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Sheep and beef winter grazing management practices in the Waikato and Waipa River catchments: quantitative study 2013

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Foreword

In the absence of good predictors of what landholders will do in response to policy interventions to manage natural resources, decision-makers will struggle to distinguish: if their chosen policy will ensure the necessary changes in farm practices and technologies will happen and, how quickly any change will occur. Traditionally councils have relied on intensive consultation meetings over an extended time frame with a small group of landholders who seek to represent all other landholders. Unfortunately, this does not necessarily generate all the information needed for policy design and this is costly for landholders involved. More information about the responses of landholders can help identify if considerations about change can be managed for in policy design and ultimately if the potential for unfavourable responses can be managed.

Kaine (2008, 2004) has developed a method to identify how landholders make decisions about changing farm practices and technologies. This method can be used to identify groups of farmers who value practices and technologies differently, and why. This information can be used to predict likely changes policies can have on farm practices and technologies, and efficient ways to promote change practices and technologies. This report presents the results of a quantitative telephone survey, which involved talking to 450 sheep and beef farmers in the Waikato and Waipa River catchments about winter management on their farm. The study quantified the use of winter grazing practices by sheep and beef farmers, and then identified differences in the use of practices and management decisions. The analysis undertaken in this report identified some relationships between the practices and technologies chosen and elements of the farm system. To further understand these, and the link between the use of practices and technologies and farm context, additional analysis was undertaken by Kaine (2014b).

This report is a resource which provides base statistics for sheep and beef enterprises. This includes differences in the use of practices and technologies across various soil types, districts, and farm sizes. It highlights a number of variables that need to be managed on farm, including the combined effect of soil type, drainage, topography, rainfall and the subsequent effect on soil pugging and /or waterlogging. This is further complicated by the individual combination of multiple stock types and their specific management requirements.

The base information contained here will be useful when considering the consequences of any potential policy interventions for sheep and beef farmers in the Waikato and Waipa River catchments. Knowing whether a practice or technology contributes to the needs of landholders can inform the selection of policy instruments. An understanding of the influences on farmer decision making can be used to consider whether policy makers might have some success implementing a policy instrument, or where change is severely constrained by factors in the farm context which are fixed. Some policy options may be infeasible or uneconomic for all landholders to implement. It is important to be aware of the substantial impacts that policy options may have on farm.

Executive summary

Introduction

Waikato Regional Council (the council) has a role in controlling the use of land for the purpose of maintaining and enhancing water quality. Nitrogen is increasing in both the Waikato and Waipa rivers. Phosphorus levels are moderate in both rivers, with concentrations remaining constant in the Waikato River, but concentration levels varying along the Waipa River and increasing in the most downstream site. E. coli levels are high but stable in the Waipa River, and are moderate in the Waikato River downstream of Karapiro. Sediment levels in the lower reaches of both rivers are high and increasing (Waikato Regional Council 2014).

Activities on the land affect water quality when contaminants such as nutrients, sediment and bacteria are washed off or leached from the land into rivers and streams. These contaminants can enter waterways through point source discharges, such as from a pipe, or from non-point (diffuse) discharges, such as run off or leaching from land (Environment Waikato 2008).

The council has been investigating how land management practices and activities affects nutrient, sediment and bacteria loss to water. To inform part of this discussion, the council commissioned research on how beef and sheep farmers' make decisions to adopt various farming practices into their grazing management systems, and how these practices link to nutrient losses from beef and sheep farms.

This report is the second phase of research to investigate sheep and beef farmers decision making. The purpose of this research was to quantify sheep and beef farmers' winter grazing management practices and their decisions by conducting a survey. The survey was undertaken with a statistically representative sample of the sheep and beef farmer population in the Waikato and Waipa River catchments. The focus of the report is on winter grazing management practices which affect nutrient management.

Theoretical framework

The objective of much of land and water resource management policy is to change the behaviour of landholders. That is, change landholders' choice of practices and technologies. For policy decision makers to influence landholders' choice of practices and technologies they need to understand how landholders make choices.

The Kaine Framework (Kaine 2008, 2004) is a method for understanding how landholders make choices about practices and technologies. It can provide insights into landholder choices and how these choices may be influenced. The framework can be used to help set priorities for, and design of, water resource management policies.

Application of this framework involves:

1. Face-to-face interviewing (qualitative) followed by analysis to identify farm context and market segments;
2. Large scale survey (quantitative) to statistically validate interview results and to quantify population and market segments;
3. Face-to-face interviews to validate membership of market segments and implications.

Once policy makers are confident they know the number of potential adopters for a given technology or practice this information can be used to customise research, extension or policy to the different sets of landholders with similar farm contexts, that suit a given technology or practice.

In 2009 Waikato Regional Council undertook the first stage of research with sheep and beef farmers using the Kaine Framework, conducting 32 interviews. The purpose of these qualitative interviews was to identify the variety of winter management practices that can be undertaken on farm, and the farm context for particular practices. Results are reported in Davies (2012).

The second stage of research was documented in two reports. The council commissioned Versus Research Ltd to survey sheep and beef farmers[1] in the Waikato and Waipa River catchments to build on the key themes that emerged from the qualitative research conducted by Davies (2012).The results of the large scale survey are included in this report. The statistical analysis of the relationship between farm context factors and management practices has been documented in Kaine (2014b).

Research objectives

The key research objectives of this project were to better understand winter management practices of sheep and beef farmers'. The study encompassed:

- the full combination of farm enterprises running on a particular farm, including; sheep (breeding, finishing or trading), beef (breeding, finishing or trading), lamb (fattening, finishing or trading), dairy heifer grazing, dry dairy cow winter grazing or other grazing;
- the grazing management decisions that are used to manage waterlogged or pugged soils, for each enterprise run on farm;
- riparian, soil conservation and fertiliser management and;
- testing key themes identified in the qualitative study by Davies (2012) with a statistically representative sample of the sheep and beef farmer population in the Waikato and Waipa River catchments.

Method and sample

A telephone survey was undertaken by Versus Research Ltd. A total of 450 interviews with sheep and beef farmers in the Waikato and Waipa River catchments were completed during the period from the 10th June to the 21st July 2013. Quotas on river catchment area ensured proportionate geographic representation. The sample was drawn from the AgriBase™ dataset of farmers in the Waikato and Waipa River catchments; telephone numbers were randomly selected from the database. Interviews were conducted between 10am and 2pm, and 6pm and 8.30pm. The average interview length was 19.5 minutes.

Research topics

This section provides an overview of the topics covered in the interviews.

Fertiliser and soils

An overview of interviewees' decision making around fertiliser and soil is provided including: fertiliser use and application (timing, location, and amount); making decisions about fertiliser usage; use of soil testing; and the use of fertiliser management plans, nutrient budgets and nutrient management plans.

[1] Similar research has been undertaken in the dairy farming sector to understand farm context and the variety of winter management practices undertaken on farm. A qualitative study was undertaken in 2008 comprising of in depth interviews with 36 dairy farmers throughout the Waikato Region (Davies and Topperwien, 2011). Subsequently a large scale telephone survey was run in 2011 of a random sample of 401 dairy farmers in the Waikato region (Versus Research Ltd and Davies, 2012). This study quantified the proportion of farmers in segments identified in Davies and Topperwien (2011) based on their standoff practices and wintering practices. The data was then re-analysed to test the link between winter management practices and farm context factors (Kaine 2014a).

Winter cropping

Questions relating to interviewees' winter cropping practices included: presence of a winter crop, topography of the winter cropping area, whether cropping was used to fill a feed deficit or for pasture renewal, types of crops grown and whether crops were grazed to bare soil.

Waterlogged soils and pugging

This section covered the frequency of soil waterlogging, the proportion of farm at risk of waterlogging, and the timing and duration of waterlogging. The impacts of waterlogging on pasture and grazing as well as the impacts on pasture composition and fertiliser spreading were also explored.

This section also reports the findings for pugging; how prone farms are to pugging during winter, areas at most risk of pugging, impact of pugging on pasture and grazing habits, impact of pugging on pasture composition and soil structure, and duration that stock are grazed on areas prone to pugging.

Sacrifice paddocks

In this section findings about interviewees use and management of sacrifice paddocks are reported. This included the use of a sacrifice paddock in winter, the topography of the sacrifice paddock, the use of the same sacrifice paddocks each winter, the location of the sacrifice paddock in terms of farm waterways or drains and the use of winter crop paddocks as sacrifice paddocks.

Managing stock types over winter

In the following section the findings for the management of the different stock classes over winter are outlined. For bulls, dairy heifers, dairy cows, sheep, lambs, and beef cattle, findings are reported on: the proportion of farms that run each stock type; number of that stock type on farm; the type of enterprise run (for sheep, lambs and beef cattle); and the management of waterlogging and pugging. These management practices were drawn from the following list, and differed for each stock type:

- Set stock them over a larger area
- Put them in a sacrifice paddock
- Feed out purchased supplements
- Feed our hay or silage
- Move them to drier paddocks/ better paddocks
- Move them to flatter paddocks
- Alter rotation length
- Graze them on a winter crop
- Back fence, strip graze or break feed
- Stand them off
    - Winter cropping areas
    - Races, yards or laneways
    - Sacrifice paddocks
    - Feedpad
    - A purpose built stand off or loafing pad
- Graze them on larger area/ more paddocks
- Return them to their owner before waterlogged soils are a problem
- Put them on the steeper country
- Sell some of them before winter
- Reduce rotation length
- Move to set stocking across the whole farm
- Doesn't change how I manage the farm

Riparian and wet area management

This section covered a range of management decisions made by interviewees in terms of waterways on their property including; fencing of any waterways, reasons for fencing or not fencing waterways, riparian plantings over the last five years, reasons for riparian planting or not planting along waterways, presence of wetland, swamps or boggy areas, and the fencing or retirement of wetlands, swamps or boggy areas.

This section also covered some infrastructure decisions including; installation of culverts or bridges on stock crossing, and reasons for, or for not, installing culverts or bridges on stock crossing.

Farmer awareness and involvement in local groups and projects

In this section farmer awareness of local groups, projects and involvement in these groups and projects was explored. Finally, interviewees were asked what they thought would be the most useful action that the Waikato Regional Council could take in their district to help them with environmental management on their farm.

1 Introduction

Waikato Regional Council (the council) has a role in controlling the use of land for the purpose of maintaining and enhancing water quality. Nitrogen is increasing in both the Waikato and Waipa rivers. Phosphorus levels are moderate in both rivers, the Waikato River is mostly stable, but levels vary along the Waipa River and are increasing in the most downstream site. E. coli levels are high but stable in the Waipa River, and are moderate in the Waikato River downstream of Karapiro. Sediment levels in the lower reaches of both rivers are high and increasing (Waikato Regional Council 2014).

Activities on the land affect water quality when contaminants such as nutrients, sediment and bacteria are washed off or leached from the land into rivers and streams. These contaminants can enter waterways through point source discharges, such as from a pipe, or from non-point (diffuse) discharges, such as run off or leaching from land (Environment Waikato 2008).

The council has been investigating how the practices and activities that farmers choose to use on their land affects nutrients, sediment and bacteria entering water. In August 2007, the Waikato Regional Council commissioned a report to summarise current scientific understanding of, and gaps in knowledge about, management practices and nutrient losses on dairy and to some extent beef and sheep farms, and to identify the effectiveness of practices in reducing nutrient losses from these farm systems (Ritchie, 2007).

In that report Ritchie (2007) observed that while there were a range of management practices available for pastoral farmers to adopt that affected nutrient losses, there were likely to be only a few practices that could be easily incorporated into existing farm systems with a beneficial impact on both farm income and the environment. In addition, local climatic, soil and farm management variables influenced the magnitude of environmental gain from implementing different practices (Ritchie, 2007). However, information on the extent to which beef and sheep farmers were adopting management practices that influence nutrient losses, and knowledge of the factors that influenced their decision-making about adopting these practices was not covered.

Consequently, the council commissioned research on the adoption of management practices by beef and sheep farmers in the Waikato region. In particular, an understanding of beef and sheep farmers' decision-making around the adoption of a given practice within the context of their grazing management systems, and how such practices link to nutrient losses from beef and sheep farms.

This report is part of a phased approach of research to investigate sheep and beef farmers decision making. The purpose of this research was to quantify sheep and beef farmers' winter grazing management practices and document the decision making process. This was achieved through a survey which was undertaken with a statistically representative sample of the sheep and beef farmer population in the Waikato and Waipa River catchments. The focus of the report is on winter grazing management practices which affect nutrient management.

This report presents the results of the information gathered in the survey. This data can assist policy makers design policy by providing information about sheep and beef farmer decision making and farm practices.

2 Theoretical framework

The objective of much of land and water resource management policy is to change the behaviour of landholders. That is, change landholders' choice of practices and technologies. For policy decision makers to influence landholders' choice of practices and technologies they need to understand how landholders make choices.

The Kaine Framework (Kaine 2008, 2004) is a method for understanding how landholders make choices about practices and technologies. It can provide insights into landholder choices and how these choices may be influenced. The framework can be used to help set priorities for, and design of, water resource management policies.

The Kaine Framework (Kaine 2008, 2004) can be used to determine the circumstances in which an agricultural technology or practice may create benefits for a landholder. The premise of the framework is that landholders are active seekers of information and will adopt technologies and practices that provide them with a benefit above current practice.

The benefits sought by landholders are highly correlated with the landholder's farm context. The farm context can be defined as the mix of farm resources, technologies, management strategies and practices that will influence the benefits sought from the adoption of an agricultural technology or practice.

Application of this framework involves:

1. Face-to-face interviewing (qualitative) followed by analysis to identify farm context and market segments;
2. Large scale survey (quantitative) to statistically validate interview results and to quantify population and market segments;
3. Face-to-face interviews to validate membership of market segments and implications.

Once policy makers are confident they know the number of potential adopters for a given technology or practice this information can be used to customise research, extension or policy to the different sets of landholders with similar farm contexts which suit a particular technology or practice.

In 2009 Waikato Regional Council undertook the first stage of research with sheep and beef farmers[2] using the Kaine Framework (Kaine 2004, 2008), conducting 32 interviews. The purpose of these qualitative interviews was to identify the variety of winter management practise that can be undertaken on farm, and the farm context for particular practices. Results are reported in Davies (2012). Key themes from this research are as follows:

- There is a deficit of information on the environmental and economic benefits of nutrient mitigation practices for beef and sheep farming systems.
- Grazing management practices of beef and sheep farmers are influenced by their farm context. This has implications for policy development and education programmes.
- Beef and sheep enterprises are characterised by livestock of different types and age classes and greater variety in topography. Farmers make stocking decisions based on the capacity of their farm to carry stock of different types

[2] Similar research has been undertaken in the dairy farming sector to understand farm context and the variety of winter management practices undertaken on farm. A qualitative study was undertaken in 2008 comprising of in depth interviews with 36 dairy farmers throughout the Waikato Region (Davies and Topperwien, 2011). Subsequently a large scale telephone survey was run in 2011 of a random sample of 401 dairy farmers in the Waikato region (Versus Research Ltd and Davies, 2012). This study quantified the proportion of farmers in segments identified in Davies and Topperwien (2011) based on their standoff practices and wintering practices. The data was then re-analysed to test the link between winter management practices and farm context factors (Kaine 2014a).

and weights and to manage stock to meet different market requirements (breeding, trading or finishing).

- The mix of livestock on beef and sheep farms has implications for nutrient management as different activities are involved in the management of each stock type and age class.
- There are a number of factors that beef and sheep farmers must consider (including climate, soils and topography) when assessing the potential benefit of changing wintering practices. Some changes may not even be feasible in some farm contexts.
- This means that farmers are unlikely to change practices to reduce nutrient emissions unless the change offers a clear advantage over current management practices for the winter months.
- For these reasons, it is clear that 'a one size fits all' approach to improving nutrient management on beef and sheep farms is not feasible. Nutrient management on such farms must be tailored to account for site-specific factors.

Davies (2012)

The second stage of research was documented in two reports. The council commissioned Versus Research Ltd to survey sheep and beef farmers in the Waikato and Waipa River catchments to build on the key themes that emerged from the qualitative research conducted by Davies (2012).The results of the large scale survey are included in this report, while the analysis to statistically test the link between farm context factors and management practices has been documented in Kaine (2014b). Specifically, the report statistically tests relationships between the frequency and extent of pugging and waterlogging, and practices farmers use to manage sheep and beef over winter. Also, the frequency and extent of pugging and waterlogging was also tested to identify if it was a function of biophysical characteristics of the farm (Kaine, 2014b).

Overall, the research steps aims of the Kaine Framework (Kaine 2004, 2008) were to understand why farmers chose certain practices over others, or why they may have made any changes to their farming system. This can provide detail on where farmers are already exercising recommended practices, what the likelihood of the adoption of new practices is and indicate potential barriers or obstacles associated with certain practices. This would influence the rate and scope of practices being implemented on farm.

3 Research objectives

The key research objectives of this project were to better understand winter management practices of sheep and beef farmers'. The study encompassed:

- the full combination of farm enterprises running on a particular farm, including; sheep (breeding, finishing or trading), beef (breeding, finishing or trading), lamb (fattening, finishing or trading), dairy heifer grazing, dry dairy cow winter grazing or other grazing;
- the grazing management decisions that are used to manage waterlogged and pugged soils, for each enterprise run on farm;
- riparian, soil conservation and fertiliser management and;
- testing key themes identified in the qualitative study by Davies (2012) (see above) with a statistically representative sample of the sheep and beef farmer population in the Waikato and Waipa River catchments.

4 Method

A telephone survey was undertaken by Versus Research Ltd. A total of 450 interviews with sheep and beef farmers in the Waikato and Waipa River catchments were completed during the period from the 10th June to the 21st July 2013. Quotas on river catchment area ensured proportionate geographic representation. Interviews were conducted between 10am and 2pm, and 6pm and 8.30pm. The average interview length was 19.5 minutes.

Previously, a pilot survey of 40 interviews[3] was completed on the 11th June to check questionnaire flow and to ensure any potential areas for confusion were eliminated and/or technical issues removed prior to 'going live'. All interviewing was completed in-house at Versus Research using the Computer Assisted Telephone Interviewing (CATI) system; all interviewers were supervised by a senior researcher at all times to handle any queries from farmers. Survey data was checked, audited and 'cleaned' on the completion of the survey process.

The survey questionnaire was designed by Geoff Kaine Research and the council. Survey design was informed by the initial qualitative interviews (Davies 2012). Refer to Appendix 1 for the questionnaire used in the survey.

4.1 Sample

Waikato Regional Council supplied Versus Research Ltd with the AgriBase™[4] dataset of farmers in the Waikato and Waipa River catchments; telephone numbers were randomly selected from this database to go into the pool of numbers to telephone. Up to six call backs were made to each telephone number before the telephone number was removed from the pool of numbers.

During initial introductions, the person who makes the day to day decisions about stock management practices on the farm was asked for, to ensure the relevant person was surveyed. Where multiple farms were owned by a farmer, the farmer was asked to provide answers for the farm identified based on geographic location as part of the survey design.

Quotas were applied to catchment areas to ensure the final sample was proportionate to the geographic spread of the farmer population. Refer to Table 1 for survey sample quota details.

[3] The 40 pilot interviews were included in the final sample, unless the changes made to the questionnaire design meant that the data gathered was too different to the new questionnaire.

[4] AgriBase™ records are maintained by AsureQuality New Zealand Limited through routine contact with farmers and through updates of property changes from Valuation Service providers. Waikato Regional Council purchased a snapshot of the AgriBase™ database. The most recent licence agreement commenced in July 2012 and will expire in June 2014, with data updated every 6 months. Data used in the survey was dated as of June 2013.

Table 1: Breakdown of quota and achieved sample

Catchment	Population[5]	Quota	Achieved
Upper Waikato	500	65	62
Lower Waikato	1700	225	235
Waipa	1200	160	153
Total	**3400**	**450**	**450**

4.2 Calling statistics

A total of 3032 phone numbers[6] were called during the survey time frame; a summary of the contact outcomes are listed in Table 2.

Table 2: Contact outcomes from research

Description	Number of occurrences	% of total contacts
Completed interviews	450	15%
Refused to participate	676	22%
Did not qualify	1343	44%
Out of service	532	18%
Incomplete interviews	31	1%
Total	**3032**	**100%**

[5] Population data based on AgriBase™ database.

[6] Total database of 3400 contact details.

5 Analysis and reporting

5.1 Subgroups

The results in this report were analysed at the sample level and by seven subgroups:

- Catchment
- Drainage
- Farm size
- Soil type
- Topography
- Enterprise types on farm
- Role on farm

Catchment and drainage was classified by the council using geographic location and soils data. This information was matched to each farm after completion of the survey.

Farm size was reported by respondents as a total amount, size ranges[7] reported were then created by Versus Research Ltd.

Soil type, topography, enterprise type and role on farm were analysed based on farmer's response.

Where possible a minimum of 30 farms per sample group was used in order for significance tests to be performed.

5.1.1 Catchment

Catchment was classified using the geographic co-ordinates of the farm area from the AgriBase™ dataset[8]. Three groupings were used for catchment; the groupings and sample sizes are shown in Table 3.

Table 3: Catchment subgroup sample sizes

Catchment	Number of interviews (n)	% of sample
Upper Waikato	62	14%
Lower Waikato	235	52%
Waipa	153	34%

5.1.2 Drainage

The soil drainage classification for each farm was calculated based on the dominant soil type and drainage data from the New Zealand Soil Classification and New Zealand Land Resource Inventory[9]. Three groupings were used for drainage; the groupings and sample sizes are shown in Table 4.

[7] Note that the choice of classification ranges may mean results reported as significant may be an outcome of the classification.

[8] Farms that crossed the boundary between catchments were classified as being in the catchment where most of the farm was located.

[9] Land drainage data was supplied and reproduced with the permission of Manaaki Whenua - Landcare Research New Zealand Ltd. The New Zealand Land Resource Inventory contains soil order data and five drainage classes and descriptions. Farms were classified into three drainage categories using the following criteria: Free draining (more than 66% of farm well drained or moderately well drained), poor draining (more than 66% of farm poorly drained or very poorly drained) and mixed (more than 66% of farm imperfectly drained or the predominant drainage class was less than 66% of farm area). The cut off point of 66% was used as where a farm's predominant drainage was less than this figure the impact on farm management could not be certain. The cut off point of 66% was set by the council.

Table 4: Drainage subgroup sample sizes

Drainage class	Number of interviews (n)[10]	% of samples
Free draining	346	77%
Poor draining	23	5%
Mixed	79	18%

5.1.3 Farm size

Farm size was reported by respondents as a total amount. Ranges[11] reported were created by Versus Research Ltd and were grouped based on the responses given in the survey. Five ranges were used for farm size; the ranges and sample spread are shown in Table 5.

Table 5: Farm size subgroups sample sizes

Farm size	Number of interviews (n)	% of sample
Under 50 hectares	187	42%
Between 51 and 100 hectares	56	12%
Between 101 and 200 hectares	73	16%
Between 201 and 400 hectares	74	16%
401 hectares or more	60	13%

5.2 Margin of error

A total of 450 interviews were completed. The final sample size provides a maximum margin of error of ±4.30%[12] at the 95% confidence interval and when p≤0.5 (maximum population variability).

5.3 Significance tests

Significance tests were used to determine whether the difference between two results is statistically significant or not, that is, to determine the probability that an observed difference occurred as a result of chance.

Significance tests have been applied to those groups with more than n=30 respondents as listed in the sub-group summary above. This test shows the differences between the proportions (also known as a Z test) and compares the results for farmers in each sub-group with all other farmers who are not in that sub-group.

Significance tests were not reported for all survey questions asked. The following criteria were used to determine which significant tests results were included in the report.

- Result is comparing two variables that are deemed to have a potential relationship based on the findings of Davies (2012).

- Result is significant at the 99% confidence level ($p<0.01$).
  This is reported as follows for example: Farmers who ran sheep were **much more** likely to have applied phosphate as a maintenance fertiliser (76% compared to 68% for all)**.**

[10] Note 2 farms were unable to be classified into either free draining, poor draining or mixed, therefore the total for this table is 448.
[11] Note that the choice of classification ranges may mean some results reported as significant may be an outcome of the classification. In these circumstances the results would need to be subjected to further testing.
[12] Assumes a total population of 3400.

If the two criteria above were met and the result for farmers in that subgroup was 20% or above the results for all other farmers not in that subgroup, additional bold formatting has been applied to that sentence.
For example: Farmers who had a farm size of 401 hectares or more were **much more** likely to apply phosphate fertiliser to where the sheep graze **(67% compared to 45% for all)**.

5.4 Display of data

For ease of interpretation, charts are used to display top level results in this report. The question asked in the survey is footnoted on the same page as the chart and the base size, that is, the number of farmers that answered a question, is shown below the chart.

Please note that not all percentages shown add up to 100%. This is due to rounding and/or questions that allow multiple responses (rather than a single response).

