013**	**578,945**	**10,609**

Expenses

Wages	105,300	1,950	89,700	1,661
Animal health	25,800	478	21,942	406
Breeding	14,800	274	14,800	274
Farm dairy	7,831	145	7,831	145
Electricity	16,686	309	14,214	263
Silage on farm	17,289	320	13,479	250
Hay Brought in	6,480	120	5,520	102
Turnips - 2 ha	7,250	134	0	0
Plantain	0	0	12,000	222
In shed Feeding	27,059	501	1,892	35
Grazing - heifers 52 weeks, calves 26 weeks	36,244	671	37,755	699
Nitrogen	25,340	469	13,874	257
Fertiliser - Capital	16,548	306	16,548	306
Weed & Pest	3,250	60	3,250	60
R & M	50,584	937	50,584	937
Vehicle & Fuel	19,476	361	19,476	361
Calf Rearing	8,400	156	14,680	272
Admin and Insurance	12,778	237	12,778	237
Other Farm Working Expenses	5,850	108	5,850	108
Depreciation	0	0	0	0
Total Expenses	**406,965**	**7,536**	**356,173**	**6596**

Income minus Expenses	**$193,995**		**$222,773**	
EFS/ha (EBITA)	**$3,592**		**$4,125**	**+14.8%**
Farm Working Expenses/kg MS	**$6.16**		**$5.97**	**-5.1%**

ECONOMICS WITHOUT EXTRA STOCK SALES AND THE SAME BREEDING PRGRAMME FOR BOTH HERDS

	Current	per ha	Future	per ha
Milk Solid Production kgMS	66,025	1211	59,679	1095
Income				
Milk solids income $8.30	548,008	10,055	495,336	9,089
Stock sales	33,152	608	24,825	456
Total income	**581,160**	**10,663**	**520,161**	**9,544**
Expenses				
Wages	105,300	1,950	89,700	1,661
Animal health	25,800	478	21,942	406
Breeding	14,800	274	12,245	227
Farm dairy	7,831	145	7,831	145
Electricity	16,686	309	14,214	263
Silage on farm	17,289	320	13,479	250
Hay Brought in	6,480	120	5,520	102
Turnips - 2 ha	7,250	134	0	0
Plaintain	0	0	12,000	222
In shed Feeding	27,059	501	1,892	35
Grazing - heifers 52 weeks, calves 26 weeks	28,744	532	22,500	417
Nitrogen	25,340	469	13,874	257
Fertliser - Capital	16,548	306	16,548	306
Weed & Pest	3,250	60	3,250	60
R & M	50,584	937	50,584	937
Vehicle & fuel	19,476	361	19,476	361
Calf rearing	8,400	156	6,800	126
Admin and Insurance	12,778	237	12,778	237
Other Farm Working Expenses	5,850	108	5,850	108
Depreciation	36,314	672	32,823	608
Total expenses	**435,779**	**8,070**	**363,306**	**6,728**

income - expenses	**$145,381**		**$156,855**	
EFS/ha (EBITA)	**$2,668**		**$2,878**	**+7.9%**
FEW/kg MS	**$6.60**		**$6.09**	**-7.8%**

GREENHOUSE GASES AND N-LOSS ANALYSIS

Numbers are modelled in Overseer.

NITROGEN	CURRENT	FUTURE	DIFFERENCE
Total N-Loss (Kg)	2119	1794	-15.3%
N-loss/ha (kg/ha)	35	30	-14.3%
NCE (%)	35	39	+11.4%
N-surplus (kg/ha)	189	141	-25.4%

GREENHOUSE GASES (GHG)	CURRENT	FUTURE	DIFFERENCE
Total GHG (t CO_2-Eq/Yr)	694.6	563.6	-18.9%
Total GHG/Ha (t CO_2-Eq/Ha)	12.74	10.34	-18.9%
Methane (t CO_2-Eq/Yr)	458	398.6	-13.0%
Methane/Ha (t CO_2-Eq/Ha)	8.40	7.31	-13.0%
Nitrous Oxide (t CO_2-eq/yr)	143.7	117.7	-18.1%
Nitrous Oxide/ha (t CO_2-eq/ha)	2.64	2.16	-18.1%
Carbon Dioxide (t CO_2-eq/yr)	92.9	47.3	-49.1%
Carbon Dioxide/ha (t CO_2-eq/ha)	1.70	0.87	-49.1%

