SOUTHERN DAIRY HUB FIELD DAY

15th March 2018

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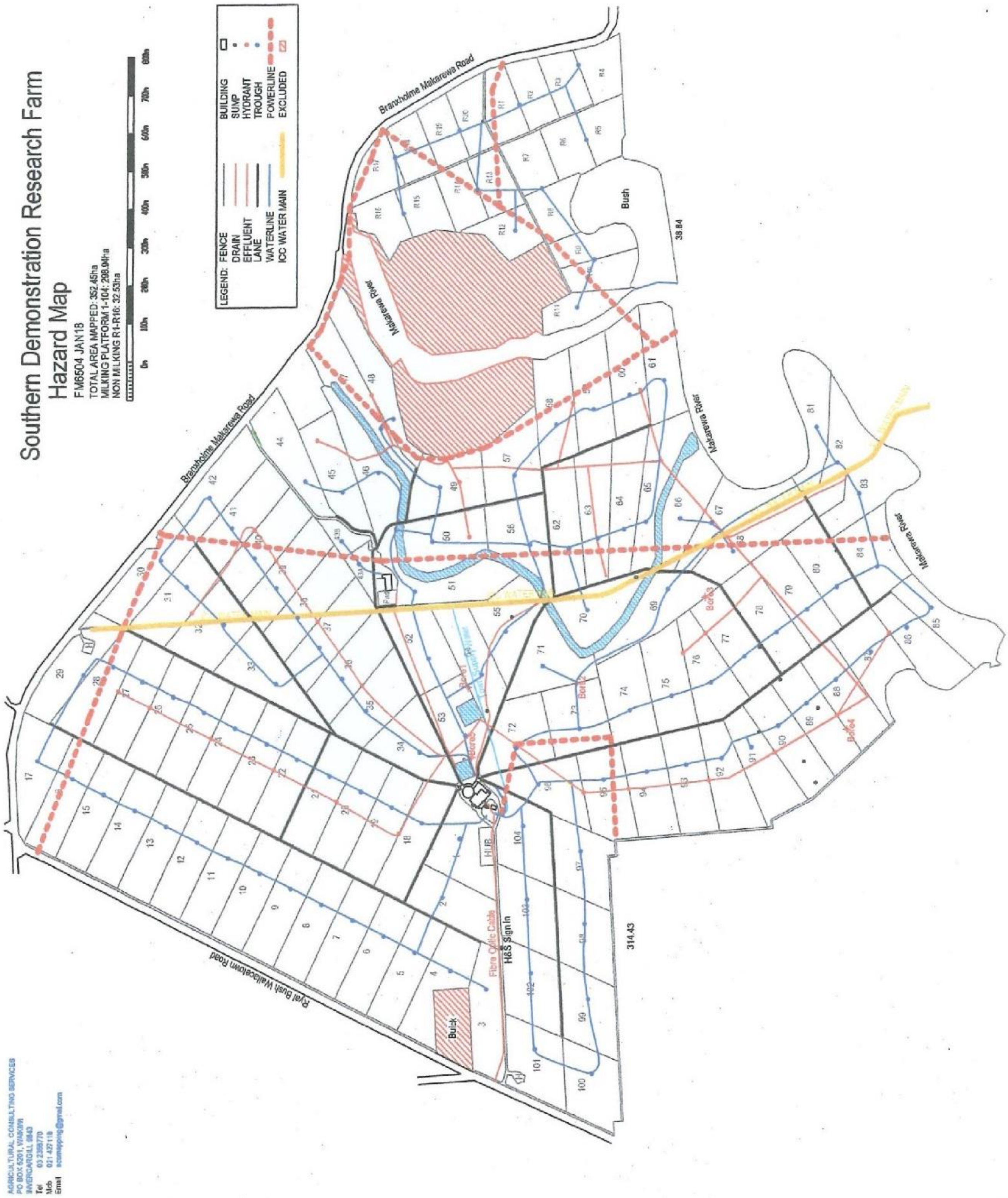

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Visitor Health and Safety Requirements

Entry onto property by permission and appointment only.

Contact either:

Business Manager Guy Michaels 027 564 5595 or

Farm Manager Jason Phillips 021 245 0402

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.

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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2017/18 Season
Hub Weekly Farm Update
Date: 6/3/18

Concrete grooving close to the entry to the shed to help alleviate a slippery yard; thanks to Doug from 'Cow Yard Grooving'

Week ending 6th March 2018

Table 1: Key Numbers week ending 6th March 2018

Av. Pasture Cover	2900 kg DM/ha
Round Length	40-42 days
Pasture Growth rate	74 kg DM/day
Soil temp	15 °C
No. of cows on farm	651 cows
Av. Supplement used (milkers)	0 kg DM/cow/day
Av. Kg MS/cow/day	1.6 kg MS/cow/day
Av. Kg MS/ha	4.16 kg MS/ha
Milking frequency	3in2

Week summary:

- APC lifted to 2900 kgDM/ha (although reduced pasture growth)
- Round length extended to 40 – 42 days
- Baleage contractor booked
- Herd pregnancy test results: 7 – 11% empty, 64% calve in 3 weeks, 83% in 6 weeks (refer to stock section notes)
- Winter feed budget in progress factoring in potential late lactation fodder beet grazing

Herd & Production

- *Four herds split evenly on age, BW / PW and on the winter crop trial treatment groups to ensure the herds are as even as possible.*
- *Each herd allocated a farmlet corresponding to their herd tag colour Green, Blue, Yellow and Pink.*
- *Farmlets have paddocks allocated so each herd has equal walking distance from the shed and the same proportion of each soil type and equal proportions of pastures in the FVI trial (forage value trial – refer web site section on research).*
- *Staph Aureus has been identified in approximately 40 cows at The Hub. A high bulk SCC and cows not reacting quickly to treatment encouraged investigation leading to this diagnosis.*
- *Infected cows have drafted out and are being milked last to prevent the spread of this infection.*

Table 2: Herd & Production

Herds on Milking Platform		Unit
Milkers – 3 in 2	620	cows
Milkers - OAD	0	cows
Colostrum	0	cows
Springers	0	cows
Sick mob (1 x penicillin, In the vat: 2 x lames and 28 x HSCC cows) All but 4 in vat	31	cows
Culls / deaths	0	cows
Current Stocking Rate (platform; not counting R1's)	2.6	cows/ha
	651	
Production (to the factory) (28/2/18)		
Total Milksolids (YTD)	202,571	kgMS
Total Milksolids (MTD)	3,754	kgMS
Total Milksolids (last 7 days)	6,769	kgMS
Average per cow daily production (last 7 days)	1.6	kgMS/cow/day
Per ha production (last 7 days)	4.16	kgMS/ha
Other (to the factory)		
Protein: Fat Ratio (7-day avg.)	0.83	%
Milk Urea (7-day avg.)	26.63	mg/dl
SCC (7-day avg.)	132,000	cells/ml
Fat Evaluation Index (FEI)	A	
Fonterra 17/18 Forecast - as at 7th Dec 17	$6.40	$/kgMS

Milking frequency

- Farm team to discuss continuing with milking 3in2 for the rest of the season vs. returning to twice a day
- Target of 1.6 kgMS/cow/day before considering twice a day option

Other considerations are –

- Will the move to extend the round drop per cow production?
- Test cow BCS now
- Are the farm team happy to continue 3in2 or not?

Lame cows

- 3 cases in the last 2 weeks
- No issues

Feed Management

- *The four herds are to remain on their allocated farmlets at all times. The 2017/18 season aim is to feed all cows in a similar manner all season. Any differences to be recorded.*
- *Decision rules for Cows of BCS 4 or less are that they can be fed extra supplement in the shed as required by the farm team and be milked OAD but will remain in their allocated herds for research purposes.*
- *The concentrate in the shed is a 50:50 mix of PKE and barley.*

Table 3:Feed Offered

Milkers – Pasture offered	18	kgDM/cow/day
Milkers - Fodder Beet	0	kgDM/cow/day
Milkers - Pasture Silage	0	kgDM/cow/day
Milkers - Concentrates – 3 in 2 Cows (shed)	0	kgDM/cow/day
Milkers - Concentrates – 3 in 2 Cows (pdk)	0	kgDM/cow/day
Milkers - Concentrates - OAD Cows	0	kgDM/cow/day

Pasture

- APC lift over the last 3 weeks; harder to hit the residual target of 1600 kg DM/ha for the autumn
- Round extended mid-month from 30-day to a 42-day without the addition of any supplement. The 42-day round will help refocus the residual APC target of 1600 kgDM/ha
- If paddocks exceed APC of 3300 kg DM/ha, they will be harvested as baleage. The intention is to keep an even approach towards the 4 different farmlets.