6 Sample profile

The following section provides an overview of the sample population for this project.

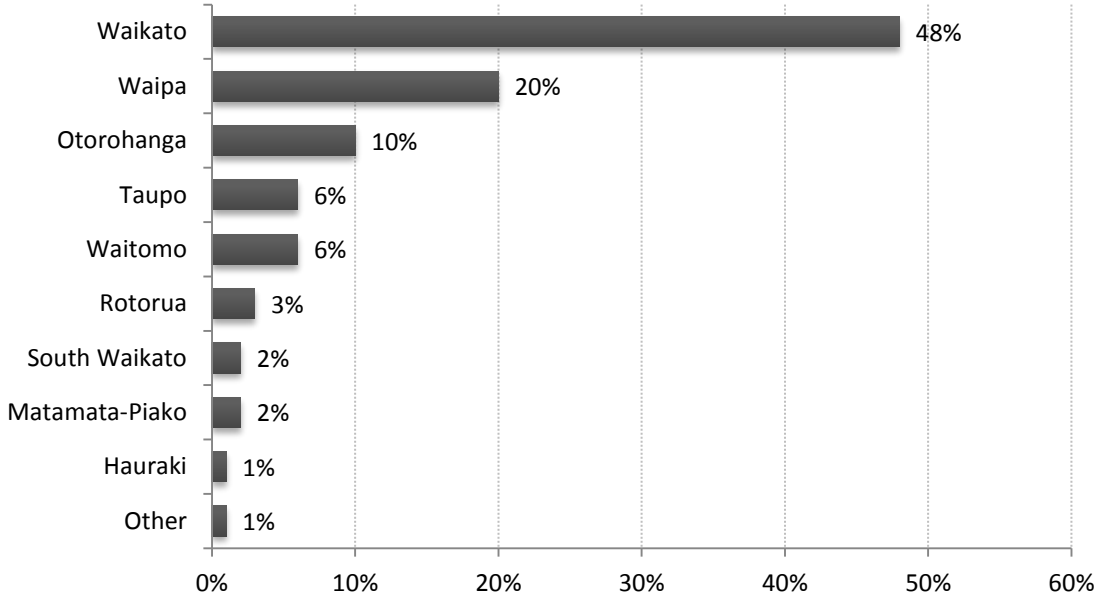
Farmers were asked about their farm and its characteristics. These characteristics were grouped for sub analysis by geographic and farm characteristics, and by role on farm.

6.1 Geographic characteristics

6.1.1 District council area

Nearly half of farmer responses were located in the Waikato district (48%), followed by Waipā district (20%) and Otorohanga district (10%). Sample responses were lower from Taupo (6%), Waitomo (6%), Rotorua (3%), South Waikato and Matamata-Piako districts (2% each) and Hauraki and another district (1% each)(Figure 1).

Figure 1: District council area[13]



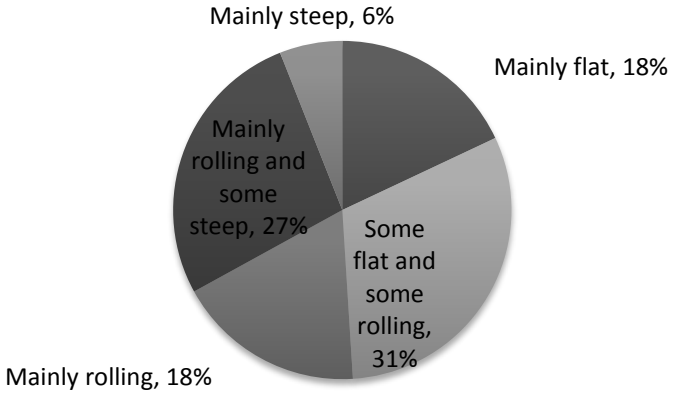
Base: All farmers, n=450

6.1.2 Farm topography

Farmers were asked to identify the topography of their farm (Figure 2). Similar proportions of farmers reported the contour of their farm was mainly flat (18%) or mainly rolling (18%). Also similar proportions of responses were reported for some flat and some rolling country (31%) and mainly rolling country and some steep (27%), with 6% reporting mainly steep country.

[13] Which District Council area are you in? (Q1)

Figure 2: Farm topography[14]



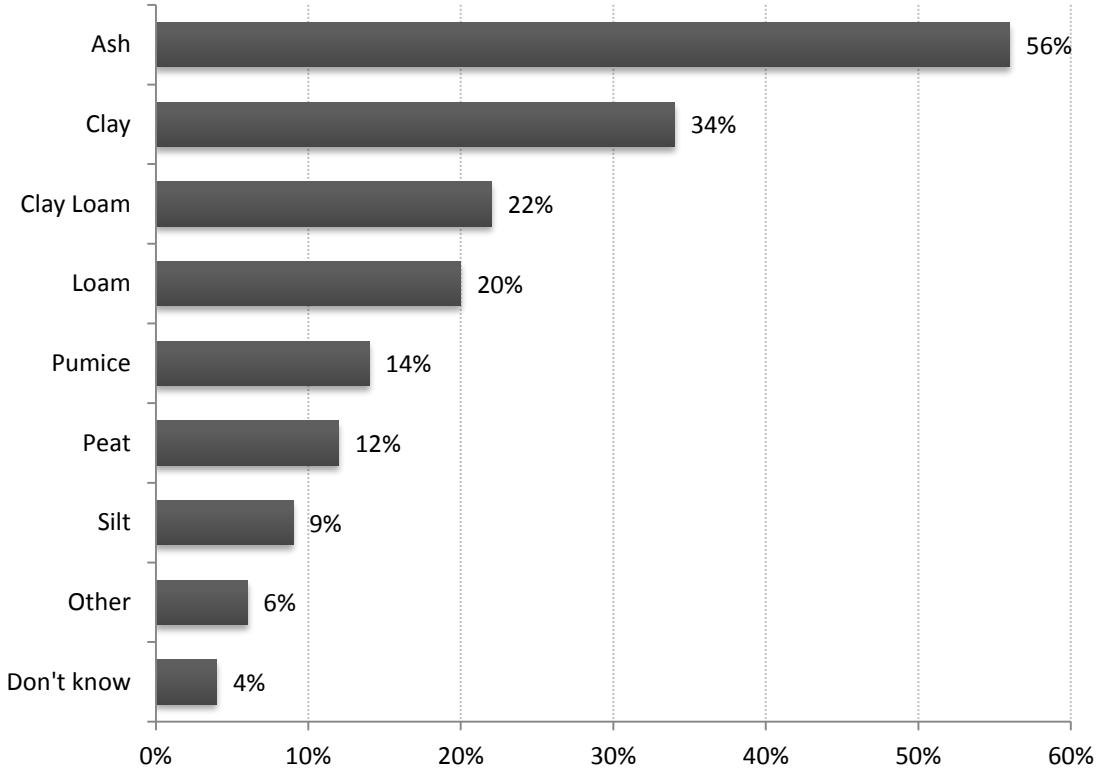
Base: All farmers, n=450

6.1.3 Soil type

Farmers were asked to identify the soil types by topography[15]. Responses were then grouped at total sample level for analysis by geographic characteristics (Figure 3).

More than half of farms had ash soil (56%), followed by 34% clay, 22% clay loam, 20% loam, 14% pumice, 12% peat, and 9% silt.

Figure 3: Soil type[16]



Base: All farmers, n=450

[14] What is the topography of your farm? (Q4)
[15] Multiple responses allowed. If respondents selected a typography type which included more than one of either flat, rolling or steep typography, they were asked which soil type they had for each typography. If respondents selected a different soil type for each typography, both soil types were reported. If respondents selected the same soil type for each typography, that soil type was only reported once.
[16] What types of soils do you have on your flats? (Q5) What types of soils do you have on your rolling country? (Q6) What types of soils do you have on your steep country? (Q7)

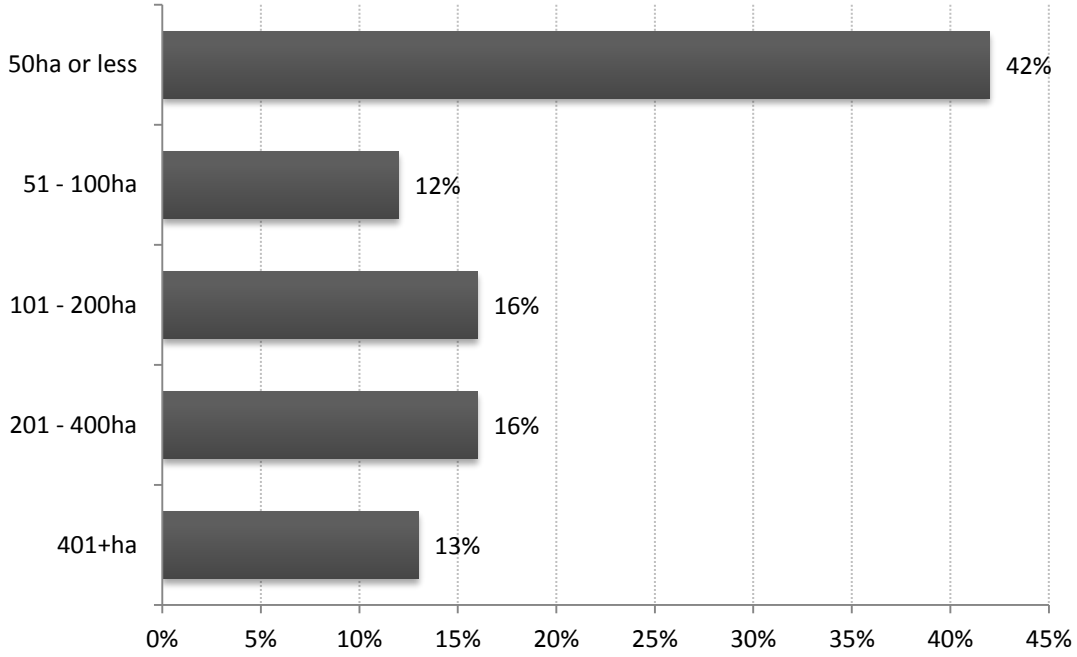
6.2 Farm characteristics

Farmers were asked to identify the effective farm size in hectares, what livestock enterprises they operate, the drivers for this choice of enterprise, and if their district had to manage for facial eczema.

6.2.1 Farm size

Farmers were asked to identify the effective farm size in hectares (Figure 4)[17]. A higher proportion of farms had 50 hectares or less effective hectares (42%). Similar proportions were reported for farm sizes of 101-200 hectares and 201-400 hectares (16% each) this was followed by farms that had 401 hectares or greater effective hectares (13%) and 12% that had between 51 and 100 effective hectares. The average (mean) farm size of the sample was 213 effective hectares.

Figure 4: Farm size[18]



Base: All farmers, n=450

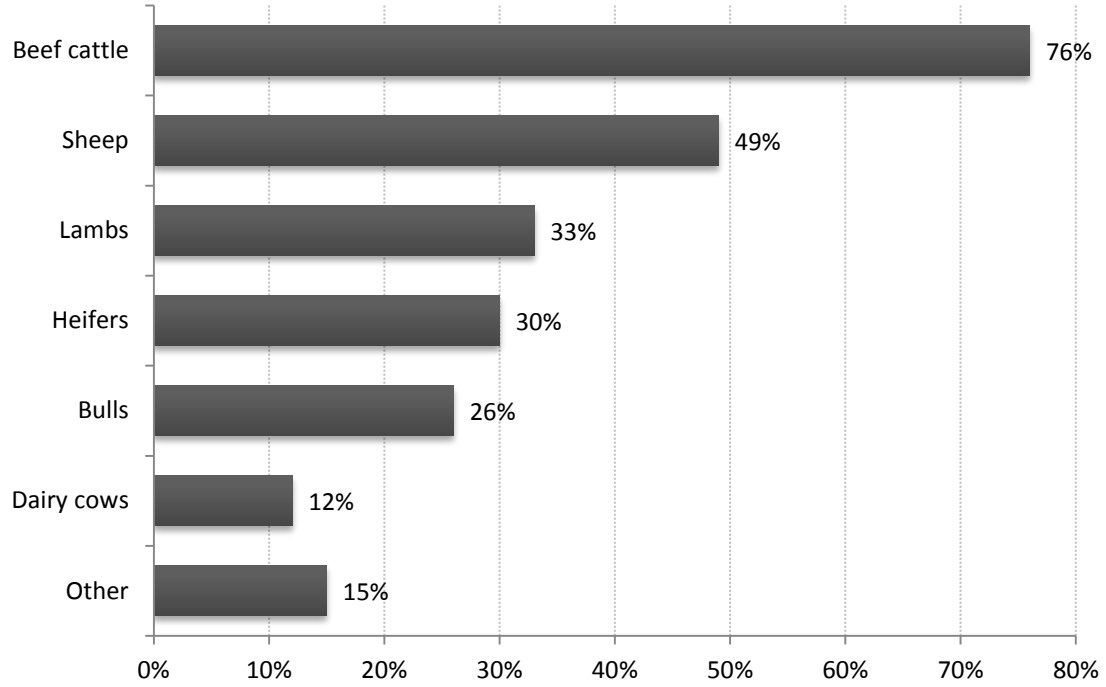
6.2.2 Enterprise types on farm

Farmers were asked to identify what livestock enterprises they run on their property[19].

A high proportion of farms ran beef cattle (76%), 49% ran sheep, and 33% ran lambs. This was followed by 30% of farms running dairy heifers, 26% running bulls, 15% running other livestock and 12% running dairy cows over winter (Figure 5).

[17] Effective hectares or acres were then grouped for analysis by Versus Research Ltd into farm size grouping; 50ha or less, 51-100ha, 101-200ha, 201-400ha and 401+ha.
[18] How many effective hectares or acres is your farm? (Q3)
[19] Multiple responses allowed.

Figure 5: Enterprise types on farm[20]



Base: All farmers, n=450

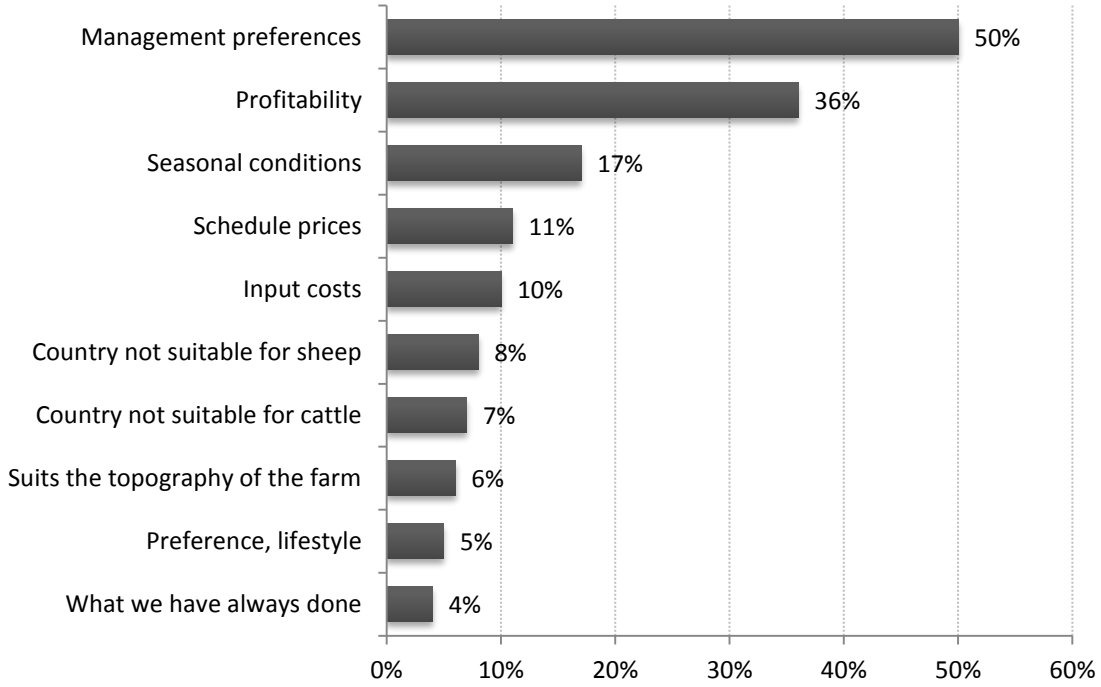
6.2.3 Choice of enterprise

Farmers were asked how they chose what livestock enterprise to run on their farm[21].

Half the proportion of farmers (50%) indicated that their livestock enterprise selection was based on management preferences, while 36% indicated profitability as the main driver for choice. This was followed by 17% of farmers indicating that seasonal conditions led to specific livestock choice, 11% indicating schedule prices, and 10% input costs. Lower proportions of farmers indicated that they had country that was not suitable for sheep (8%), 7% had country not suited to cattle, 6% indicated that the livestock choice suits the topography of the farm, 5% indicated personal preference or lifestyle, and 4% indicated their livestock choice was based on what they had always done (Figure 6).

[20] Do you usually run...? (Q56, Q60, Q64, Q68, Q73, Q78). Do you graze any other stock on your farm? (Q83)
[21] Multiple responses allowed.

Figure 6: Reason for choosing enterprise[22]

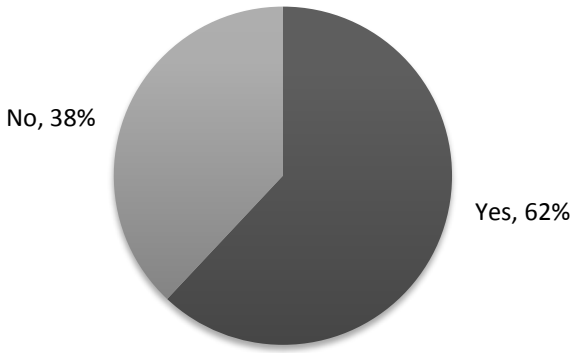


Base: All farmers, n=450

6.2.4 Facial eczema

Farmers were asked if they had to manage for facial eczema in their district. More than half the proportion of farmers had to manage for facial eczema in their district (62%)(Figure 7).

Figure 7: Facial eczema[23]



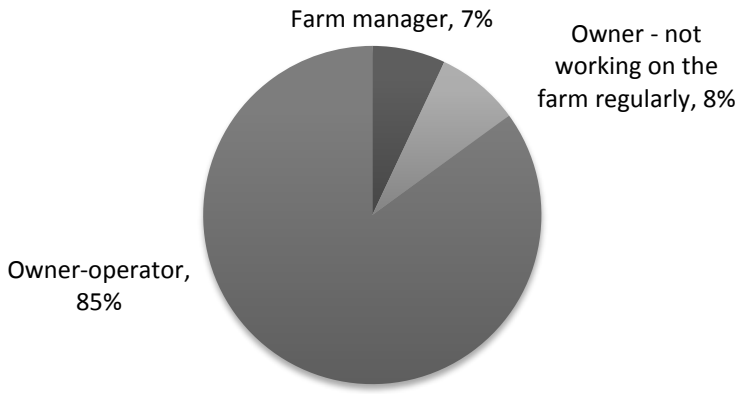
6.3 Role on farm

Farmers were asked to identify their role on farm; owner operator, owner (not working on the farm regularly) and farm manager.

A high proportion of farmers were the owner-operator (85%), with 8% the owner (who did not work on the farm regularly) and 7% the farm manager (Figure 8).

[22] How do you choose what livestock enterprises to run on your farm? (Q8)
[23] Do you have to manage for facial eczema in your district? (Q9)

Figure 8: Farm role[24]



Base: All farmers, n=450

[24] And you are a...? (Q2)

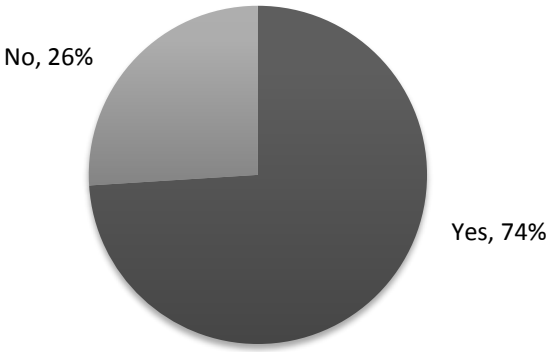
7 Fertilisers and soils

The following section provides an overview of farmers' application and decision making around fertilisers and soils. This includes their fertiliser use and application (timing, location, and amount), making decisions about fertiliser usage, their use of soil testing and the use of fertiliser management plans, nutrient budgets and nutrient management plans.

7.1 Application of capital fertiliser

Overall 74% of farmers had applied a capital fertiliser in the last five years (Figure 9).

Figure 9: Application of capital fertiliser[25]

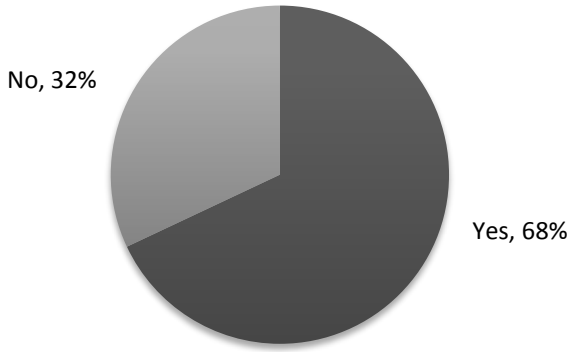


Base: All farmers, n=450

7.2 Application of phosphate as a maintenance fertiliser

Overall 68% of farmers had applied phosphate as a maintenance fertiliser (Figure 10).

Figure 10: Application of phosphate as a maintenance fertiliser[26]



Base: All farmers, n=450

Farm characteristics variation

- Farmers who ran sheep were **much more** likely to have applied phosphate as a maintenance fertiliser (76% compared to 68% for all).
- Farmers who ran lambs were **much more** likely to have applied phosphate as a maintenance fertiliser (76% compared to 68% for all).

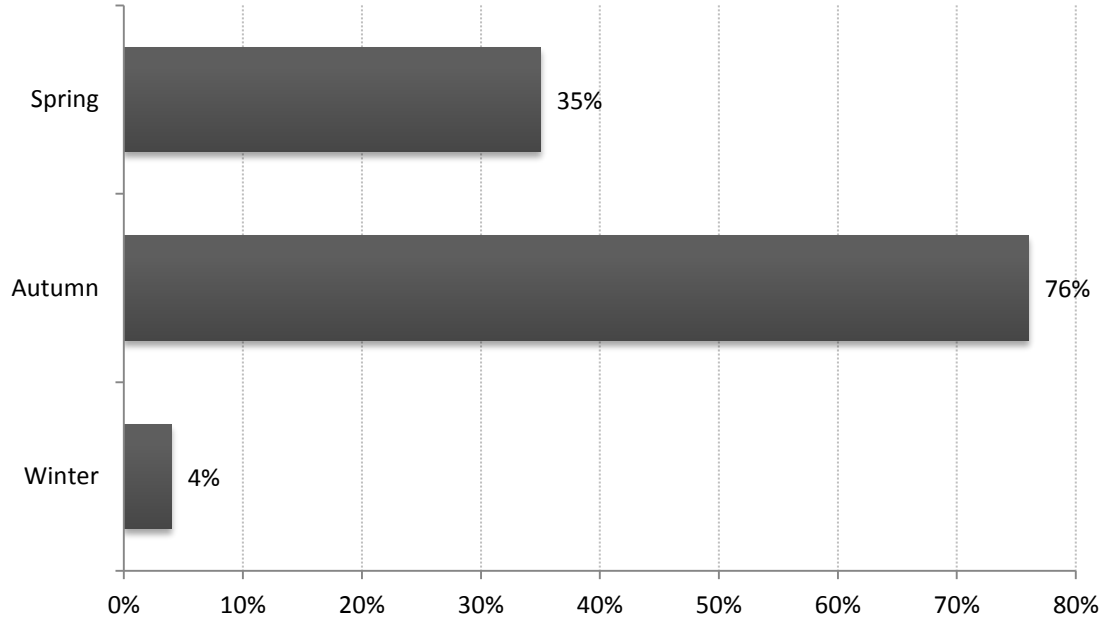
[25] Have you applied a capital fertiliser dressing in the last five years? (Q10)
[26] Do you apply phosphate as a maintenance fertiliser? (Q11)

- Farmers who had a farm size between 201 and 400 hectares were **much more** likely to have applied phosphate as a maintenance fertiliser (81% compared to 68% for all).

7.2.1 Timing of phosphate application

Farmers who applied phosphate as a maintenance fertiliser (68%) were asked when they applied phosphate. Of these farmers, the highest proportion applied it in autumn (76%), this was followed by 35% of farmers who applied it in spring, and 4% who applied it in winter.

Figure 11: Timing of phosphate fertiliser[27]



Base: Farmers who apply phosphate as maintenance fertiliser, n=306

Geographic variation

- Farmers with mainly flat topography were **much more** likely to apply phosphate as a maintenance fertiliser in spring (52% compared to 35% for all).
- Farmers with mostly flat land with some rolling topography were **much more** likely to apply phosphate as a maintenance fertiliser in autumn (86% compared to 76% for all).

