SOUTHERN DAIRY HUB FIELD DAY

10th October 2018

Lunch kindly supplied by

PGG Wrightson

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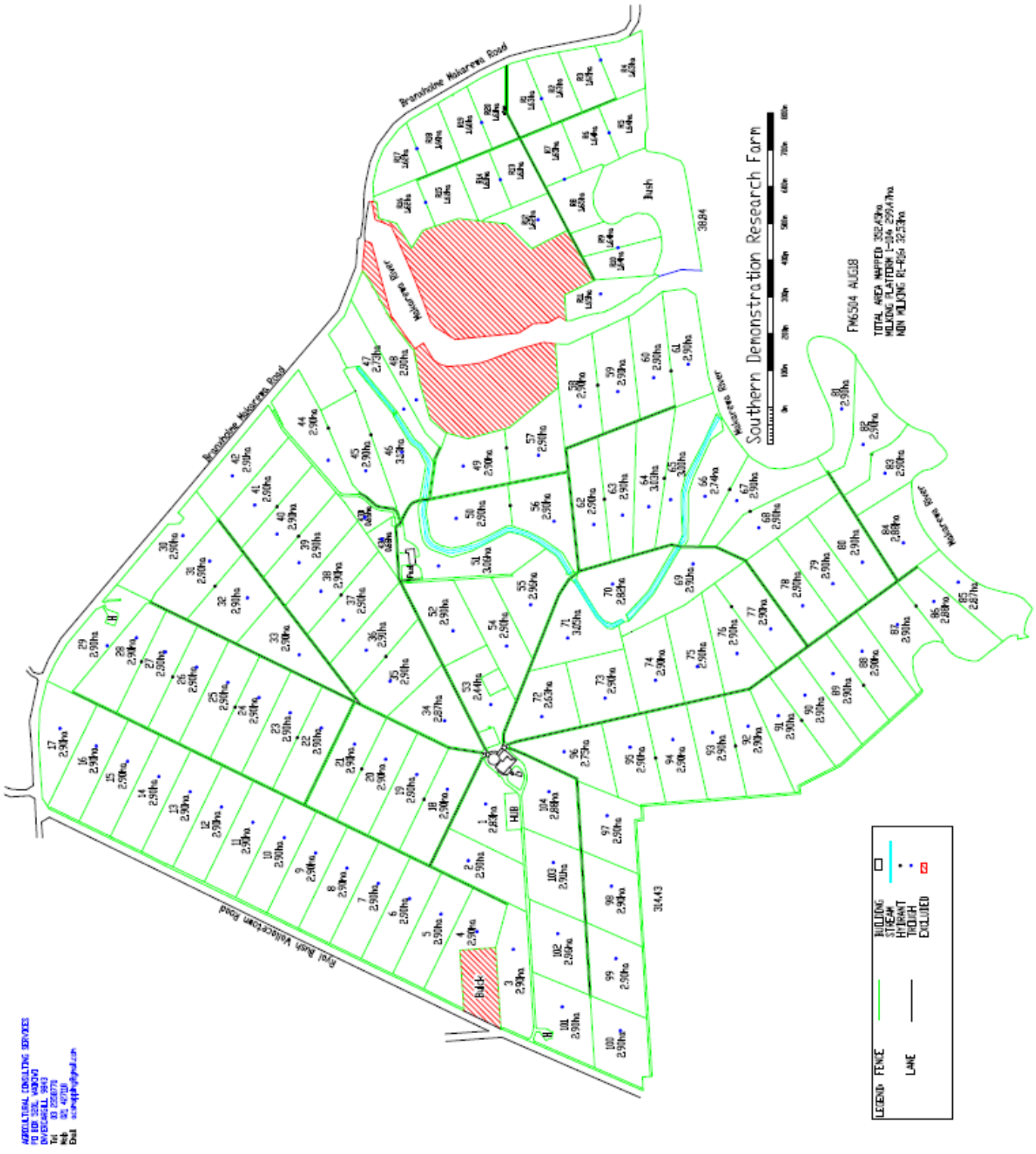
SOUTHERN DAIRY DEVELOPMENT TRUST

agresearch

DairyNZ



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Contents

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Visitor Health and Safety Requirements

Entry onto property by permission and appointment only.

Contact either:

Business Manager Guy Michaels 027 564 5595 or

Farm Manager Shane Griffin 027 207 6012

All visitors required to sign in and out accepting farm rules

A farm map will be provided showing any general hazards on the farm; the manager will instruct you of any new hazards

General Rules

- Communication – sign in and out
- Children on farm – must be under constant adult supervision and only with express permission of manager
- Reporting – Please notify manager immediately any accidents or near miss events/hazards
- Drive to the conditions – Max speed of 30km/hr 

- Farm bikes – trained operators only, helmet with strap done up **at all times**, never operate if under 16 years' old
- Vehicles – no one to operate farm vehicles without manager's permission
- Water ponds/troughs – Keep a close eye on children around water sources – do not drink from farm taps, troughs, water ways
- In emergency – Please report back to farm manager at Assembly point in front of cowshed
- Fire extinguishers – found in farm houses, dairy shed, vehicles, and woolshed
- No smoking in cowshed, buildings, or vehicles
- Firearms – only with approval of farm manager, must hold current licence

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Biosecurity Requirements for Southern Dairy Hub (SDH) Farm Visits

All visitors must comply with the Biosecurity Requirements when visiting the SDH

- All footwear must be disinfected with materials supplied, upon arrival at and departure from the SDH farm site. Protective footwear may be borrowed from the SDH upon request, and must be cleaned thoroughly before its return. People wearing inappropriate (or no) footwear will not be allowed onto the SDH premises.

- All visitors are expected to wear clean protective clothing, including wet weather gear if necessary when on the farm(s).

- No farm visits will be allowed, under any circumstances, from anyone within five days of their arrival in New Zealand from Central or South America, any part of Asia or any part of Africa. Further restrictions may be applied at any time, dependent upon international disease status.

- On farm, visiting vehicles must be parked in designated visitor parking areas. Approved vehicles may only access the farm after washing the undercarriage. This may be repeated prior to departure but this is up to the operator concerned.

- SDH retains the right at any time to refuse access to any person or persons deemed not to be complying with these requirements.

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Mission and Strategic Direction of the Southern Dairy Hub

Farmers in the Southland region took the initiative to establish the Southern Dairy Development Trust (SDDT) and its fully owned registered trading company, the Southland Demonstration Farm (SDF) in 2007.

The Charitable Trust Deed outlines that the purpose of the trust is for "the promotion of dairy farming in Southland and West Otago, and to assist, support and encourage existing dairy farmers and those interested in joining the dairy industry for general educational purposes".

Following the expiry of the lease on the Southland Demonstration Farm at Wallacetown in 2016 SDDT and SDF approached DairyNZ and AgResearch seeking agreement to establish a dedicated Southern Dairy Hub (SDH) to facilitate dairying research and extension in the region. The anticipated benefits are predominantly associated with the ability for farmers, researchers and the industry body DairyNZ to work together to create new solutions for the Southland/Otago and New Zealand Dairy industries.