Crop feeding

If the winter feed budget allows, fodder beet may be considered as a supplement for milkers late season.

This will allow the farm team to:

- Offer a supplement feed with pasture to take pressure off the APC late in the season
- Introduce the cows to beet through early winter transition
- Open up the fodder beet paddock face ready for winter and ease of grazing
- Avoid the use of pasture paddocks when transitioning onto fodder beet early winter (and the pugging damage associated)

Replacements

- R1 heifers behind a wire rotating around the platform; no supplements offered
- R2 heifers on the platform; pregnancy testing this week

Land, Pasture, Crop & Silage Management

- *Total area is 327ha(eff), 32.5ha(eff) young stock block and 294ha(eff) platform. Winter crop is grown on both blocks for all stock.*
- *Crop rotation is two years in crop then re-grass. PGG Wrightson grass cultivars used are Rely, Platform and Excess, all diploids.*
- *Where target residuals are missed, topping after grazing is the tool the farm team use as needed.*

Table 4: Land, Pasture, Crop & Silage Metrics

		Unit
Pre - Graze cover *target*	2700	kgDM/ha
Post - Graze cover *target*	1600	kgDM/ha
Average Pasture Cover (avg. over 4 farmlets)	2900	kgDM/ha
Growth Rate (avg. over 4 farmlets)	74	kgDM/ha/day
Rotation Length (avg. over 4 farmlets)	42	days
Area Available for grazing (milkers)	253	ha
Regrassing Area (out of rotation)	0	ha
Baleage/Silage Area (out of rotation)	0	ha
Crop Area (out of rotation whole farm)	46	ha
Aeration Area	0.0	ha
Total platform effective	300	ha
Young Stock (not included in rotation)	29	ha

Crop management

- Fungicide spray (recommended by our agronomy support PGGWrightsons) applied to 12ha of beet, mixed with a thistle spray to control thistles present in the beet.
- A second fungicide spray due on same area at the end of month.
- Spray has a 42 day with holding period so half of the beet area was sprayed to allows for potential late lactation grazing (should feed budget and yields allow).
- No spray drift onto surrounding pasture paddock. Our research tech team had to allow 24 hours post spray before entering to avoid contact with residues.

Hub Kale yield assessment done end of February at 7.8t/DM/ha

Fertiliser & Nitrogen

- No N applied this week – planning a light dressing on the support block this week.

Table 5: Nitrogen use on Farm

Nitrogen (Urea only) (last 7 days)		Unit
Area (Winter crop)		ha
Rate		Kg/N/ha
Fertiliser (last 7 days)		
Area	0	ha
Rate	0	kg/ha
Climate conditions		
Rainfall (total last 7 days)	6	mm
Soil Temp (7-day average) @10am	15	°C

Stock Reproductive Performance

Table 6: Reproduction Metrics

Planned start of Mating (PSM)	Target	Actual	Unit
Mixed Aged Cows		29-Oct-17	Date
2016 Born Heifers		21-Oct-17	Date
Calving spread			
3 weeks		64	%
6 weeks		83	%
9 weeks		97	%
3 week Submission Rate	90	91	%
6 week in-calf rate	78	79	%
Empty Rate	10	**7-11**	%

- The herd had an empty rate of 7 – 11%. This is either 7% of cows scanned or 11% of cows mated. The 11% is from that start of mating inclusive of cows culled due to Staph outbreak and the dry period.

Fertility Focus Report

Fertility Focus 2017: Seasonal

SDF Limited

[redacted]

Report date:	12/03/18
PTPT:	[redacted]
Herd Code:	
No of cows included:	693
These cows calved between:	19/06/17 and 25/12/17
Mating start & stop date: (estimated from AI or rectal pregnancy test data)	27/10/17 - 11/01/18
Planned start of calving:	05/08/18

incalf FERTILITY FOCUS Version 1.0

DairyNZ

LIC

1 Overall herd reproductive performance

6-week in-calf rate
Percentage of cows pregnant in the first 6 weeks of mating

Your herd	77% (76-81%)
Aim above	78%

★★★★★

Empty rate
Percentage of cows not pregnant after 11 weeks of mating

Your herd	11% (7-13%)
Aim for	6%

★

% of herd in calf after:	3 weeks	6 weeks	9 weeks	12 weeks of mating
Top result				
Average				
Below average				

2 Drivers of the 6-week in-calf rate

3-week submission rate
% of cows that were inseminated in the first 3 weeks of mating

Your herd	92%
Aim above	90%

★★★★★

Non-return rate
% of inseminations that were not followed by a return to heat

Your herd	
Aim above	

Conception rate
% of inseminations that resulted in a confirmed pregnancy

Your herd	54%
Aim above	60%

★★★

3 Key indicators to areas for improvement

Calving pattern of first calvers
Well managed heifers get in calf quickly and calve early.

Calved by	Week 3	Week 6
Your herd	81%	96%
Aim above	75%	92%
	★★★★★	★★★★★

Calving pattern of whole herd
Did late calvers reduce in-calf rates?

Calved by	Week 3	Week 6	Week 9
Your herd	64%	83%	97%
Aim above	60%	87%	98%
	★★★★★	★★★★★	★★★★★

Pre-mating heats
A high % of well managed cows will cycle before the start of mating.

Your herd	
Aim above	85%

3-week submission rate of first calvers
Well managed heifers cycle early

Your herd	95%
Aim above	90%

★★★★★

Heat detection
A high % of early-calved mature cows should be inseminated in the first 3 weeks of mating.

Your herd	93%
Aim above	95%

★★★★★

Non-cycling cows
Treated non-cyclers get in calf earlier.

Treated	By PSM	Wks 1-3	Wks 4-6
Your herd	0%	0%	0%

Rating	What does it tell me?	What should I do?
★★★★★	Top result	Ideal - keep up the good work!
★★★	Average	Getting there - focus on getting the details right.
★	Below average	Plenty of room to improve - seek professional advice.
	No result	Not enough information provided - seek help with records.

Performance after week 6
If you ran bulls after week 6 of mating, empty rate helps assess bull performance.

	Empty rate
Your herd	11%
Expected	5%

Seek advice

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Southern Dairy Hub Farm Systems Proposal 2018-2021

Background

Over the last 6 months the Research Advisory Committee (RAC) has held a series of meetings and workshops to discuss farm systems options for implementation from 1 June 2018 for the next 3 lactation seasons. A brainstorming session was used to identify issues facing dairy farmers in Southland and Otago. These issues were collated into 13 themes from which the top 3 were identified. The top 4 issues were:

1. **Fodder beet**
2. **Nutrient loss reduction**
3. **Wintering**

There is a desire to understand crop vs **off-paddock wintering** and the **impact of infrastructure on whole system performance**, profitability and achieving environmental regulation. Realistically, however, it will be a 2-3 year timeline before this could be considered on the SDH farm due to the current lack of infrastructure and the tight budget situation.

The proposed systems have been designed to better understand crop-based wintering in relation to consequences for environmental impact and profit with the view that the best crop system would be used as the base farm in the next phase of farm systems comparisons (2021 onwards), that might include off paddock infrastructure.

Several mitigations to reduce the environmental impact were considered in the pre- experimental modelling and farmlet design that is described below.

The RAC opted to only consider system changes where there is high confidence in reducing the environmental impact. There were two emerging mitigations – namely plantain and catch crops - that have not been considered in the farm systems designs. An additional option within the fodder beet systems to reduce the environmental impact is lifting the fodder beet in autumn.