Farm characteristics variation

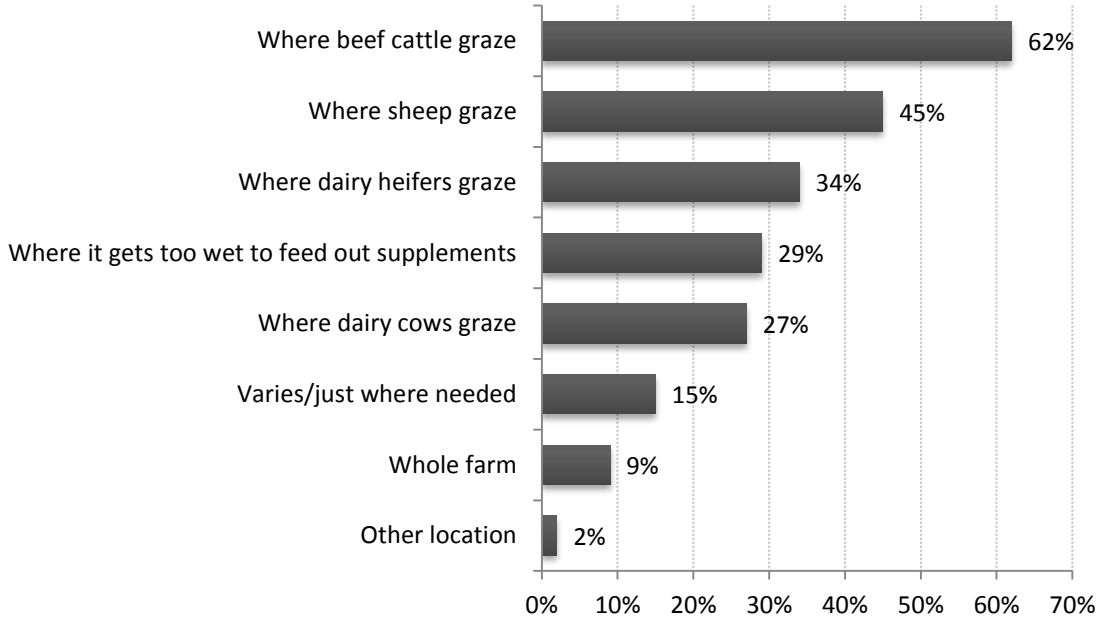
- Farmers who ran bulls were **much more** likely to apply phosphate as a maintenance fertiliser in spring (50% compared to 35% for all).
- Farmers who had a farm size of 50 hectares or less were **much more** likely to apply phosphate as a maintenance fertiliser in winter (8% compared to 4% for all).

7.2.2 Location of phosphate application

Farmers who applied phosphate as a maintenance fertiliser (68%) were asked to specify the location of phosphate application (Figure 12). More than half the proportion of these farmers applied phosphate where beef cattle grazed (62%), 45% applied it where sheep grazed, 34% where dairy heifers grazed, and 27% where dairy cows grazed. The proportion of farmers that applied phosphate to locations where it gets too wet to feed supplements out was 29%, 15% applied phosphate to wherever it was needed, and 9% applied phosphate to the whole farm.

[27] When do you apply phosphate as a maintenance fertiliser? (Q12)

Figure 12: Location of phosphate application[28]



Base: Farmers who apply phosphate as a maintenance fertiliser, n=306

Geographic variation

- Farmers who had mostly rolling with some steep topography were **much more** likely to apply phosphate to where sheep graze (60% compared to 45% for all).
- Farmers who had free draining soil were **much more** likely to apply phosphate to where sheep graze (49% compared to 45% for all).
- Farmers who had mainly rolling topography were **much more** likely to apply phosphate to where dairy heifers graze (49% compared to 34% for all).

Farm characteristics variation

- Farmers who had a farm size of 401 hectares or more were **much more** likely to apply phosphate fertiliser to where the sheep graze **(67% compared to 45% for all).**

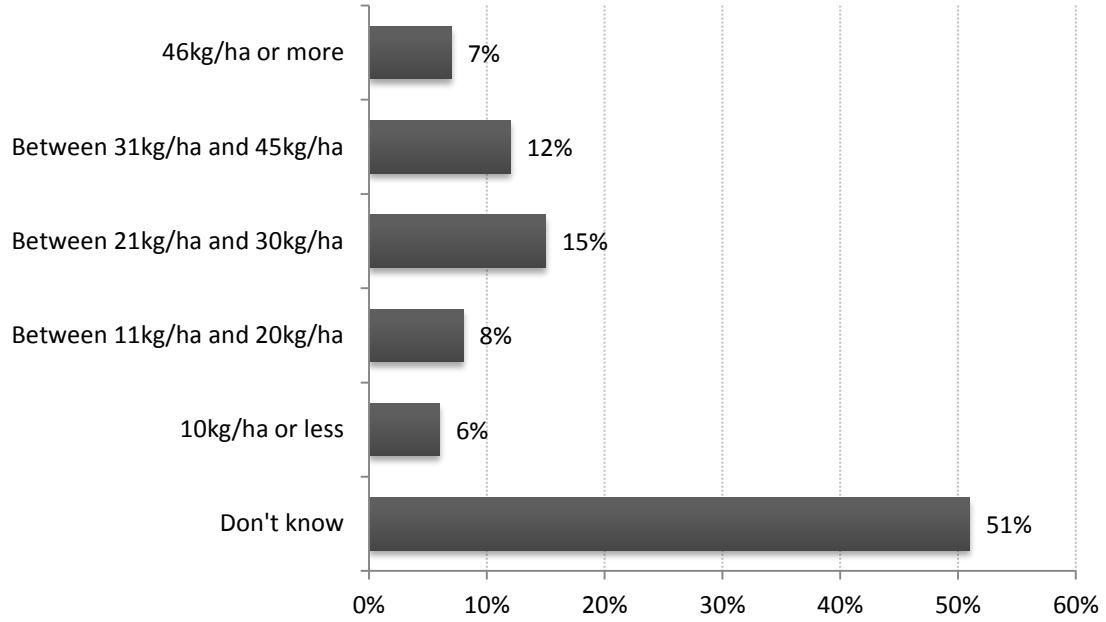
7.2.3 Amount of phosphate applied

Farmers who applied phosphate as a maintenance fertiliser (68%) were asked how much phosphate fertiliser they applied[29] (Figure 13). Just over half (51%) of farmers did not know how many kilograms per hectare (kg/ha) of phosphate they applied. Lower proportions applied 10kg/ha or less (6%), 8% applied between 11 and 20kg/ha, 15% applied between 21 and 30kg/ha, 12% applied between 31 and 45 kg/ha and 7% applied over 45kg/ha.

The average application volume (amongst those who knew the amount they applied) was 32kg/ha.

[28] Where do you apply phosphate as a maintenance fertiliser? (Q13)
[29] Farmer application responses were then grouped by Versus Research Ltd into; 10kg/ha or less, between 11kg/ha and 20kg/ha, between 21kg/ha and 30kg/ha, between 31kg/ha and 45kg/ha and 46kg/ha or more.

Figure 13: Amount of fertiliser applied[30]



Base: Farmers who apply phosphate as a maintenance fertiliser, n=306

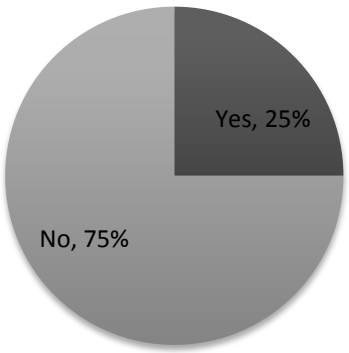
Farm characteristics variation

- Farmers who ran beef cattle were **much more** likely to apply 46kg/ha or more of phosphate as a maintenance fertiliser (10% compared to 7% for all).

7.3 Application of nitrogen fertiliser

Overall 25% of farmers applied nitrogen fertiliser (Figure 14).

Figure 14: Application of nitrogen fertiliser[31]



Base: All farmers, n=450

Geographic variation

- Farmers who had a farm in the Upper Waikato catchment were **much more** likely to apply nitrogen fertiliser (44% compared to 25% for all).
- Farmers who had pumice soil were **much more** likely to apply nitrogen fertiliser (40% compared to 25% for all).

Farm characteristic variation

- Farmers who ran bulls were **much more** likely to apply nitrogen fertiliser (37% compared to 25% for all).

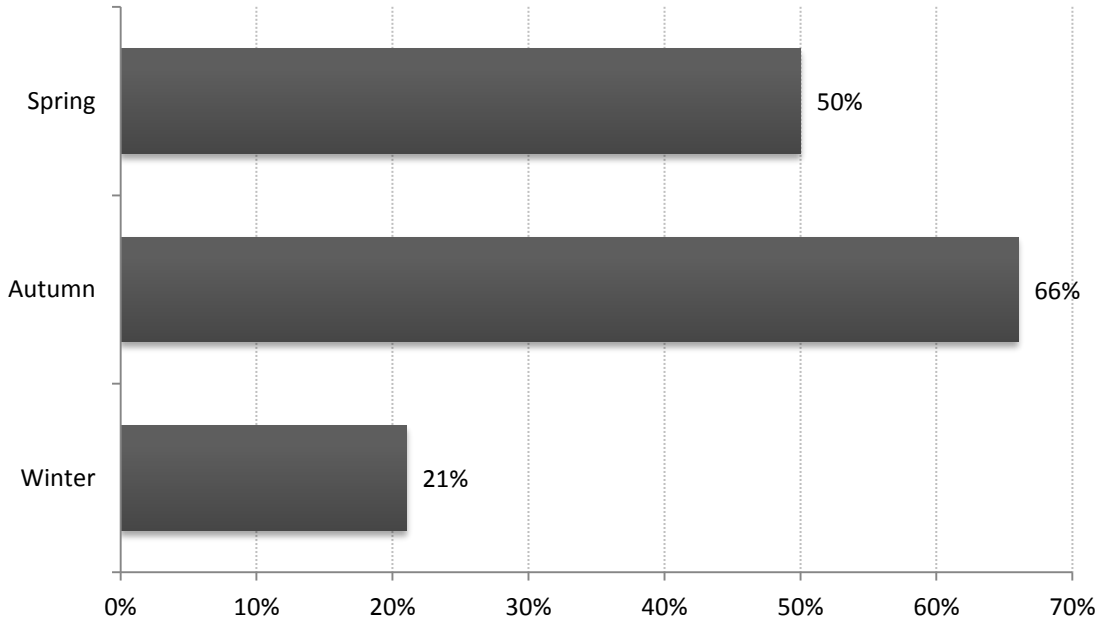
[30] As an estimate, how many kilograms per hectare of phosphorus fertiliser did you last apply? (Q14)
[31] Do you apply nitrogen fertiliser? (Q15)

- Farmers who ran heifers were **much more** likely to apply nitrogen fertiliser (36% compared to 25% for all).
- Farmers who wintered dairy cows were **much more** likely to apply nitrogen fertiliser (41% compared to 25% for all).
- Farmers who had a farm of 401 hectares or more were **much more** likely to apply nitrogen fertiliser **(52% compared to 25% for all).**

7.3.1 Timing of nitrogen application

Farmers who applied nitrogen fertiliser (25%) were asked about the timing of application; the highest proportion of these farmers (66%) applied it in autumn, followed by 50% who applied it in spring, and 21% who applied it in winter (Figure 15).

Figure 15: Timing of nitrogen application[32]



Base: Farmers who apply nitrogen fertiliser, n=113

Farm characteristics variation

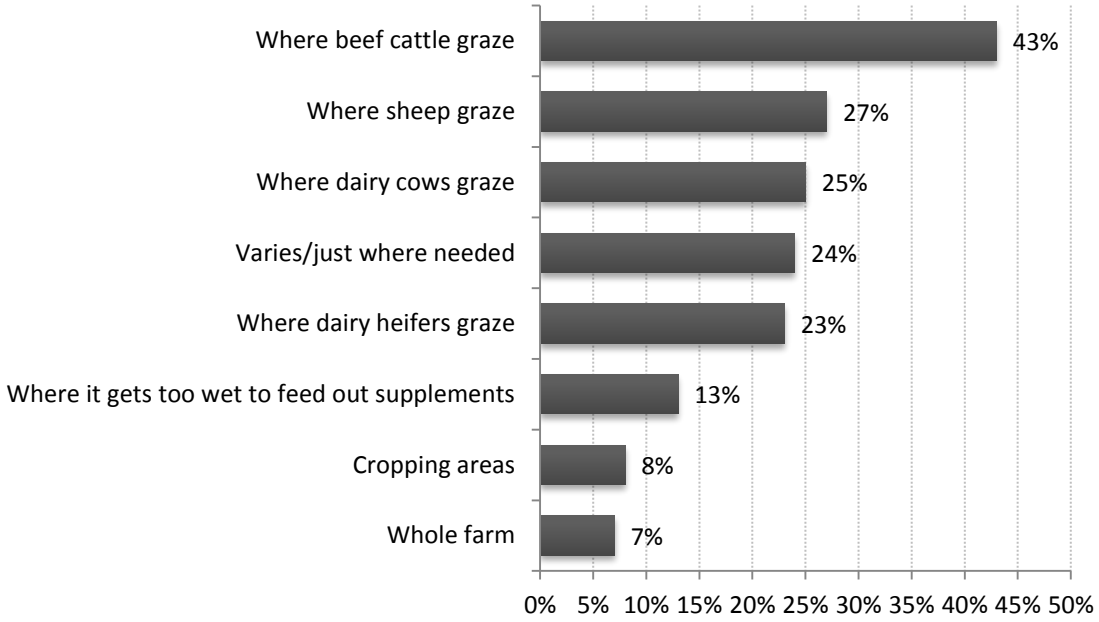
- Farmers who ran heifers were **much more** likely to apply nitrogen fertiliser during winter (33% compared to 21% for all).

7.3.2 Location of nitrogen application

Farmers who applied nitrogen fertiliser (25%) were asked where they applied nitrogen fertiliser (Figure 16). The proportion who applied it where their beef cattle grazed was 43%. This was followed by 27% who applied it where sheep grazed, 25% where dairy cows grazed, and 23% where dairy heifers grazed. The proportion who applied nitrogen only where it was needed was 24%, 13% applied it where it gets too wet to feed out supplements, 8% applied nitrogen fertiliser in cropping areas and 7% applied it to the whole farm.

[32] When do you apply nitrogen fertiliser? (Q16)

Figure 16: Location of nitrogen application[33]



Base: Farmers who apply nitrogen fertiliser, n=113

Geographic variation

- Farmers who had a farm in the Lower Waikato catchment were **much more** likely to apply nitrogen fertiliser where beef cattle graze (58% compared to 43% for all).
- Farmers who had a farm in the Lower Waikato catchment were **much more** likely to apply nitrogen fertiliser where dairy heifers graze (37% compared to 23% for all).
- Farmers who had mainly rolling with some steep topography were **much more** likely to apply nitrogen fertiliser to various locations/where needed (40% compared to 24% for all).

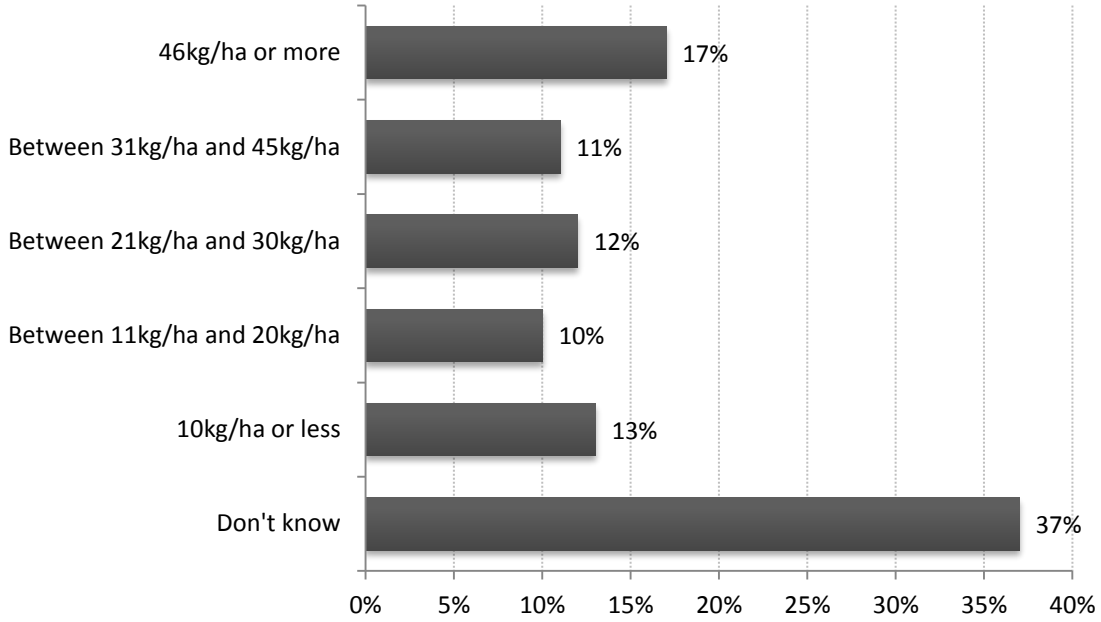
7.3.3 Amount of nitrogen applied

Farmers who applied nitrogen fertiliser (25%) were asked how many kilograms per hectare they last applied[34] (Figure 17). The proportion of farmers that did not know how many kilograms per hectare (kg/ha) of nitrogen they applied was 37%. Of those that did know, 17% applied over 45kg/ha, 13% applied 10kg/ha or less, 12% applied between 21 and 30kg/ha, 11% applied between 31 and 45kg/ha, and 10% applied between 11 and 20kg/ha.

The average application volume (amongst those farmers who knew the amount they applied) was 33kg/ha.

[33] Where do you apply nitrogen? (Q17)
[34] Farmer application responses were then grouped by Versus into; 10kg/ha or less, between 11kg/ha and 20kg/ha, between 21kg/ha and 30kg/ha, between 31kg/ha and 45kg/ha and 46kg/ha or more.

Figure 17: Amount of nitrogen applied[35]



Base: Farmers who apply nitrogen fertiliser, n=113

Farm characteristics variation

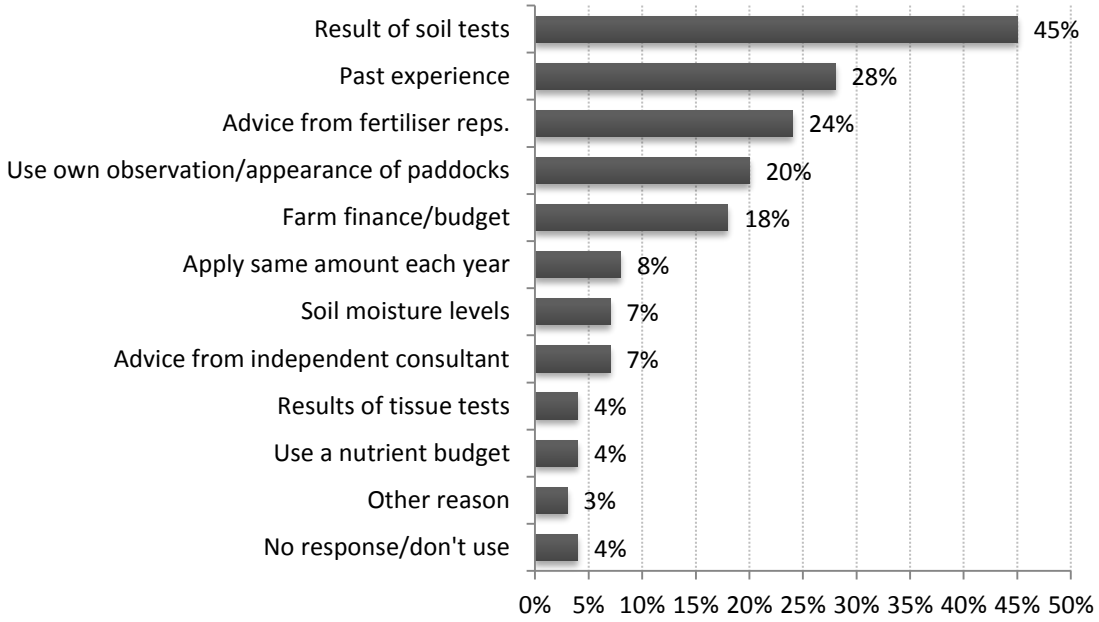
- Farmers who had a farm size of 401 hectares or more were **much more** likely to apply between 11 and 20kg/ha of nitrogen fertiliser (23% compared to 10% for all).

7.4 Making decisions about fertiliser usage

Overall 45% of farmers used soil tests to make decisions about how much fertiliser to apply (Figure 18). The proportion of farmers who used past experience was 28%, 24% sourced advice from fertiliser representatives while 20% used their own observation. For 18% of farmers, fertiliser use depended on the money they had available, while a further 8% applied the same amount each year and 7% relied on soil moisture levels or advice from independent consultants. All other mentions registered less than 5% each.

[35] As an estimate, how many kilograms per hectare of nitrogen fertiliser (e.g. urea) did you last apply? (Q18)

Figure 18: Making decisions about fertiliser usage[36]



Base: All farmers, n=450

Geographic variation

- Farmers who had silt soils were **much more** likely to make decisions about fertiliser usage based on advice from a fertiliser representative (39% compared to 24% for all).
- Farmers who had silt soils were **much more** likely to make decisions about fertiliser usage from results of tissue tests (12% compared to 4% for all).
- Farmers who had mainly rolling topography were **much more** likely to make decisions about fertiliser usage from a nutrient budget (10% compared to 4% for all).
- Farmers who had pumice soils were **much more** likely to make decisions about fertiliser usage from a nutrient budget (11% compared to 4% for all).
- Farmers who had silt soils were **much more** likely to make decisions about fertiliser usage from a nutrient budget (11% compared to 4% for all).

Farm characteristics variation

- Farmers who had a farm size of 401 hectares or more were **much more** likely to make decisions about fertiliser usage based on advice from a fertiliser representative **(50% compared to 24% for all).**
- Farmers who had a farm size of 401 hectares or more were **much more** likely to make decisions about fertiliser usage based on advice from an independent consultant (15% compared to 7% for all).

Role on farm variation

- Farmers who were owners (not working on the farm regularly) were **much more** likely to make decisions about fertiliser usage from soil moisture levels (20% compared to 7% for all).
- Farmers who were owners (not working on the farm regularly) were **much more** likely to make decisions about fertiliser usage based on advice from independent consultants (21% compared to 7% for all).

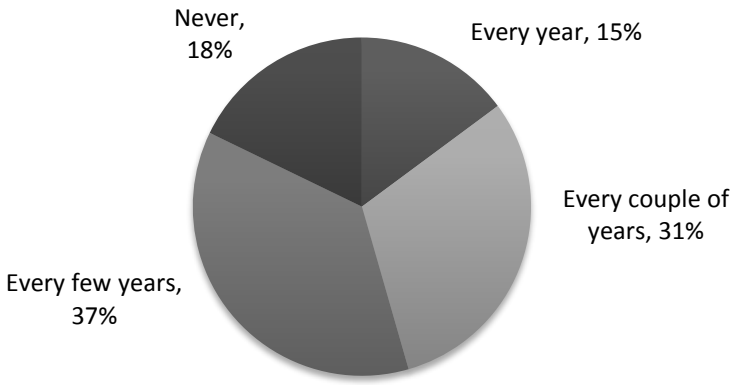
[36] How do you normally decide how much fertiliser to apply? (Q19)

- Farmers who were farm managers were **much more** likely to make decisions about fertiliser usage based on advice from independent consultants (16% compared to 7% for all).

7.5 Frequency of soil testing

Overall 15% of farmers tested their soils each year, 31% tested every couple of years, 37% tested every few years, and 18% never tested their soils at all (Figure 19).

Figure 19: Frequency of soil testing[37]



Base: All farmers, n=450

Geographic variation

- Farmers who had ash soils were **much more** likely to test their soils every couple of years (36% compared to 31% for all).
- Farmers who had mainly flat topography were **much more** likely to never test their soils (31% compared to 18% for all).

Farm characteristics variation

- Farmers who ran bulls were **much more** likely to test their soils every year (22% compared to 15% for all).
- Farmers who ran heifers were **much more** likely to test their soils every couple of years (44% compared to 31% for all).
- Farmers who had a farm size of 401 hectares or more were **much more** likely to test their soils every couple of years (48% compared to 31% for all).
- Farmers who had a farm size of 50 hectares or less were **much more** likely to never test their soils (29% compared to 18% for all).