AgResearch, DairyNZ and SDDT have recognised the current scale and growth potential for dairying in Southland. However, there are significant local issues faced by farmers dealing with wet soils, cold winters, and unique environmental issues. The region will require new levels of research and development activity and resourcing to provide solutions that reflect the area's unique climate and soil conditions. Failing to find solutions to address environmental concerns within the context of long-term sustainable farm systems will impact on the ability of the dairy industry to grow in the region.

SDH Vision:

- *To be an internationally recognised, innovative and leading centre of excellence for dairy farming, comparative research, and extension*

SDH Mission:

- *Providing economic, social, and environmentally sustainable solutions for the southern South Island dairy farmers and community*

SDH Fundamental aims:

- *To improve the performance and protect the viability of existing dairy farms in the southern South Island.*
- *To help develop and test new options for dairying in the southern South Island. To support the responsible and sustainable growth of dairying in the southern South Island.*
- *To promote the Dairy Industry Strategy.*

SDH has leased the farm to the Operating Company (SDRF) for dairy farming and the **conduct of research** related to dairy farming.

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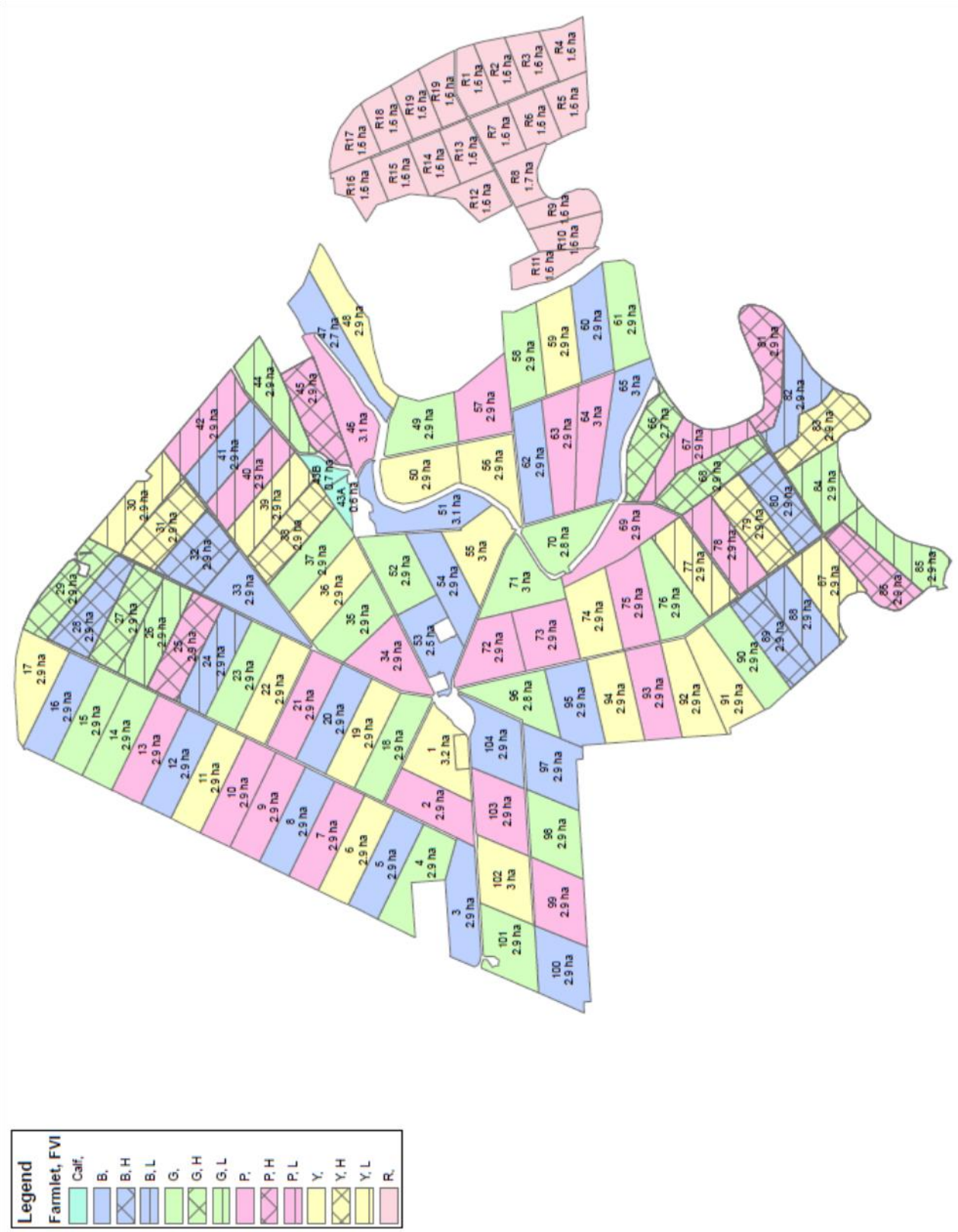

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Environmental Work

1. Measurement of N leaching losses from autumn- and winter-grazed crops

Pre-experimental modelling of the 4 research farmlets at SDH has incorporated autumn- and winter-grazed fodder beet (FB) crops as important feed supplies in the FB farmlets. Kale is included in the 2 remaining farmlets, although only as a winter feed supply. Given the potential environmental impacts of these grazed forage crops, N leaching losses are being measured in selected treatments during 2018 to provide:

- Quantitative N leaching data for the crops, soils and climate of SDH.
- N leaching comparisons between:
  - autumn-grazed v lifted FB
  - winter-grazed v lifted FB
  - winter-grazed kale
  - selected pastures on the milking platform.

Preliminary results summarising yields and imposed grazing pressures are shown in Table 1. Soil mineral N levels and interim flow-weighted concentrations of N in leachate are shown in Table 2. Due to a relatively dry winter, drainage totals have been less than normal (May-Sept = 260 mm; July-Sept = 115 mm). The amounts of N lost thus far this winter are hence lower than expected.

Table 1: Crop yields, N content, and animal intakes for the autumn and winter grazed fodder beet (FB) and the winter grazed kale.

	May grazed FB	July grazed FB	July grazed Kale
Crop yield (T/ha)	24.4	20.4	15.7
Crop N (kg/ha)	288	199	286
Grazing pressure (urinations/m^2)	0.3	1.8	0.8

Table 2: Soil mineral N contents (kg/ha) for the 0-600 mm soil layer and interim flow-weighted leachate N concentrations (mg/L) up to September 2018. (* denotes a significant difference)

Treatment	Soil Mineral N (kg/ha)	Drainage NO_3-N concentration (mg/L)
Fodder beet		
Lifted May	52[a]	14.1
Grazed May	74[a]	20.9
Significance	*	
Lifted July	44[b]	10.0
Grazed July	54 [b]	10.7
Significance		
Kale	71	11.9
Pasture	nd	10.8

[a,b]as measured in either [a]May or [b]July 2018.