In developing the systems, consideration was given to the following factors:

1. Currently SDH is a first year conversion with 80% new pastures and some areas that need drainage, ripping etc to improve performance ie. pastures are still developing
2. Some leniency in N fertiliser in Year 1 (within defined boundaries) for all systems
3. The staph aureus infection in the herd may require more aggressive culling in the next couple of years to avoid ongoing issues
4. Young herd with potential for increasing milk production
5. Production must be sufficient for the farm to have credibility with southern farmers
6. Assumed good management practice implementation on all farmlets with respect to grazing management, reproductive management, calf rearing, fertiliser use etc.
7. Feed to be purchased for mature cattle rather than stock sent out to grazing and concentrate preferred to silage because of quality and consistency of the product

As the farm develops the expectation is that performance will improve in all systems – Targets below:

	2018-19	2019-20	2020-21
MS/cow	450	465	480
MS/ha	1350	1395	1440
N fertiliser on base farm (kg N/ha)	Up to 250	200	180
Total supplement to milkers (kg/cow)	7-800	7-800	7-800

The Process

The Standard kale system was set up as the base model in Farmax Dairy. The results of this were used to generate the key input parameters for the Standard fodder beet system.
Further management changes were considered (reduced N fertiliser, less supplementary feed, reduced stocking rate, dry off date) for each to generate the parameters of the two reduced impact systems.

During the modelling process we identified several physical aspects of the farm and a constraint of OVERSEER that could impede model results being achieved. These are:

1. The pasture growth of the farm (we may have been optimistic on the time to reach potential yield given the early stage of farm conversion).
2. Choice of in-shed supplement and amount that can be consumed during milking
3. The uncertainties associated with N leaching estimates for autumn-grazed fodder beet crops.

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

Physical Model Assumptions

- 75 ha effective for each herd
- Some double cropping for both kale and fodder beet

Cow properties

- 200 milking cows for the Standard kale system
- Breed - FXJ, BW 86
- Cow Lwt – 490 kg (as of December)
- Planned start of Calving -10 August
- Calving spread see below- based on the fertility focus report for a GMP calving spread.

Week	Calving		
	%	cum%	fem%
1	20	20	50
2	20	40	50
3	20	60	50
4	10	70	50
5	9	79	50
6	8	87	50
7	5	92	50
8	4	96	50
9	3	99	50
10	1	100	50
11		100	

- Empty rate 15% MA cows and 5% heifers
- Replacement rate 22.5% (entering the herd after deaths and empties in calves and R2's)
- All MA cows wintered within the 75 ha (10kg Kale/fodder beet & 4kg imported baleage)
- 70 days per cow wintering
- All replacement stock grazed off the farm
- Dry off 30 May
- 2% deaths – occurring through late winter/spring
- Culls going off in Sept (poor production/sickness); Dec (drying off); Feb (early culls); April and May.

Pasture growth rate (no nitrogen)

	kg DM/day
June	7
July	5
August	15
September	42
October	50
November	65
December	55
January	50
February	50
March	42
April	33
May	20

The growth rates above result in a potential pasture growth of 13.1 T DM/ha without nitrogen. Within the modelling we aimed to keep pasture covers for the scenarios within the same range as the Standard kale system (200 kg N/ha/yr)

Crop yields

- Kale – 13 T DM/ha
- Fodder beet – 20 T DM/ha by winter

Financial Model Assumptions:

- $6/kg MS

- $1200/ha for kale establishment
- $2600/ha for fodder beet establishment
- $320/TDM for baleage purchase
- $410/TDM for barley grain
- Southland benchmark costs from DairyBase 2015-16 financial year

Farmax® Dairy Outputs

	Reduced impact kale (50)	Standard impact kale (200)	Reduced impact fodder beet (50)	Standard impact fodder beet (200)
Effective area	75	75	75	75
Milking platform (MP) area	65.4	64	66.2	64.8
Crop area (ha) (% of effective area)	9.6 (10.1%)	11 (15%)	8.8 (11.7%)	10.2 (13.6%)
Peak cows milked	171	200	171	200
Stocking rate (effective ha)	2.28	2.66	2.28	2.66
Stocking rate (MP)	2.61	3.1	2.58	3.09
Physical outputs				
Pasture grown (including nitrogen) platform (T DM/ha)	13.7	15.7	13.7	15.7
Fertiliser N input (kg/ha MP)	50	200	50	200
Baleage made(TDM)	14	14	14	14
Imported Baleage (t DM)	75 (439 kg DM/cow)	122 (610 kg DM/cow)	75 (439 kg DM/cow)	87 (435 kg DM/cow)
Imported barley grain (t DM) (kg DM/cow)	54 (316 kg)	78 (390 kg)	0 (0 kg)	41 (205 kg)
Imported Supplement fed to milkers (kg DM/cow)	316	565	0	205
Days in milk	253	255	253	253
Milksolids produced (kg/cow)	448	448	448	450
Milksolids produced (kg/ha)-75ha	1021	1196	1022	1199
Milk solids produced (kg/ha) milking platform only	1171	1402	1157	1388
Total MS production	76552	89696	76618	89915
Financial Outputs				
Gross Margin/ha (75 ha total)	$4122	$4370	$4299	$4590
Operating profit/ha	$1678	$1969	$1839	$2180
FWE $/kg MS	4.20	4.27	4.06	4.11

Overseer® Outputs

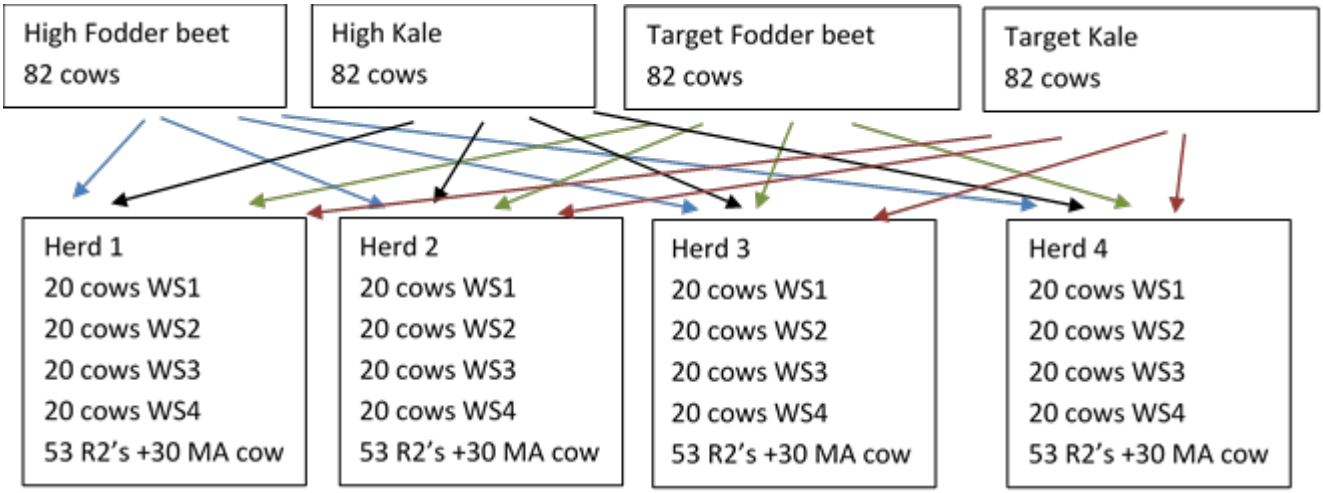
	Reduced impact kale (50)	Standard impact kale (200)	Reduced impact fodder beet (50)	Standard impact fodder beet (200)
Farm-gate N surplus (kg N/ha/yr)	152	226	133	210
N leached (kg N/ha/yr)	30	39	26	35
% reduction from Standard Footprint Kale farmlet	24	0	34	11
Total N lost kg N/yr	2261	2958	1949	2629
kg MS/ kg N lost	34	30	40	34
Operating profit, $/kg N leached	$56	$50	$71	$62

SDH Winter Crop Feeding Monitoring Study – Field day Notes 15 March 18

Objective
To monitor the winter and early lactation performance of four groups of mixed age cows offered different winter diets on the Southern Dairy Hub (SDH) during winter/spring 2017.

