

Report

30 May 2020

Forages for Reduced Nitrate Leaching

Critical Step 1.3.2

This report has been funded by New Zealand dairy farmers through DairyNZ and the Ministry of Business, Innovation and Employment.



**MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT**
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DairyNZ 

Forages for Reduced Nitrate Leaching

Critical Step 1.3.2 Report

Milestone: 1.3.2FBCC.A1 Conduct case studies / surveys / focus group workshops on North and South Island farms using fodder beet and/or catch crops long-term (establishment and management of grazed crop and catch crops).

1.3.2FBCC.MS1 Key findings on long-term fodder beet and catch crop use summarised and submitted to leaders of RA2, 1.3.3 and 1.3.4.

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30 May 2020

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Forages for Reduced Nitrate Leaching is a DairyNZ-led collaborative research programme across the primary sector delivering science for better farming and environmental outcomes. The aim is to reduce nitrate leaching through research into diverse pasture species and crops for dairy, arable and sheep and beef farms. The main funder is the Ministry of Business, Innovation and Employment, with co-funding from research partners DairyNZ, AgResearch, Plant & Food Research, Lincoln University, Foundation for Arable Research and Landcare Research.



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1. Introduction

Winter grazing of forage crops such as kale (*Brassica oleracea* var. *acephala*) and fodder beet (*Beta vulgaris* spp. *Vulgaris*) is common practice in New Zealand, particularly in the South Island. These systems typically result in fallow soils for 3-5 months until a new crop is established in spring¹. The risk of nitrogen (N) leaching from large numbers of urine patches deposited during grazing is greatest during these winter and early-spring fallow periods with estimated losses between 50 and 180kg N/ha^{2,3}. There is a high probability of soil drainage and nutrient loss in these grazing systems because precipitation normally exceeds evapotranspiration in winter and early spring.

Recent research has demonstrated that catch crops (e.g. oats), sown in winter after forage grazing, can be successfully used to reduce drainage and take up N from the soil, ultimately reducing N leaching losses⁴. Catch crops, also commonly referred to as cover crops, are not new practises and have been extensively used in cropping systems (primarily sown in autumn), to conserve nutrients over the winter and provide ground cover for weed control and soil stabilisation⁵. The novelty around recent studies, however, relates to establishing catch crops after forage crop grazing for better environmental outcomes during the coolest months of the year.

With increasing pressure on farmers to reduce their nitrate leaching risk, many in the pastoral sector have identified catch crops as a mitigation option for their business and have adopted the practice. The objective of this survey was to better understand existing catch cropping practices, farmer satisfaction with yields, challenges for establishing catch crops, where farmers got their information from and what additional resource material was required to help farmers with their decision making.

2. Methods

The survey questions were developed in consultation with the wider FRNL team involved with Research Aim 2. The questions were piloted with the FRNL monitor farms before being formatted into a Survey Monkey for online completion.

The survey consisted of 18 questions. The first five questions collected information on the farm operation, region, type of farming operation and experience with catch crops. The next three questions captured information specifically relating to the type of catch crop and the system it is used within. Questions 9-11 related to when and how the catch crop was established, and were

¹ Edwards GR, de Ruiter JM, Dalley DE, Pinxterhuis JB, Cameron KC, Bryant RH, Malcolm BJ, Chapman DF. 2014. Dry matter intake and body condition score change of dairy cows grazing fodder beet, kale and kale-oat forage systems in winter. *Proceedings of the New Zealand Grassland Association* 76:81-87.

² Shepherd M, Stafford A, Smeaton D. 2012. The use of a nitrification inhibitor (DCn™) to reduce nitrate leaching under a winter-grazed forage crop in the Central Plateau. *Proceedings of the New Zealand Grassland Association* 74: 103-107.

³ Malcolm B, Teixeira E, Johnstone P, Maley S, de Ruiter J, Chakwizira E. 2016. Catch crops after winter grazing for production and environmental benefits. *Agronomy New Zealand* 47: 65-77.

⁴ Carey PL, Cameron KC, Di HJ, Edwards GR, Chapman DF. 2016. Sowing a winter catch crop can reduce nitrate leaching losses from winter-applied urine under simulated forage grazing: a lysimeter study. *Soil Use and Management* 32: 329-337.

⁵ Fraser PM, Curtin D, Harrison-Kirk T, Meenken ED, Beare MH, Tabley F; Gillespie RN; Francis GS. 2013. Winter nitrate leaching under different tillage and winter cover crop management practices. *Soil Science Society of America Journal* 77: 1391-1401.

followed by three questions relating to harvest timing, estimated yields and activities post-harvest. The final four questions were open answer questions capturing any challenges associated with establishing catch crops, where farmers got their information from and what information they felt was lacking.

The link to the Survey Monkey was made available through extension channels within DairyNZ, Plant & Food, Foundation for Arable Research and other FRNL industry partners.

Farmers self-selected to complete the survey, therefore the sample population will be biased to those interested in or already using catch crops, so the responses will not be representative of the general pastoral sector. A total of 90 completed surveys were received during the 4-week period the survey was open for.

3. Results and discussion

3.1. Responses

Note that the distribution of farm type was not uniform across the regions. Therefore, there may have been some confounding between region and farm type (Figure 1). Actual numbers can be seen in the Appendix - Table 1.

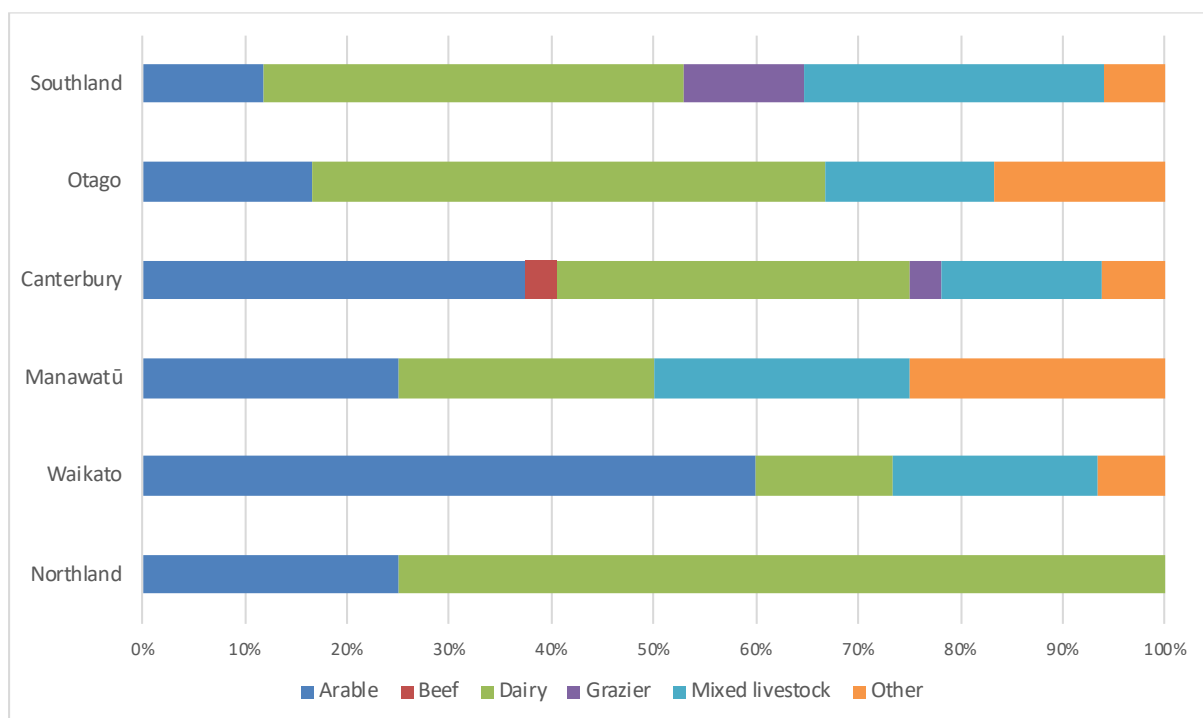


Figure 1 – Proportion of respondents' farm type in each region

Also note that the responses were dominated by Canterbury, and to a lesser extent, the Waikato and Southland (Figure 2). Collectively, these three regions made up 72% of responses. This will affect aggregated statistics.