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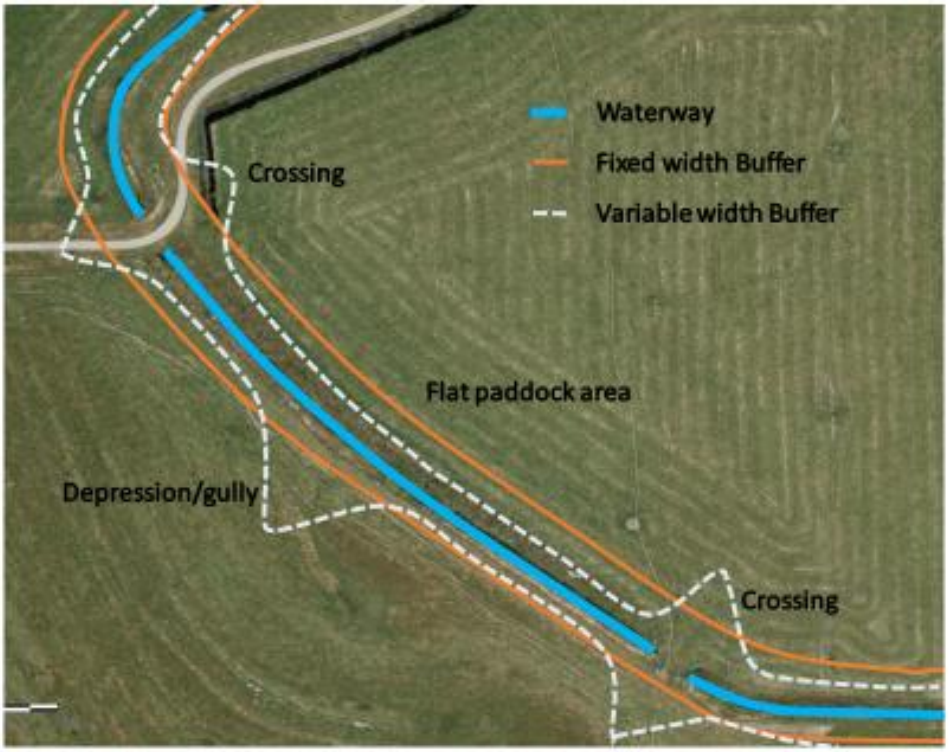
2. Variable Width Waterway Protection

Rather than having a set buffer width along the entire length of the SDH stream, a variable width riparian plan has been developed with the aim of protecting areas that have the greatest risk of generating surface runoff – for example, locations such as critical source areas (CSA), laneways, drains, gullies. Stream protection using variable width buffer areas will reduce the amount of contaminants reaching waterways, particularly phosphorus (P), sediment and faecal microbes (such as E. coli).

The plan developed for the SDH has been designed to meet the aspirations of Iwi and the SDH community of interest, as well as satisfying Resource Consent requirements. Some pertinent features of the plan are:

- The stream area occupies 1.4 ha and is currently fenced to encompass 2.6 ha in total.
- The proposed variable width riparian area is 3.8 ha, with a minimum buffer distance of 5 meters.
- Progressive planting is planned for buffer areas over several years.
- Plantings are to be non-toxic native grasses and shrubs and flaxes.
- Allowance has been made for digger access as required.



3. Stream monitoring

The stream that drains the foot of the terrace at SDH has been monitored since spring 2017 to scope its usefulness as a catchment that could be used to monitor the general effects of SDH farming activity (i.e. considering other water quality parameters such as faecal microorganisms and sediment and phosphorus concentrations and loads). Preliminary analysis of results indicate that the stream itself is of limited value for this purpose, however, due to (i) the extremely complex stream hydrology (it gains and loses water along its flow path), and (ii) flows appear to likely include drainage discharges from surrounding farmland and historical landfill sites. Monitoring of the many tile drain inputs to the stream indicates that considerable quantities of N are discharged to the stream, potentially offering opportunity for attenuation using some form of end-of-pipe technology. Discussions are therefore underway to scope the potential for this attenuation to be realised.

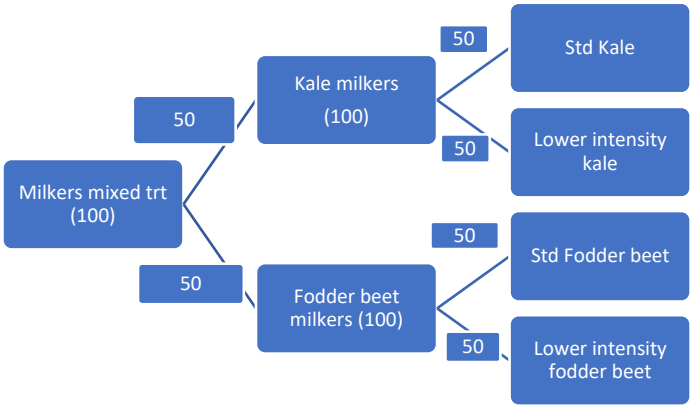
Southern Dairy Hub Farm Systems Proposal 2018-2021

Target System Performance and Input Parameters

		Crop Type	
		Kale (wintering) + grain as lactation supplement	Fodder beet (wintering) + fodder beet as lactation supplement
N Input	**Standard Environmental Impact System**	≥1300 kg MS/ha (milking platform) ≥ 250 days in milk Up to 250 kg N/ha for 2018-19 Up to 700 kg/cow lactation supplement (home grown first, use driven off pasture deficit) 23% replacement rate No N applied after 10th April or if soil temperature <5 °C in spring	≥1300 kg MS/ha (milking platform) ≥ 250 days in milk Up to 250 kg N/ha for 2018-19 Up to 700 kg/cow lactation supplement (home grown first, use driven off pasture deficit) 23 % replacement rate No N applied after 10th April or if soil temperature <5 °C in spring
	Reduced Environmental Impact System	30% lower N leaching ≥ 250 days in milk 23% replacement rate N applications – Sep, Dec, Feb, Mar Up to 75 kg N/ha for 2018-19	30% lower N leaching ≥ 250 days in milk 23% replacement rate N applications – Sep, Dec, Feb, Mar Up to 75 kg N/ha for 2018-19

Management

- Cows allocated to their farm system prior to winter 2018
- Wintered within their farm
- Spring management as outlined below



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SDH 2018 Winter management and preliminary results

Management

- Cows wintered in their respective farm herds – 2 mobs for each farm
  - Lighter mixed age cows and R2's
  - Mixed age cows
- At the first springer draft they were drafted into earlies and lates
- Body condition score assessments fortnightly
- Once daily allocation of crop
- Springers drafted off crop 10 days before expected calving date
- Springers managed in 2 mobs
  - Kale wintered
  - Fodder beet wintered