Treatments

- **High Fodder beet**: Fodder beet offered with approx. 15% of the diet as pasture baleage
  - 11.9 kg DM fodder beet + 3 kg pasture silage – offering 160 MJME/day
- **High Kale**: Kale offered with approx. 15% of the diet as pasture baleage
  - 14 kg DM kale + 3 kg DM pasture silage – offering 160 MJME/day
- **Target Fodder beet**: Fodder beet offered with a minimum of 30% of the diet as pasture baleage
  - 9.1 kg DM fodder beet + 4.5 kg DM pasture silage – offering 140 MJME/day
- **Target Kale**: Kale offered with a minimum of 30% of the diet as pasture baleage
  - 10.4 kg DM kale + 4.5 kg DM pasture silage – offering 140 MJME/day



Reproductive Performance

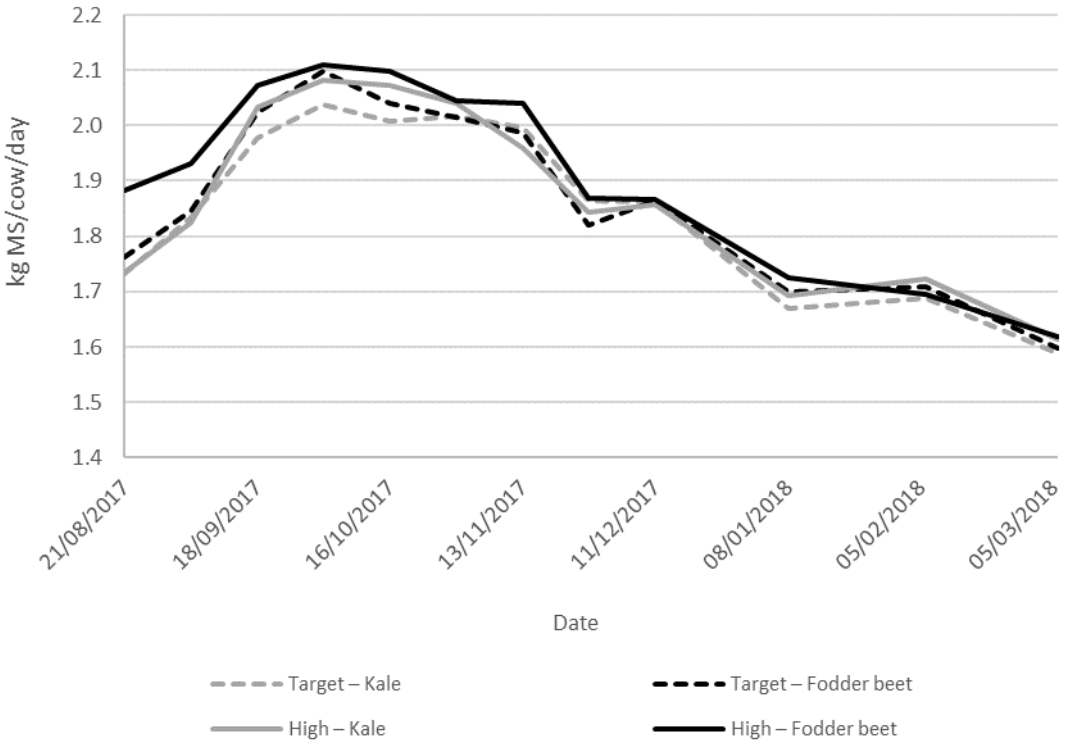
	Average calving date	Average Estimated calving date 2018	6 week in calf rate (of animals at scanning)	Not in calf rate (NICR) %
Target Kale	24 Aug 17	20 Aug	77%	7.6
High Kale	26 Aug 17	21 Aug	78%	4.0
Target Fodder beet	24 Aug 17	16 Aug	81%	1.3
High Fodder beet	24 Aug 17	16 Aug	78%	7.5

Lactation Performance (season to date)

Milk solids production

	Days in milk	Milk solids kg/cow (8 Mar 18)	Current Production (MS/cow)	% cows <1.2 kg MS/cow
Target Kale	180	332	1.6	9
High Kale	177	330	1.6	5.5
Target Fodder beet	179	338	1.6	5.5
High Fodder beet	179	340	1.6	8

Per cow production



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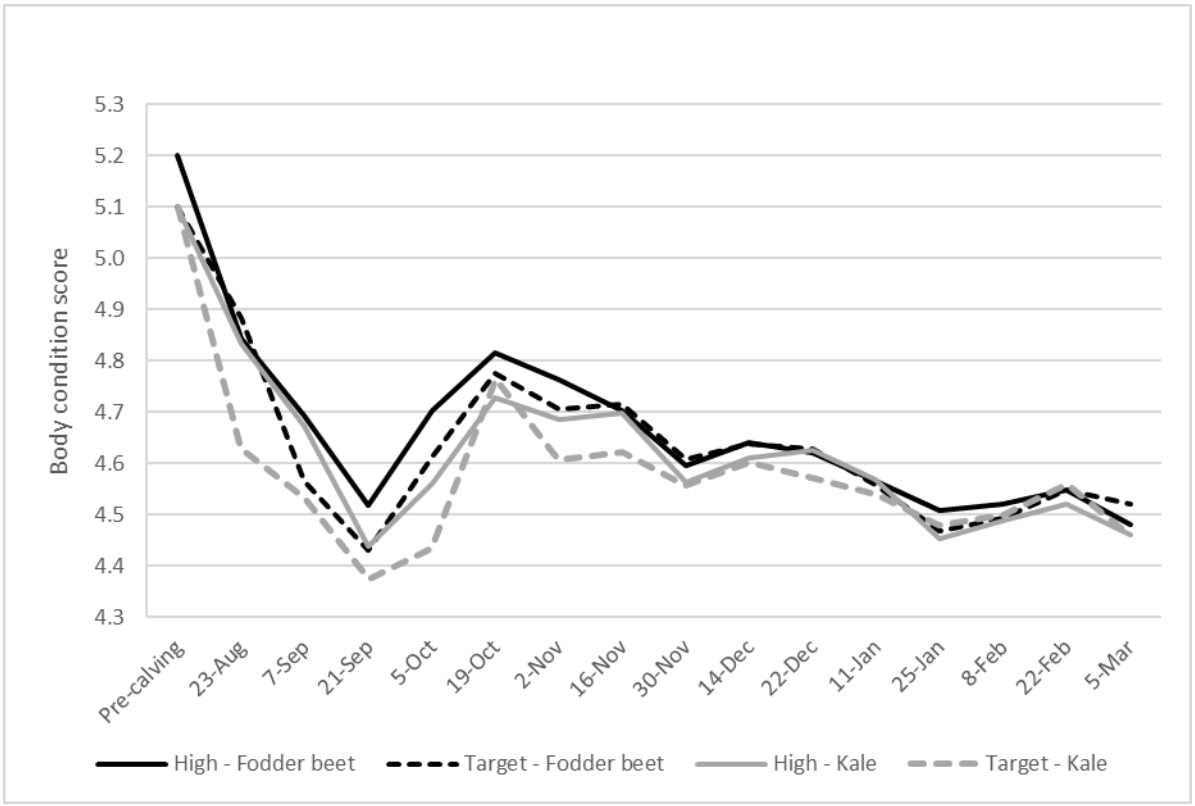
Body Condition Score

Latest average body condition score per treatment

	Average BCS 8 March 18	% BCS ≤ 4.0
Target Kale	4.5	27
High Kale	4.5	25
Target Fodder beet	4.5	12
High Fodder beet	4.5	23