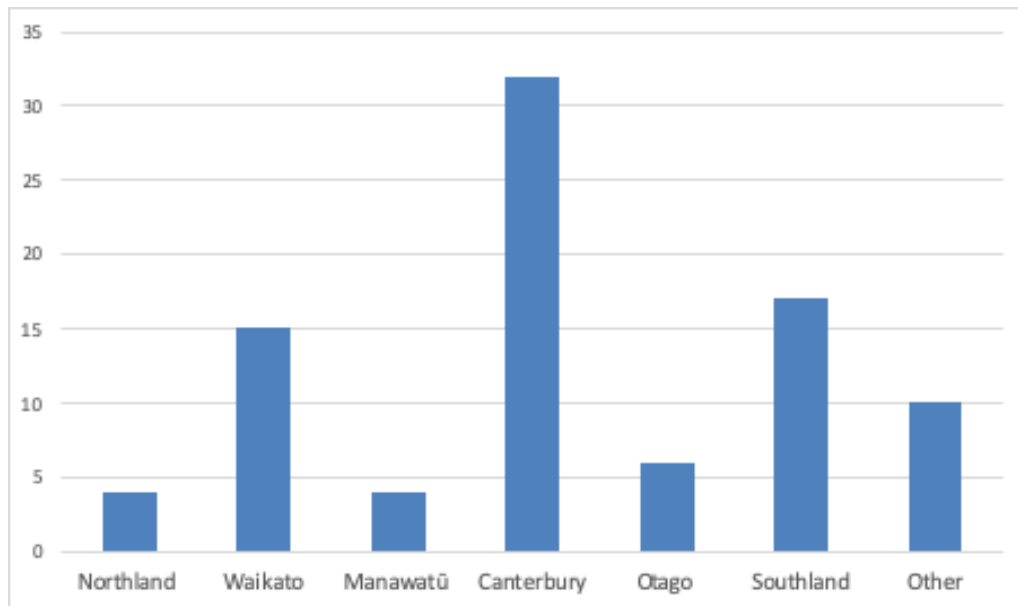


Figure 2 – Distribution of responses across New Zealand by region

3.2. Experience with catch crops

- 28% (n=25) of respondents were interested but haven't tried.
- Of those that have tried catch crops, few people (10%) have found that it doesn't work at all. Some ('Other') (13%) have found mixed success, either temporal (some years work, some don't) or spatial (some paddocks work, some don't). 78% (n=49) were using successfully.
- Generally, the proportion of farmers who have tried catch crops increased going down the country (Figure 3).

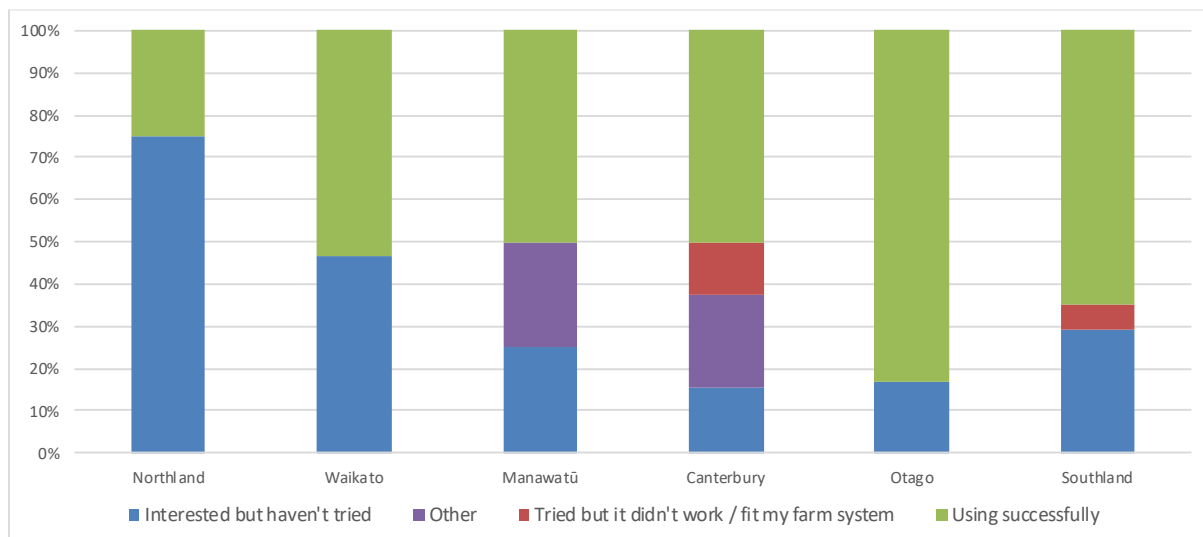


Figure 3 - Proportion of respondents' experience with catch crop in each region. Regions with very low response rates omitted.

3.3. Reasons why farmers are using catch crops

- The highest ranked reason for using catch crops was simply as ‘part of their crop rotation’ (Figure 4), esp. arable and dairy (Figure 5)
- Of slightly lower importance was ‘to add organic matter’, then for ‘ground cover’, then for ‘additional feed’ (Figure 4);
- ‘Environment’ was consistently ranked lower, particularly for dairy and ‘other’ (Figure 5)
- There were no major regional differences (Figure 6)
- Reasons reported under ‘other’ (14 respondents) included weed control and ‘to make more money’

Much of the focus of recent research on catch crops, including this programme, has been around their environmental benefits. However, it was the least important reason farmers were using them, suggesting some disconnect. Perhaps farmers are thinking/prioritising only within farm gate; there is some research from the USA suggesting that farmers are more likely to implement environmental mitigations where they can also see or internalise the value to their farming business⁶. However, some New Zealand work suggests that both financial and environmental values drive changes to cropping rotations⁷. Indeed, the second most common need for more information is environmental. So, perhaps the environment is ranked lower because of a lack of trust or confidence in the information they have, or they just felt they don’t have enough information (more extension needed).

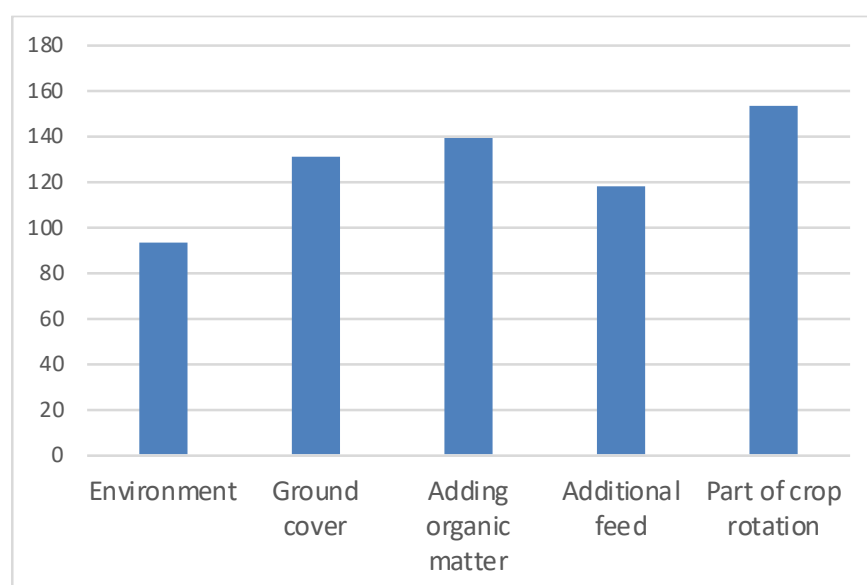


Figure 4 – Sum of ranking for each reason for using a catch crop

⁶ Reimer, A. P., Thompson, A. W., & Prokopy, L. S. (2012). The multi-dimensional nature of environmental attitudes among farmers in Indiana: implications for conservation adoption. *Agriculture and Human Values*, 29(1), 29-40. doi:10.1007/s10460-011-9308-z

⁷ Small, B., Brown, P., & Montes de Oca Munguia, O. (2016). Values, trust, and management in New Zealand agriculture. *International Journal of Agricultural Sustainability*, 14(3), 282-306. doi:10.1080/14735903.2015.1111571