Feeding

- Crop and supplement allocation targeted for an average of 0.5 BCS gain between 1 June and calving = eating 135 MJ ME
- 70% crop:30% supplement was the target ratio
- 40 T deficit in kale feed budget filled with PKE up until 19th July
- Kale cows finished crop 23rd August; Fodder beet cows finished crop 13 September

Results

Table 1: Winter feed allocations (kg DM/cow/day) offered

	Std Kale		LI Kale		Std FB		LI FB	
	MA	Lights/R2	MA	Lights/R2	MA	Lights/R2	MA	Lights/R2
Crop	8.1	7.9	8.6	8.3	11.3	11.3	11.2	11.3
Baleage	3.2	3.4	1.6	1.7	3.4	2.3	2.6	2.8
PKE	4.0	3.7	4.8	5.1				

Table 2: Kale yield and quality by month

	June	July	August
Kale average yield (kg DM/ha)	12.0	13.7	13.6
Kale DM%	11%	12%	13%
Kale ME	12.4	12.0	11.8
Kale crude protein %	17.4	16.6	13.4
Kale Phosphorus	0.30	0.25	0.27
Kale Magnesium	0.17	0.16	0.17
Kale Calcium	1.30	1.15	1.00

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Table 3: Fodder beet yield and quality by month.

	June	July	August
Average fodder beet yield (kg DM/ha)	22.4	20.5	19.0
Average proportion of bulb (%)	75	81	75
Fodder beet leaf DM%	9.0	9.9	11.8
Fodder beet leaf ME	11.1	10.8	12.5
Fodder beet leaf crude protein %	20.9	25.3	11.0
Fodder beet leaf Phosphorus	0.27	0.35	0.32
Fodder beet leaf Magnesium	0.59	0.51	0.39
Fodder beet leaf Calcium	1.15	0.75	0.64
Fodder beet bulb DM%	15.7	14.9	14.5
Fodder beet bulb ME	>13.0	>13.0	>13.0
Fodder beet bulb crude protein %	11.5	11.5	9.1
Fodder beet bulb Phosphorus	0.16	0.14	0.12
Fodder beet bulb Magnesium	0.16	0.14	0.14
Fodder beet bulb Calcium	0.18	0.15	0.14

Table 4: Supplement quality by month.

	June	July	August
Baleage DM%	38.6	35.7	40.7
Baleage ME	10.2	10.3	10.1
Baleage crude protein %	11.6	14.8	14.5
Baleage Phosphorus	0.30	0.32	0.33
Baleage Magnesium	0.18	0.19	0.18
Baleage Calcium	0.57	0.58	0.60
PKE DM%	93.6	85.5	-
PKE ME	12.3	12.1	-
PKE crude protein %	17.2	23.2	-
PKE Phosphorus	0.63	0.64	-
PKE Magnesium	0.30	0.31	-
PKE Calcium	0.47	0.48	-

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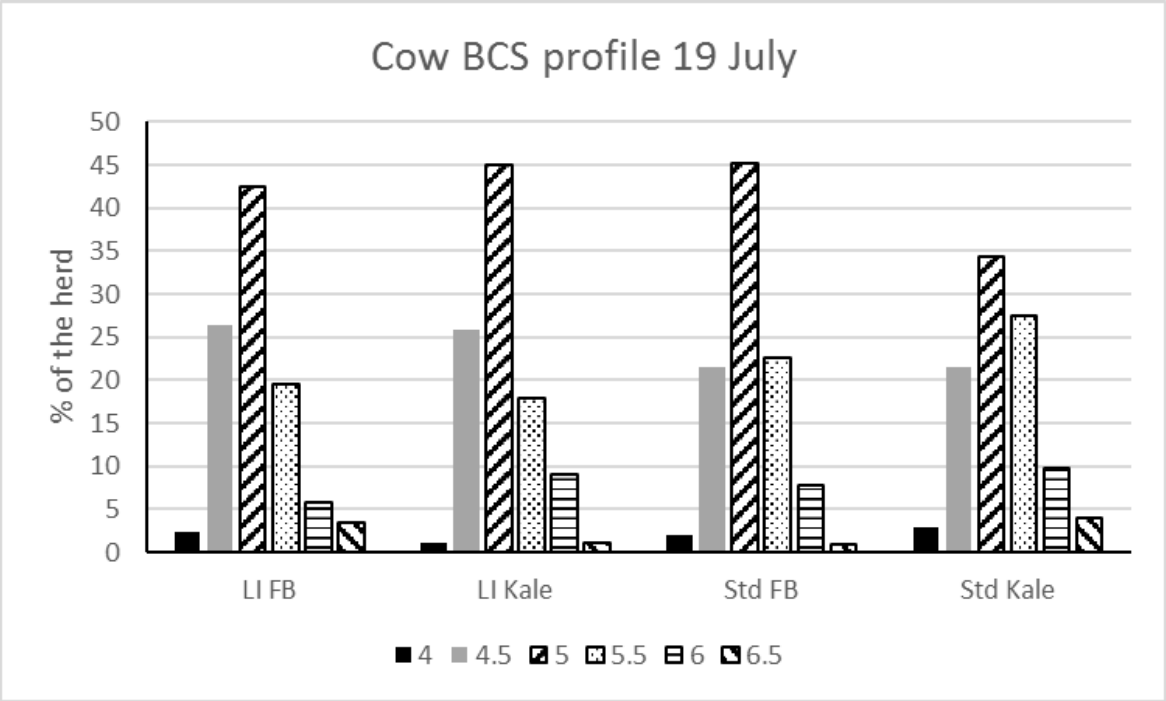