Average body condition score per cow per treatment



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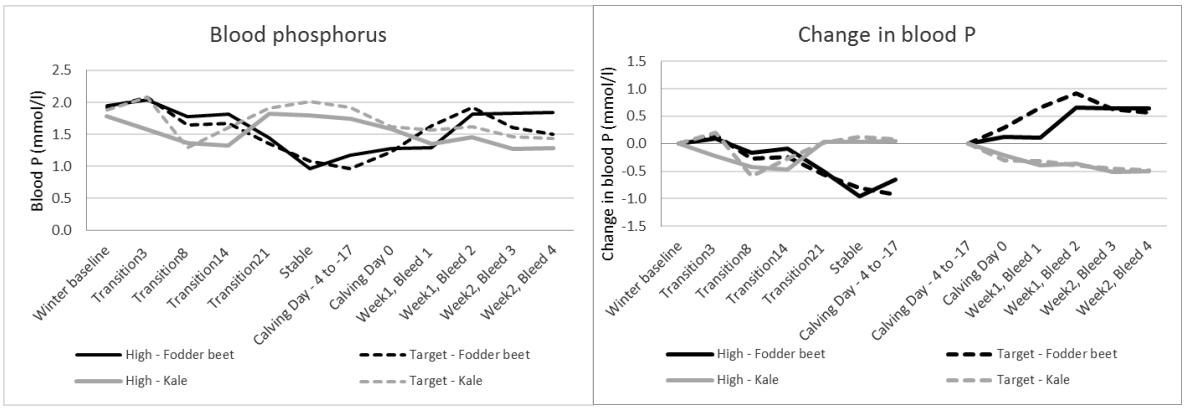
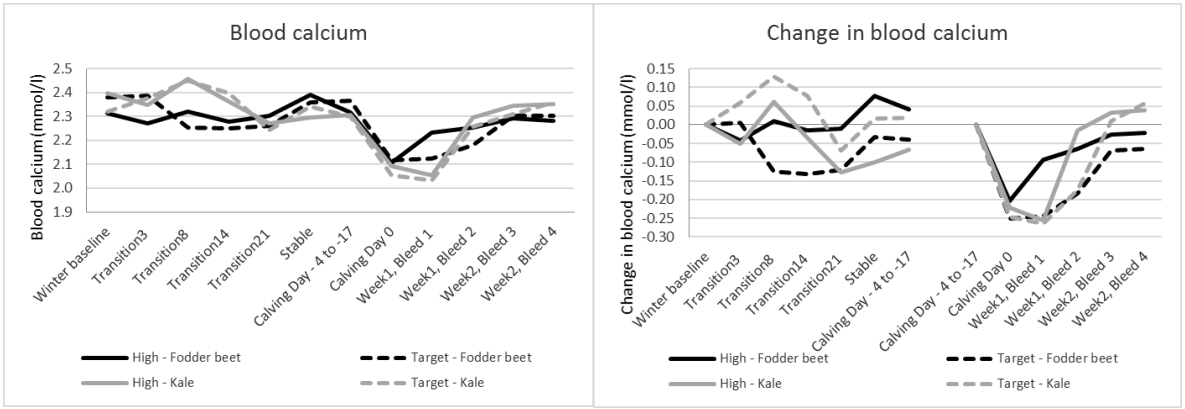
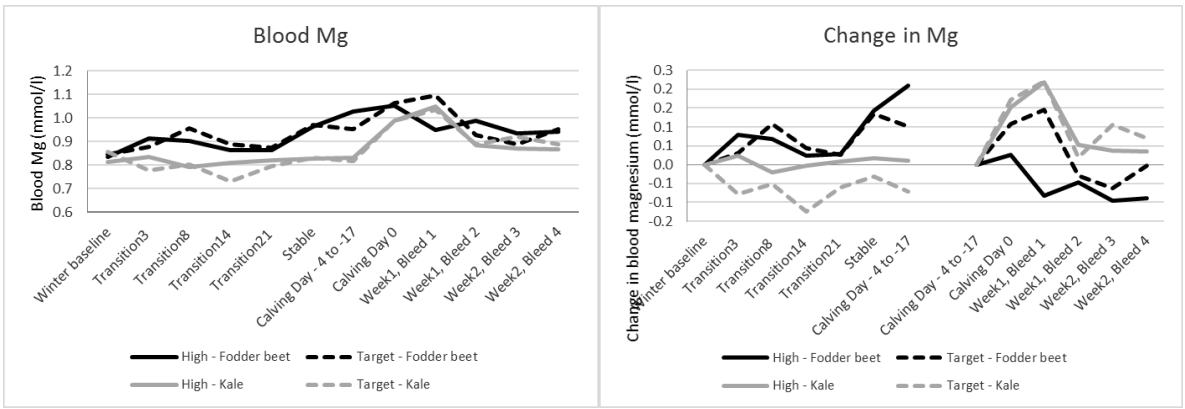
Blood Metabolites

Minerals –trends differ with crop type

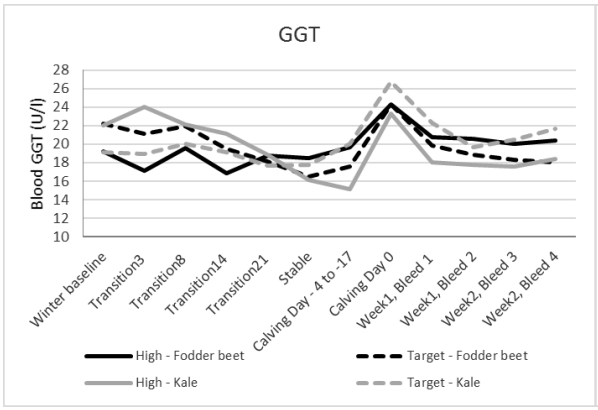


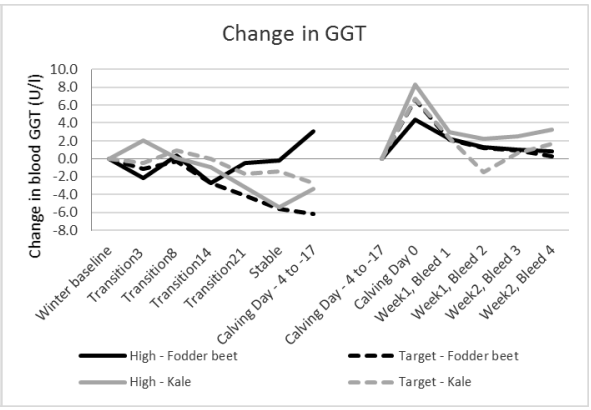


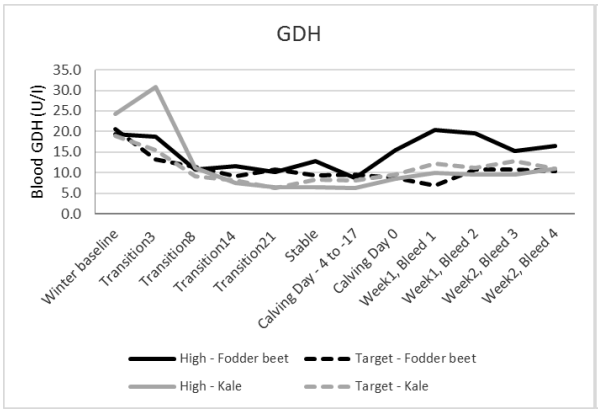


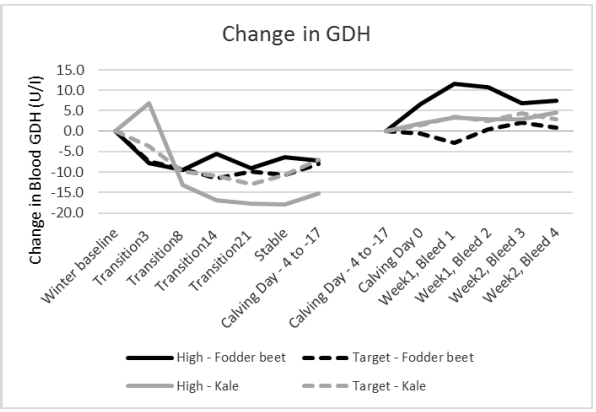
Proudly supported by:

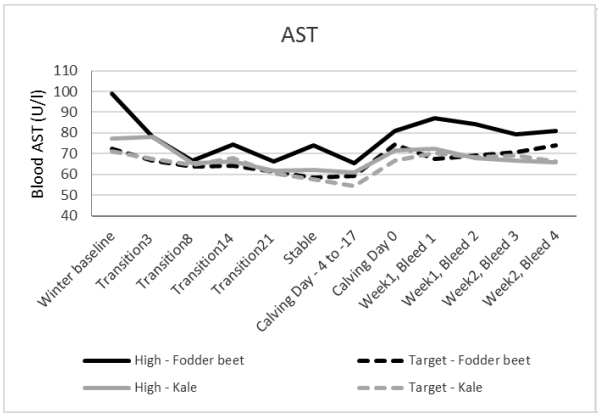
Liver Enzymes – all within the normal range