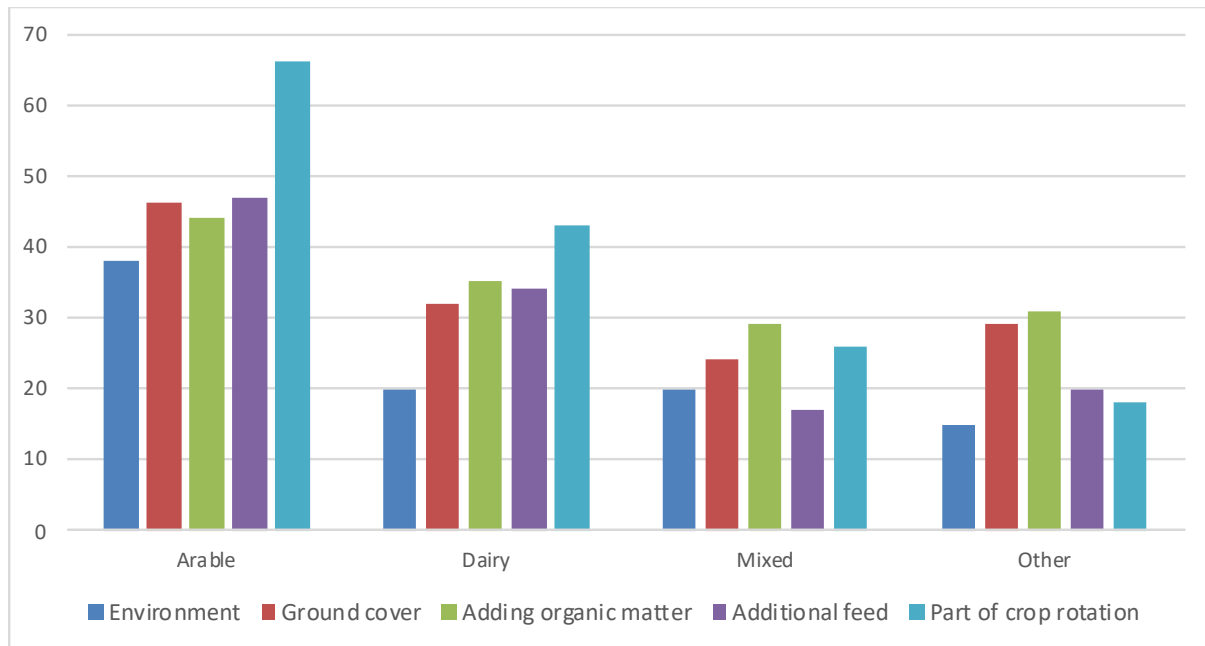


Figure 5 – Sum of ranking for each reason for using a catch crop, broken down by farm type

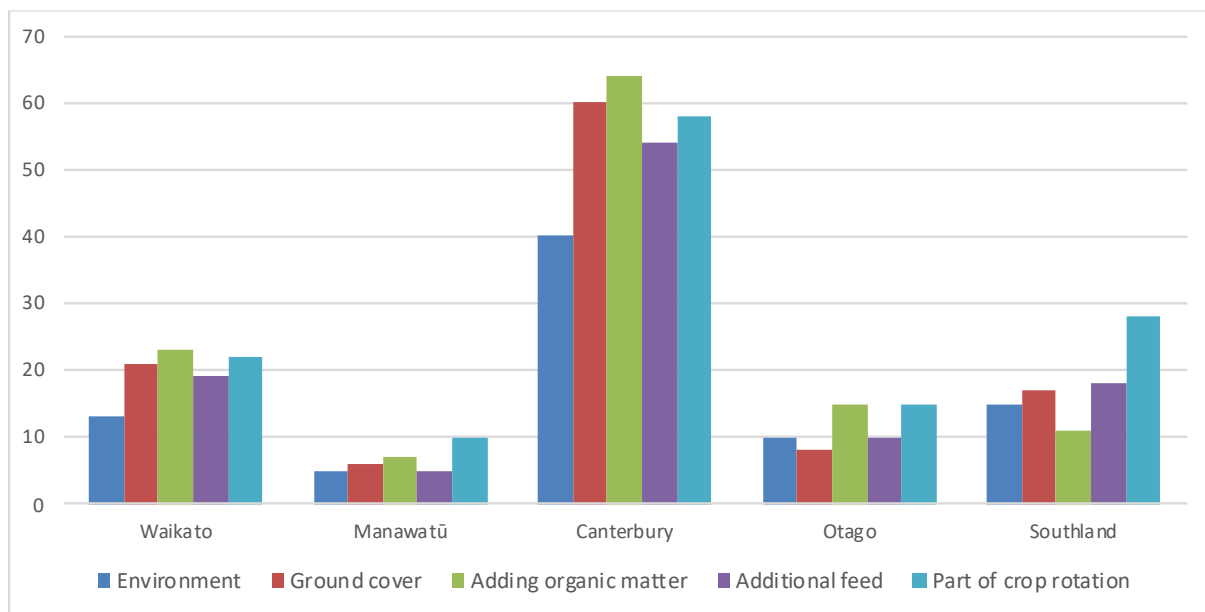


Figure 6 – Sum of ranking for each reason for using a catch crop, broken down by region. Regions with low response rates removed.

3.4. Yield satisfaction

- 83% were satisfied across all different types of yield. No real difference between yield types.
- There were not enough unsatisfied farmers to break this down further.

3.5. Catch crop species used

- Top four species used were: Oats (31%), Italian ryegrass (14%), Annual ryegrass (13%), "Other" (12%).

- The percentage of all cereals excluding oats was 23%
- Dairy was using fewer different spp. of crops; oats were much more popular in dairy (Figure 7)
- Oats tended to become more popular moving down the country, annual ryegrass became less popular moving down the country and barley was more popular in Otago/Southland (Figure 8)

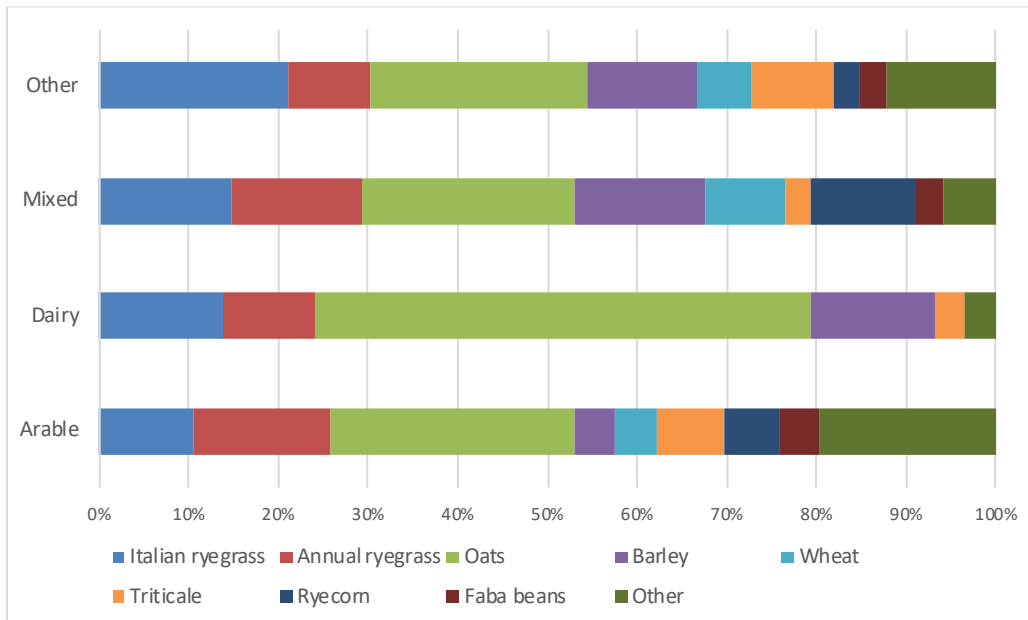


Figure 7 – Proportion of crops used for each type of farmer. Beef farmers and graziers have been combined with 'Other'.