Fig 1: Cow body condition score profile on 19th July

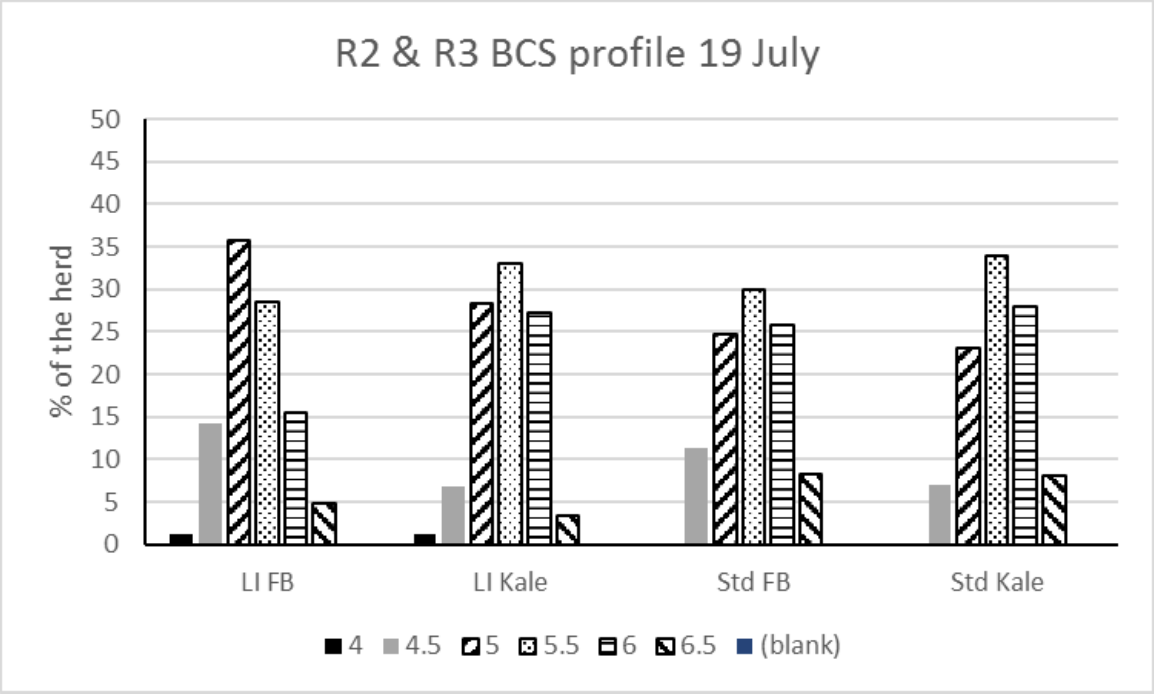

Fig 2: Average herd body condition - Rising 2yr old cows till 19th Jul

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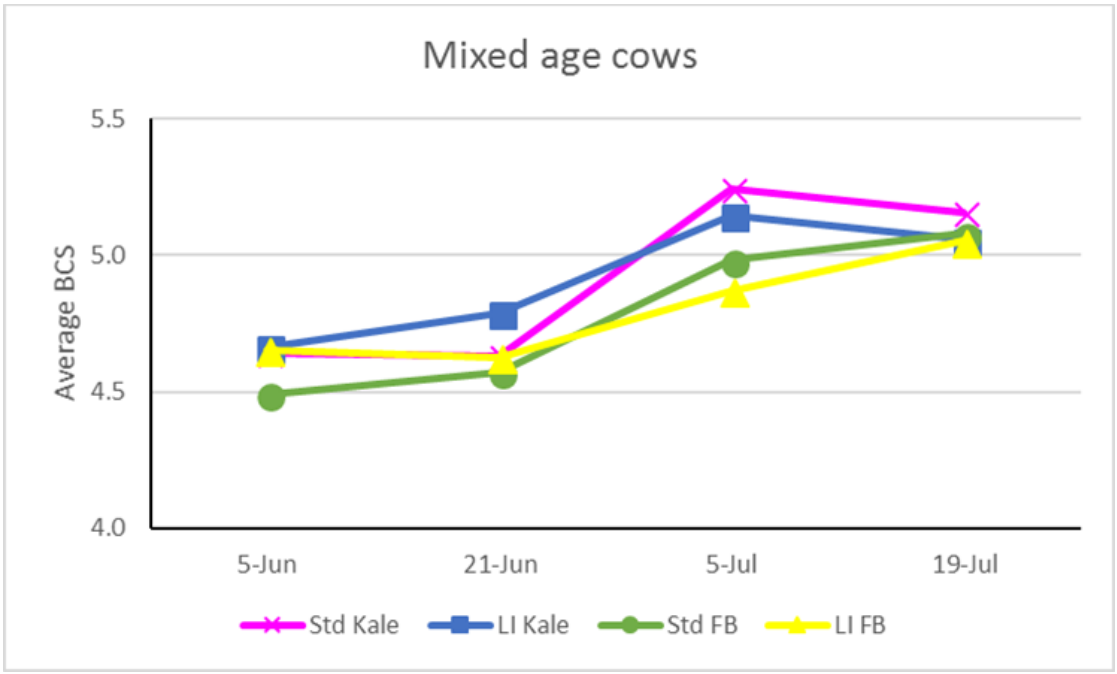