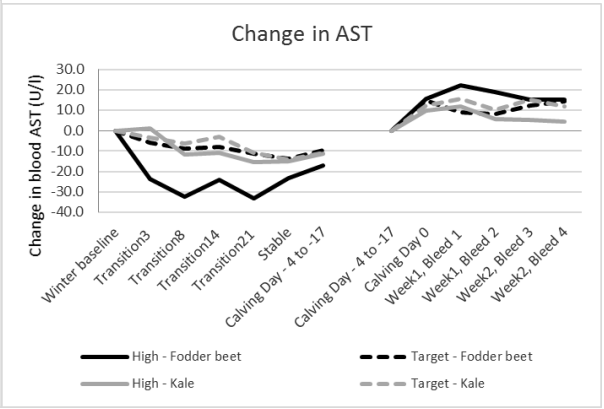












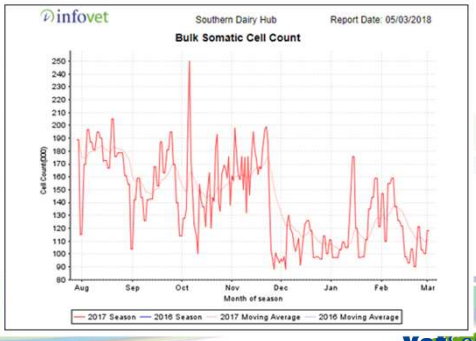
Proudly supported by:

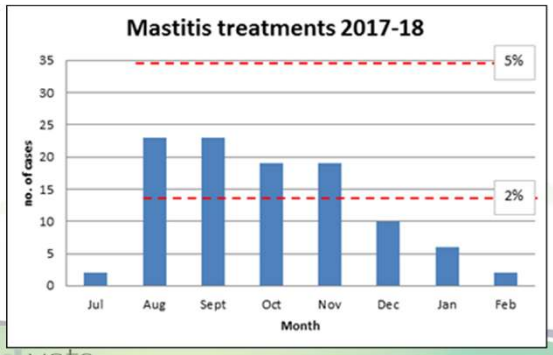
Southern Dairy Hub

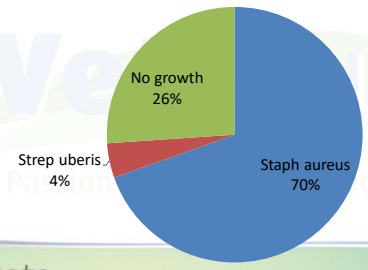
2017-18 mastitis/milk quality review and dry period recommendations

Sally Taylor
Veterinarian, Vetsouth

BMSCC



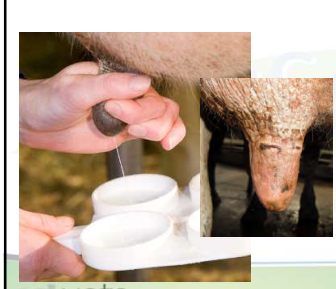




Staph aureus

- Lives in the milk of infected cows and on the udder/teat skin (especially when it is dry/cracked or has teat sores).
- Spread from cow to cow at milking time (hands and liners).

Staph aureus



Staph aureus

- Clinical or subclinical, often chronic
- Difficult to treat/cure
- Culling important

Staph aureus

- Prevention important
  - Teatspraying
  - Proper machine function
  - Milking hygiene
  - Segregation of infected cows

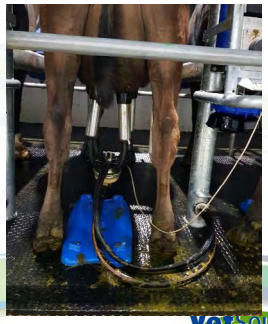
Immediate plan

- Draft high SCC cows
- Keep in a 'dirty' mob – milk last
- Forestrip dirty mob daily – gloves/hygiene
- Use individual cow records to make treatment/culling decisions
  - Prev. treatment
  - ISCC records
  - Age
  - Production
  - Udder conformation
  - Milk culture results
  - Pregnancy test results

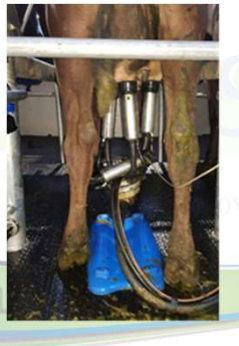
Milking visit – Dec 2017

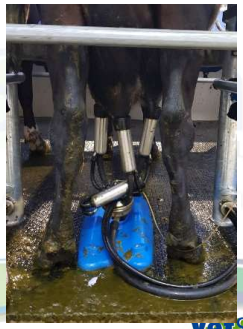
- Machine function and teat scores OK
- Teatsprayer had been functioning poorly
- Poor cow flow and delay in milk letdown

Cluster alignment



Unmarked 3T





Environment/hygiene

Since Dec 2017….

- Addressed points in visit report
- Culled 35 cows
- 20-30 cows still in 'dirty' mob
- BMSCC and treatments within target
- Further dry off/culling decisions to be made on individual high SCC cows

Dry off plan

- **Whole herd selective dry cow therapy**
  - **'Infected' cows – AB DCT + ITS**
  - **'Uninfected' cows – ITS only**

Infected vs uninfected?

- Is there bacteria present in quarter at dry off?
- Milk culture

Recent studies (DairyNZ/Cognosco/AnexaFVC/Vetsouth)

- Rates of infection at dry off very low
- Even herds with 'high' level of infection still only ~18% cows
- Nationwide study – multiple regions

Infected vs uninfected?

- Herd test data good predictor
  - How many herd tests?
  - Timing of herd test
- Treatment records good predictor
- RMT?
- Automated systems e.g. milk hub, cell sense, etc?
- BMSCC?

Infected vs uninfected?

- What threshold should I use?

250

100

As threshold decreases:

- Less 'infected' cows will be missed
- More 'uninfected' cows will be treated unnecessarily
- More antibiotics will be used

It's a balance

Modelling: assumes prevalence of infection of 7.5% of quarters (with a major pathogen) in a 500 cow herd.

Cut point:	Infected	Uninfected	Total	Se	Sp	PPV	NPV
>125	33	154	187	0.88	0.67	0.17	0.99
<=125	4	308	312				
>150	31	128	159	0.85	0.72	0.19	0.98
<=150	6	333	339				
>175	30	107	137	0.80	0.77	0.21	0.98
<=175	7	354	361				
>200	29	94	123	0.78	0.79	0.23	0.98
<=200	8	367	375				
>225	26	82	108	0.71	0.82	0.24	0.97
<=225	11	380	391				

Source: DCV conference proceedings 2017, McDougall et al

Looks good on paper!.....but....

- Teat end health
- Product handling and administration
- Staff training and expectations
- Shed environment and lighting
- Nutritional management to reduce milk production

Dry off plan – SDH 2018

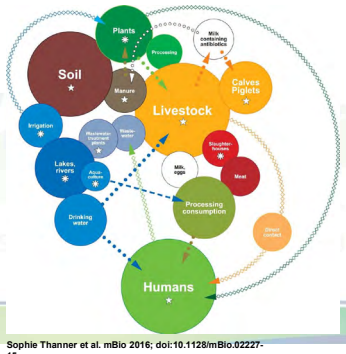
- Whole herd <u>selective</u> dry cow therapy
  - – 'infected' cows – AB DCT + ITS (~ 277 cows)
    (>150,000 cows, >120,000 heifers, any CM)
  - – 'uninfected' cows – ITS only (~ 322 cows)

Questions?

Antimicrobial resistance, antimicrobial use, and the dairy industry

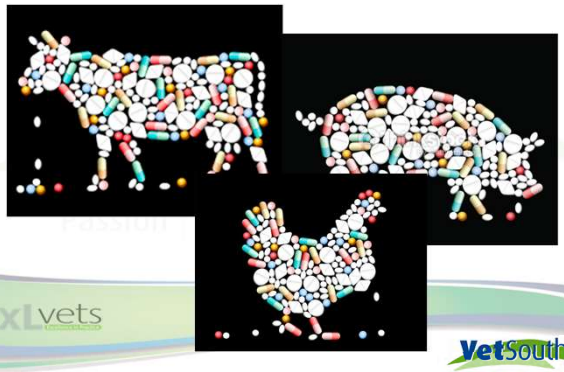
Mark Bryan BVMS MACVSc (Epi) MVS (Epi)
Managing Director
VetSouth

Pathway map of AMU and AMR dissemination within agriculture, the environment, and the food processing industry.