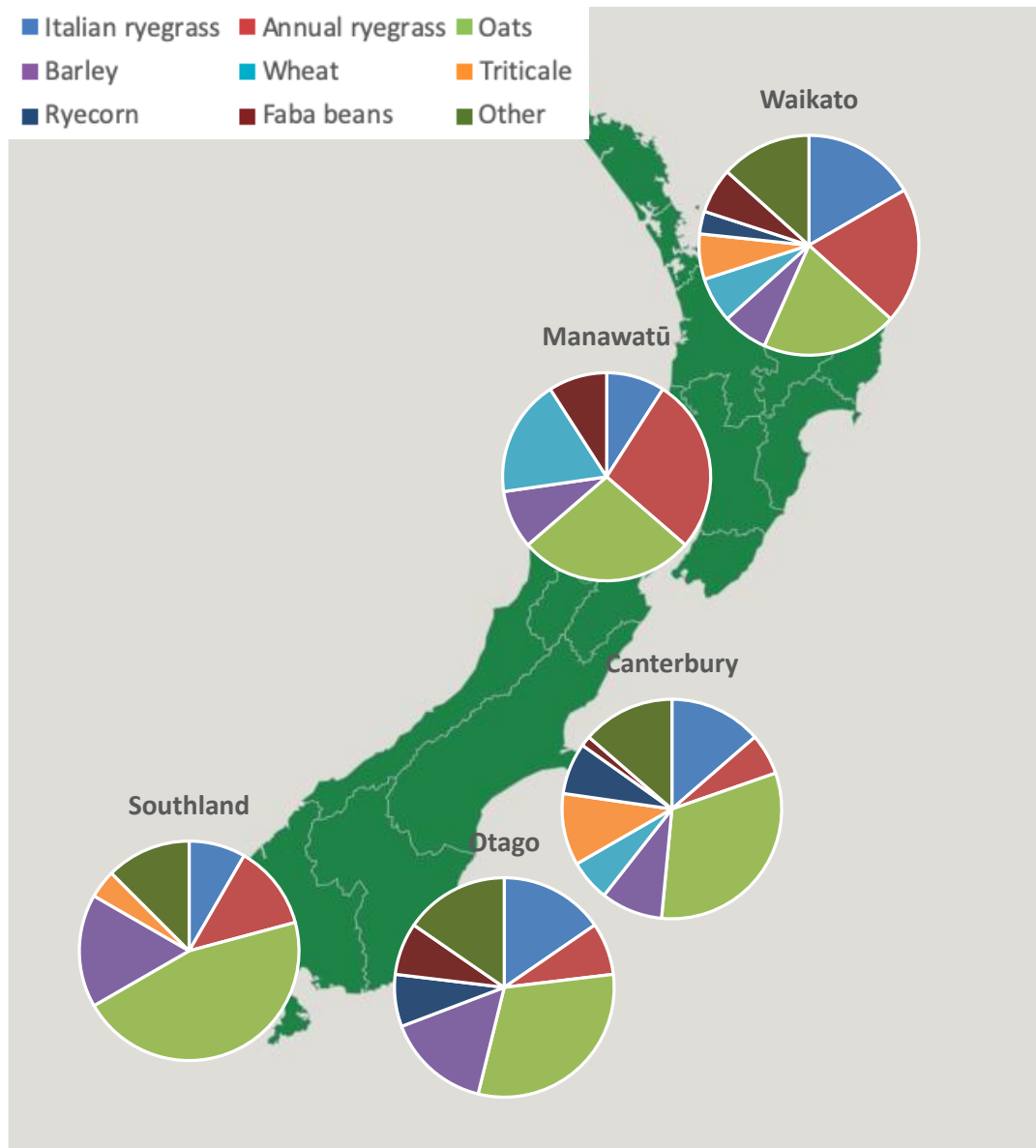


Figure 8 – Proportion of crop species used in each region. Regions with low response rates have been omitted.

3.6. Use of catch crops

- Uses were: 39% for grazing, 25% green chop baleage, 15% green manure, 14% whole crop silage, 6% grain. Note some farmers reported more than one use.
- Green manure was not used in Otago or Southland, grazing was frequently used across the country, harvesting for green chop baleage and whole crop silage tends to decrease going up the country (Figure 9)
- There was less diversity in use for dairy. Grazing was most common in arable and mixed operations, green chop baleage was most common in dairy. Grazing was frequently used across sectors. (Figure 10)

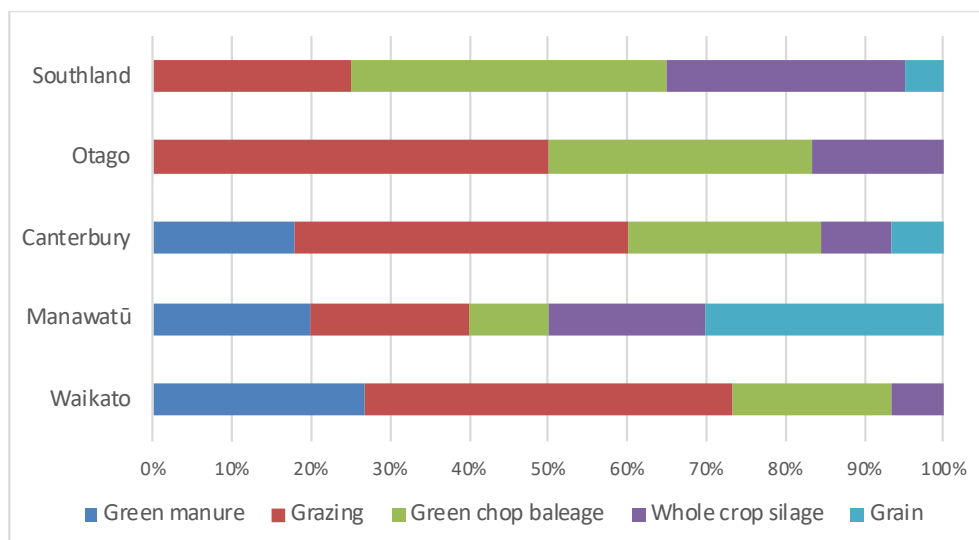


Figure 9 – Proportion of catch crop use in each region. Note: some respondents reported more than one type of use. Regions with low response rates have been omitted.

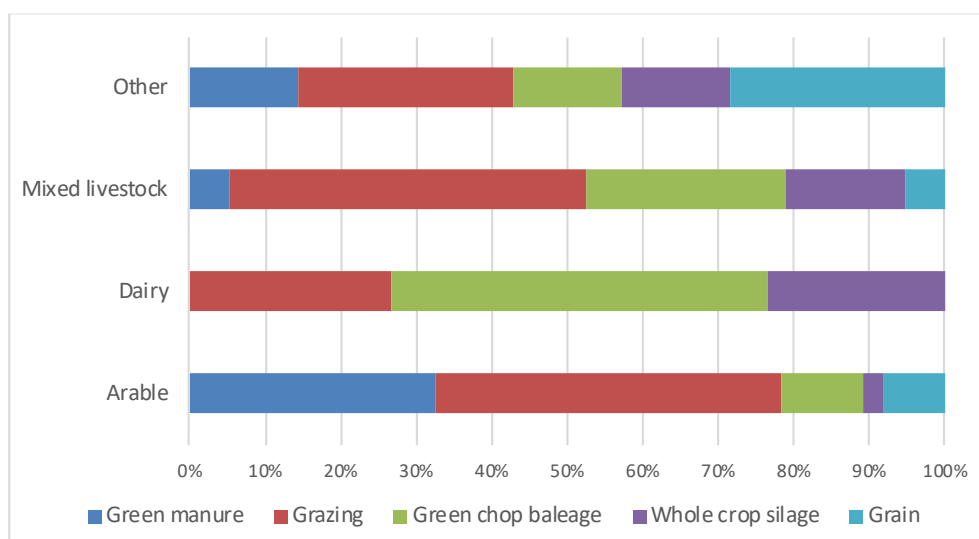


Figure 10 – Proportion of catch crop use for each farm type. Note: some respondents reported more than one type of use. Beef farmers and graziers have been combined with 'Other'.

3.7. Establishment

- The most common method of establishment was direct drilling (44%), then surface cultivation (27%), then conventional cultivation (16%), then other (8%). "Other" tended to be a combination of more than one method, depending of the particular crop used or soil conditions at that particular establishment.
- Direct drilling tended to be the most common method across all farm types, but particularly in arable (52%). It was less common in dairy (37%) (Figure 11).
- Ryegrasses and oats were mostly direct drilled (64% and 45% respectively). The other cereals were mostly cultivated conventionally (52%). Surface cultivation was similar for all three groups (around 23%) (Figure 12)
- There was no significant difference between establishment methods in grazing yield (Figure 13). There was insufficient data to analyse this for any other type of yield.

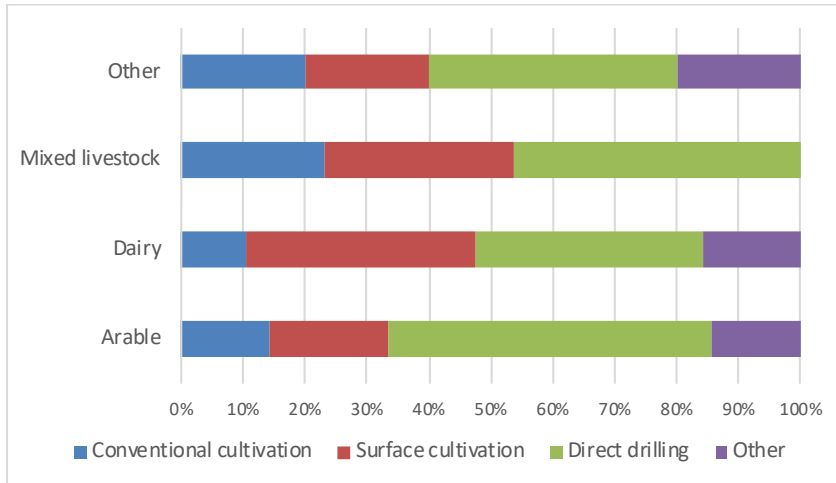


Figure 11 - Proportion of establishment methods used by each farm type. Beef farmers and graziers have been combined with 'Other'.