Role on farm variation

- Farmers who were farm managers were **much more** likely to test their soils every year **(45% compared to 15% for all).**

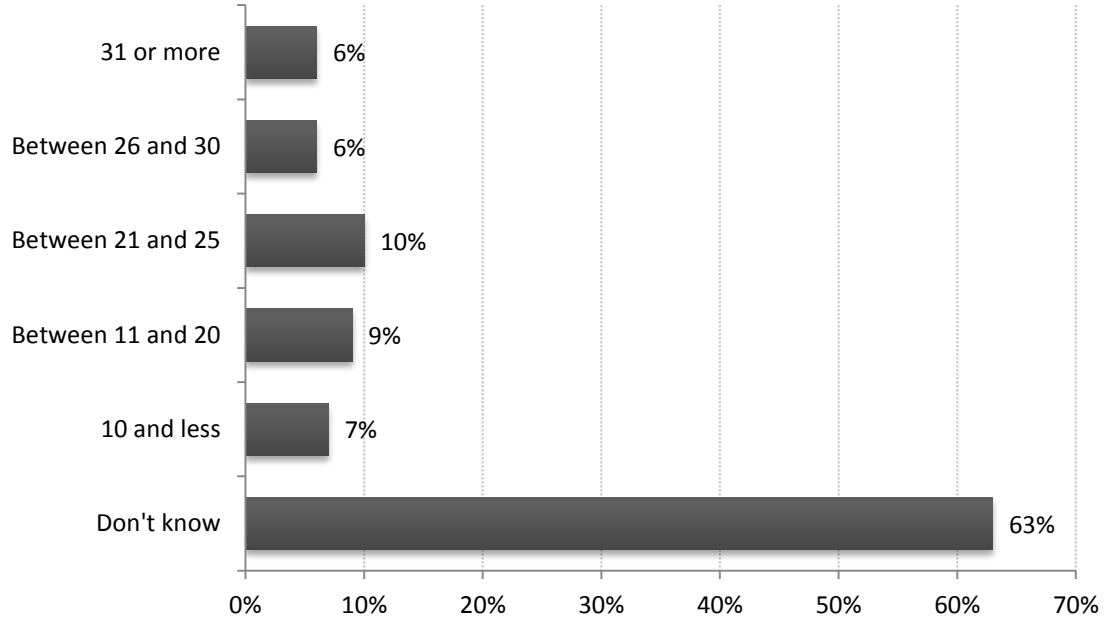
7.6 Olsen P scores

Farmers were asked their Olsen P score[38] (Figure 20). The proportion of farmers that did not know their Olsen P score was 63%. The proportion of farmers that stated that it was 10 μg/L or less was 7%, 9% stated that it was between 11 and 20 μg/L, 10% stated it was between 21 and 25 μg/L, 6% stated it was between 26 and 30 and a further 6% stated it was 31 μg/L or greater.

[37] How often do you test your soils? (Q20)
[38] Farmer Olsen P scores were then grouped by Versus into; 10 and less, between 11 and 20, between 21 and 25, between 26 and 30 and 31 or more.

The average Olsen P score (amongst those who knew their score) was 25.

Figure 20: Olsen P scores (presented in μg/L)[39]



Base: All farmers, n=450

Geographic variation

- Farmers who had ash soil were **much more** likely to have an Olsen P score of between 11 and 20 μg/L (13% compared to 9% for all).
- Farmers who had a farm in the Waipa catchment were **much more** likely to have an Olsen P score of 10 μg/L or less (11% compared to 7% for all).
- Farmers who had ash soil were **much more** likely to have an Olsen P score of 10 μg/L or less (10% compared to 7% for all).
- Farmers who had a farm in the Lower Waikato catchment were **much more** likely to not know their Olsen P score (69% compared to 63% for all).
- Farmers who had mainly flat topography were **much more** likely to not know their Olsen P score (81% compared to 63% for all).

Farm characteristics variation

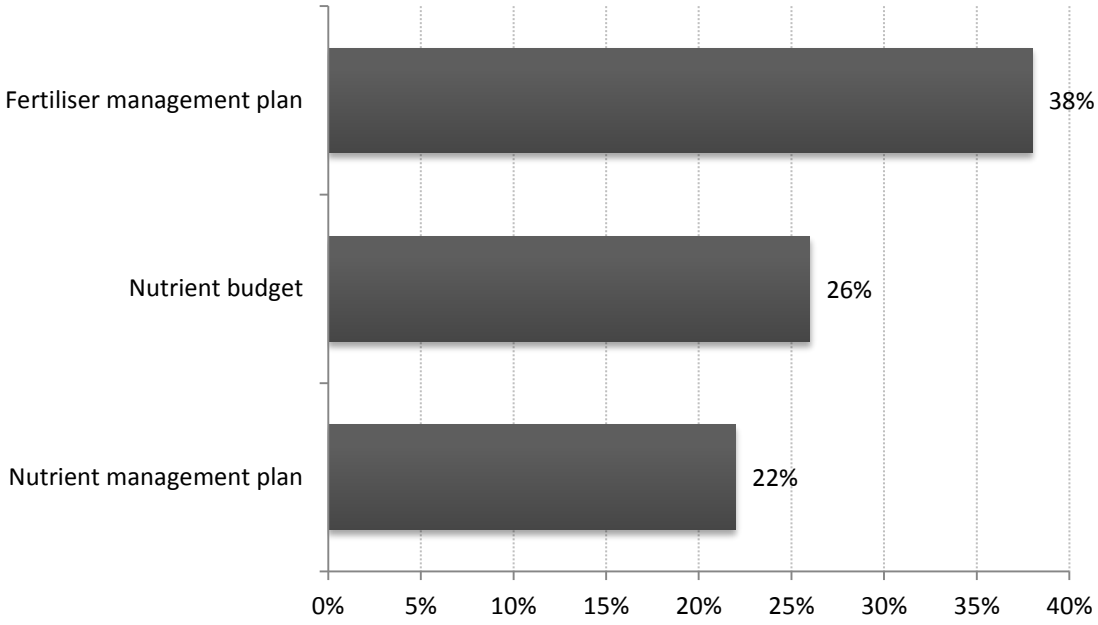
- Farmers who wintered dairy cows were **much more** likely to have an Olsen P score of 31 μg/L or more (15% compared to 6% for all).
- Farmers who ran sheep were **much more** likely to have an Olsen P score of between 11 and 20 μg/L (15% compared to 9% for all).
- Farmers who ran lambs were **much more** likely to have an Olsen P score of between 11 and 20 μg/L (17% compared to 9% for all).
- Farmers who had a farm size of between 201 and 400 hectares were **much more** likely to have an Olsen P score of between 11 and 20 μg/L (19% compared to 9% for all).
- Farmers who had a farm size of 401 hectares or more were **much more** likely to have an Olsen P score of between 11 and 20 μg/L (25% compared to 9% for all).
- Farmers who had a farm size of 50 hectares or less were **much more** likely to not know their Olsen P score (82% compare to 63% for all).

[39] What is your Olsen P? (Q21)

7.7 Fertiliser management plans, nutrient budgets and nutrient management plans

Overall 38% of farmers had a fertiliser management plan, 26% had a nutrient budget and 22% had a nutrient management plan (Figure 21).

Figure 21: Fertiliser management plan, nutrient budget or nutrient management plan[40]



Base: All farmers, n=450

Geographic variation

- Farmers with ash soils were **much more** likely to have a fertiliser management plan (44% compared to 38% for all).

Farm characteristics variation

- Farmers who ran heifers were **much more** likely to have a fertiliser management plan (48% compared to 38% for all).
- Farmers who had a farm size of 401 hectares or more were **much more** likely to have a fertiliser management plan **(62% compared to 38% for all).**
- Farmers who ran bulls were **much more** likely to have a nutrient budget (36% compared to 26% for all).
- Farmers who wintered dairy cows were **much more** likely to have a nutrient budget (44% compared to 26% for all).
- Farmers who had a farm size of 401 hectares or more were **much more** likely to have a nutrient budget (48% compared to 26% for all).
- Farmers who ran bulls were **much more** likely to have a nutrient management plan (32% compared to 22% for all).
- Farmers who ran heifers were **much more** likely to have a nutrient management plan (31% compared to 22% for all).
- Farmers who had a farm size of 401 hectares or more were **much more** likely to have a nutrient management plan **(47% compared to 22% for all).**

[40] Do you have a fertiliser management plan? (Q22) Do you have a nutrient budget? (Q23) Do you have a nutrient management plan? (Q24)

Role on farm variation

- Farmers who were farm managers were **much more** likely to have a fertiliser management plan (65% compared to 38% for all).

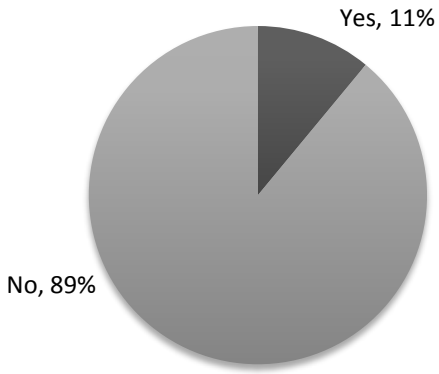
8 Winter cropping

The following section gives an overview of farmers' winter cropping practices including if they grow a winter crop, the topography of their winter cropping area, if they use cropping to fill a feed deficit or cropping for pasture renewal and if they graze crops to bare soil.

8.1 Growing a winter crop

Overall 11% of farmers grew a winter crop (Figure 22).

Figure 22: Grow a winter crop[41]



Base: All farmers, n=450

Geographic variation

- Farmers who had a farm in the Upper Waikato catchment were **much more** likely to grow and winter crop **(40% compared to 11% for all).**
- Farmers who had pumice soil were **much more** likely to grow and winter crop **(34% compared to 11% for all).**
- Farmers who had free draining soil were **much more** likely to grow and winter crop (14% compared to 11% for all).

Farm characteristics variation

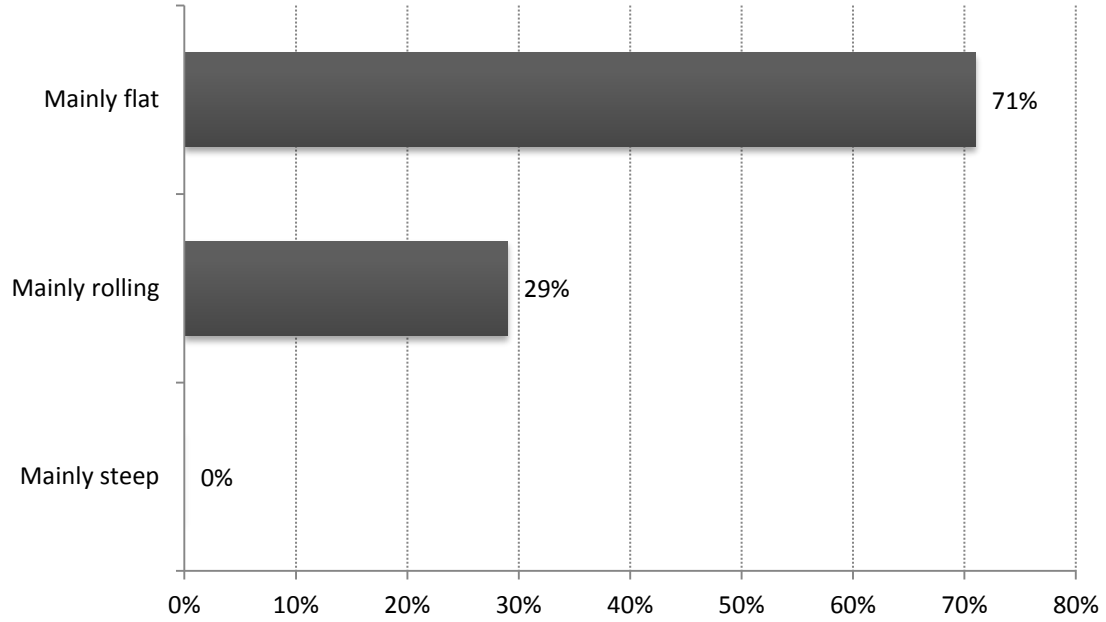
- Farmers who wintered dairy cows were **much more** likely to grow a winter crop (28% compared to 11% for all).
- Farmers who had a farm size of 401 hectares or more were **much more** likely to grow a winter crop (30% compared to 11% for all).
- Farmers who had a farm size of between 201 and 400 hectares were **much more** likely to grow a winter crop (22% compared to 11% for all).

8.2 Topography of winter cropping area

Farmers who grew a winter crop (11%) were asked if their winter cropping areas were mainly flat, mainly rolling or mainly steep (Figure 23). A high proportion used a mainly flat area (71%) and 29% grew a winter crop on a mainly rolling area. None of the farmers grew a winter crop on a mainly steep area.

[41] Do you grow a winter crop? (Q25)

Figure 23: Topography of winter cropping area[42]

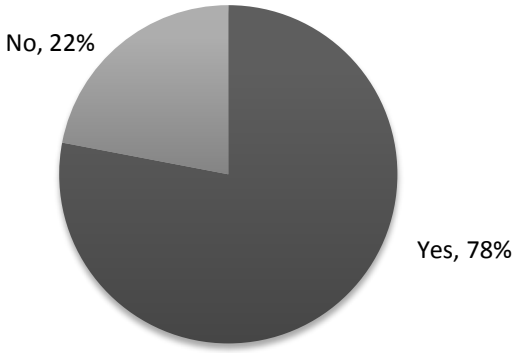


Base: Farmers who grow a winter crop, n=51

8.3 Growing winter crops to fill a feed deficit

Farmers who grew a winter crop (11%), likely did so to fill a feed deficit (78%)(Figure 24).

Figure 24: Growing winter crops to fill a feed deficit[43]



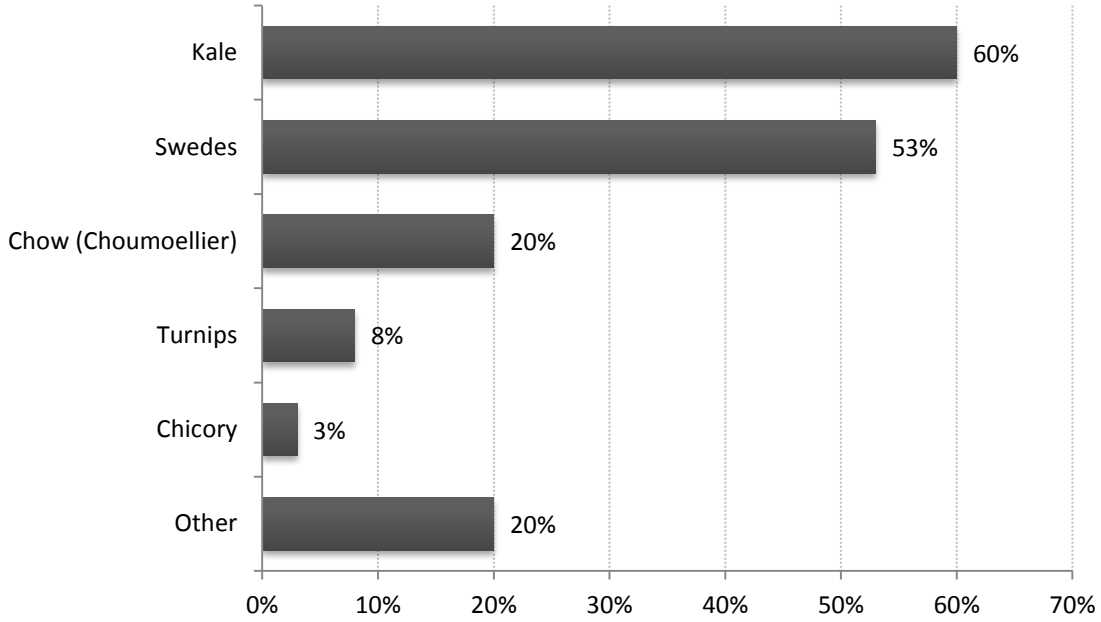
Base: Farmers who grow a winter crop, n=51

8.3.1 Types of winter crops to fill a feed deficit

Farmers who grew a winter crop to fill a feed deficit (8% of total sample) were asked which winter crops they grew for feed (Figure 25)[44]. The proportion of these farmers who grew kale was 60%, followed by 53% who grew swedes, 20% who grew chow (choumoellier), 20% who grew other types of winter crop, 8% who grew turnips, and 3% who grew chicory.

[42] Thinking about your winter cropping area, is it...? (Q26)
[43] Do you grow a winter crop to fill a feed deficit? (Q27)
[44] Farmers identified these as winter crops unprompted

Figure 25: Types of winter crops to fill a feed deficit[45]

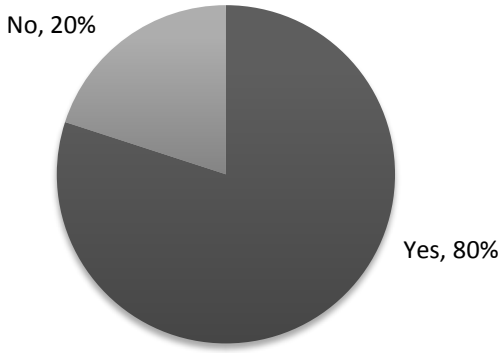


Base: Farmers who grow a winter crop to fill a feed deficit, n=40

8.4 Growing winter crops for pasture renewal

Farmers who grew a winter crop (11%), likely did so as a component of a pasture renewal programme (80%)(Figure 26).

Figure 26: Growing winter crops for pasture renewal[46]



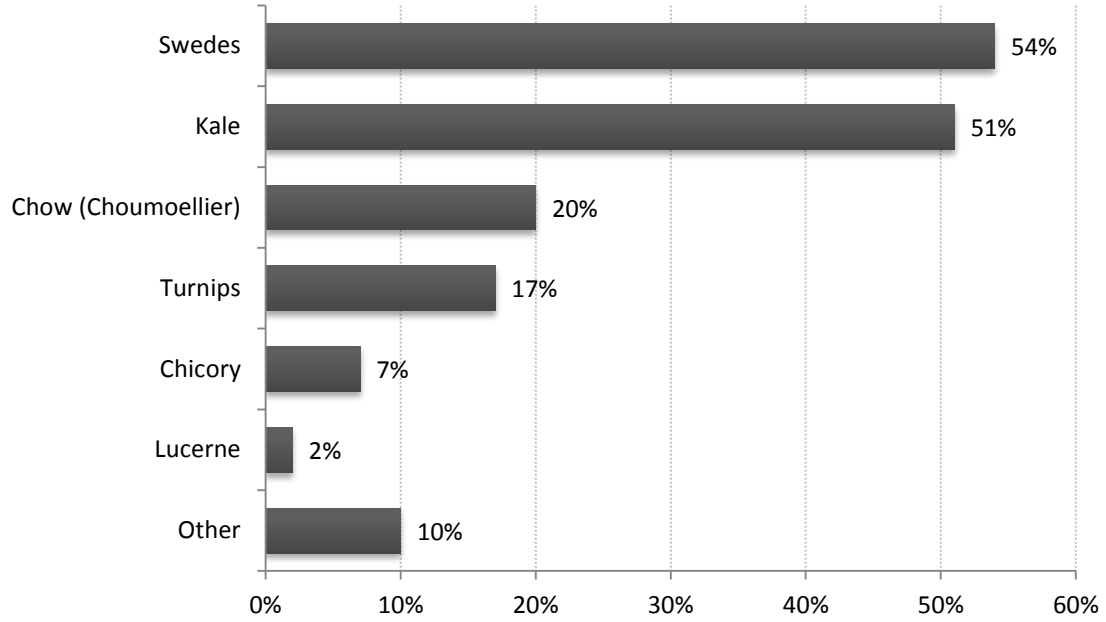
Base: Farmers who grow a winter crop, n=51

8.4.1 Types of winter crops for pasture renewal

Farmers who grew a winter crop as a component of a pasture renewal programme (9% of total sample) were asked to specify what type of winter crop they grew. More than half the proportion of these farmers (54%) grew swedes, and 51% grew kale. This was followed by 20% of farmers growing chow (choumoellier) as pasture renewal, 17% growing turnips, and 7% grew chicory. Lucerne was grown by 2% as a component of a pasture renewal programme and 10% of farmers grew another winter crop[47] (Figure 27).

[45] What winter crops do you grow for feed? (Q28)
[46] Do you grow a winter crop as a component of a pasture renewal programme? (Q29)
[47] Farmers identified these as winter crops unprompted

Figure 27: Types of winter crops for pasture renewal[48]

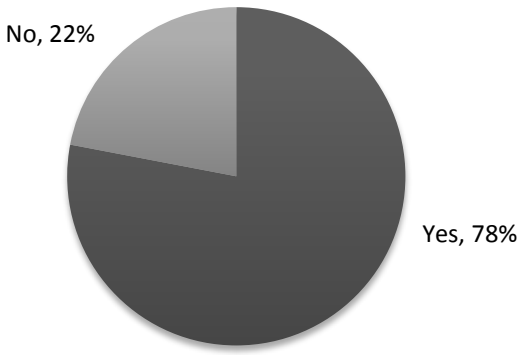


Base: Farmers who grow a winter crop for pasture renewal, n=41

8.5 Stock grazing crops to bare soil

Farmers who grew a winter crop (11%), usually let stock graze their winter crop to bare soil (78%)(Figure 28).

Figure 28: Stock grazing winter crops to bare soil[49]



Base: Farmers who grow a winter crop, n=51

[48] What winter crops do you grow for pasture renewal? (Q30)
[49] Do you usually let stock graze your winter crop to bare soil? (Q31)

9 Waterlogged soils and pugging

The following section gives an overview of farmers' experience with managing waterlogged soils and pugging.

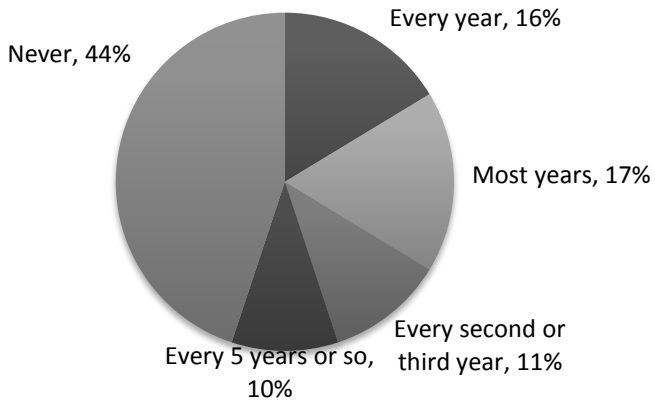
This section covers frequency of waterlogging of soils, proportion of farm that is at risk of waterlogging, timing of waterlogging and duration of waterlogging. It also explores the impacts of waterlogging on pasture and grazing, impact on pasture composition and impact on fertiliser spreading.

This section also reports the findings for pugging; how prone farms are to pugging during winter, areas at most risk of pugging, impact of pugging on pasture and grazing habits, impact on pasture composition and soil structure, and duration that stock are grazed on areas prone to pugging.

9.1 Waterlogging

Overall 16% of farmers stated that their farms were waterlogged every year, while 17% stated they were waterlogged most years, 11% stated that their farms were waterlogged every second or third year, and 10% stated that they were waterlogged every five or so years. A higher proportion (44%) stated that their farms never became waterlogged (Figure 29).

Figure 29: Frequency of waterlogging[50]



Base: All farmers, n=450

Geographic variation

- Farmers who had a farm in the Lower Waikato catchment were **much more** likely to experience waterlogging every year (22% compared to 16% for all).
- Farmers who had clay loam soil were **much more** likely to experience waterlogging every year (27% compared to 16% for all).
- Farmers who had peat soil were **much more** likely to experience waterlogging every year (31% compared to 16% for all).
- Farmers who had a farm in the Lower Waikato catchment were **much more** likely to experience waterlogging most years (23% compared to 17% for all).
- Farmers who had silt soil were **much more** likely to experience waterlogging every five years or so (24% compared to 10% for all).
- Farmers who had a farm in the Upper Waikato catchment were **much more** likely to never experience waterlogging **(79% compared to 44% for all).**

[50] Do your farm soils get waterlogged..? (Q33)

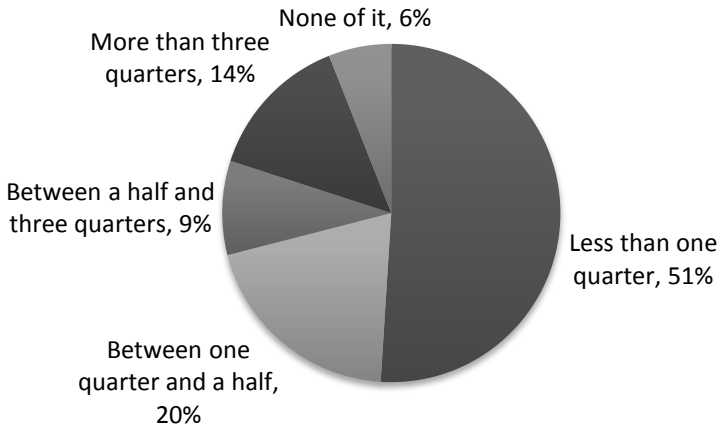
- Farmers who had pumice soil were **much more** likely to never experience waterlogging **(69% compared to 44% for all).**
- Farmers who had free draining soil were **much more** likely to never experience waterlogging (48% compared to 44% for all).