HE WAKA EKE NOA

He Waka Eke Noa (HWEN) is still being re- considered by the Government. It is expected to come into effect in 2025.
The indicative price for methane remains at 11 cents/kg methane as far as we know.
1 kg methane = 25 kgCO2-eq

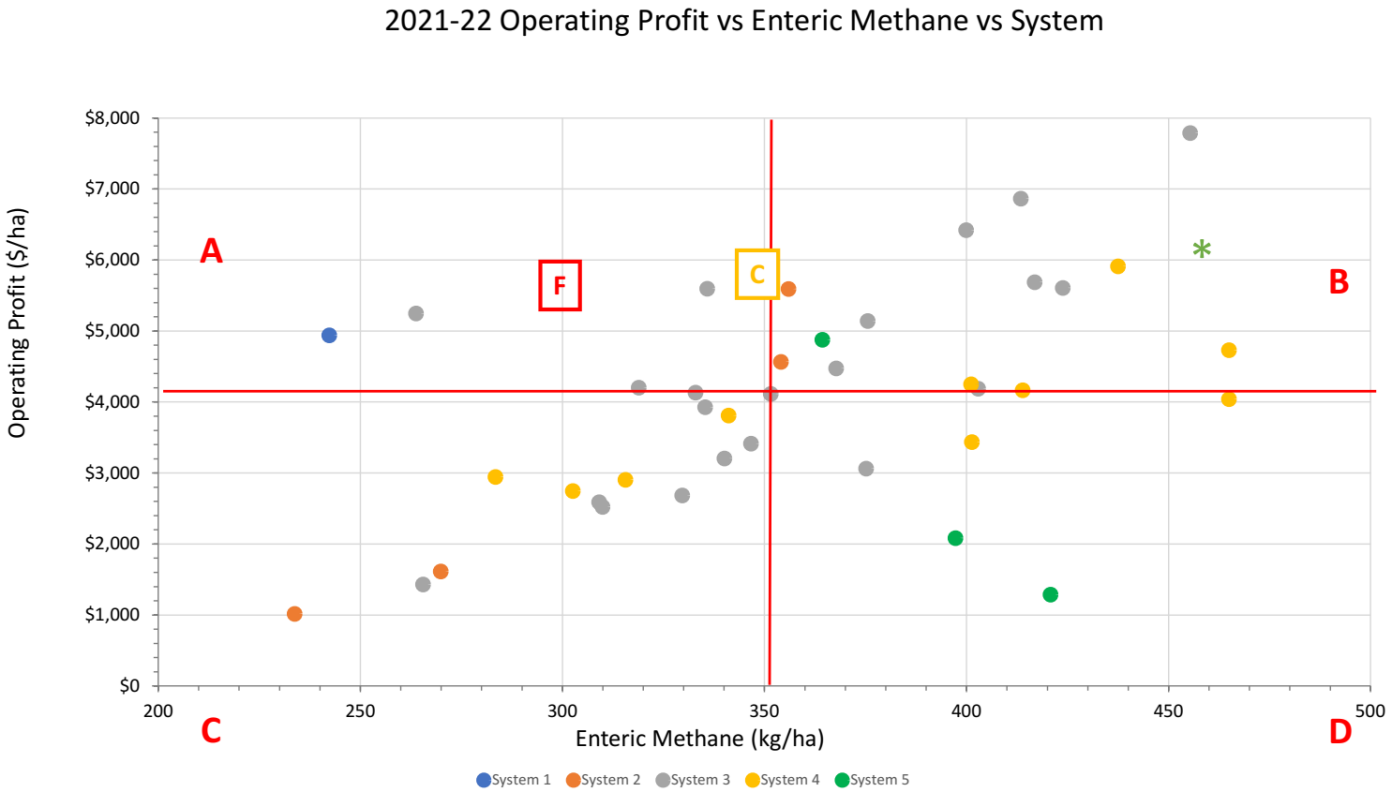
Current farmlet methane emitted per ha:

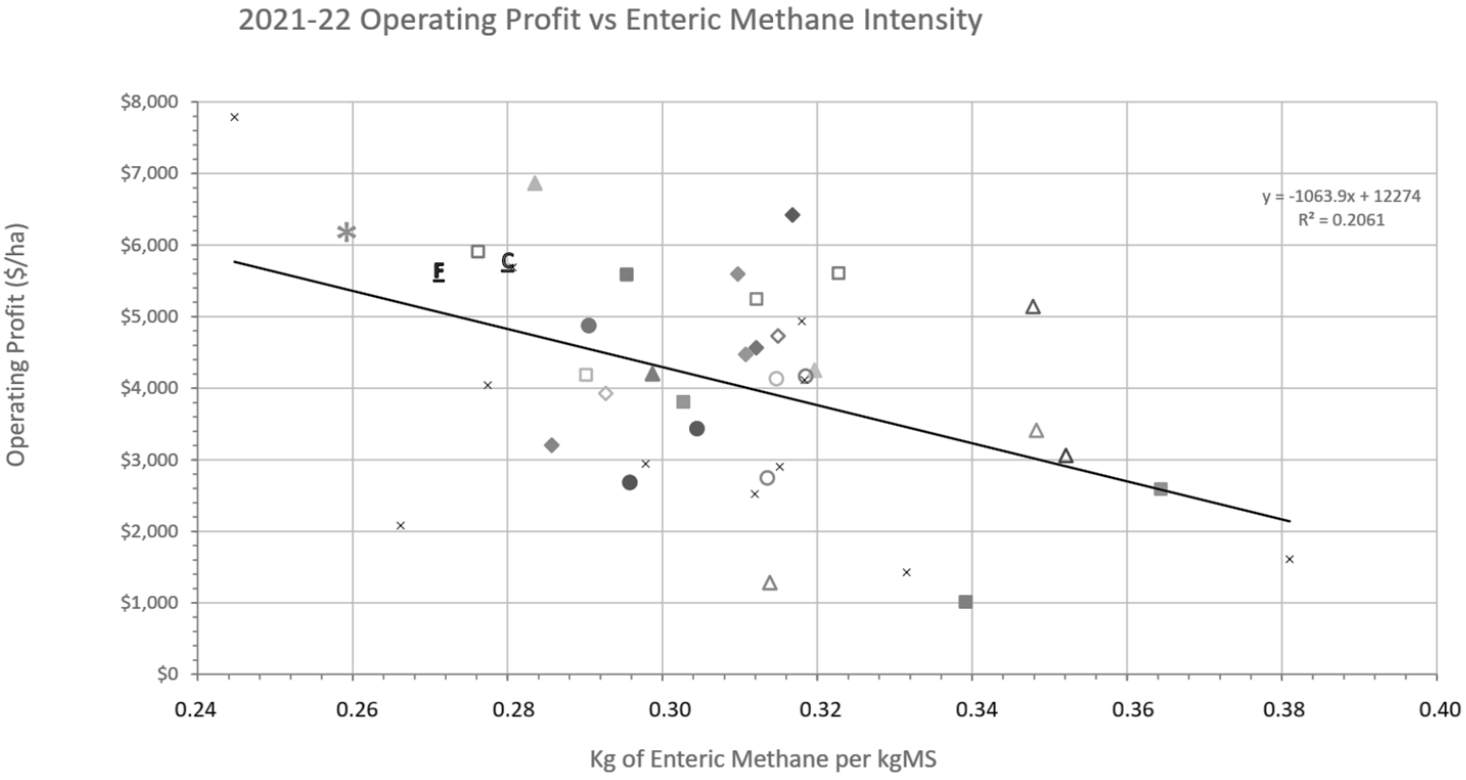
336 kg/ha methane x $0.11 = **$36.96/ha** = $2,014 for 54.5 ha.

Future farmlet methane emitted per ha:

292 kg/ha x $0.11 = **$32.12/ha** = $1,751 for 54.5 ha

This is a difference of **$4.84/ha** or $263.78 for the total farmlet in favour of the Future farm.
2021/2022 difference was $5.90/ha
2020/2021 difference was $4.84/ha