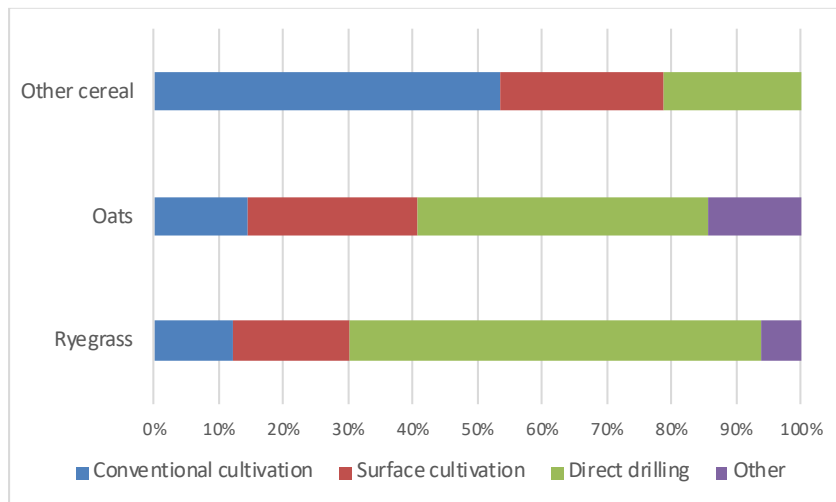


Figure 12 – Proportion of establishment methods used for ryegrass (Italian and annual), oats, and other cereals.

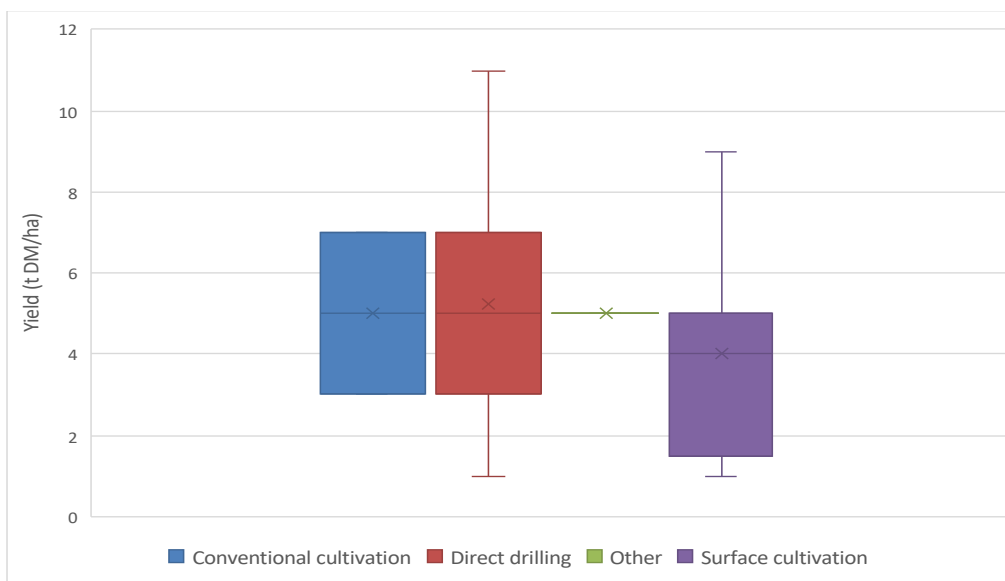


Figure 13 - Average reported grazing yields (t DM/ha) for each establishment method.

3.8. Delay in sowing

- Roughly 75% of delays was because of adverse weather (too hot/cold/dry/wet)
- The cause of the remainder of the delays was mostly that the previous crop was harvested late (Figure 14)

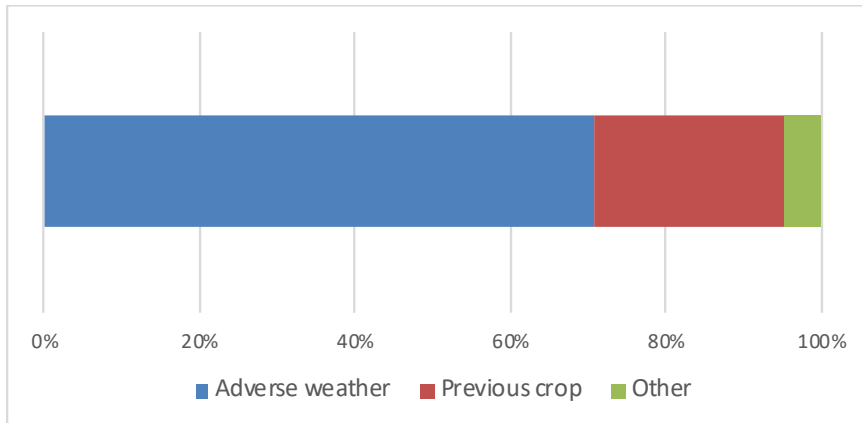


Figure 14 - Proportion of reasons for any delay in sowing

3.9. Fertiliser

- 14% of farmers used N fertiliser at planting and 18% during the growing period. The inter-quartile range was 90-175kg N/ha and 85-136kg N/ha, respectively (Figure 15).

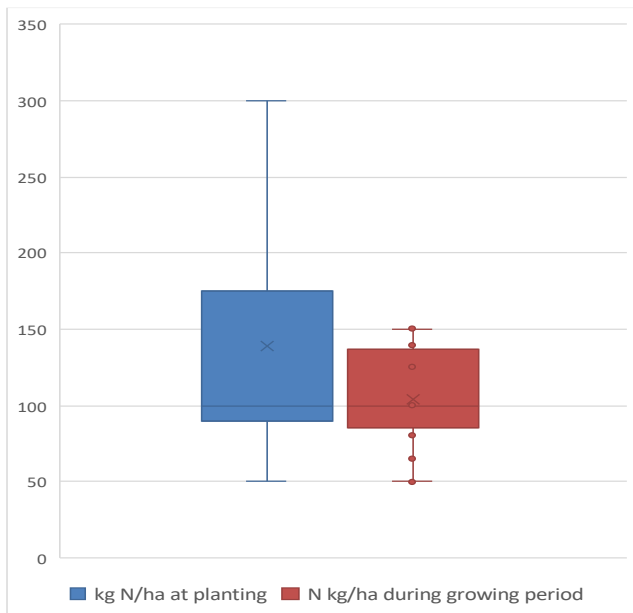


Figure 15 – Quantity of fertiliser applied at planting and during the growing period

3.10. Yield

- Generally, there was no significant difference in grazing yield between regions
- Generally, only Canterbury and Southland farmers reported yields for other uses
- Farmers typically reported average yields between 3-5t DM/ha as green manure, 3-7t DM/ha for grazing, 5-7tDM/ha as green chop, 5-10.5t DM/ha as a whole crop and 5-8.5t DM/ha as grain. (inter-quartile ranges). A detailed table can be found in the Appendix - Table 3.
- Between 0, 5, 8, 11 and 18% of farmers reported not knowing their yield, for average yield for grain, green chop, whole crop, grazing and green manure, respectively.
- Nitrogen fertiliser may boost yield, but the relationship appeared weak, and there were farmers reporting similar average yields with no nitrogen fertiliser. Grazing yield did not appear to be affected by nitrogen fertiliser. In most cases there was not enough data to be more conclusive (Figure 18).
- There was no significant relationship between yield and sowing date, harvest date or time from sowing to harvest. Again, the sample size limited analysis.
- As mentioned earlier, there was little difference in yield between sowing methods.