9.1.1 Proportion of farm at risk to waterlogging

Farmers who stated they experienced waterlogged soils (56%) were asked what proportion of their farm was at risk of getting waterlogged in most years (Figure 30). The proportion who stated that more than three quarters of their farm became waterlogged most years was 14%, 9% stated that between half and three quarters of their farm became waterlogged, and 20% stated that between half and one quarter of their farm became waterlogged.

Just over half (51%) of these farmers stated that less than one quarter of their farm became waterlogged, and 6% stated that none of their farm became waterlogged most years.

Figure 30: Proportion of farm at risk of waterlogging[51]



Base: Farmers who get waterlogged soils, n=250

Geographic variation

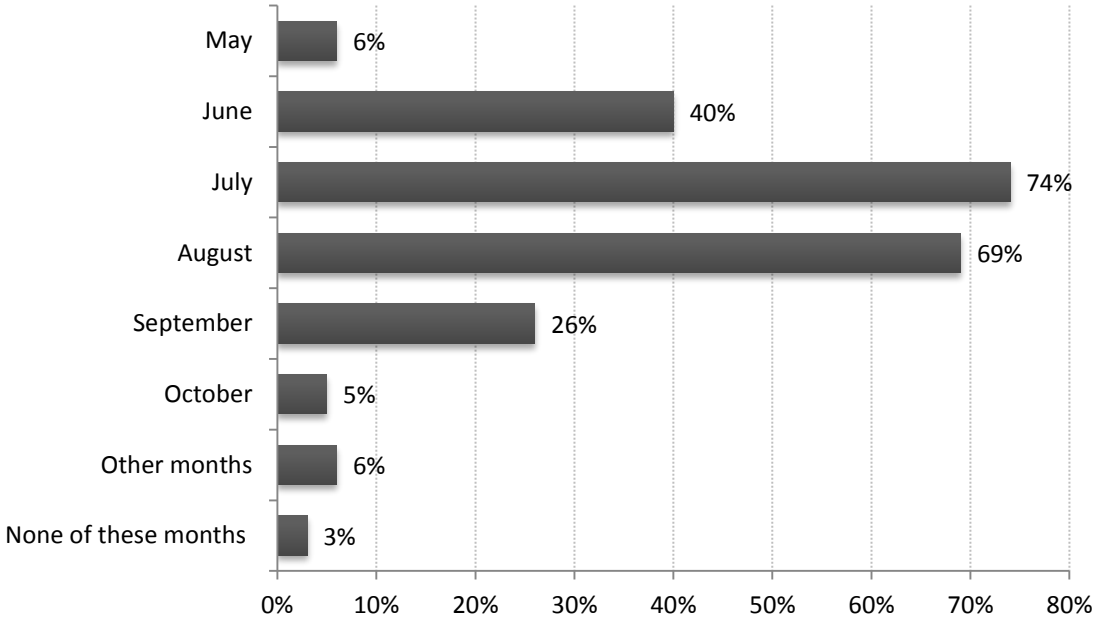
- Farmers who had ash soil were **much more** likely to experience waterlogging on less than one quarter of their farm (60% compared to 51% for all).
- Farmers who had farm topography which was mainly flat were **much more** likely to experience waterlogging on more than three quarters of their farm (30% compared to 14% for all).

9.1.2 Months that soils are waterlogged

Farmers who stated they experienced waterlogged soils (56%) were asked in which months they experienced waterlogging (Figure 31). The majority experienced waterlogged soils in July (74%) and August (69%). These months were followed by June (40%) and September (26%). All other months registered mentions of only 6% or fewer.

[51] What proportion of your farm would you say is at risk of getting waterlogged in most years? (Q34)

Figure 31: Months that soils are waterlogged[52]



Base: Farmers who get waterlogged soils, n=250

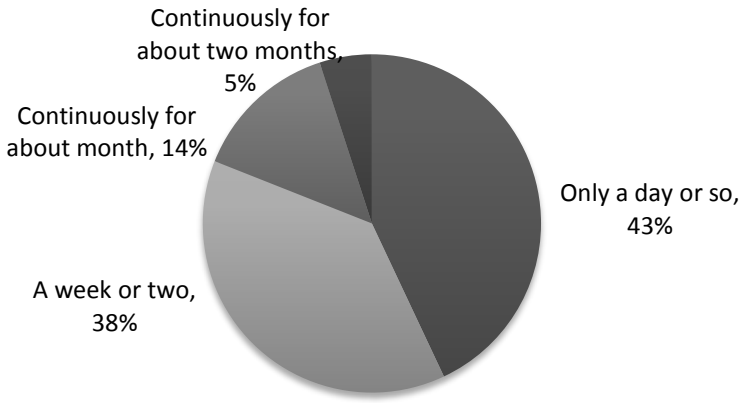
Farm characteristics variation

- Farmers who ran other livestock were **much more** likely to experience waterlogging in September **(49% compared to 26% for all).**
- Farmers who ran other livestock were **much more** likely to experience waterlogging in October (21% compared to 5% for all).

9.1.3 Duration of waterlogging

Farmers who stated they experienced waterlogged soils (56%) were asked to specify the duration of waterlogging on farm from options; only a day or so at a time, a week or two at a time, continuously for about a month or continuously for two months or more (Figure 32). The majority stated that their soils were waterlogged for only a day or so (43%) or a week or two (38%). Only 14% stated that their soils were waterlogged continuously for about a month and 5% stated that they were waterlogged continuously for two months or more.

Figure 32: Duration of waterlogging[53]



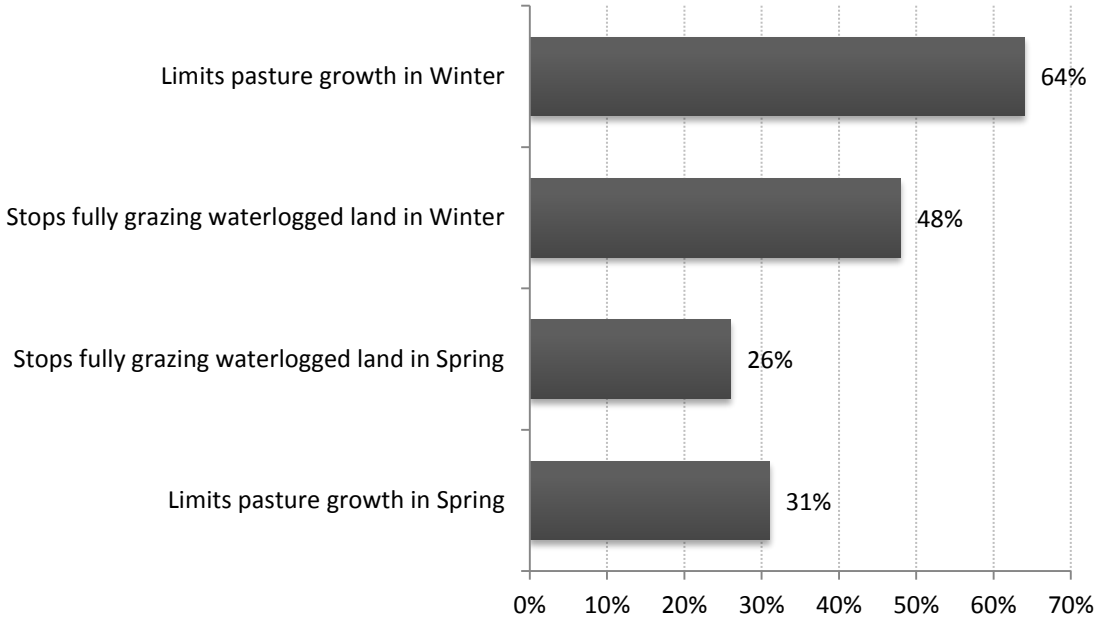
Base: Farmers who get waterlogged soils, n=250

[52] Which months do you usually experience waterlogged soils in? (Q35)
[53] Are your soils generally waterlogged for…? (Q36)

9.1.4 Impact of waterlogging on pasture and grazing

Farmers who stated they experienced waterlogged soils (56%) were asked about the impact of waterlogging on grazing and pasture management (Figure 33). Nearly half of these farmers (48%) stated that waterlogging of soils prevents them fully utilising the available land in winter and 64% stated that waterlogged soils limits pasture growth in winter. The proportion of farmers who stated that waterlogging stops them fully grazing land in spring was 26%, and 31% stated that waterlogging limits pasture growth in spring.

Figure 33: Impact of waterlogging on pasture and grazing[54]



Base: Farmers who get waterlogged soils, n=250

Geographic variation

- Farmers who had soils where the effect of farm drainage on farm management was mixed were **much more** likely to have waterlogging stop them from fully grazing land in winter (64% compared to 48% for all).

9.1.5 Impact of waterlogging on pasture composition

Of those farmers who stated that they experienced waterlogged soils (56%), 42% reported that waterlogged soils had an unfavourable impact on their pasture composition (Figure 34).

[54] Do waterlogged soils stop you from fully grazing the land that gets waterlogged in winter? (Q37) Do waterlogged soils limit pasture growth on the land that gets waterlogged in winter? (Q38) Do waterlogged soils stop you from fully grazing the land that gets waterlogged in spring? (Q39) Do waterlogged soils limit pasture growth on the land that gets waterlogged in spring? (Q40)

Figure 34: Impact of waterlogging on pasture composition[55]

Base: Farmers who get waterlogged soils, n=250

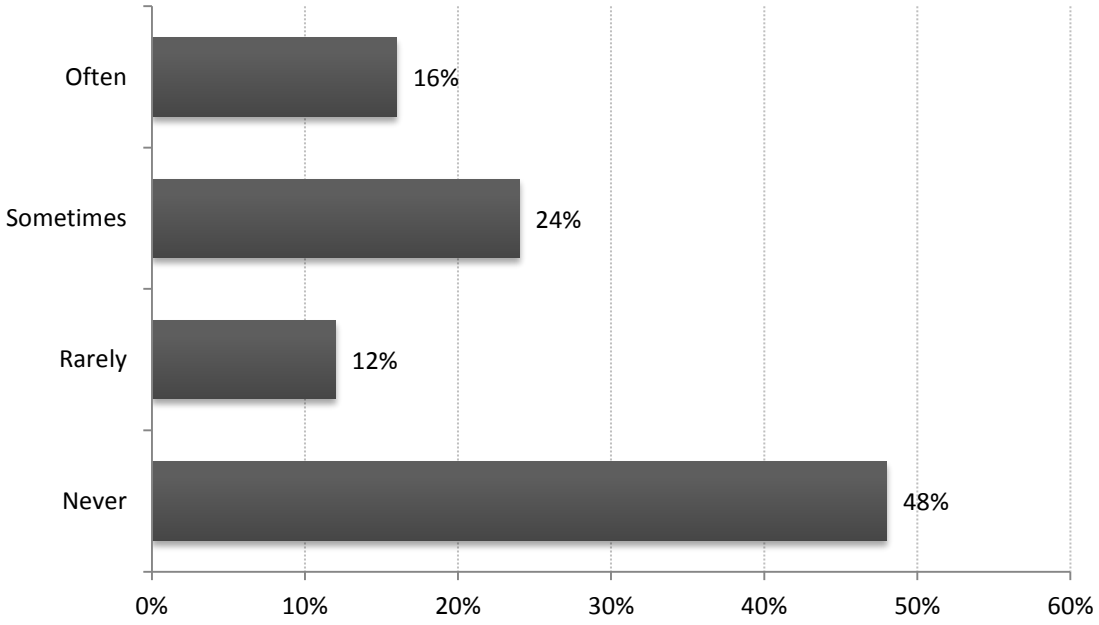
Geographic variation

- Farmers who had peat soils were **much more** likely to have waterlogged soils have an unfavourable impact on pasture composition **(74% compared to 42% for all).**

9.1.6 Impact of waterlogging on fertiliser spreading

Farmers who stated they experienced waterlogged soils (56%) were asked if waterlogged soils prevented or delayed fertiliser spreading (Figure 35). Almost half these farmers (48%) stated that waterlogging never prevented or delayed fertiliser spreading on their farm, and 12% stated that waterlogging rarely prevented or delayed fertiliser spreading. Just under a quarter of these farmers (24%) stated that waterlogging sometimes prevented or delayed fertiliser spreading, and a further 16% stated that waterlogging often prevented or delayed fertiliser spreading.

Figure 35: Impact of waterlogging on fertiliser spreading[56]



Base: Farmers who get waterlogged soils, n=250

Geographic variation

- Farmers who had peat soils were **much more** likely to have waterlogged soils <u>often</u> prevent or delay fertiliser spreading (34% compared to 16% for all).

[55] Do waterlogged soils have an unfavorable impact on your pasture composition? (Q41)
[56] Do waterlogged soils prevent or delay fertiliser spreading? (Q42)

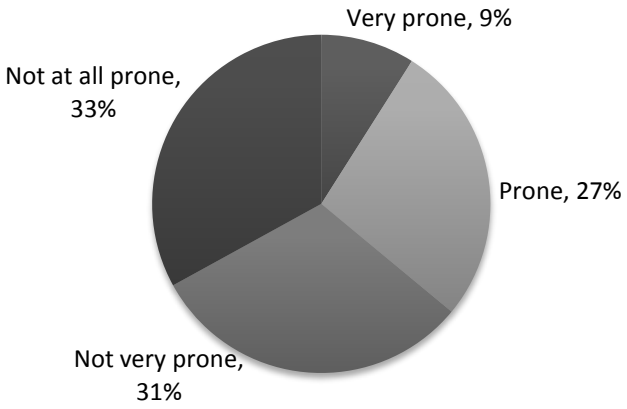
- Farmers who had soils where the effect of farm drainage on farm management was mixed were **much more** likely to have waterlogged soils <u>often</u> prevent or delay fertiliser spreading (27% compared to 16% for all).

9.2 Pugging

Overall 33% of farmers stated that their farm was not at all prone to pugging or pasture damage over winter, and 31% of farmers stated it was not very prone (Figure 36).

The proportion of farmers that stated their farm was prone to pugging or pasture damage over winter was 27%, while 9% stated that their farm was very prone.

Figure 36: Proneness to pugging[57]



Base: All farmers, n=450

Geographic variation

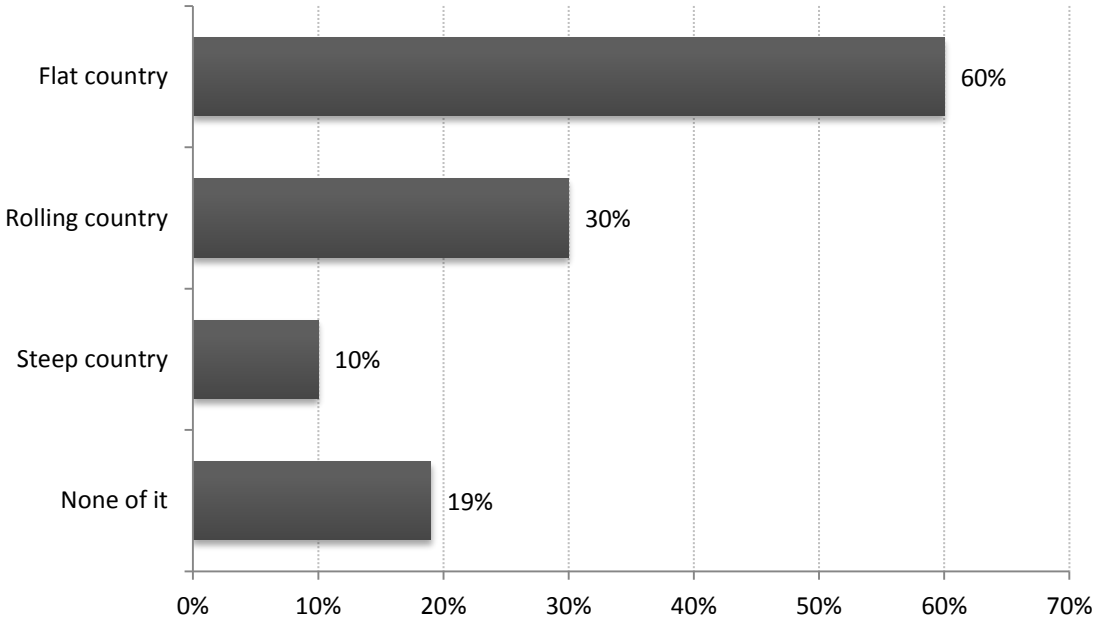
- Farmers who had soils where the effect of farm drainage on farm management was mixed were **much more** likely to state that their farm was <u>very prone to pugging</u> (16% compared to 9% for all).
- Farmers who had a farm in the Lower Waikato catchment were **much more** likely to state that their farm was <u>prone to pugging</u> (32% compared to 27% for all).
- Farmers who had clay soils were **much more** likely to state that their farm was <u>prone to pugging</u> (37% compared to 27% for all).
- Farmers who had peat soils were **much more** likely to state that their farm was <u>prone to pugging</u> (43% compared to 27% for all).
- Farmers who had silt soils were **much more** likely to state that their farm was <u>prone to pugging</u> **(49% compared to 27% for all).**
- Farmers who had soils where the effect of farm drainage on farm management was mixed were **much more** likely to state that their farm was <u>prone to pugging</u> (42% compared to 27% for all).
- Farmers who had free draining soils were **much more** likely to state that their farm was <u>not very prone to pugging</u> (34% compared to 31% for all).
- Farmers who had a farm in the Upper Waikato catchment were **much more** likely to state that their farm was <u>not at all prone to pugging</u> **(56% compared to 33% for all).**
- Farmers who had pumice soil were **much more** likely to state that their farm was <u>not at all prone to pugging</u> (52% compared to 33% for all).

[57] Overall how prone would you say your farm is to pasture damage or pugging during winter? Is it… (Q32)

9.2.1 Areas at most risk of pugging

Farmers who stated that they were not very prone, prone or very prone to pugging (67%) were asked which areas on their farm were at risk of pugging. Of these farmers, the proportion that stated their flat country is at risk of pugging was 60%, 30% stated that their rolling country was at risk of pugging, and a further 10% stated that their steep country was at risk of pugging, while 19% stated that none of these areas were at risk of pugging (Figure 37).

Figure 37: Areas at most risk of pugging[58]



Base: Farmers with farms that are prone to pugging, n=303

Farm characteristics variation

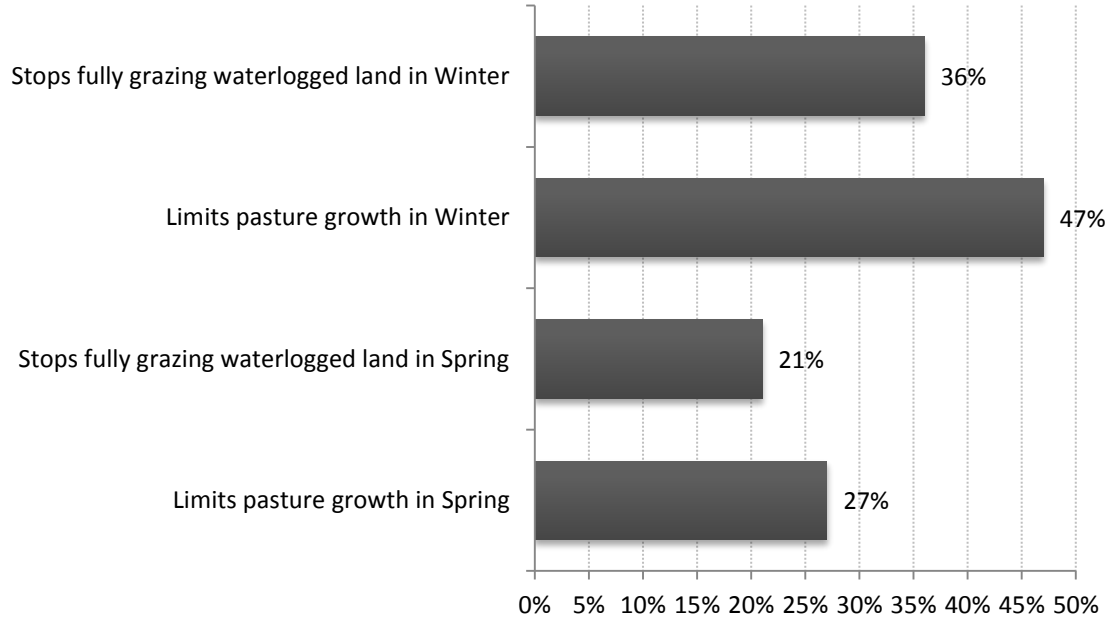
- Farmers who ran sheep were **much more** likely to state that their steep country was at risk of pugging (15% compared to 10% for all).

9.2.2 Impact of pugging on pasture growth and grazing

Farmers who stated that they were not very prone, prone or very prone to pugging (67%) were asked if pugging impacted on pasture and grazing. Over a third (36%) of these farmers stated that pugging stops them from fully grazing the waterlogged land in winter and 47% stated that pugging limits pasture growth in winter. Meanwhile 21% stated that pugging stops them from grazing fully waterlogged land in spring and 27% stated that pugging limits pasture growth in spring (Figure 38).

[58] Which areas on your farm are at risk of pugging? (Q43)

Figure 38: Impact of pugging on pasture and grazing[59]



Base: Farmers with farms that are not very prone, prone or very prone to pugging, n=303

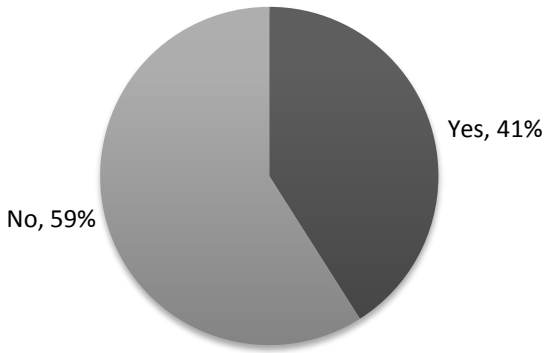
Geographic variation

- Farmers who had clay loam soils were **much more** likely to state that pugging stops them from fully grazing land that gets waterlogged in winter (51% compared to 36%).
- Farmers who had soils where the effect of farm drainage on farm management was mixed were **much more** likely to state that pugging stops them from fully grazing land that gets waterlogged in winter (52% compared to 36%).

9.2.3 Impact of pugging on pasture composition

Of those farmers who stated that they were not very prone, prone or very prone to pugging (67%), 41% reported pugging had an unfavourable impact on pasture composition (Figure 39).

Figure 39: Impact of pugging on pasture composition[60]



Base: Farmers with farms that are not very prone, prone or very prone to pugging, n=303

[59] Does pugging stop you from fully grazing the land that gets waterlogged in winter? (Q44) Does pugging limit pasture growth on the land that gets waterlogged in winter? (Q45) Does pugging stop you from fully grazing the land that gets waterlogged in spring? (Q46) Does pugging limit pasture growth on the land that gets waterlogged in spring? (Q47)

[60] Does pugging have an unfavorable impact on your pasture composition? (Q48)

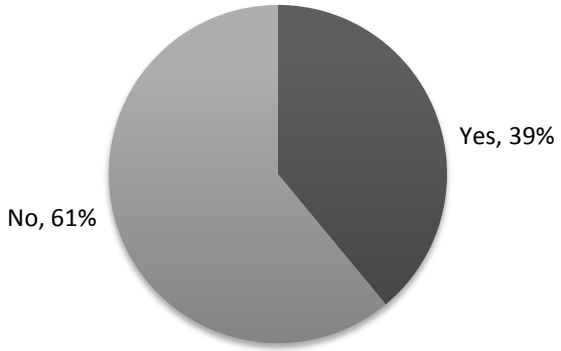
Geographic variation

- Farmers who had clay loam soils were **much more** likely to state that pugging had an unfavourable impact on their pasture composition (53% compared to 41% for all).
- Farmers who had peat soils were **much more** likely to state that pugging had an unfavourable impact on their pasture composition (60% compared to 41% for all).

9.2.4 Impact of pugging on soil structure

Of those farmers who stated that they were not very prone, prone or very prone to pugging (67%), 39% stated that pugging had an unfavourable impact on their soil structure (Figure 40).

Figure 40: Impact of pugging on soil structure[61]



Base: Farmers with farms that are prone to pugging, n=303

Geographic variation

- Farmers who had clay loam soils were **much more** likely to state that pugging had an unfavourable impact on their soil structure (52% compared to 39% for all).

9.2.5 Duration of grazing on waterlogged paddocks

Farmers who stated that they experience pugging or waterlogged soils[62] (73%) were asked to select one statement from a list of statements that best described how long they could graze waterlogged paddocks (Figure 41).