Figure 3: Average herd body condition of mixed age cows by month till 19th July

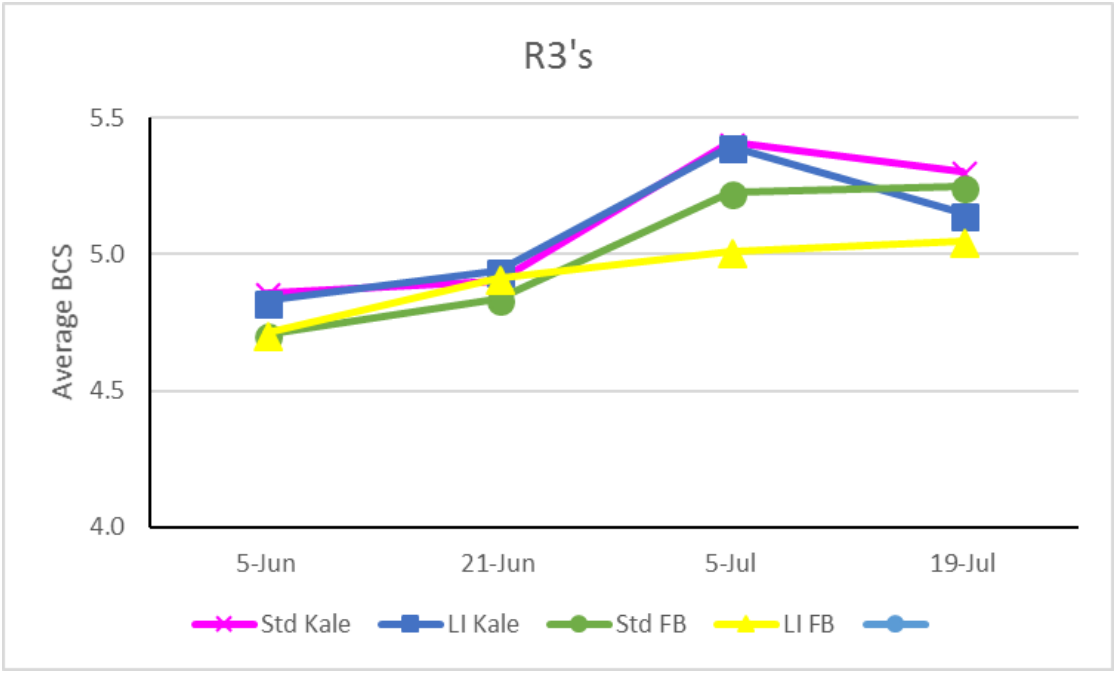

Fig 4: Average herd body condition - Rising 3yr old cows till 19th July

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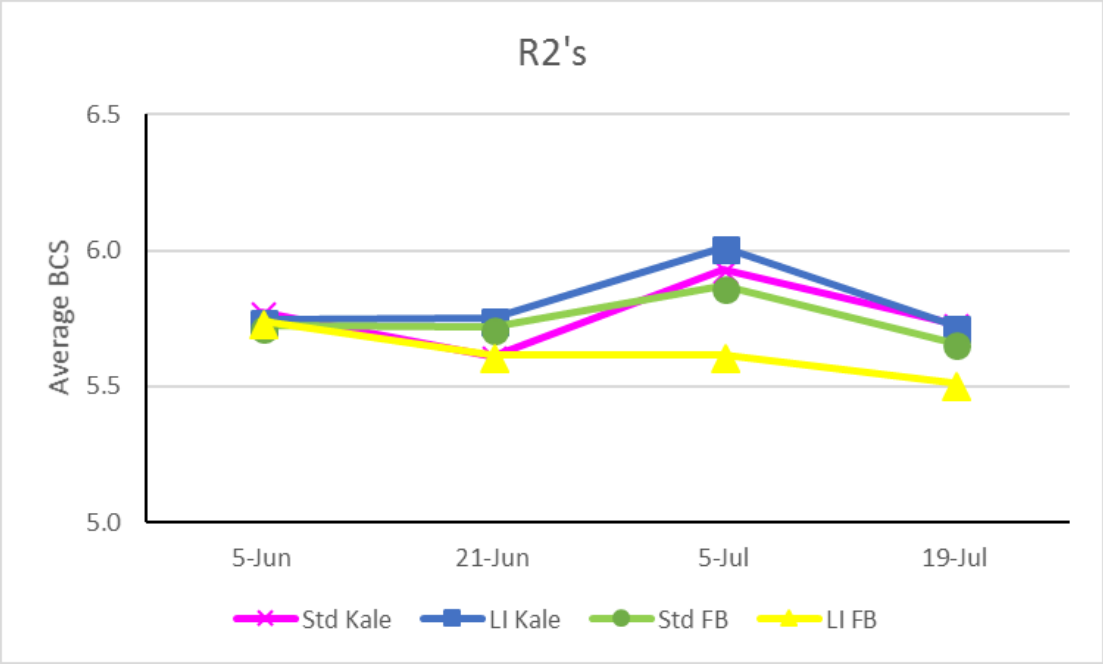

Fig 5: Average herd body condition - Rising 2yr old cows till 19th July

Season to Date summary

	Std Kale	LI Kale	Std FB	LI FB
% calved	94	96	96	96
Deaths (%)	2.4	0.5	7.1	7.8
Culls (%)	3.8	1.6	4.3	1.7
Metabolic cases (%)	0.5	0	5.2	3.9
Assisted calvings (%)	1.0	1.0	0.5	0.6
Staph infections (%)	2.6	6.2	3.8	3.0
Milk solids (kg/cow) 26 Sep	43	44	44	44
Milk solids (kg/ha) 26 Sep	135	116	136	113
Supplement fed YTD (kg/cow)	97	111	65	78
Average BCS 26 Sept (excluding dry cows)	4.4	4.4	4.4	4.4
% less than BCS 4	6	3	2	3

Key Messages

- Average BCS targets on 19th July were achieved for mixed age cows and R2's but still a percentage of each group were below the target.
- Calving BCS data will be reported once all cows have calved
- PKE was fed to the Kale herds until 19th July to fill a 40T DM crop deficit in the kale feed budget.
    - Original feed budget to determine crop area was done on an average of 14 T DM/ha.
- Kale DM% & yield and ME were negatively correlated i.e. as DM/yield increased, quality decreased
- Proportion of fodder beet bulb was highest in July
- Mineral concentrations of the fodder beet changed with time
    - Decrease in leaf magnesium and calcium
    - Decrease in bulb phosphorus
- Deaths/euthanised were predominantly metabolic related but also include Johnes, calving damage, broken leg, peritonitis and several with inconclusive autopsy results
- Culls predominantly slips and empties at the end of winter, plus a couple for poor udders and behavioural issues.
- Bacto sampling all cows above 200, 000 SCC at herd test. Currently 35 animals identified with Staph infections.
- Similar MS production per cow season to date
- Supplement feeding to

SDH 2018 Calf management and preliminary results

Management

- Kale and fodder beet cows drafted off crop using the same criteria
- 2 springer mobs – kale and fodder beet
- Calves collected within 24 hours of birth
- On arrival at the shed:
    - Blood sample
    - Weight, height, girth and length measurements
- Managed separately for the first 24 hours
- Gold colostrum collected separately from kale and fodder beet cows
- Calves feed colostrum from their treatment for the first 48 hours
- After 48 hours moved into mixed groups of kale and fodder beet calves (approx. 20/group)
- Weighed and measured fortnightly until weaning
- Weaning target weight determined from calf genetics i.e. LW breeding value and parentage

Feeding

- 2-3 litres gold colostrum for the first 48 hours
- Ad libitum pooled colostrum until they were moved outside
- Offered ad libitum fibrestart and had access to clean water indoors
- Once they were 45-50 kg weight they were put outside where they were offered:
    - 2-3 litres milk 2 times/day until at least 6 weeks old and 60 kg
    - Fibrestart
- High protein pellets have been fed since 20th September

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Results

Table 3: Young stock information and measurements by farmlet

	Std Kale (Pink)	LI Kale (Blue)	Std FB (Green)	LI FB (Yellow)
No. calves	54	41	46	48
% from R2's	15		15	
Average Date of birth	11 Aug	11 Aug	12 Aug	11 Aug
Medium Date of birth	10 Aug	10 Aug	10 Aug	7 Aug
Mean Colostrum Brix (range)	19.7 (13-27)		19.5 (11-29)	
Colostrum Brix - % < 22	82		80	
Measurements within the first 24 hours of birth				
Weight (kg) (mean (SEM))	32.0 (0.61)	33.1 (0.58)	29.6 (0.59)	29.4 (0.72)
Height (cm) (mean (SEM))	70.9 (0.38)	71.2 (0.42)	69.5 (0.46)	69.1 (0.48)
Length (cm) (mean (SEM))	58.1 (0.55)	58.6 (0.45)	56.9 (0.50)	58.4 (0.81)
Girth (cm) (mean (SEM))	74.3 (1.17)	74.6 (1.57)	72.7 (0.55)	72.7 (0.73)