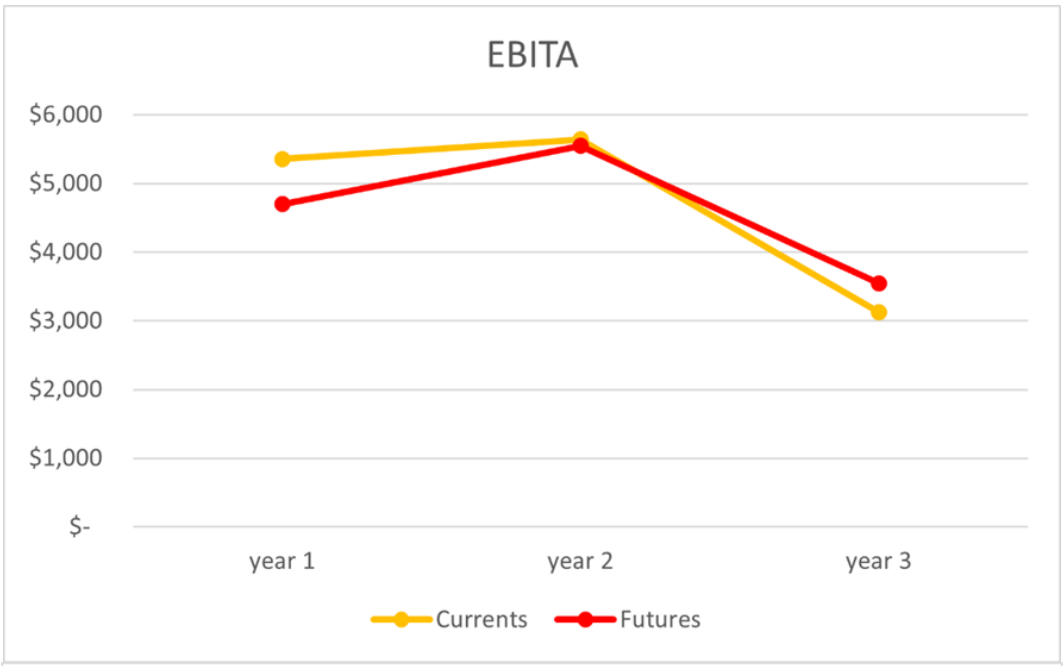

2021-22 Operating Profit vs Enteric Methane vs System
Operating Profit ($/ha)
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
200
250
300
350
400
450
500
Enteric Methane (kg/ha)
A
B
C
D
F
C
*
System 1
System 2
System 3
System 4
System 5

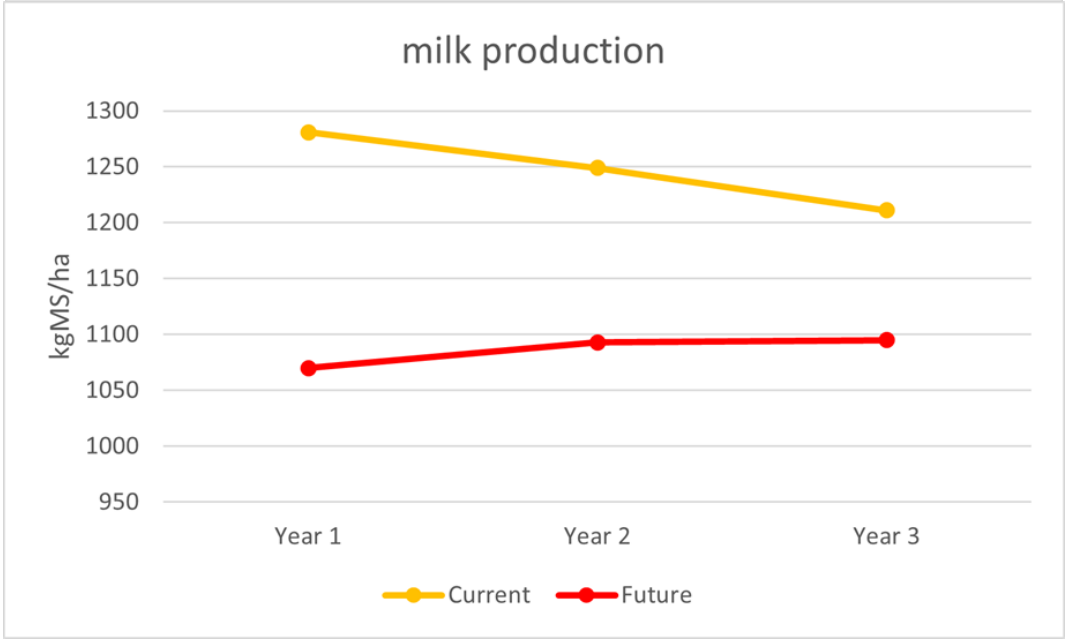

2021-22 Operating Profit vs Enteric Methane Intensity
Operating Profit ($/ha)
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
0.24
0.26
0.28
0.30
0.32
0.34
0.36
0.38
0.40
Kg of Enteric Methane per kgMS
y = -1063.9x + 12274
R² = 0.2061
F
C
*