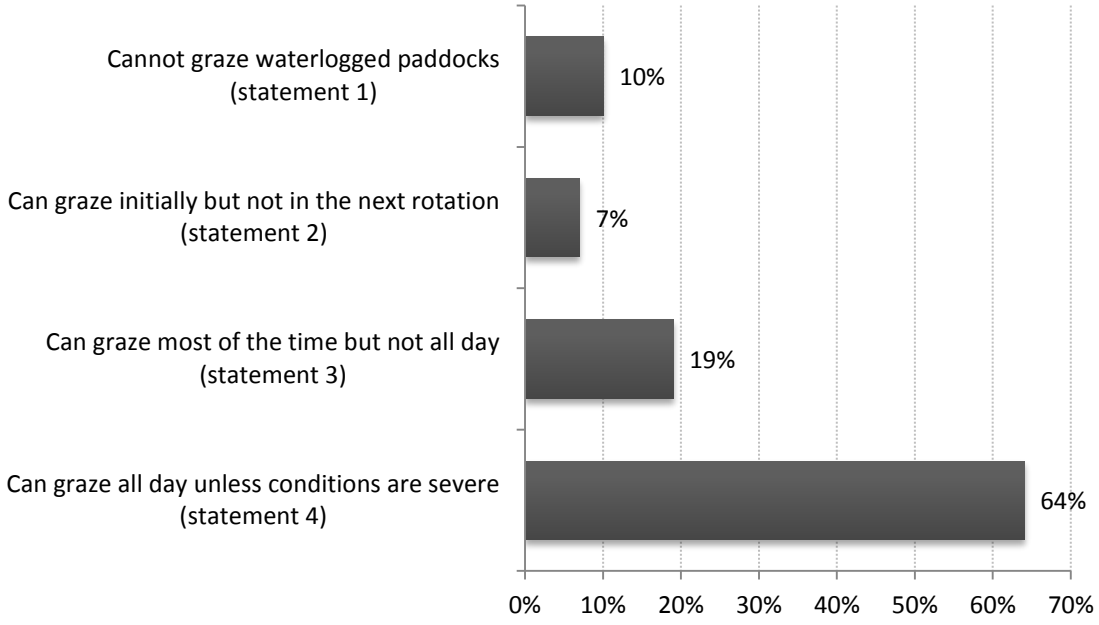
A higher proportion of these farmers (64%) stated that they were able to graze pretty well all day without pugging unless the conditions were severe (statement 4). Meanwhile 19% stated that most of the time they grazed waterlogged paddocks for a few hours without too much damage, but stock could not be left on all day (statement 3).

A smaller proportion (7%) stated that initially, they grazed waterlogged paddocks for a few hours without too much damage but on the next rotation they could not graze wet paddocks even for a few hours without experiencing too much pugging damage (statement 2). While 10% stated that they could not graze waterlogged paddocks for even a couple of hours without experiencing too much pugging damage (statement 1).

[61] Does pugging have an unfavorable impact on your soil structure? (Q49)

[62] Respondents had stated that they were not very prone, prone or very prone to pugging or that they experience waterlogging every year, most years, every second or third years or every five years or so, or a combination of both (Q32 and Q33).

Figure 41: Duration of grazing on waterlogged paddocks[63]



Base: Farmers with farms that are prone to pugging or who had waterlogged soils, n=331

Geographic variation

- Farmers with clay loam soils were **much more** likely to state that they can graze most of the time but not all day (statement 3) (30% compared to 19% for all).
- Farmers who had free draining soils were **much more** likely to state that they can graze all day unless conditions are severe (statement 4) (68% compared to 64% for all).

[63] I am going to read out four statements. Please tell me the one that best describes your situation… (Q50)

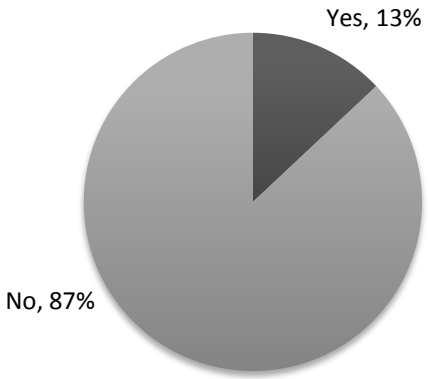
10 Management of sacrifice paddocks

In this section findings about farmers use and management of sacrifice paddocks are reported. This included the use of a sacrifice paddock in winter, the topography of the sacrifice paddock, the use of the same sacrifice paddocks each winter, the location of the sacrifice paddock in terms of farm waterways or drains and the use of winter crop paddocks as sacrifice paddocks.

10.1 Sacrifice paddocks

Overall 13% of farmers usually had a sacrifice paddock in winter (Figure 42).

Figure 42: Sacrifice paddocks[64]



Base: All farmers, n=450

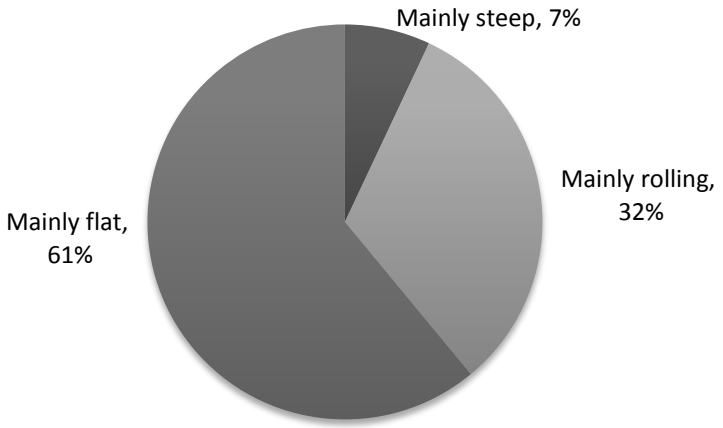
Farm characteristics variation

- Farmers who ran a combination of stock types were **much more** likely to have a sacrifice paddock (26% compared to 13% for all).

10.2 Topography of sacrifice paddock

Farmers who stated that they had a sacrifice paddock (13%) were asked to describe the contour of their sacrifice paddock as; mainly steep, rolling or flat. A higher proportion of these farmers used a mainly flat area (61%), 32% used a mainly rolling area and 7% had a mainly steep paddock (Figure 43).

Figure 43: Topography of sacrifice paddock[65]



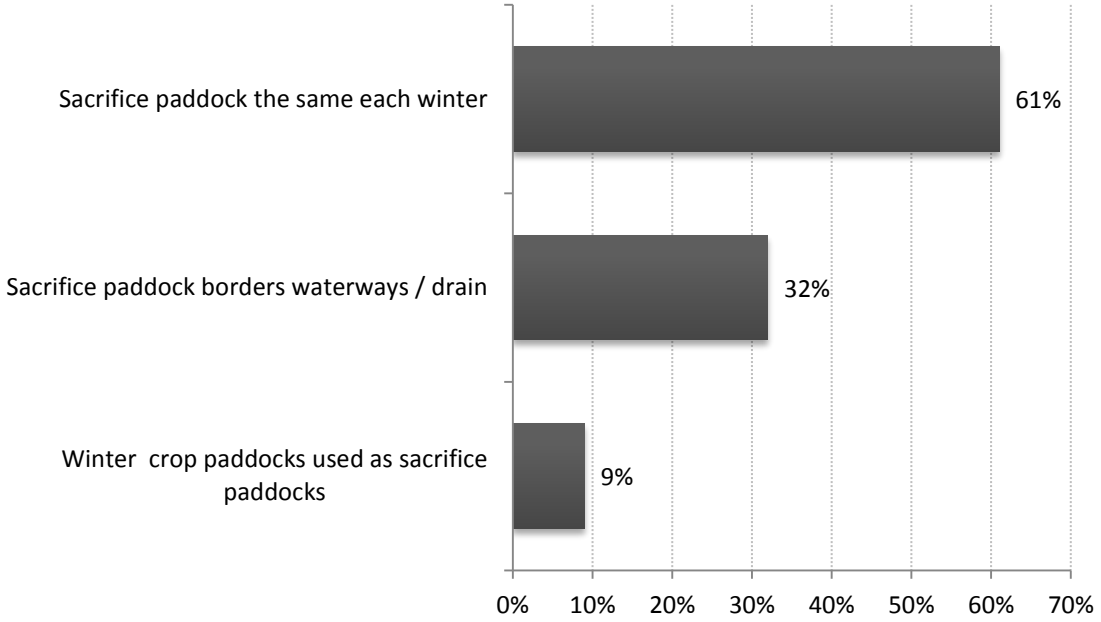
Base: Farmers who had a sacrifice paddock in winter, n=57

[64] Do you usually have a sacrifice paddock in winter? (Q51)
[65] Thinking about your sacrifice paddock, is it …? (Q52)

10.3 Characteristics of a sacrifice paddock

Farmers who stated that they had a sacrifice paddock (13%) were asked if they sacrificed the same paddock each winter, if their sacrifice paddock bordered a drain or a waterway and if they used winter crop paddocks as a sacrifice paddock. A higher proportion of these farmers sacrificed the same paddock each winter (61%), while 32% of sacrifice paddocks bordered a waterway or drain and 9% used winter crop paddocks as sacrifice paddocks (Figure 44).

Figure 44: Characteristics of a sacrifice paddock[66]



Base: Farmers who had a sacrifice paddock in winter, n=57

[66] Do you sacrifice the same paddocks each winter? (Q53) Does the sacrifice paddock usually border a waterway or drain? (Q54) Do you use winter crop paddocks as sacrifice paddocks? (Q55)

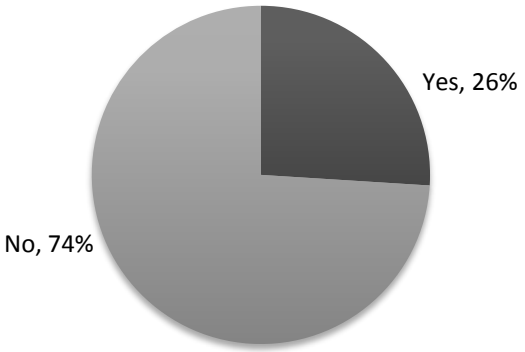
11 Managing stock types over winter

In the following section the findings for the management of the different stock class over winter are outlined. For bulls, dairy heifers, dairy cows, sheep, lambs, and beef cattle, findings are reported on; the proportion who run each stock type, number of that stock type on farm, the type of enterprise run (for sheep, lambs and beef cattle) and the management of waterlogging and pugging.

11.1 Bulls

Overall 26% of farmers usually ran bulls on their farm (Figure 45).

Figure 45: Proportion that run bulls[67]



Base: All farmers, n=450

Geographic variation

- Farmers who had a farm topography that was rolling with some steep areas were **much more** likely to run bulls (35% compared to 26% for all).

Farm characteristics variation

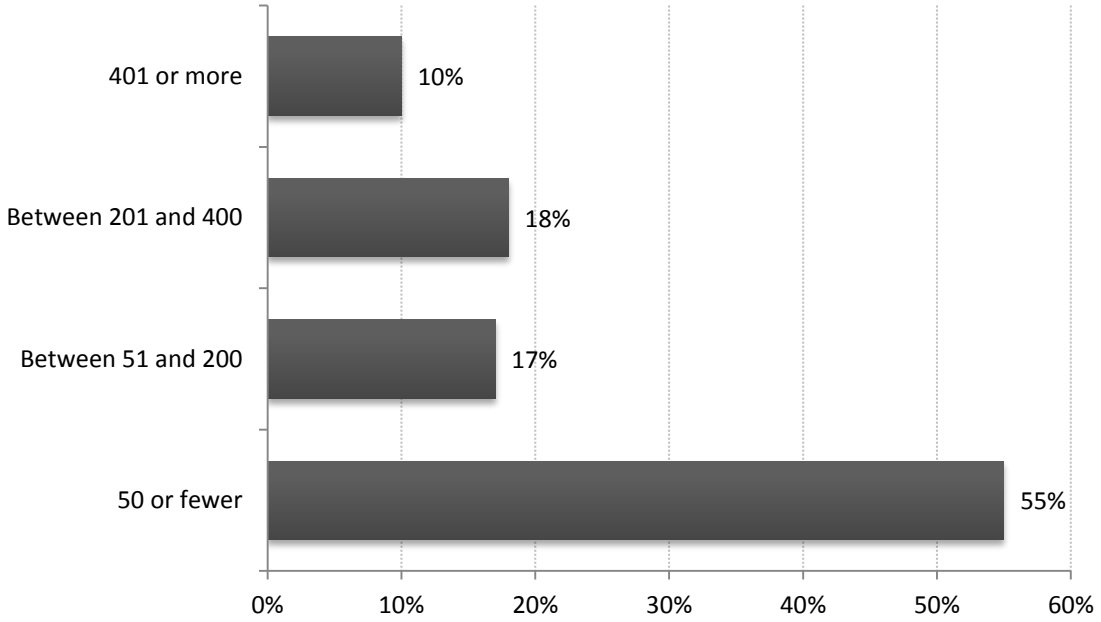
- Farmers who had a farm size of 201 and 400 hectares were **much more** likely to run bulls (39% compared to 26% for all).
- Farmers who had a farm size of 401 hectares or greater were **much more** likely to run bulls **(48% compared to 26% for all).**

11.1.1 Number of bulls on farm

Farmers who ran bulls (26%) were asked how many they usually ran[68]. The majority of these farmers ran 50 or fewer bulls on their farm (55%). A lower proportion ran between 51 and 200 bulls (17%), 18% had between 201 and 400 bulls, and 10% had more than 400 bulls. The average number of bulls run on a farm was 182 (Figure 46).

[67] Do you usually run bulls? (Q56)
[68] Farmer stock number responses were then grouped by Versus Research Ltd into bull number grouping; 50 or fewer, between 51 and 200, between 201 and 400, and 401 or more.

Figure 46: Number of bulls on farm[69]



Base: Farmers who ran bulls on their farm, n=117

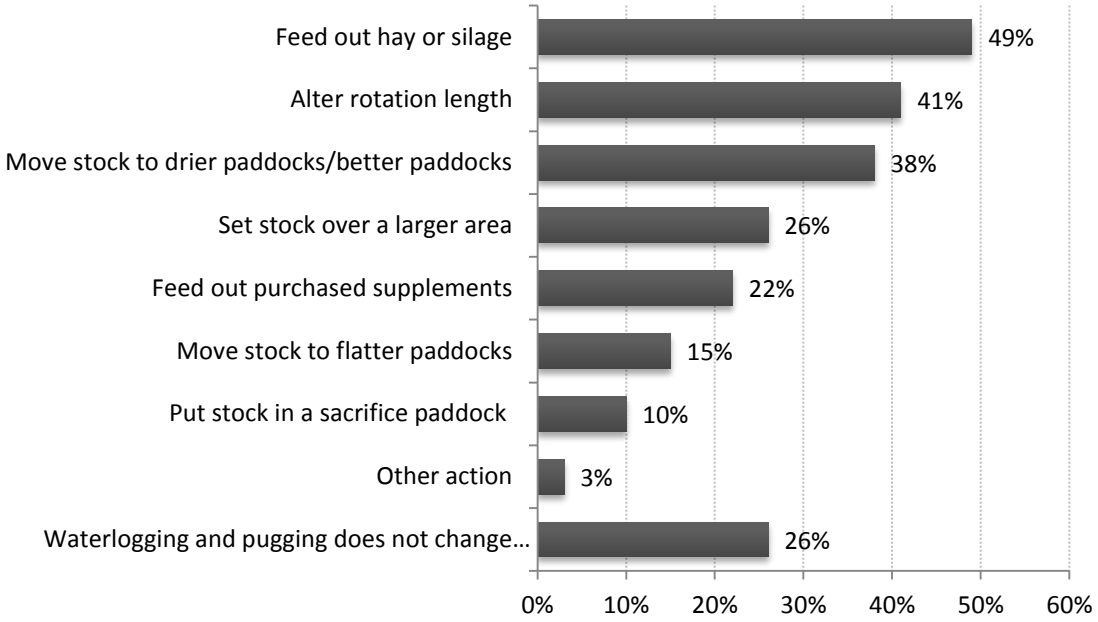
11.1.2 Management of bulls for waterlogged soils or pugging

Farmers who ran bulls (26%) were asked, based on their usual practice with bulls, how they managed waterlogged soils or pugging, or how they usually managed their bulls in winter[70] (Figure 47). Nearly half the proportion of these farmers (49%) fed out hay or silage, 41% altered the rotation length and 38% moved stock to drier or better paddocks. Just over a quarter (26%) set stock over a larger area, 22% fed out purchased supplements, 15% moved stock to flatter paddocks and 10% put stock on a sacrifice paddock. While 26% of farmers did not change how they managed bulls.

[69] How many...? (Q57)

[70] Farmers were filtered to one of these two questions. If they had answered that they are not at all prone to pasture damage or pugging in winter (Q32) AND answered that their farm soils were never waterlogged (Q33) they were asked in 'winter' do you..? If they answered they were in some way prone to pasture damage or pugging (Q32) and they did experience waterlogged soils (Q33) they were asked when you have 'waterlogged soils or pugging' do you..?

Figure 47: Management of bulls for waterlogged soils or pugging[71]



Base: Farmers who ran bulls on their farm, n=117

Geographic variation

- Farmers with a farm topography that was rolling with some steep areas were **much more** likely to feed out purchased supplements to their bulls (36% compared to 22% for all).

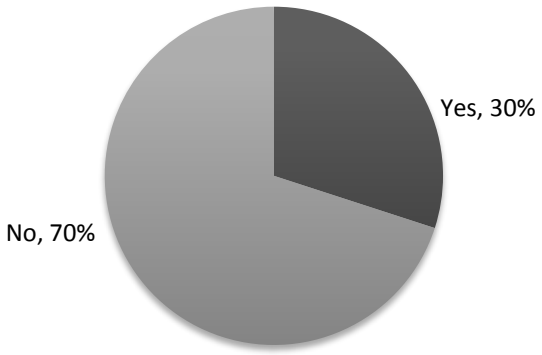
Farm characteristics variation

- Farmers who ran beef cattle were **much more** likely to put their bulls in a sacrifice paddock (16% compared to 10% for all).

11.2 Dairy heifers

Overall 30% of farmers usually ran dairy heifers on their farm (Figure 48).

Figure 48: Proportion that run dairy heifers[72]



Base: All farmers, n=450

Geographic variation

- Farmers in the Waipa catchment were **much more** likely to run dairy heifers (39% compared to 30%).

[71] Thinking about your usual practice with bulls, when you have waterlogged soils or pugging do you…? (Q58). Thinking about your usual practice with bulls, in winter do you…? (Q59)
[72] Do you usually run dairy heifers? (Q60)

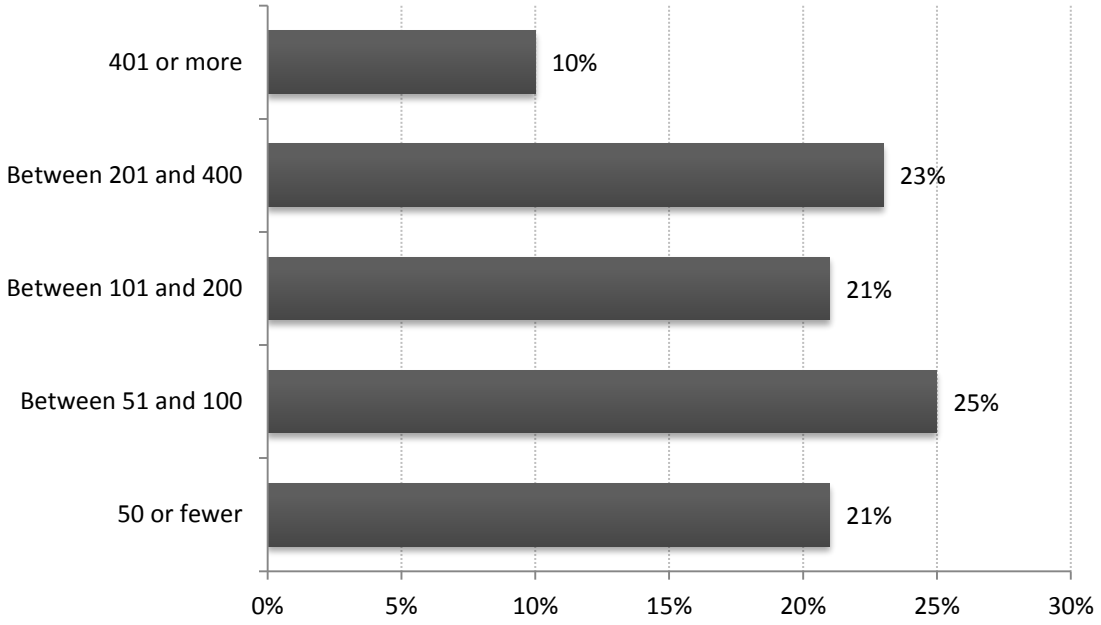
Farm characteristics variation

- Farmers who wintered dairy cows were **much more** likely to run dairy heifers **(61% compared to 30%).**

11.2.1 Number of dairy heifers on farm

Farmers who ran dairy heifers (30%) were asked how many they usually ran[73]. The proportion of these farmers who ran 50 or fewer was 21%. One quarter (25%) ran between 51 and 100 dairy heifers, 21% ran between 101 and 200, 23% ran between 201 and 400 and 10% ran more than 400 dairy heifers. The average number of dairy heifers run on a farm was 206 (Figure 49).

Figure 49: Number of dairy heifers on farm[74]



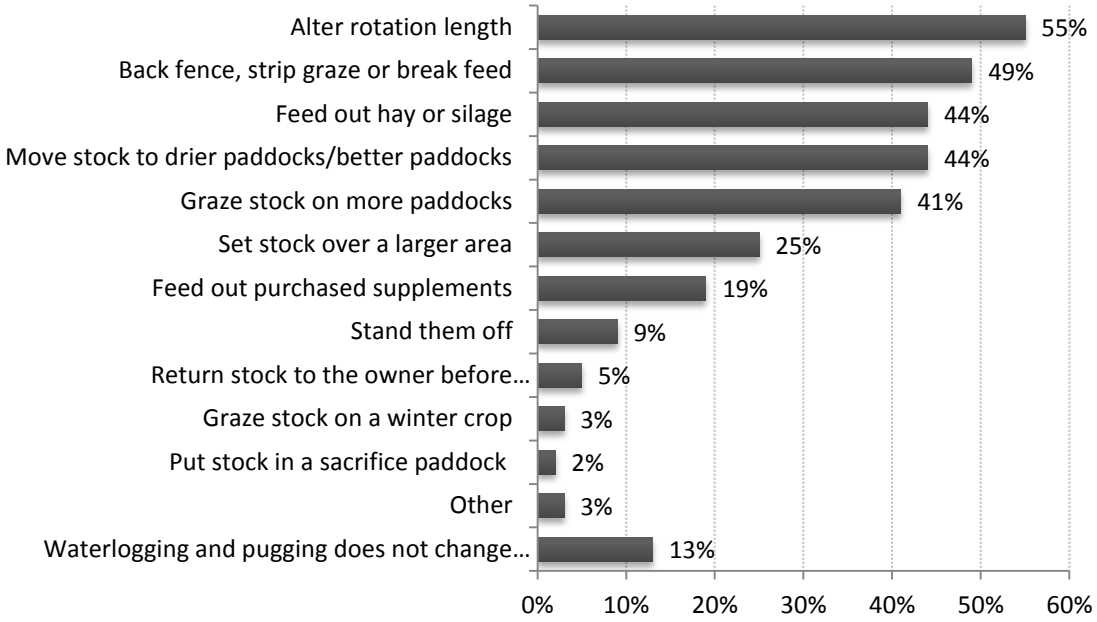
Base: Farmers who ran dairy heifers on their farm, n=135

11.2.2 Management of dairy heifers for waterlogged soils or pugging

Farmers who ran dairy heifers (30%) were asked, based on their usual practice with dairy heifers, how they managed waterlogged soils or pugging, or how they usually managed their dairy heifers in winter[75] (Figure 50). Of these farmers, more than half 55% altered their rotation length, 49% back fenced, strip grazed or break fed their heifers, 44% fed out hay or silage, 44% moved stock to drier or better paddocks and 41% grazed stock on more paddocks. A quarter (25%) set stock over a larger area, 19% fed out purchased supplements and 9% stood stock off. All other actions registered mentions of only 5% or fewer, while 13% of farmers did not change how they managed heifers.

[73] Farmer stock number responses were then grouped by Versus Research Ltd into dairy heifer number grouping; 50 or fewer, between 51 and 100, between 101 and 200, between 201 and 400 and 401 or more.
[74] How many...? (Q61)
[75] Farmers were filtered to one of these two questions. If they had answered that they are not at all prone to pasture damage or pugging in winter (Q32) AND answered that their farm soils were never waterlogged (Q33) they were asked in 'winter' do you..? If they answered they were in some way prone to pasture damage or pugging (Q32) and they did experience waterlogged soils (Q33) they were asked when you have 'waterlogged soils or pugging' do you..?