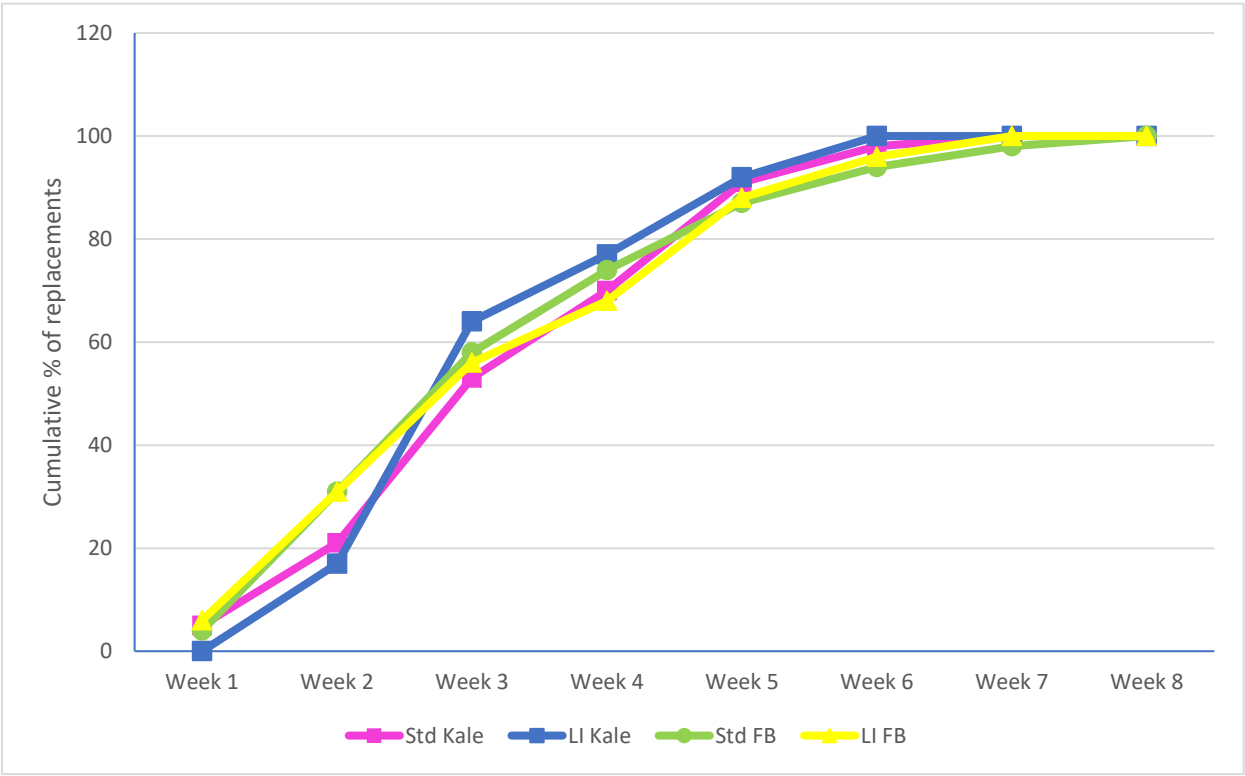

Figure 1: Replacement rate cumulative percent by week for each farm system

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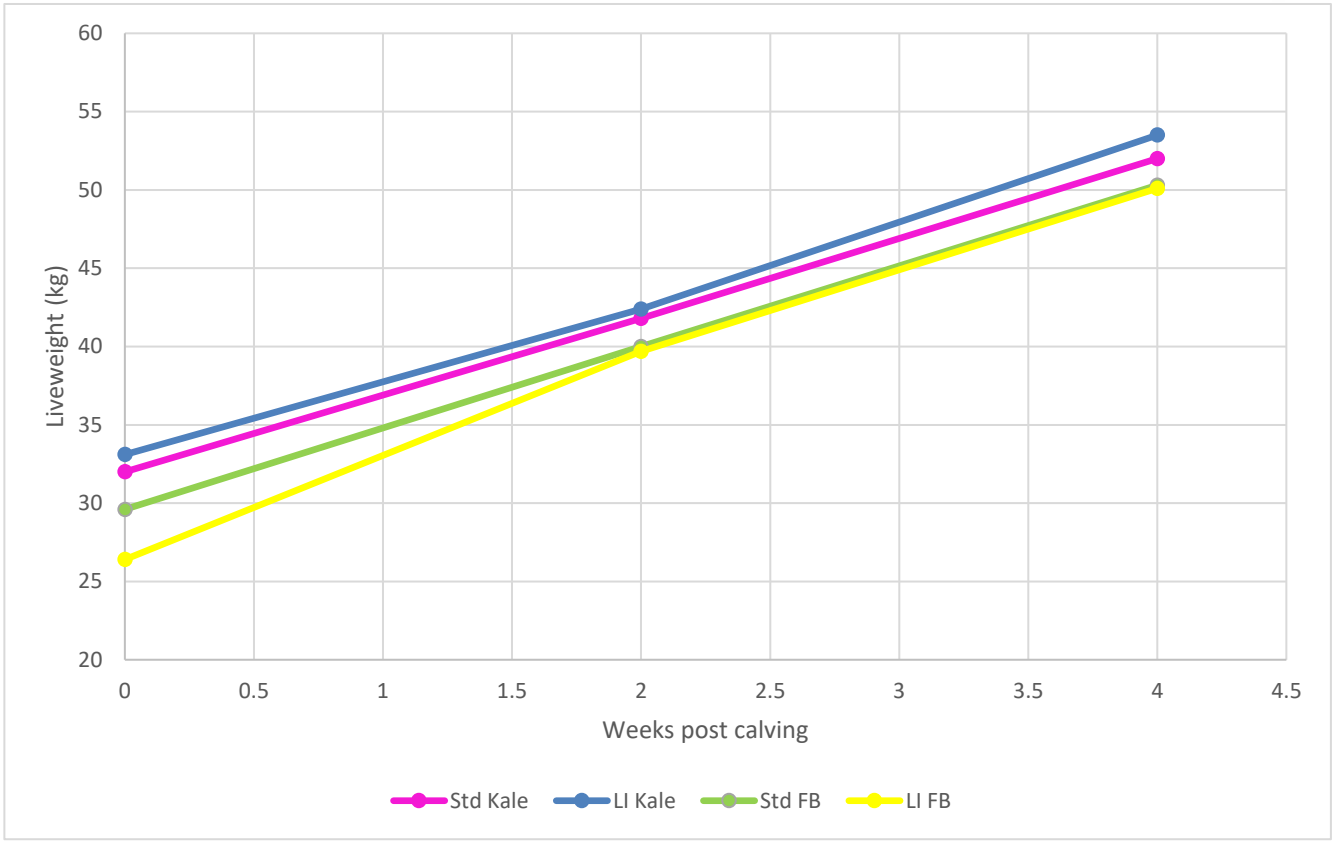

Figure 2: Average calf liveweight entering the shed and fortnightly liveweight for the first month