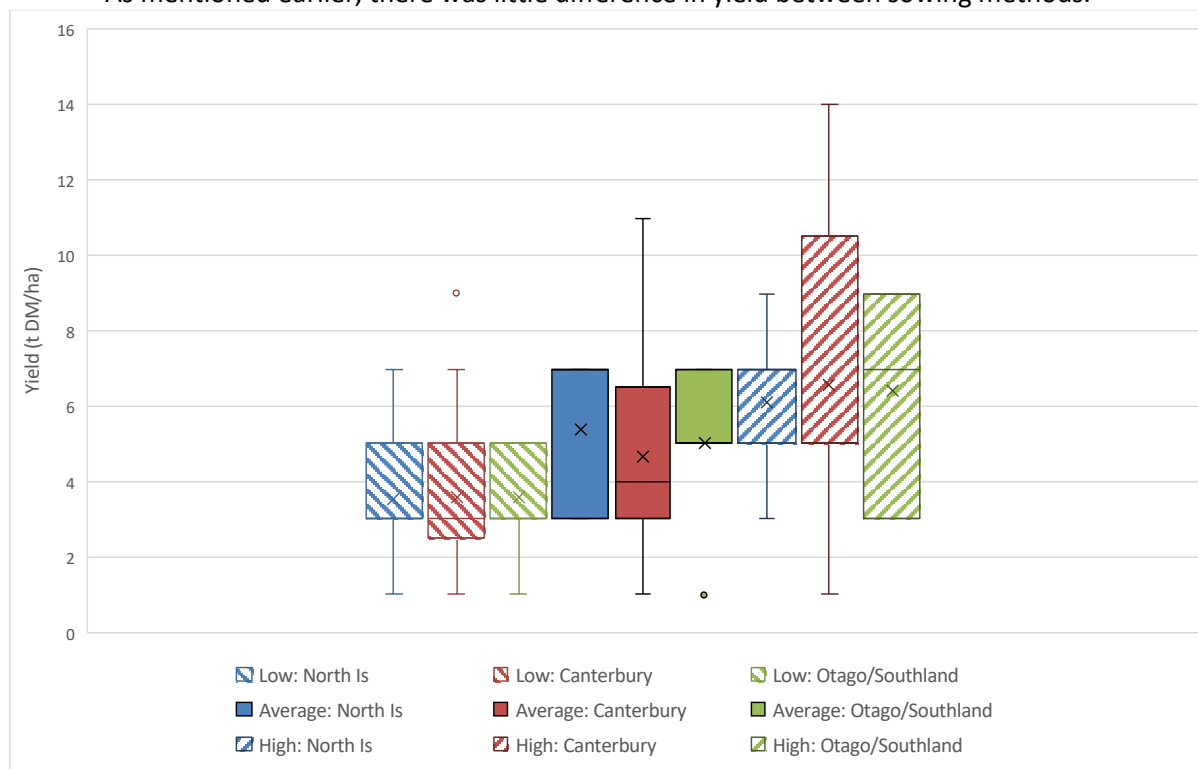


Figure 16 – Grazing yields reported in each region, aggregated up to North Island, Canterbury and Otago/Southland. Note that the North Is. is somewhat dominated by the Waikato.

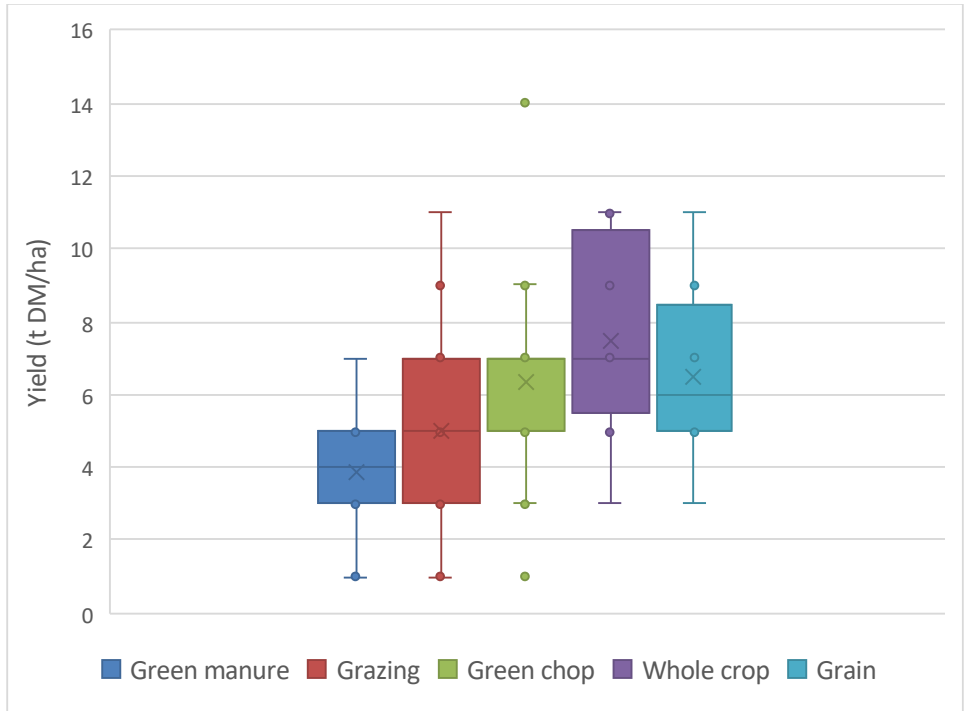


Figure 17 – Average yields reported by farmers. Note that some farmers reported more than one crop use and yield.

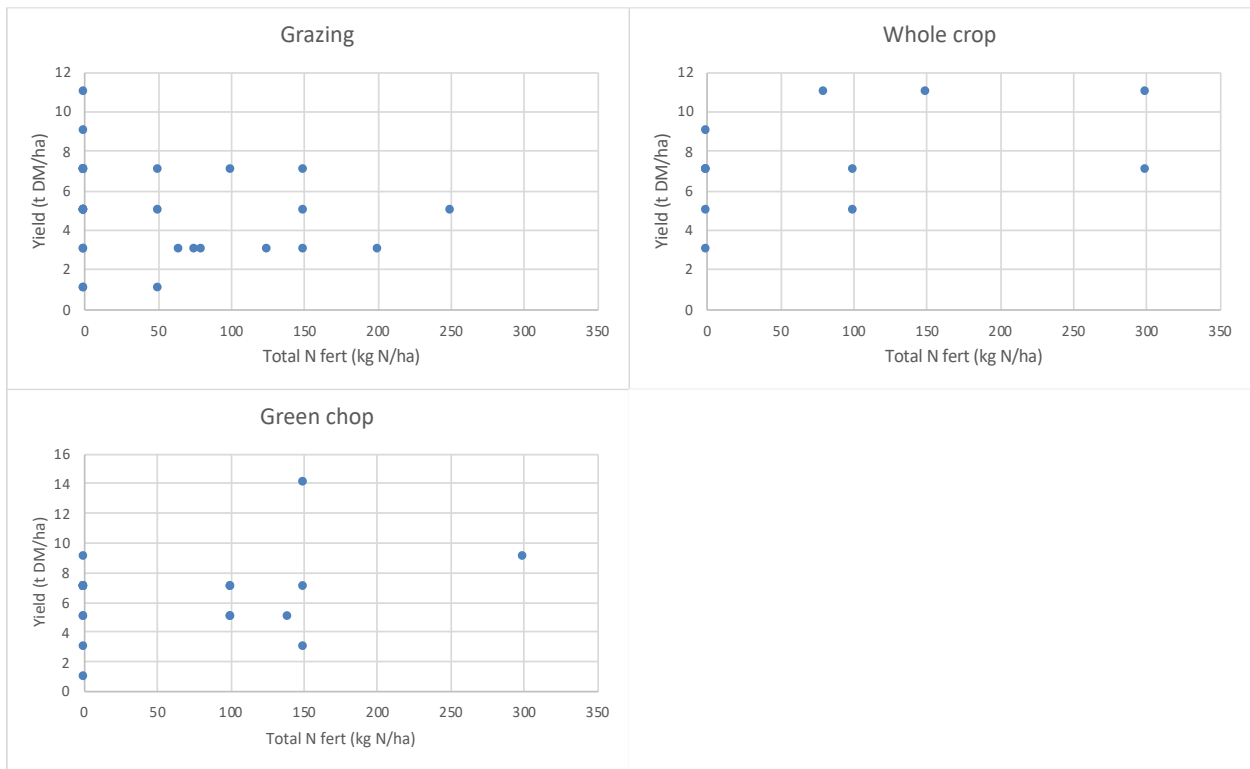


Figure 18 – Catch crop yield reported plotted against total N fertiliser used over the lifetime of the crop (establishment to harvest) for grazing, whole crop and green chop yields.

3.11. Sowing and harvesting date

- The average sowing rate ranged from February to September, but peaked in March
- Harvest for grazing mostly ranged from May to January, peaking in August
- Harvest for green manure generally occurred earlier, from April to November, peaking from August to October.
- Harvest month for green chop was later, November to April, peaking in December
- Harvest month for whole crop was similar to green chop but peaked a month later
- There was insufficient data to do any kind of further break down

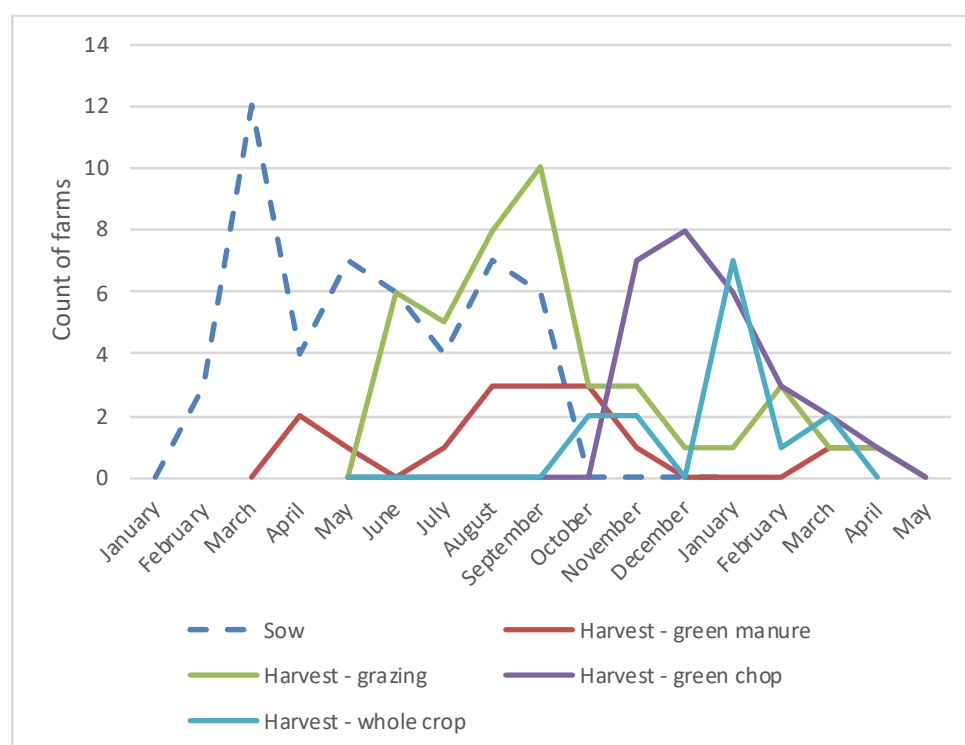


Figure 19 – Typical sowing and harvest months. Harvest months are broken down by crop end use.