Figure 50: Management of dairy heifers for waterlogged soils or pugging[76]



Base: Farmers who ran dairy heifers on their farm, n=135

Geographic variation

- Farmers who had clay loam soils were **much more** likely to stand off their dairy heifers (21% compared to 9% for all).

Farm characteristics variation

- Farmers who wintered dairy cows were **much more** likely to state that they do not change the management practices for their dairy heifers (27% compared to 13% for all).

Farmers who said they stood off their dairy heifers (9%) were asked where they stood them off[77]. Eight stood them off in races, yards or laneways, two stood them off in a purpose built shed or loafing pad, one stood them off in a sacrifice paddock and one stood them off on a feedpad.

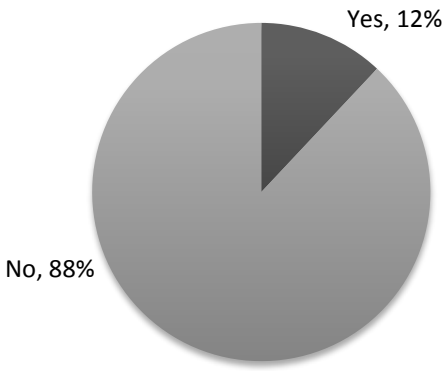
11.3 Dairy cows

Overall 12% of farmers' usually wintered dairy cows on their farm (Figure 51).

[76] Thinking about your usual practice with dairy heifers, when you have waterlogged soils or pugging do you…? (Q62). Thinking about your usual practice with dairy heifers in winter, do you…? (Q63)

[77] The results reported here include responses to the option 'stand them off'. Respondents were then prompted to specify where. It does don't include responses to the option 'put them in a sacrifice paddock'.

Figure 51: Proportion that winter dairy cows[78]



Base: All farmers, n=450

Geographic variation

- Farmers in the Upper Waikato catchment were **much more** likely to winter dairy cows (24% compared to 12% for all).

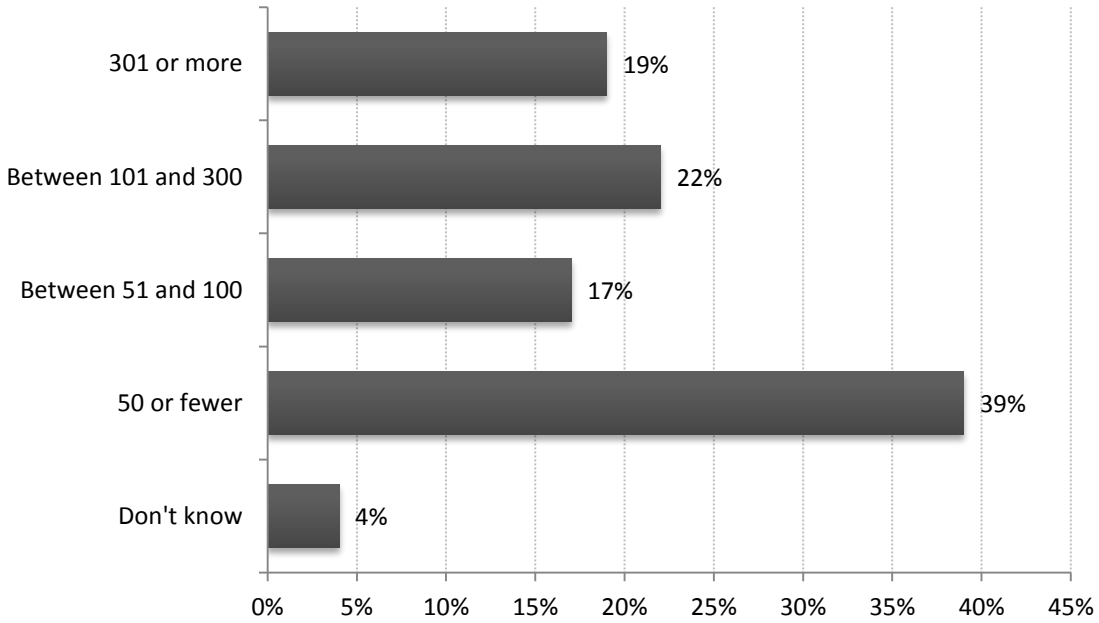
Farm characteristics variation

- Farmers who ran dairy heifers were **much more** likely to winter dairy cows (24% compared to 12% for all).

11.3.1 Number of dairy cows on farm

Farmers who wintered dairy cows (12%) were asked how many dairy cows they usually ran over winter[79] (Figure 52). A higher proportion of these respondents (39%) wintered 50 or fewer dairy cows on their farm, 17% wintered between 51 and 100 dairy cows, 22% had between 101 and 300 dairy cows, and 19% had more than 300 dairy cows. The average number of dairy cows wintered on a farm was 182.

Figure 52: Number of dairy cows on farm[80]



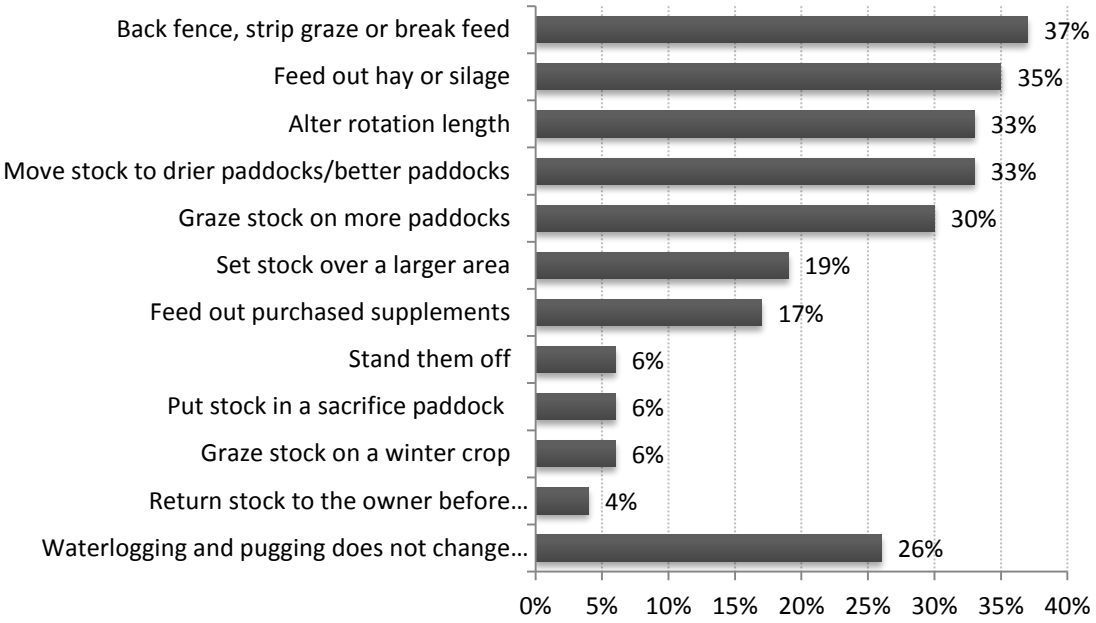
Base: Farmers who wintered dairy cows on their farm, n=54

[78] Do you usually run dry dairy cows over winter? (Q64)
[79] Farmer stock number responses were then grouped by Versus into dairy cow number grouping; 50 or fewer, between 51 and 100, between 101 and 300, 301 or more.
[80] How many...? (Q65)

11.3.2 Management of dairy cows for waterlogged soils and pugging

Farmers who wintered dairy cows (12%) were asked, based on their usual practice with dairy cows, how they managed waterlogged soils or pugging, or how they usually managed their dairy cows in winter[81] (Figure 53). The proportion of these farmers who back fenced, strip grazed or break fed their dairy cows was 37%, while 35% fed out hay or silage, 33% altered the rotation length, 33% moved stock to drier or better paddocks and 30% grazed stock on more paddocks. A smaller proportion (19%) set stock over a larger area and 17% fed out purchased supplements, while all other actions registered mentions of only 6% or fewer. Just over a quarter (26%) of farmers did not change how they managed dairy cows.

Figure 53: Management of dairy cows for waterlogged soils or pugging[82]



Base: Farmers who wintered dairy cows on their farm, n=54

Farmers who said they stood off their dairy cows (6%) were asked where they stood them off[83]. Two stood them off on a feedpad and one on races, yards or laneways.

11.4 Sheep

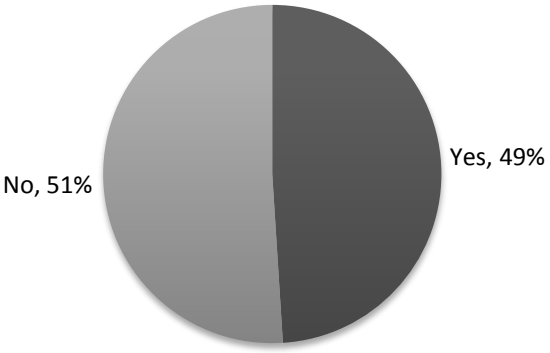
Overall 49% of farmers usually ran sheep on their farm (Figure 54).

[81] Farmers were filtered to one of these two questions. If they had answered that they are not at all prone to pasture damage or pugging in winter (Q32) AND answered that their farm soils were never waterlogged (Q33) they were asked in 'winter' do you..? If they answered they were in some way prone to pasture damage or pugging (Q32) and they did experience waterlogged soils (Q33) they were asked when you have 'waterlogged soils or pugging' do you..?

[82] Thinking about your usual practice with dairy cows, when you have waterlogged soils or pugging do you…? (Q66). Thinking about your usual practice with dairy cows in winter, do you…? (Q67)

[83] The results reported here include responses to the option 'stand them off'. Respondents were then prompted to specify where. It does don't include responses to the option 'put them in a sacrifice paddock'.

Figure 54: Proportion that run sheep[84]



Base: All farmers, n=450

Geographic variation

- Farmers who had a farm topography of rolling with some steep areas were **much more** likely to run sheep **(72% compared to 49% for all).**
- Farmers who had ash soils were **much more** likely to run sheep (63% compared to 49% for all).
- Farmers who had free draining soils were **much more** likely to run sheep (55% compared to 49% for all).

Farm characteristics variation

- Farmers who ran other stock were **much more** likely to run sheep (59% compared to 49% for all).
- Farmers who had a farm size of between 201 and 400 hectares were **much more** likely to run sheep **(78% compared to 49% for all).**
- Farmers who had a farm size of 401 hectares or more were **much more** likely to run sheep **(77% compared to 49% for all).**

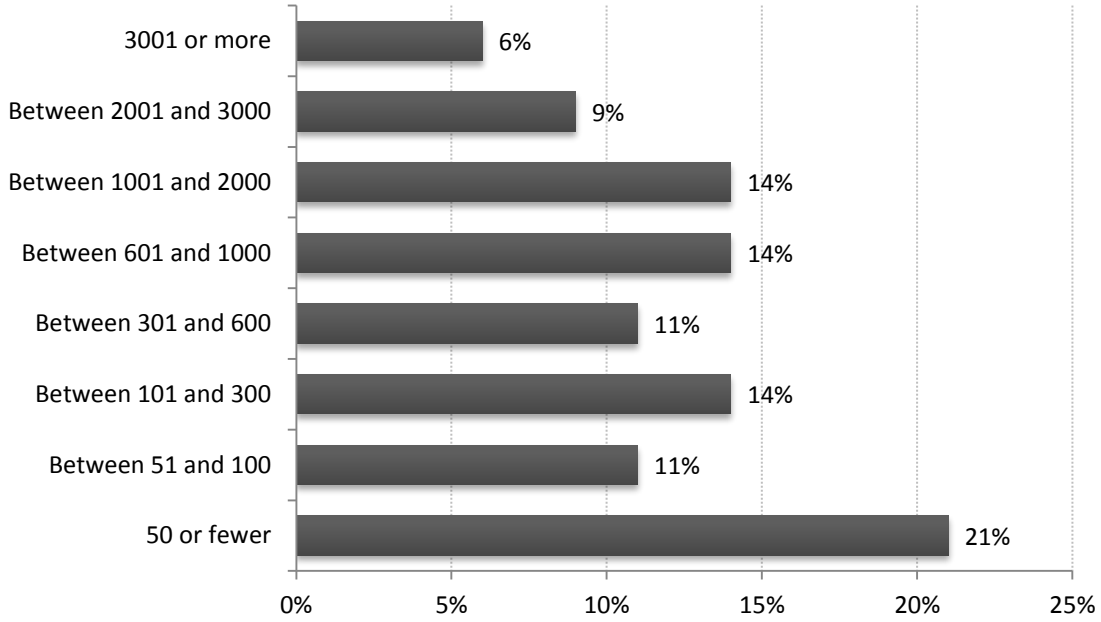
11.4.1 Number of sheep on farm

Farmers who ran sheep (49%) were asked the number of sheep they usually ran[85] (Figure 55). The proportion of these farmers who ran 50 or fewer sheep on their farm was 21%, while 11% ran between 51 and 100 sheep, 14% ran between 101 and 300 sheep, 11% between 301 and 600, 14% between 601 and 1000, and 14% between 1001 and 2000. The remaining farmers (15%) ran more than 2000 sheep. The average number of sheep run on a farm was 1,256.

[84] Do you usually run sheep? (Q68)

[85] Farmer stock number responses were then grouped by Versus Research Ltd into sheep number of grouping; 50 or fewer, between 51 and 100, between 101 and 300, between 301 and 600, between 601 and 1000, between 1001 and 2000, between 2001 and 3000 and 3001 or more.

Figure 55: Number of sheep on farm[86]

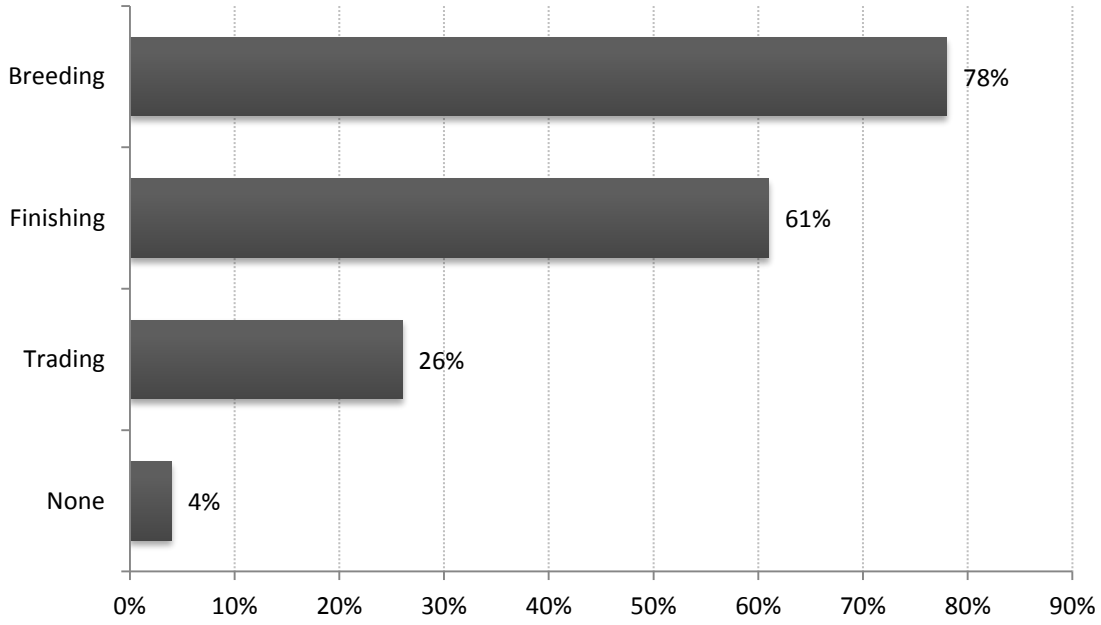


Base: Farmers who ran sheep on their farm, n=221

11.4.2 Sheep enterprises operated on farm

Farmers who ran sheep (49%) were asked what sheep enterprises they operated on their farm (Figure 56). The most common enterprise was breeding (78%), followed by finishing (61%) and trading (26%). Just 4% of sheep farmers did not identify a sheep enterprise.

Figure 56: Sheep enterprises operated on farm[87]



Base: Farmers who ran sheep on their farm, n=221

Farm characteristics variation

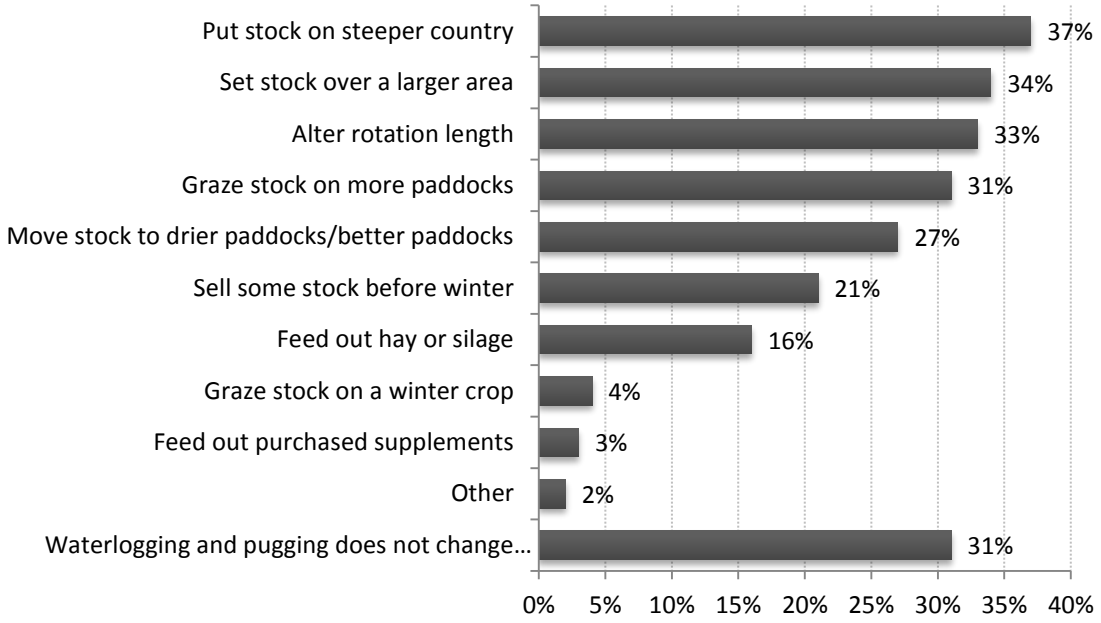
- Farmers who ran lambs were **much more** likely to run a <u>sheep finishing enterprise</u> (66% compared to 61% for all).

[86] How many...? (Q69)
[87] Which sheep enterprises do you operate on your farm? (Q70)

11.4.3 Management of sheep for waterlogged soils and pugging

Farmers who ran sheep (49%) were asked, based on their usual practice with sheep, how they managed waterlogged soils or pugging, or how they usually managed their sheep in winter[88] (Figure 57). A higher proportion of these farmers put their sheep on steeper country (37%), followed by 34% who set stock over a larger area, 33% altered the rotation length, 31% let stock graze more paddocks and 27% moved stock to drier paddocks. The proportion of farmers who sold stock off before winter was 21%, and 16% fed out hay or silage. All other management practices registered mentions of less than 5% while 31% of farmers did not change how they managed their sheep.

Figure 57: Management of sheep for waterlogged soils or pugging[89]



Base: Farmers who ran sheep on their farm, n=221

Geographic variation

- Farmers in the Waipa catchment were **much more** likely to alter the rotation length of their sheep (41% compared to 33% for all).

Farm characteristics variation

- Farmers who had a farm size of 50 hectares or less were **much more** likely to feed out hay or silage to their sheep (32% compared to 16% for all).
- Farmers who had a farm size of 50 hectares or less were **much more** likely to feed out purchased supplements to their sheep (9% compared to 3% for all).

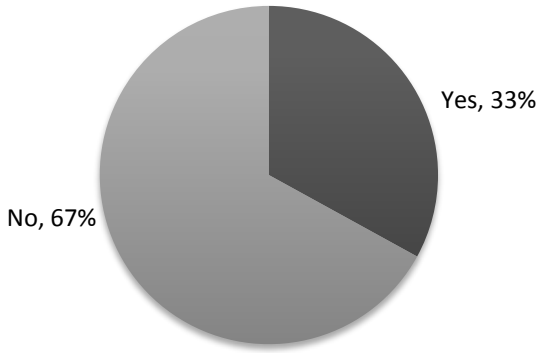
11.5 Lambs

Overall 33% of farmers usually ran lambs on their farm (Figure 58).

[88] Farmers were filtered to one of these two questions. If they had answered that they are not at all prone to pasture damage or pugging in winter (Q32) AND answered that their farm soils were never waterlogged (Q33) they were asked in 'winter' do you..? If they answered they were in some way prone to pasture damage or pugging (Q32) and they did experience waterlogged soils (Q33) they were asked when you have 'waterlogged soils or pugging' do you..?

[89] Thinking about your usual practice with sheep, when you have waterlogged soils or pugging do you…? (Q71). Thinking about your usual practice with sheep, in winter do you…? (Q72)

Figure 58: Proportion that run lambs[90]



Base: All farmers, n=450

Geographic variation

- Farmers who had a farm topography that was rolling with some steep areas were **much more** likely to run lambs (51% compared to 33% for all).
- Farmers who had ash soils were **much more** likely to run lambs (43% compared to 33% for all).
- Farmers who had free draining soils were **much more** likely to run lambs (36% compared to 33% for all).

Farm characteristics variation

- Farmers who ran other stock were **much more** likely to run lambs (50% compared to 33% for all).
- Farmers who had a farm size of between 201 and 400 hectares were **much more** likely to run lambs **(57% compared to 33% for all).**
- Farmers who had a farm size of 401 hectares or greater were **much more** likely to run lambs **(58% compared to 33% for all).**

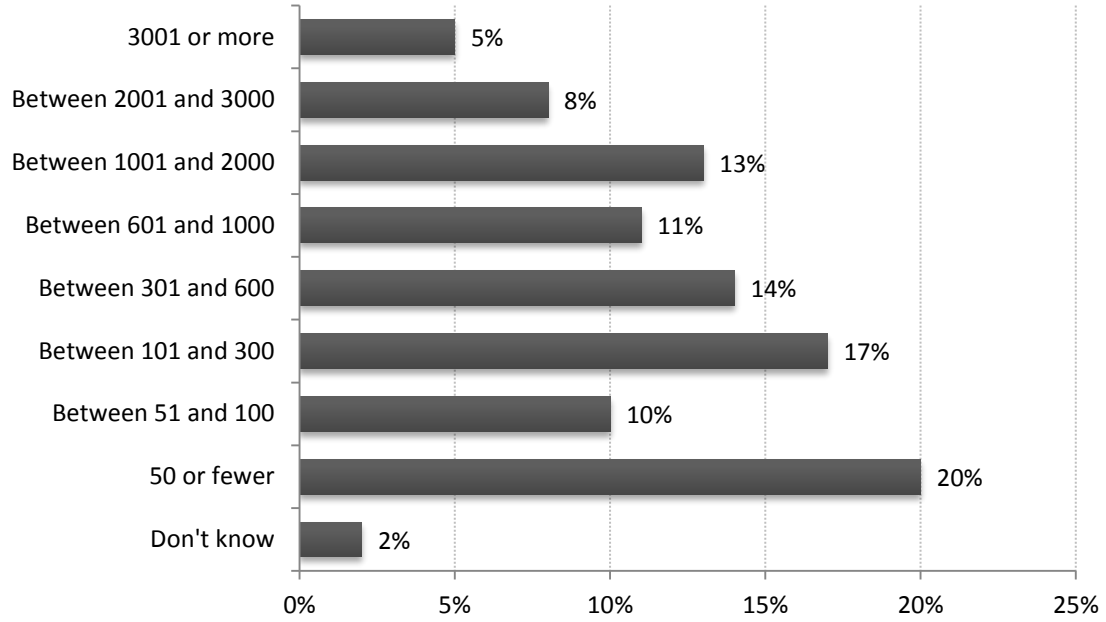
11.5.1 Number of lambs on farm

Farmers who ran lambs (33%) were asked the number of lambs they usually ran[91] (Figure 59). The proportion of these farmers who ran 50 or fewer lambs on their farm was 20%, while 10% ran between 51 and 100 lambs, 17% ran between 101 and 300, 14% between 301 and 600, and 11% ran between 601 and 1000 lambs. The remaining farmers (26%) ran more than 1000 lambs, and 2% were unsure how many lambs they ran. The average number of lambs run on a farm was 1,058.

[90] Do you usually run lambs? (Q73)

[91] [91] Farmer stock number responses were then grouped by Versus into lamb number grouping; 50 or fewer, between 51 and 100, between 101 and 300, between 301 and 600, between 601 and 1000, between 1001 and 2000, between 2001 and 3000 and 3001 or more.