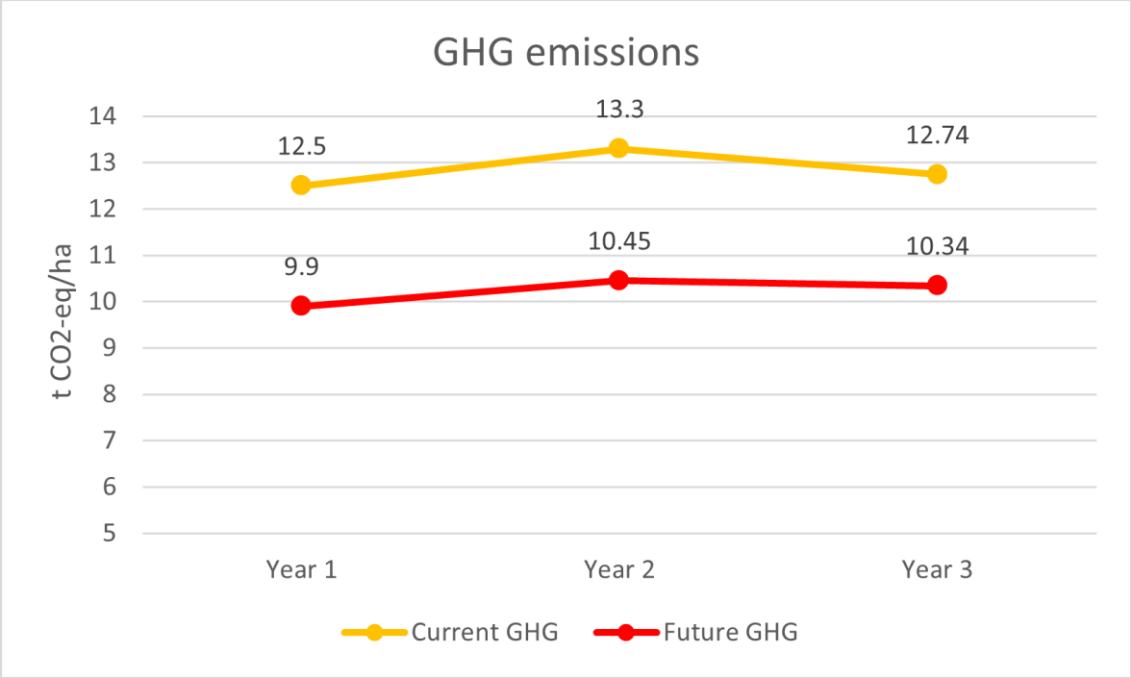
3 Year Summary

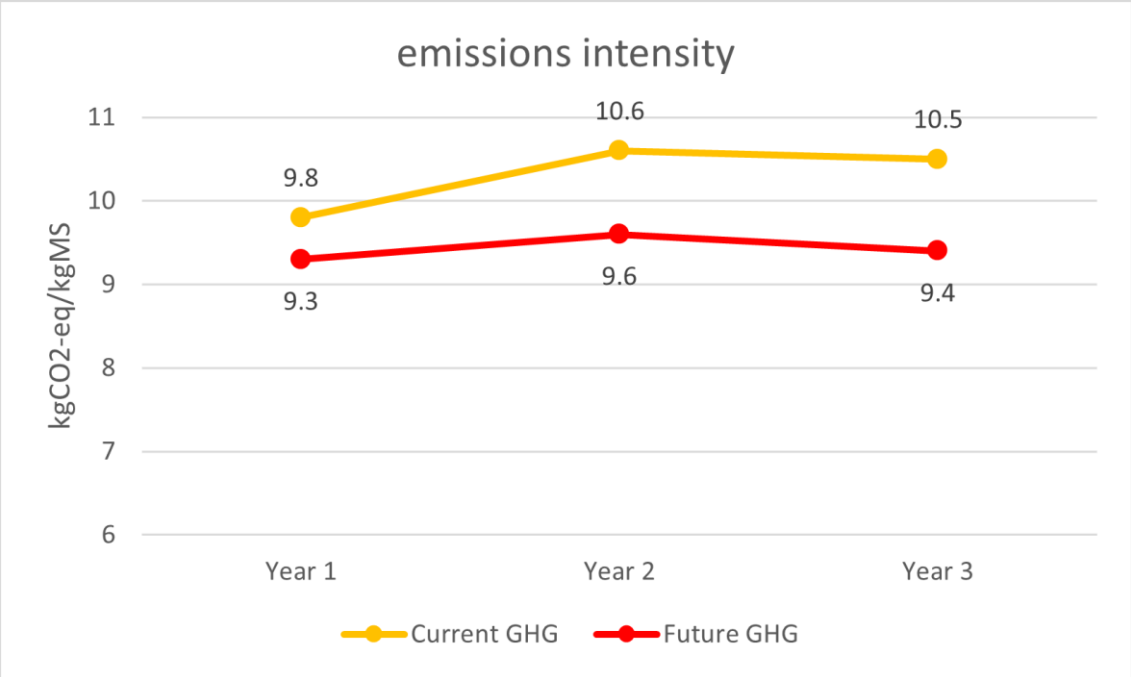
Current Minus Future	Year 1	Year 2	Year 3
N-input (kg/ha)	-91	-87	-71
N-response (kgDM/kgN) from extra input	15.4	4.6	12.7
Pasture grown (tDM/ha)	-1.4	-0.4	-0.9
Milk production (kgMS/ha)	-211	-156	-116
Operating profit/ha (%)	-12	-2	+14.8
Total GHG (%)	-21	-22	-19
Methane (%)	-13	-15	-13
N-loss (%)	-22	-24	-14