3.12. What follows catch crop

- The most common crops following a catch crop were cereal (23) and pasture (22). Ten farmers/growers followed with a brassica.
- The cereals were mostly maize (11) or barley (5).
- The brassicas were mostly kale (7).
- Dairy farmers mostly followed with pasture or kale. The cropping farmers followed with a range of crops.

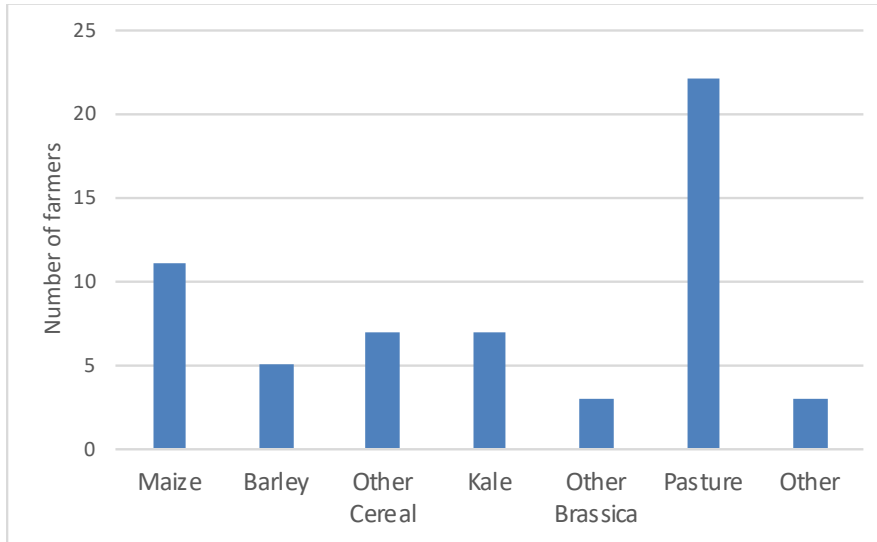


Figure 20 – Species sown following the catch crop

3.13. Source of info

- Respondents reported a wide range of sources of information
- Top 5: Internet, Agronomist/seed rep, DairyNZ, Other farmers/growers, International sources
- Combining DairyNZ and FAR put industry good bodies in 1st place.
- Note that the industry good bodies use some of the other channels mentioned, e.g. internet and literature, so there may be some overlap
- Just over half of dairy farmers were getting information from DairyNZ

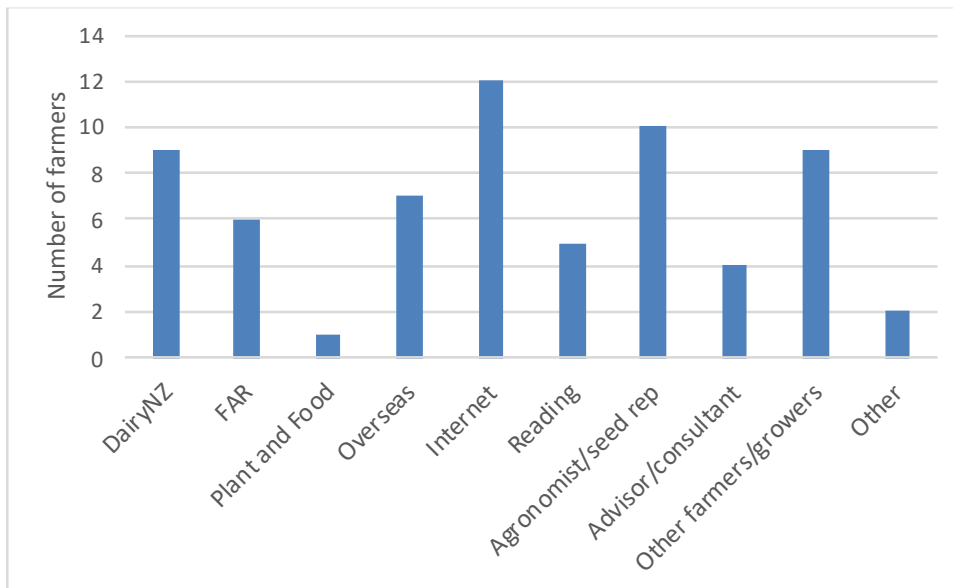


Figure 21 – Sources that the respondents get their catch crop information from.

3.14. More info needed

- Mostly respondents indicated they'd want either environmental information (16) or information about the different species/cultivars available (how do I choose?) (13).
- Environment can be broken down into soil carbon/health (7 [5 arable, 1 dairy, 1 mixed]), wider environment (e.g. demonstration of/information on nutrient uptake/leaching reduction) (7) and Overseer (2). Dairy farmers requested mostly environmental information.
- Other needs were around management (pre-, during, and post-catch crop) (6) and financial (1).
- All responses can be found in the Appendix - Table 4.

3.15. Other general points

- One farmer (mixed) commented that they lost **more** N with the catch crop. They graze their catch crop in July which is probably why.
- The comments indicate that a lot of farmers are not quite sure or are not confident in what they're doing. What they are doing now is working for them, but they are not sure if there is a better way or better species to use. Requests for clear guidelines, or something like a decision tree when choosing a catch crop came up often.

4. Appendix

Table 1 – Number of respondents in each region and farm type

	Arable	Beef	Dairy	Grazier	Mixed livestock	Other	Grand Total
Northland	1		3				4
Auckland	2					1	3
Waikato	9		2		3	1	15
Bay of Plenty			1		1		2
Taranaki		1	1				2
Hawkes Bay					1		1
Manawatū	1		1		1	1	4
Canterbury	12	1	11	1	5	2	32
Otago	1		3		1	1	6
Southland	2		7	2	5	1	17
Other			1		1		2
Grand Total	28	2	30	3	18	7	88

Table 2 – Number of respondents using each species of catch crop in each region

	Count of Italian ryegrass	Count of Annual ryegrass	Count of Oats	Count of Barley	Count of Wheat	Count of Triticale	Count of Ryecorn	Count of Faba beans	Count of Other	Total
Northland	1									1
Auckland			1						2	3
Waikato	5	6	6	2	2	2	1	2	4	30
Bay of Plenty			1							1
Taranaki	1	1	1							3
Hawkes Bay	1	1	1				1			4
Manawatū	1	3	3	1	2			1		11
Canterbury	9	4	21	6	4	7	5	1	9	66
Otago	2	1	4	2			1	1	2	13
Southland	2	3	11	4		1			3	24
Other	1	2	1	1			1			6
Grand Total	23	21	50	16	8	10	9	5	20	162

Table 3 – Five-number summary of yields reported by farmers in each regional grouping. Yields were reported as low, average and high. ‘Combined’ is low, average and high aggregated into one data set. ‘n’ is the minimum number of respondents in each group. Summaries have not been given where n<4. Summary is: local minimum, lower quartile, **median**, upper quartile and local maximum.