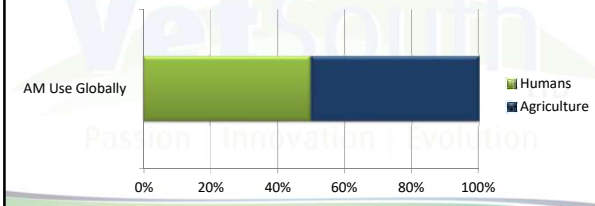


Sophie Thanner et al. mBio 2016; doi:10.1128/mBio.02227-15

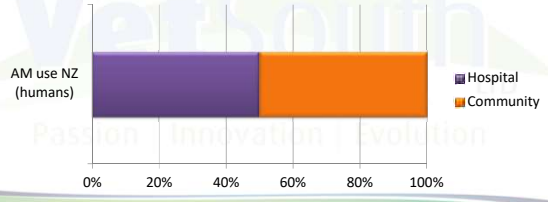
Background- public perception



What proportion of total AM is used in Agriculture vs Humans globally?

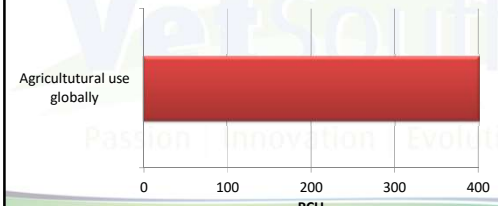


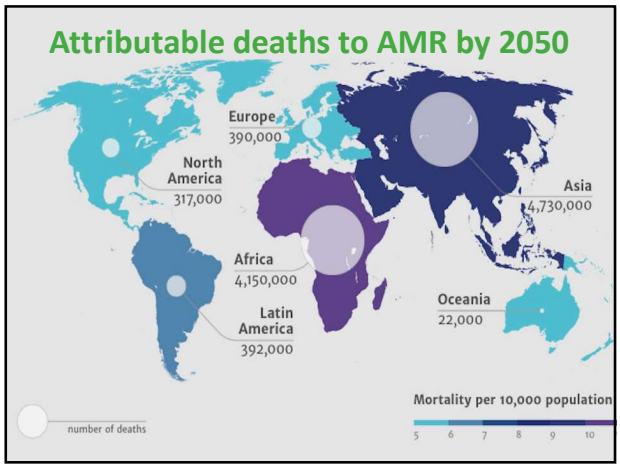
What proportion of total AM in humans is used in hospitals vs in the community (NZ)?

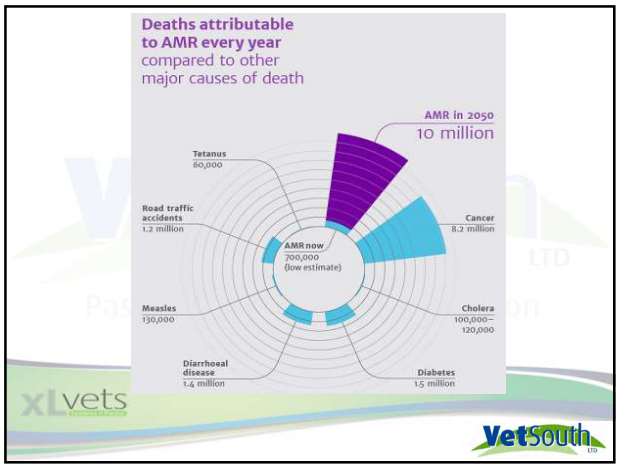


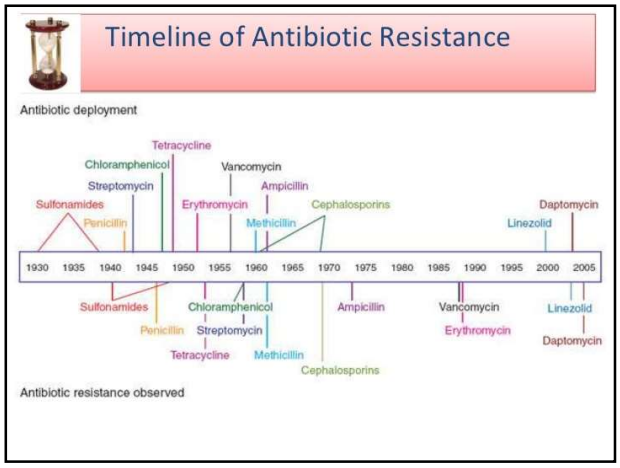
What is NZ's agricultural use?

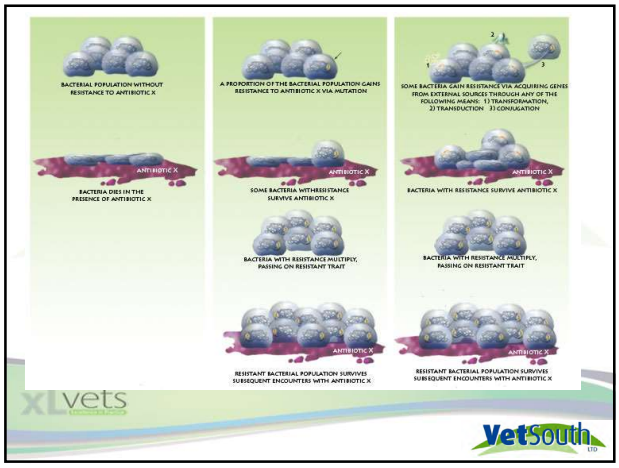
NZ?

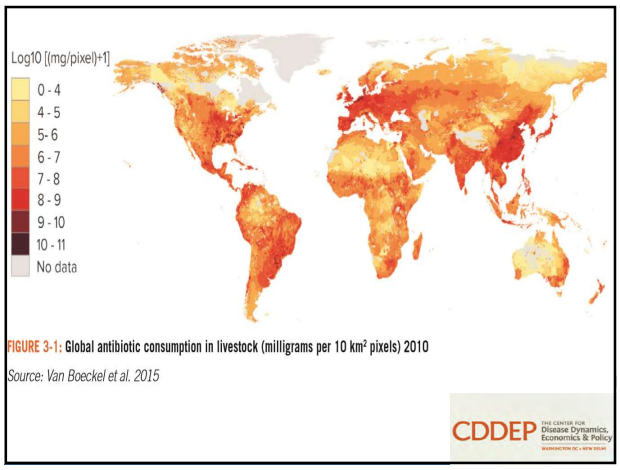


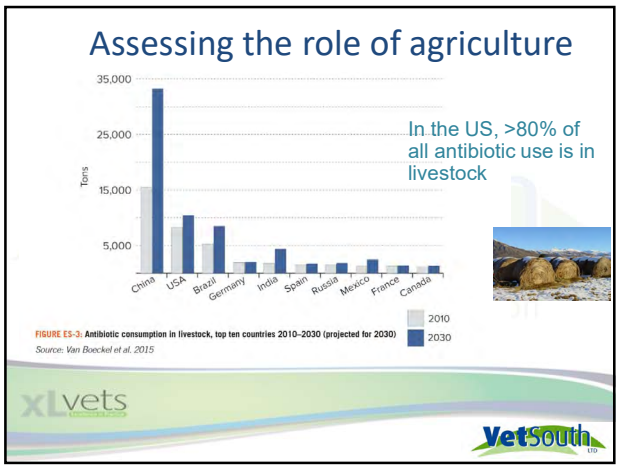

Attributable deaths to AMR by 2050
Europe
390,000
North America
317,000
Asia
4,730,000
Africa
4,150,000
Latin America
392,000
Oceania
22,000
number of deaths
Mortality per 10,000 population
5 6 7 8 9 10


Deaths attributable to AMR every year compared to other major causes of death
AMR in 2050
10 million
Tetanus
60,000
Road traffic accidents
1.2 million
Cancer
8.2 million
AMR now
700,000
(low estimate)
Measles
130,000
Cholera
100,000–120,000
Diarrhoeal disease
1.4 million
Diabetes
1.5 million
XL vets
VetSouth


Timeline of Antibiotic Resistance
Antibiotic deployment
Tetracycline
Chloramphenicol
Streptomycin
Vancomycin
Ampicillin
Sulfonamides
Penicillin
Erythromycin
Cephalosporins
Methicillin
Daptomycin
Linezolid
1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005
Sulfonamides
Penicillin
Chloramphenicol
Streptomycin
Tetracycline
Methicillin
Ampicillin
Cephalosporins
Vancomycin
Erythromycin
Linezolid
Daptomycin
Antibiotic resistance observed