Difference is calculated as Current minus Future







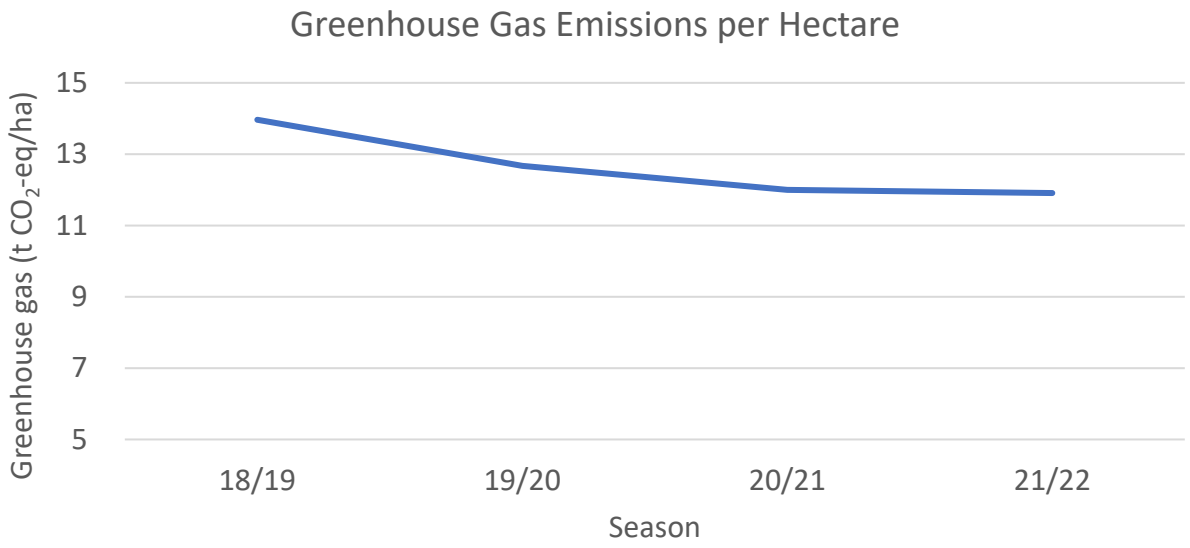


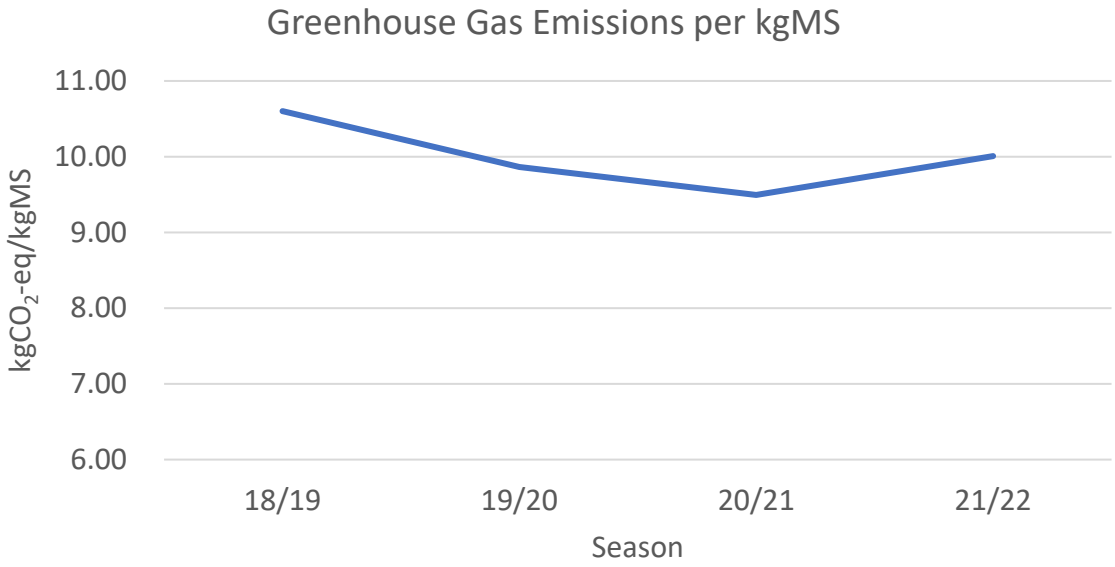
CONCLUSION

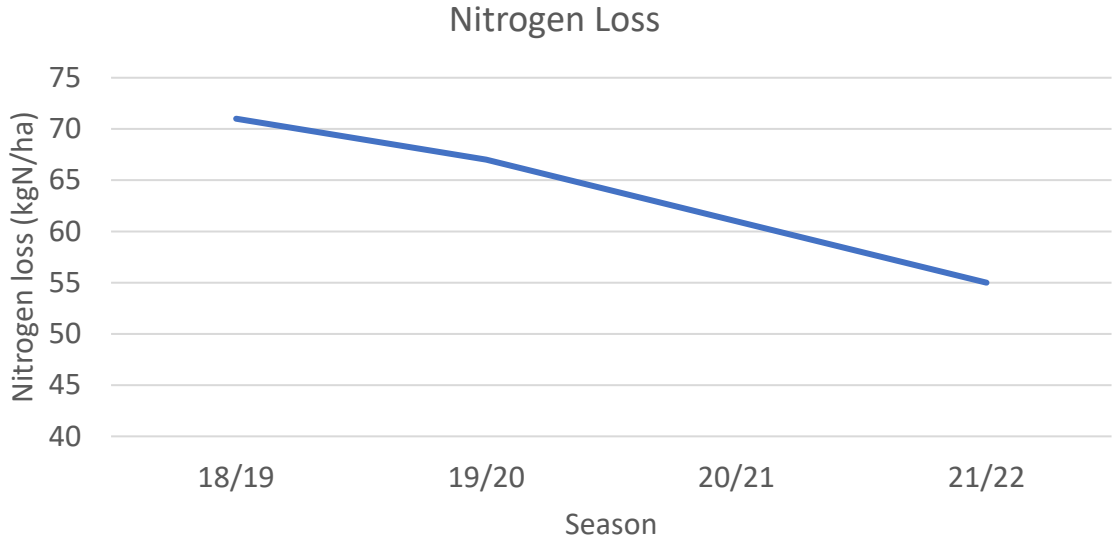
This Step Change programme was able to achieve 2030 emissions reduction targets each season with varying impacts on profit. Lower payouts and high input costs are favouring the future farmlet. The challenge with the reduced stocking rate is to manage quality of pastures and harvest any surplus as supplement.