		Green manure	Grazing	Green chop	Whole crop	Grain
North Is.	Low	1, 1, 3 , 5, 5	1, 3, 3 , 5, 7	1, 1, 5 , 6, 7		
	Average	1, 2.5, 5 , 5, 5	3, 3, 7 , 7, 7	5, 5.5, 7 , 8.5, 9		
	High	1, 2.5, 5 , 7.5, 9	3, 5, 7 , 7, 9	7, 7.5, 9 , 10.5, 11		
	Combined	1, 2.5, 5 , 5, 7	1, 3, 5 , 7, 9	1, 5, 7 , 9, 11	3, 4.5, 7 , 8, 11	3, 4.5, 6 , 9, 9
	n	6	11	4	2	2
Canterbury	Low	1, 1, 3 , 3, 5	1, 2.5, 3 , 5, 7	1, 2, 3 , 6, 7	5, 5, 5 , 6, 7	3, 3, 4 , 8, 9
	Average	3, 3, 3 , 5, 5	1, 3, 4 , 6.5, 11	1, 3.5, 6 , 7, 7	5, 6.5, 7 , 11, 11	3, 3.5, 6 , 10, 11
	High	3, 3, 5 , 7, 7	1, 5, 5 , 10.5, 14	3, 5, 7 , 8.5, 9	5, 5.5, 8 , 13, 14	5, 5.5, 9 , 13, 14
	Combined	1, 3, 3 , 5, 7	1, 3, 5 , 6.5, 11	1, 3, 5 , 7, 9	3, 5, 7, 9 , 14	3, 3.5, 6 , 10.5, 14
	n	7	12	8	5	4
Otago/Southland	Low		1, 3, 3 , 5, 5	3, 3, 5 , 6, 7	3, 4.5, 5 , 9.5, 11	
	Average		5, 5, 5 , 7, 7	3, 5, 7 , 7, 9	7, 7, 9 , 11, 11	
	High		3, 3, 7 , 9, 9	7, 7, 9 , 9, 9	9, 9, 9 , 14, 14	
	Combined	1, 1, 3 , 3.5, 5	1, 3, 5 , 7, 9	3, 5, 7 , 8.5, 11	3, 5, 9 , 11, 14	5, 5, 7 , 11, 11
	n	2	7	8	6	1

Table 4 – Farmers responses when asked what additional information they would like. Responses have been edited for spelling.

Region	Farm Type	What additional info required
Canterbury	Other	Honest financials and implications
Canterbury	Arable	Rooting depths in early winter based on sowing date. Benefit of nitrogen holding capacity
Bay of Plenty	Dairy	Residual N in the soil. Our experience is the catch crop has been very slow to establish with poor yields, suggesting the residual N in soil was very low.
Canterbury	Dairy	Knowledge of variation of N uptake
Hawke's Bay	Mixed livestock	Leaching
Southland	Mixed livestock	How to optimise the environment benefits while still maintaining the economic benefits.
Canterbury	Beef	Recommendations for best crops for nutrient uptakes
Southland	Other	Nutrient uptake/losses at particular times throughout the year
Other	Dairy	How they work in Overseer
Canterbury	Arable	Enabling catch crops to be modelled in Overseer
Canterbury	Arable	Relative effects on soil biome, nutrient scavenging and release
Waikato	Arable	Quantity of N fixed over winter by clovers. Quantity of C sequestered vs C lost due to cultivation

Otago	Mixed livestock	Stop destroying the soil and waterways before the catch crop
Canterbury	Arable	Its benefit to soil health and not just about DM production
Southland	Dairy	What damage do we do going in too early and spearing the soil with cultivation gear?
Southland	Arable	How different catch crops affect soil structure and soil health
Otago	Arable	Finding out the benefits of the soil health
Canterbury	Arable	Do lupins and beans harbour the same root/soil diseases that affect peas? What other species would be suitable to add to my mix, no grasses, no brassicas, no clovers and must be easily killed in barley, peas?
Southland	Mixed livestock	More work around different types of establishment. Also more data to be used in Overseer.
Southland	Mixed livestock	Is more capital fertiliser necessary to maximise yields?
Auckland	Other	What works?
Southland	Mixed livestock	What fertiliser is required to put back into grass?
Canterbury	Grazier	More access to info on variety that would suit our system and intended uses
Southland	Grazier	Which crop to choose and when is it too late to plant a catch crop
Waikato	Arable	Alternative and additional species that suit my use/rotation - i.e. multi species and multi-year trials
Canterbury	Arable	Website with catch crop/cover crop options/prices/available from whom

Waikato	Arable	Trying crops that might be suitable for our area & soil type.
Canterbury	Arable	Multi-species cover crops
Waikato	Other	Cultivars and herbicide tolerances
Manawatū	Other	Information on legumes and N-fixing plants that could be used, also mixes of species
Canterbury	Dairy	Different plants
Waikato	Arable	It depends what you want the cover crop to achieve on your own farm. A table with the different options of cover crop and the yields and nutrient capture for our soil type (peat). We graze our covers with lambs.
Canterbury	Dairy	Ease of growing/what spraying required/what kgs a hectare you can expect from different crops
Other	Mixed livestock	What's best?
Canterbury	Mixed livestock	Better crop species
Otago	Other	Other options to increase yield, or alternative crop with higher yields

Catch Crop Survey Monkey Questions

Definition of a catch crop: A catch/cover crop is defined as a fast-growing crop that is grown between successive plantings of a main crop within a crop rotation for the purposes of:

- a. utilising nutrients remaining in the soil following grazing/harvesting the previous crop,
- b. providing ground cover (weed control, soil stabilisation),
- c. adding organic matter,
- d. minimising leaching or
- e. providing additional feed for grazing or conservation

The Forages for Reduced Nitrate Leaching Project is interested in capturing farmer experiences with the use of catch crops to help inform future research and for inclusion in resource material. We appreciate you taking the time to complete the survey below.

1. Please select your region

Drop down box

Northland
Auckland
Waikato
Bay of Plenty
Hawkes Bay
Manawatu
Taranaki
Nelson/Marlborough
West Coast
Canterbury
Otago
Southland

Other

2. What type of farming operation?

Arable

Mixed livestock

Sheep

Deer

Beef

Dairy

Grazier

Other (please specify, comment box)_____

3. What is your experience with catch crops?

Using successfully (continue with survey)

Tried but it didn't work/fit my farm system (continue with survey)

Interested but haven't tried

Other (please specify, comment box)_____

4. Where is/was your main catch crop area located?

City/town

Postcode

5. Please rank the following reasons for using catch crops in order of importance for you

Environmental outcomes (soil & water)

Provide ground cover

Adding organic matter

Generating additional feed

Part of the normal crop rotation

Other (please specify, comment box) _____

6. What crops do you use/have you tried (tick all that apply)

Italian ryegrass

Annual ryegrass

Oats

Barley

Wheat

Triticale

Ryecorn

Faba beans

Other (please specify, comment box) _____

7. Does/did the catch crop follow grazing of a crop with livestock? – Yes/No

8. What crop does/did your catch crop usually follow? (tick all that apply)

Winter kale

Winter swedes

Autumn fodder beet

Winter fodder beet

Rape

Winter turnips

Maize

Other (comment box) _____

9. When do you typically sow your catch crop? (select/tick the period that applies in each row)

	Before 1 May**	1-15 May	16- 31 May	1-15 Jun	16- 30 Jun	1- 15 Jul	16- 31 Jul	1-15 Aug	16- 31 Aug	1-15 Sep	16- 30 Sep	>1 Oct
Earliest Date												
Most Common date												

Latest Date													
-------------	--	--	--	--	--	--	--	--	--	--	--	--	--

** Please specify the date range and month for the first column

10. What establishment method do you use for the catch crop

Direct drilling

Conventional cultivation

Surface cultivation

Other (please specify, comment box) _____

11. Do you use N fertiliser on the catch crop? – Yes/No

If yes, **what and when** is this applied

At planting: _____ kg of _____/ha

During the growing period: _____ kg of _____/ha

Other (comment box) _____

12. What is the intended end use for the catch crop and harvest month?

	Harvest month(s)	Are you happy with the yield you get? Yes/No
Green manure		
Grazing		
Green chop silage/baleage		
Whole crop silage/baleage		
Grain		

13. Please choose two main uses (if applicable) of your catch crops from the list in bold - **green manure, grazing, green chop, whole crop or grain** and write above the table below. What is your expected yield in tonnes dry matter/ha for each of these (tick the box in each row that applies)

Catch crop 1 use: _____

	Don't know	0-2	2-4	4-6	6-8	8-10	10-12		>12
Low yield (bad year)									
Average (most years)									
High yield (good year)									

Catch crop 2 use (if applicable): _____

	Don't know	0-2	2-4	4-6	6-8	8-10	10-12	>12
Low yield (bad year)								
Average (most years)								
High yield (good year)								

14. What follows the catch crop? (Open answer, comment box) _____

15. What is the most common reason that delays planting the catch crop in your region? (open answer, comment box) _____

16. Where did/do you go for information on catch crops? (open answer, comment box)

17. What additional information would you like to help you with your decision making around catch crops? (open answer, comment box) _____

18. Any other information you would like to provide? (open answer, comment box)

19. Would you be interested in providing additional information on your catch crop experience to a member of the project team? Yes/No

If yes please provide your name and contact details.

Name _____

Email _____

Phone number _____