BACTERIAL POPULATION WITHOUT RESISTANCE TO ANTIBIOTIC X
BACTERIA DIES IN THE PRESENCE OF ANTIBIOTIC X
A PROPORTION OF THE BACTERIAL POPULATION GAINS RESISTANCE TO ANTIBIOTIC X VIA MUTATION
SOME BACTERIA WITHRESISTANCE SURVIVE ANTIBIOTIC X
BACTERIA WITH RESISTANCE MULTIPLY, PASSING ON RESISTANT TRAIT
RESISTANT BACTERIAL POPULATION SURVIVES SUBSEQUENT ENCOUNTERS WITH ANTIBIOTIC X
SOME BACTERIA GAIN RESISTANCE VIA ACQUIRING GENES FROM EXTERNAL SOURCES THROUGH ANY OF THE FOLLOWING MEANS: 1) TRANSFORMATION, 2) TRANSDUCTION 3) CONJUGATION
BACTERIA WITH RESISTANCE SURVIVE ANTIBIOTIC X
BACTERIA WITH RESISTANCE MULTIPLY, PASSING ON RESISTANT TRAIT
RESISTANT BACTERIAL POPULATION SURVIVES SUBSEQUENT ENCOUNTERS WITH ANTIBIOTIC X
XL vets
VetSouth


Log10 [(mg/pixel)+1]
0 - 4
4 - 5
5- 6
6 - 7
7 - 8
8 - 9
9 - 10
10 - 11
No data
FIGURE 3-1: Global antibiotic consumption in livestock (milligrams per 10 km² pixels) 2010
Source: Van Boeckel et al. 2015
CDDEP
Center for Disease Dynamics, Economics & Policy

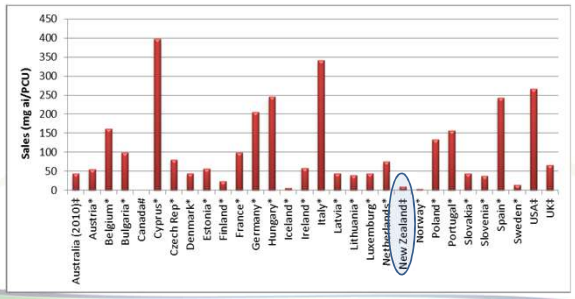

Assessing the role of agriculture
35,000
25,000
15,000
5,000
Tons
China
USA
Brazil
Germany
India
Spain
Russia
Mexico
France
Canada
In the US, >80% of all antibiotic use is in livestock
2010
2030
FIGURE ES-3: Antibiotic consumption in livestock, top ten countries 2010–2030 (projected for 2030)
Source: Van Boeckel et al. 2015
XL vets
VetSouth

NZVA
New Zealand Veterinary Association
www.nzva.org.nz

The NZVA's aspirational statement on AMR:

'By 2030, NZ Inc will not need antibiotics for the maintenance of health and welfare in animals'

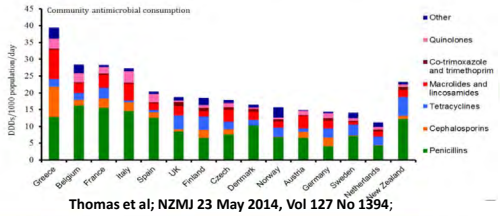
Agricultural use



Hillerton et al; 2017; NZVJ

Human use

Figure 4. Annual per capita consumption of antimicrobials by community-based patients, in various European countries [10] and in New Zealand, during 2010, measured in DDDs/1000 population/day



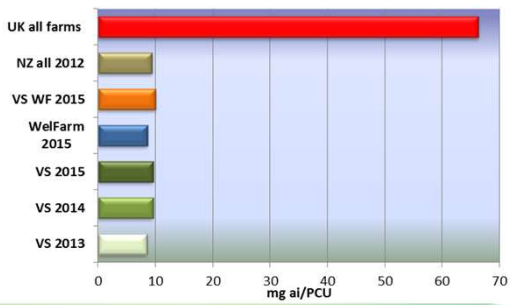
Thomas et al; NZMJ 23 May 2014, Vol 127 No 1394;
ISSN 1175 8716
http://journal.nzma.org.nz/journal/127-1394/6136/

New National Study – 2017

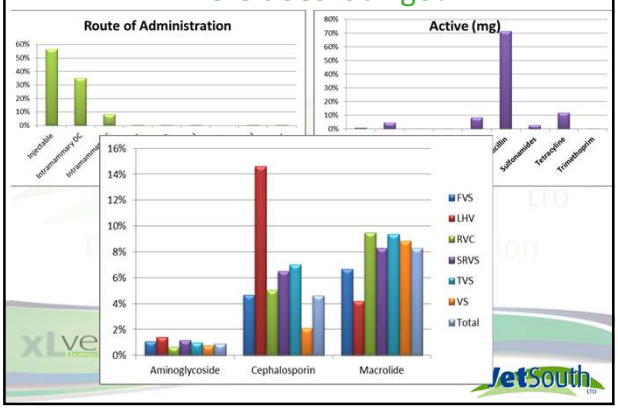
- 1462 dairy farms; 707 general farms
- 623430 cows and R2s; 895,000 red meat

- Dairy PCU **8.54** (regional variation 4.72- 11.91)
- Red meat PCU **0.57** (regional variation 0.33- 0.94)

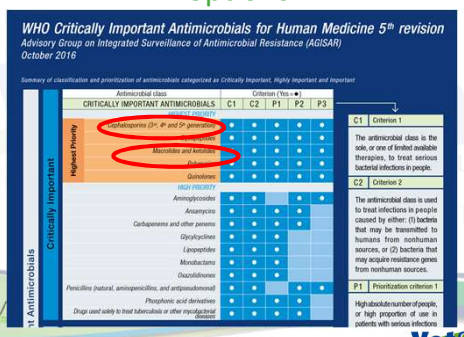
Other comparative data



Where does it all go?



How AMR may impact our treatment options



Key points

- Current NZ Ag ~9 PCU; third lowest globally
- NZ Dairy around 8.5 PCU
- No use of AMs for growth promotion since 1999
- DCAT = ~
- Only around 12% of cows infected at dry off
- Goal of 4PCU by 2025- reduction in DCAT, ZnB
- Zero (<2) by 2030?

SFF Project – 2017-2020

- **Development of farmer-led regional Sustainable Health Groups**
- **20% reduction in AM use by 2020**
  - 3 year project- SFF and VetSouth
  - Southland/South Otago
  - Multi- sector
  - Supported by Beef & Lamb; SDDT; local vets and farmers
  - Stakeholders: Uni of Auckland (Prof Mark Thomas); Otago Uni (Prof Greg Cook)
- **'Participatory development'** farmer-lead approach
- 4 x Farmer- driven groups

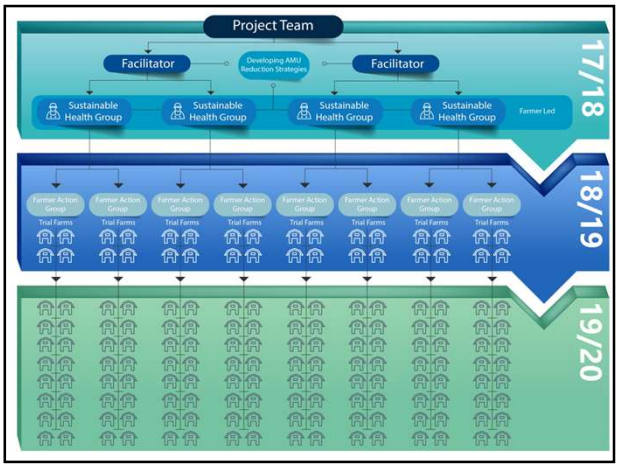
Funded by Sustainable Farming Fund
Ministry for Primary Industries
Manatū Ahu Matua

The NZVA's position on DCAT:

www.nzva.org.nz

The NZVA recognises that the use of DCAT in non- infected cows is no longer appropriate in an era of effective alternatives such as internal teat sealants (ITS) and improved management practices.

By 2020, DCAT (Dry Cow Antimicrobial Therapy) will only be used in the treatment of existing intramammary infections



Expected outcomes

- Identification of successful and less successful strategies for reduction in AM use
- Reduction in antimicrobial use on farms.
- Changes in farmers' attitudes to disease management, with a reduced reliance on antimicrobials.
- Dissemination of information, knowledge, and success or otherwise of strategies
- Unofficial goal to reduce AMU by 20% by 2020

Funded by Sustainable Farming Fund
Ministry for Primary Industries
Manatū Ahu Matua

Thanks and questions

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SOUTHERN
DAIRY HUB