PARTNER FARMER JOURNEY – DONNA AND PHIL CRAM

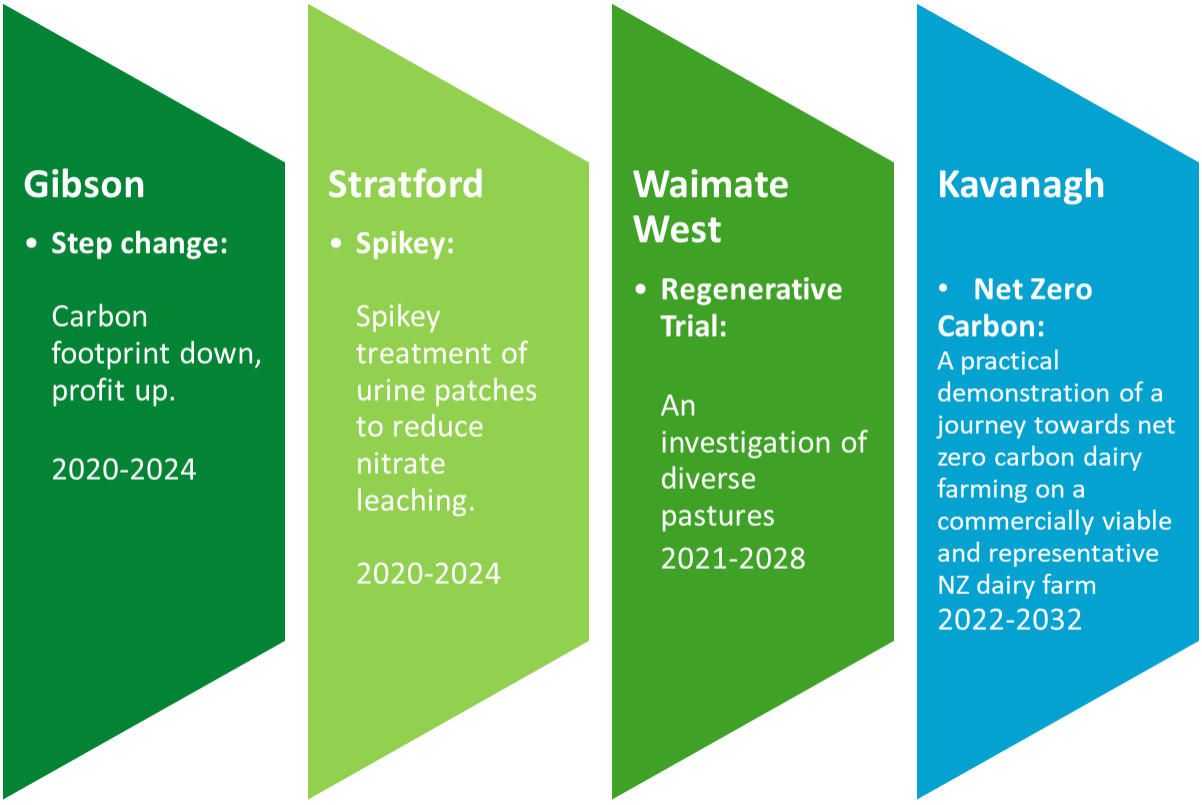
	2022/23	2021/22	2020/21
	Forecast	Actual	Actual
Total Cows	*282*	250	252
Peak Cows Milked	*269*	244	242
Stocking Rate (per Effective Milking ha)	*2.5*	2.3	2.3
Liveweight (kg/cow)	*500*	500	500
Breed	*Friesian*	Friesian	Friesian
Total Ha	*118*	118	118
Milking Effective (ha)	*107*	107	107
Support Effective (ha)	*42*	-	-
Total Effective (ha)	*107*	107	107
Production (kg MS)	*130,000*	119,015	126,364
Production (kg MS/effective milking ha)	*1,215*	1,112	1,181
System	*3*	3	3
Production (kg MS/cow)	*483*	488	522
R1 Replacement Calves	*62*	49	73
R2 Replacement Heifers	*49*	72	60
June - Cows Wintered Off	*0*	-	-
July - Cows Wintered Off	*0*	-	-
N Fertiliser (kg N/ha)	*135*	105	122
P Fertiliser (kg P/ha)	*20*	20	42
Effluent Area (ha)	*25*	25	25
Effluent Area (% effective milking ha)	*23%*	23%	23%
Total Pasture Eaten (t DM/ha)	*10.9*	11.4	12.5
Crop Types	-	Turnips	Turnips
Total Crop Area (ha)	-	3.65	3.65
Supplement Imported (%)	*22%*	17%	13%
N Loss (kg N/ha)		55	61
P Loss (kg P/ha)		1.6	1.5
Operating Profit ($/effective milking ha)	***$ 3,301***	**$ 3,927**	**$ 3,324**
Farm Working Expenses ($/kg MS)	***$ 5.15***	**$ 4.77**	**$ 3.91**
Farm Operating Expenses ($/kg MS)	*$ 6.09*	$ 6.18	$ 4.96
Rainfall (mm)	*1,554*	1,554	1,545


Greenhouse Gas Emissions per Hectare
Greenhouse gas (t CO_2-eq/ha)
15
13
11
9
7
5
18/19
19/20
20/21
21/22
Season


Greenhouse Gas Emissions per kgMS
$kgCO_2$-eq/kgMS
11.00
10.00
9.00
8.00
7.00
6.00
18/19
19/20
20/21
21/22
Season


Nitrogen Loss
Nitrogen loss (kgN/ha)
75
70
65
60
55
50
45
40
18/19
19/20
20/21
21/22
Season

For more information on Step Change and on the trials that Dairy Trust Taranaki is running on its other three farms sign up to the weekly farm walk notes and follow us across our social media channels.



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