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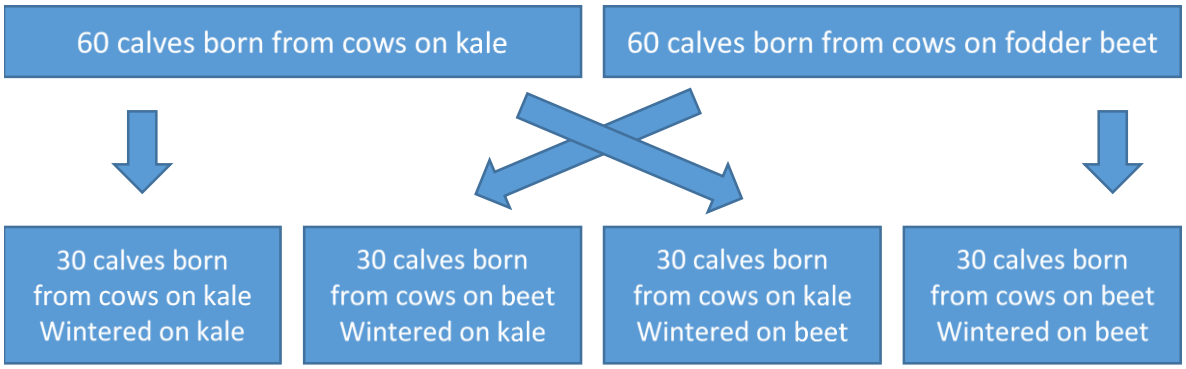
SDH 2018 R1 Management and Preliminary Results

Management

- Using the diet of the dams in winter 2017, the spring 2017 born calves were allocated into 4 balanced groups prior to winter 2018 (see below).
- Calves were managed under the same management until 10th May when the two groups allocated to fodder beet started their transition onto the crop on the milking platform area.
- Kale R1's continued to be managed on pasture until 1 June when they were transitioned onto kale on the support block
- Winter allocations were
  - Fodder beet – 5.0 kg DM fodder beet and 3.1 kg DM baleage
  - Kale – 4.8 kg DM kale and 3.2 kg DM baleage
- Kale animals finished their crop on the 29th August and returned to pasture
- Fodder beet animals finished their crop on 26th September
- Animals were weighed, measured and a blood sample collected on the 10th May and the 14th August



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Results

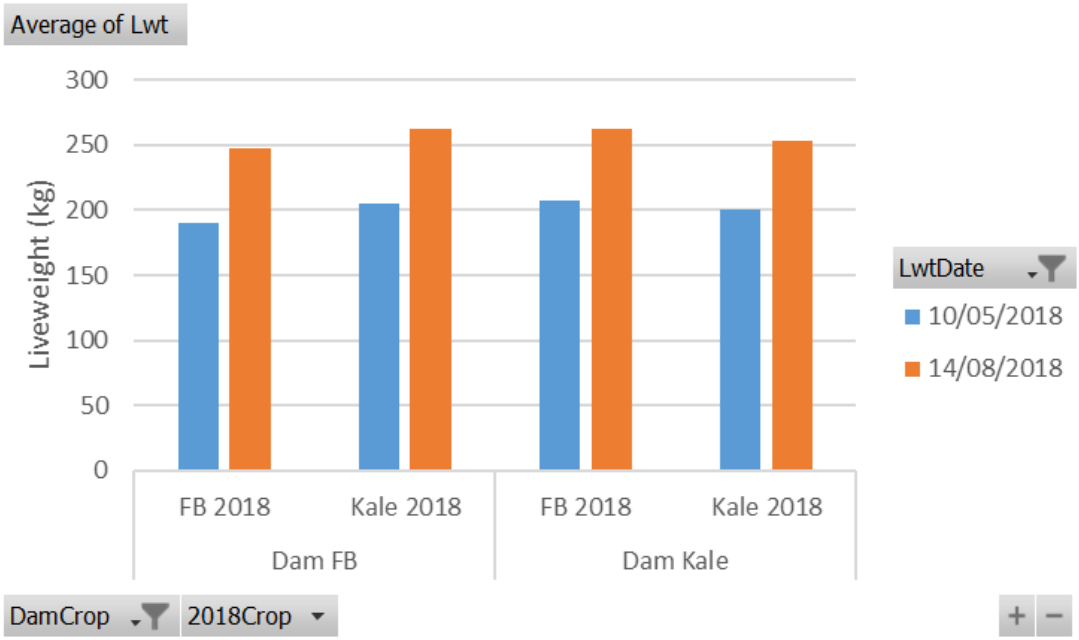

Fig 1: Liveweight pre- and post-winter 2018 for the four treatment groups

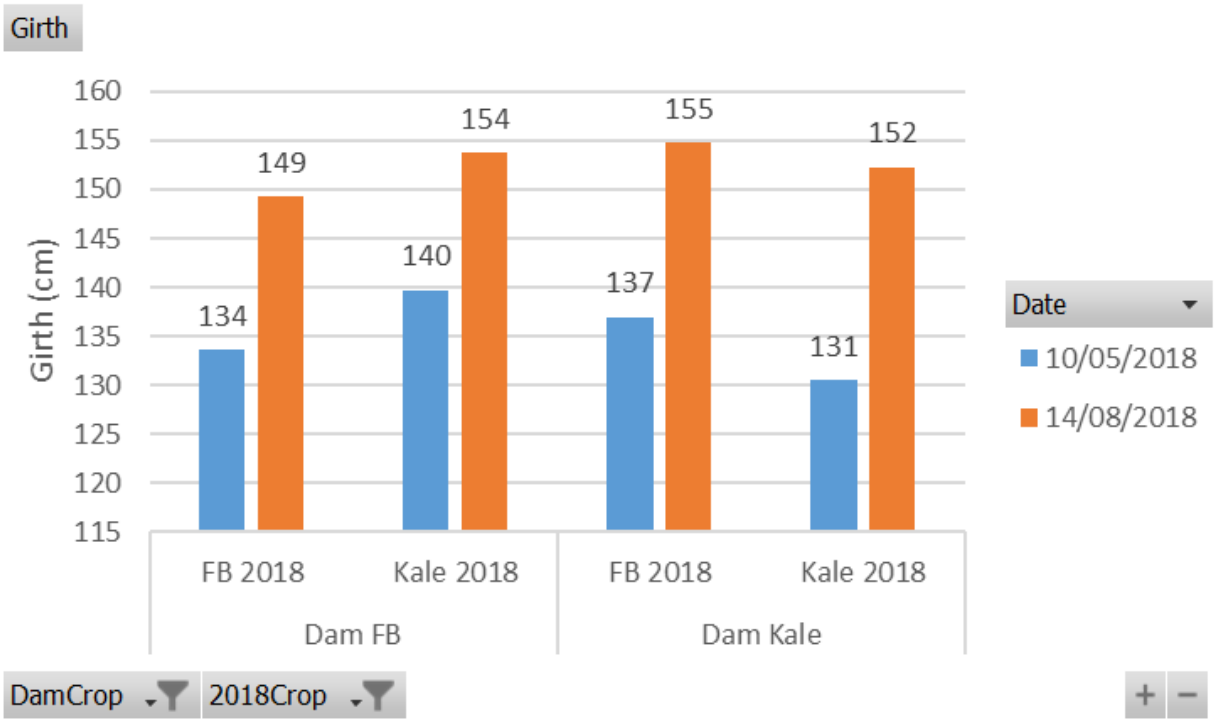

Fig 2: Animal girth pre- and post-winter 2018 for the four treatment groups

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Notes:

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