Figure 59: Number of lambs on farm[92]

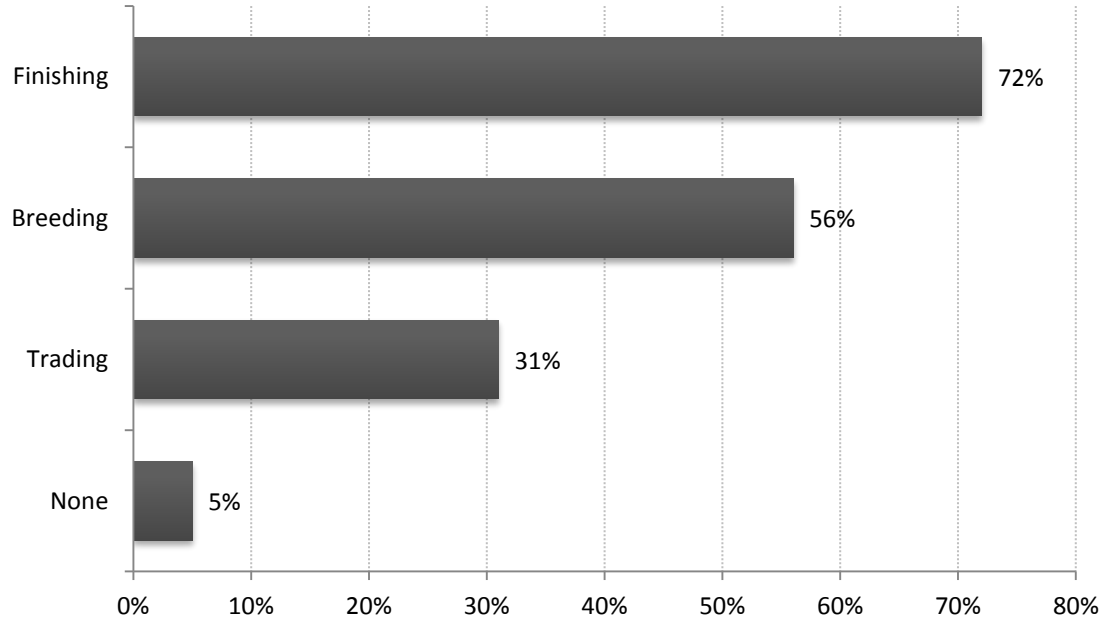


Base: Farmers who ran lambs on their farm, n=147

11.5.2 Lamb enterprises operated on the farm

Farmers who ran lambs (33%) were asked which lamb enterprises they operated on their farm. The most common enterprise was finishing (72%), followed by breeding (56%) and trading (31%). A low proportion (5%) did not identify a lamb enterprise (Figure 60).

Figure 60: Lamb enterprises operated on farm[93]



Base: Farmers who ran lambs on their farm, n=147

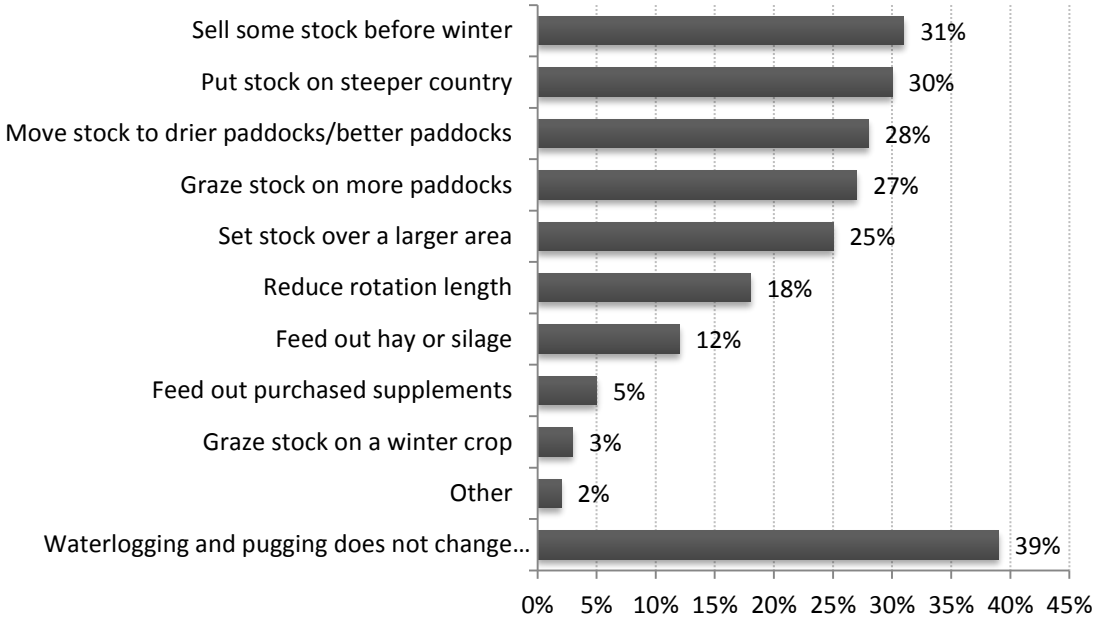
11.5.3 Management of lambs for waterlogged soils or pugging

Farmers who ran lambs (33%) were asked, based on their usual practice with lambs, how they managed waterlogged soils or pugging, or how they usually managed their

[92] How many...? (Q74)
[93] Which lamb enterprises do you operate on your farm? (Q75)

lambs in winter[94] (Figure 61). The proportion of these farmers who would sell some of their lambs before winter was 31%, while 30% put stock on steeper country, 28% moved stock to drier paddocks and 27% grazed stock on more paddocks. A quarter (25%) would set stock over a larger area while 18% reduced the rotation length. Only 12% fed out hay or silage, 5% feed out supplements, and 3% grazed a winter crop. Meanwhile 39% of farmers did not change how they managed their lambs.

Figure 61: Management of lambs for waterlogged soils or pugging[95]



Base: Farmers who ran lambs on their farm, n=147

Geographic variation

- Farmers who had a farm topography that was flat with some rolling areas were **much more** likely to <u>put their lambs on steeper country</u> (49% compared to 30% for all).
- Farmers who had clay soils were **much more** likely to <u>feed out hay and silage</u> to their lambs (26% compared to 12% for all).

Farm characteristics variation

- Farmers with a farm size of 50 hectares or less were **much more** likely to <u>feed out purchased supplements</u> to their lambs (15% compared to 5% for all).

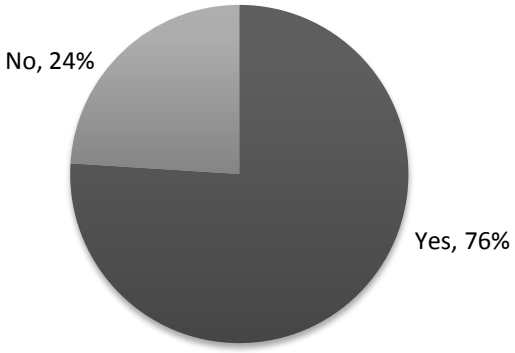
11.6 Beef cattle

Overall 76% of farmers usually ran beef cattle on their farm (Figure 62).

[94] Farmers were filtered to one of these two questions. If they had answered that they are <u>not at all prone</u> to pasture damage or pugging in winter (Q32) AND answered that their farm soils were <u>never</u> waterlogged (Q33) they were asked in 'winter' do you..? If they answered they were in some way prone to pasture damage or pugging (Q32) and they did experience waterlogged soils (Q33) they were asked when you have 'waterlogged soils or pugging' do you..?

[95] Thinking about your usual practice with lambs, when you have waterlogged soils or pugging do you…? (Q76). Thinking about your usual practice with lambs, in winter do you…? (Q77)

Figure 62: Proportion that run beef cattle[96]

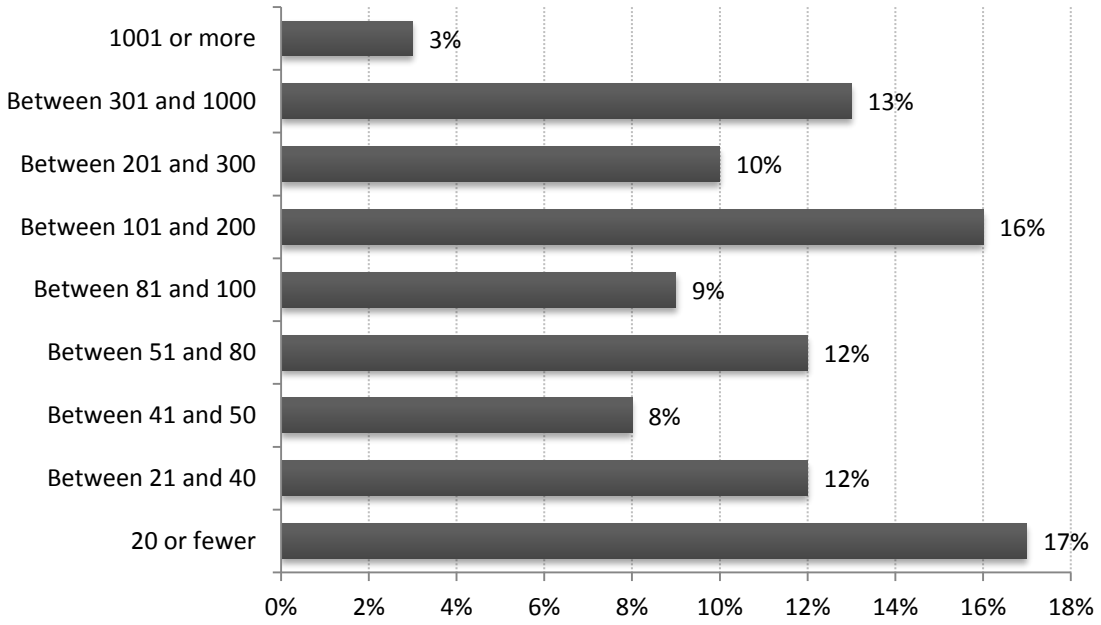


Base: All farmers, n=450

11.6.1 Number of beef cattle on farm

Farmers who ran beef cattle (76%) were asked how many beef cattle they usually ran[97] (Figure 63). The proportion of these farmers who ran 20 or fewer beef cattle on their farm was 17%, while a further 20% ran between 21 and 50 (12% between 21 and 40, 8% between 41 and 50). The proportion who ran between 51 and 100 beef cattle was 21% (12% between 51 and 80, 9% between 81 and 100), and 16% ran between 101 and 200 beef cattle. The remaining farmers (26%) ran more than 200 beef cattle with only 3% running more than 1000 stock. The average number of beef cattle run on a farm was 193.

Figure 63: Number of beef cattle on farm[98]



Base: Farmers who ran beef cattle on their farm, n=343

[96] Do you usually run beef cattle? (Q78)

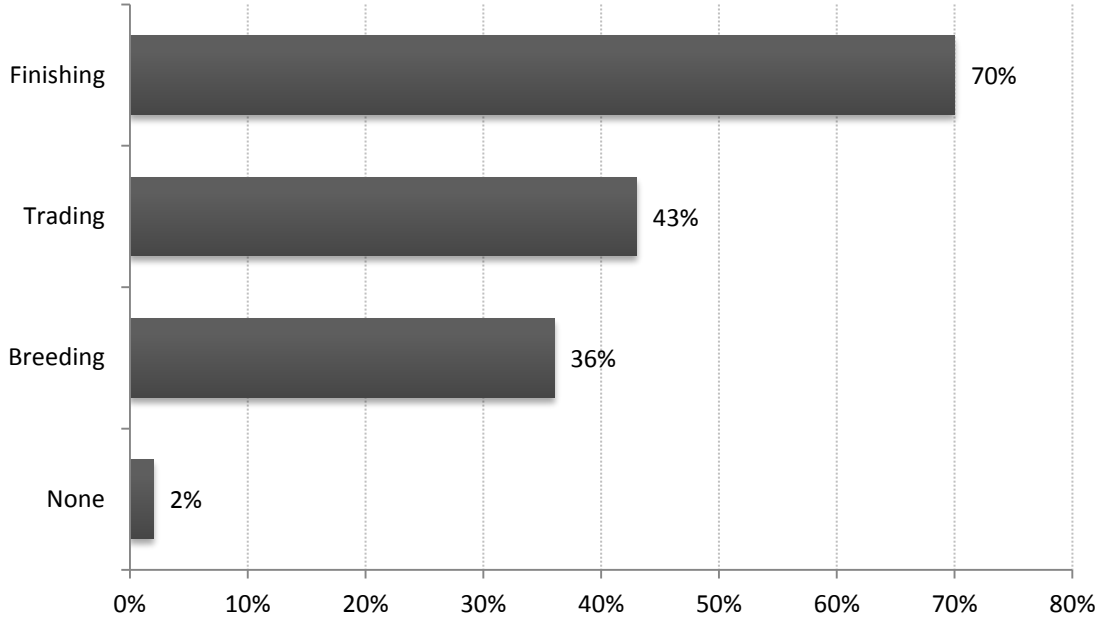
[97] [97] Farmer number of stock responses were then grouped by Versus Research Ltd into beef number grouping; 20 or fewer, between 21 and 40, between 41 and 50, between 51 and 80, between 81 and 100, between 101 and 200, between 201 and 300, between 301 and 1000 and 1001 or more.

[98] How many...? (Q79)

11.6.2 Beef cattle enterprises operated on farm

Farmers who ran beef cattle (76%) were asked what beef cattle enterprises they operated on their farm (Figure 64). The most common enterprise operated was finishing (70%), followed by trading (43%) and breeding (36%). Only 2% of beef cattle farmers did not identify a beef cattle enterprise.

Figure 64: Beef cattle enterprises operated on farm[99]



Base: Farmers who ran beef cattle on their farm, n=343

Geographic variation

- Farmers who had soils where the effect of farm drainage on farm management was mixed were **much more** likely to run none of those beef cattle enterprises (8% compared to 2% for all).

Farm characteristics variation

- Farmers who ran bulls were **much more** likely to run a beef cattle breeding enterprise **(68% compared to 36% for all).**
- Farmers who had a farm size of 401 hectares or more were **much more** likely to run a beef cattle breeding enterprise **(63% compared to 36% for all).**
- Farmers who ran other livestock were **much more** likely to run none of those beef cattle enterprises (7% compared to 2% for all).

11.6.3 Management of beef cattle for waterlogged soils or pugging

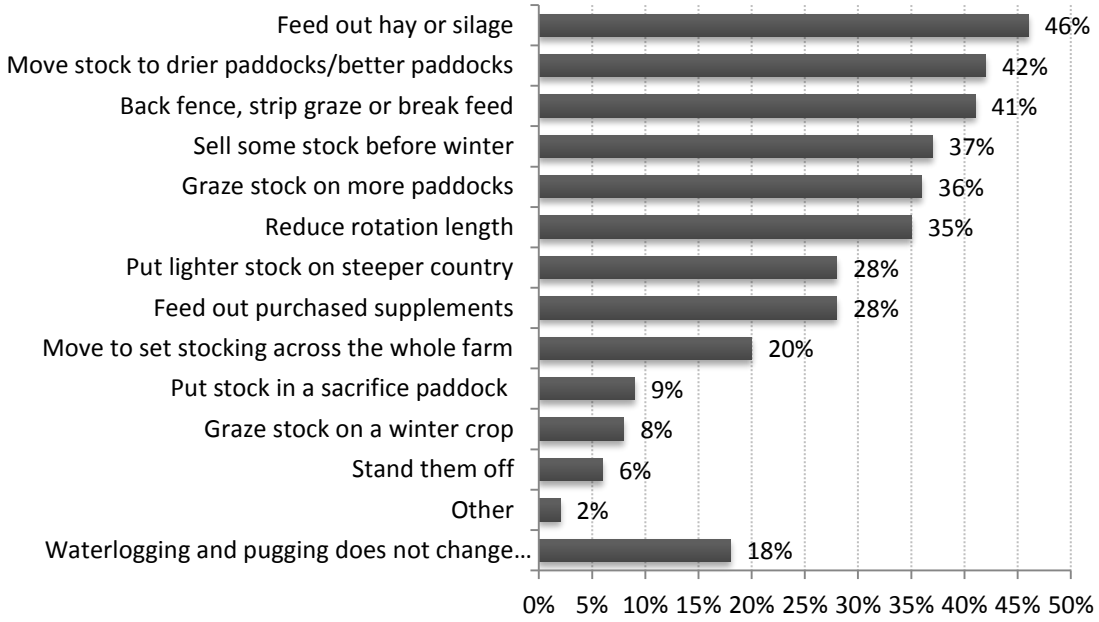
Farmers who ran beef cattle (76%) were asked, based on their usual practice with beef cattle, how they managed waterlogged soils or pugging, or how they usually managed their beef cattle in winter[100] (Figure 65). The proportion of these farmers who fed out hay or silage was 46%, while 42% moved stock to drier paddocks, 41% back fenced, strip grazed or break fed, 37% sold stock before winter and 36% grazed stock on more paddocks while 35% reduced the rotation length and 20% set stock across the whole farm; 28% each put lighter stock on steeper country or fed out purchased supplements.

[99] Which beef enterprises do you operate on your farm? (Q80)

[100] Farmers were filtered to one of these two questions. If they had answered that they are not at all prone to pasture damage or pugging in winter (Q32) AND answered that their farm soils were never waterlogged (Q33) they were asked in 'winter' do you..? If they answered they were in some way prone to pasture damage or pugging (Q32) and they did experience waterlogged soils (Q33) they were asked when you have 'waterlogged soils or pugging' do you..?

All other mentions registered less than 10% mentions each and 18% of farmers did not change how they managed their beef cattle.

Figure 65: Management of beef cattle for waterlogged soils or pugging[101]



Base: Farmers who ran beef cattle on their farm, n=343

Geographic variation

- Farmers who had a farm in the Waipa were **much more** likely to back fence, strip graze or break feed their beef cattle (52% compared to 41% for all).
- Farmers who had silt soils were **much more** likely to graze their beef cattle on more paddocks **(57% compared to 36% for all).**
- Farmers who had a farm in the Upper Waikato were **much more** likely to graze their beef cattle on a winter crop (18% compared to 8% for all).
- Farmers who had free draining soils were **much more** likely to graze their beef cattle on a winter crop (9% compared to 8% for all).

Farm characteristics variation

- Farmers who ran bulls were **much more** likely to put their beef cattle on a sacrifice paddock (18% compared to 9% for all).
- Farmers who ran other livestock were **much more** likely to put their beef cattle on a sacrifice paddock (22% compared to 9% for all).
- Farmers who ran sheep were **much more** likely to put their beef cattle on a winter crop (13% compared to 8% for all).
- Farmers who ran lambs were **much more** likely to put their beef cattle on a winter crop (15% compared to 8% for all).
- Farmers who ran sheep were **much more** likely to state that waterlogged soils and pugging does not change how they manage the farm for their beef cattle (24% compared to 18% for all).
- Farmers who ran lambs were **much more** likely to state that waterlogged soils and pugging does not change how they manage the farm for their beef cattle (26% compared to 18% for all).

[101] Thinking about your usual practice with beef cattle, when you have waterlogged soils or pugging do you…? (Q81). Thinking about your usual practice with beef cattle, in winter do you…? (Q82)

Farmers who said they stood off their beef cattle when they had waterlogged or pugged soils (6%) were asked where they stood them off[102]. Fourteen stood them off in races, yards or laneways, four stood them off in a purpose built stand off or loafing pad, two stood them off on a feedpad, one stood them off on a winter cropping area, one stood them off in a sacrifice paddock and one stood them off in both races, yards or laneways and a sacrifice paddock.

[102] The results reported here include responses to the option 'stand them off'. Respondents were then prompted to specify where. It does don't include responses to the option 'put them in a sacrifice paddock'.

12 Riparian and wet area management

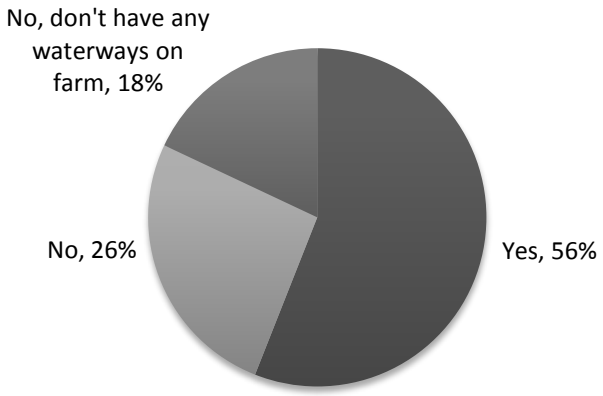
This section covers a range of management decisions made by farmers in terms of waterways on their property. This covers a range of practices including; fencing of waterways, reasons for fencing or not fencing waterways, riparian plantings over the last 5 years, reasons for riparian planting or not planting along waterways, management of wetland, swamps of boggy areas, and the fencing or retirement of swamps or boggy areas.

This section also covers some infrastructure decisions including; installation of culverts or bridges for stock crossing, and reasons for installing culverts or bridges for stock crossing or reasons for not installing culverts or bridges for stock crossing.

12.1 Managing waterways on farms

Overall 56% of farmers had fenced any waterways on their farms in the last five years. A further 18% of farmers did not have any waterways on farm (Figure 66).

Figure 66: Waterways fenced on farm[103]



Base: All farmers, n=450

Geographic variation

- Farmers who had a farm topography of mostly rolling with some steep areas were **much more** likely to have fenced waterways in the last five years (67% compared to 56% for all).
- Farmers who had ash soils were **much more** likely to have fenced waterways in the last five years (62% compared to 56% for all).

Farm characteristics variation

- Farmers who ran dairy heifers were **much more** likely to have fenced waterways in the last five years (67% compared to 56% for all).

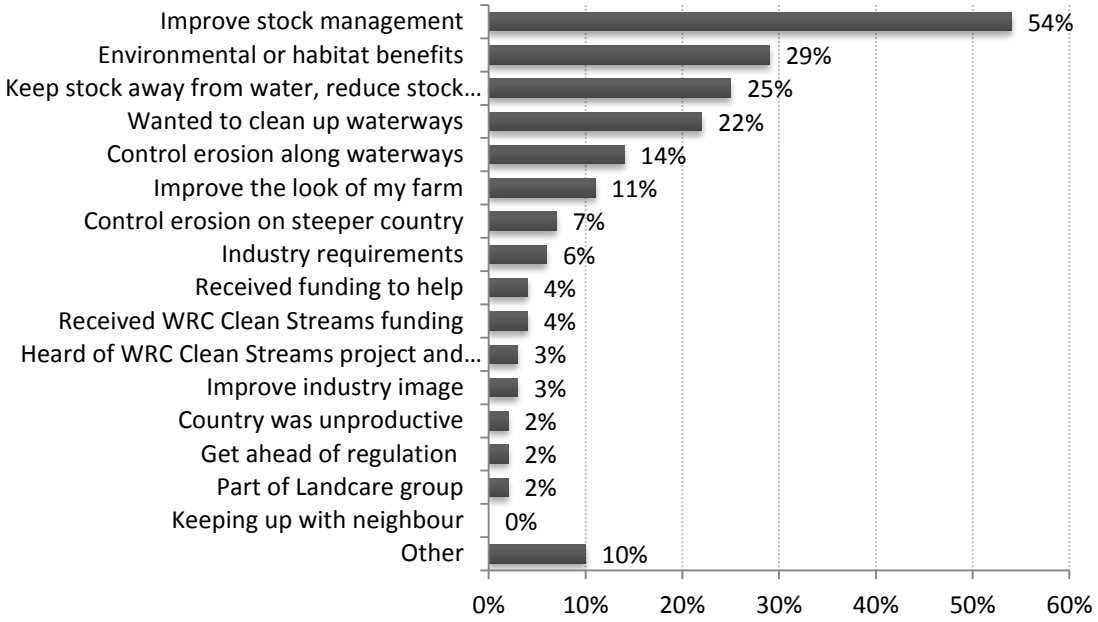
12.1.1 Reasons for fencing waterways

Farmers who had fenced any waterways on their farm in the last five years (56%) were asked what their main reasons were for fencing waterways on their farm (Figure 67). More than half did so to improve stock management (54%) while 29% fenced waterways for environmental or habitat benefits, 25% to keep stock away from water and reduce stock losses, and 22% to clean up waterways. A smaller proportion (14%) fenced waterways in the past five years to control erosion, 11% to improve the look of their farm, 7% fenced waterways for control of erosion on steeper country and 6% in response to industry requirements. In terms of funding, 4% indicated they received funding to help and 4% indicated that they received WRC Clean Streams funding.

[103] Have you fenced any waterways on your farm in the last five years? (Q84)

Farmers who had heard of WRC Clean Streams funding but decided to get on with it themselves was 3% and 3% fenced waterways to improve industry image.

Figure 67: Reasons for fencing waterways[104]



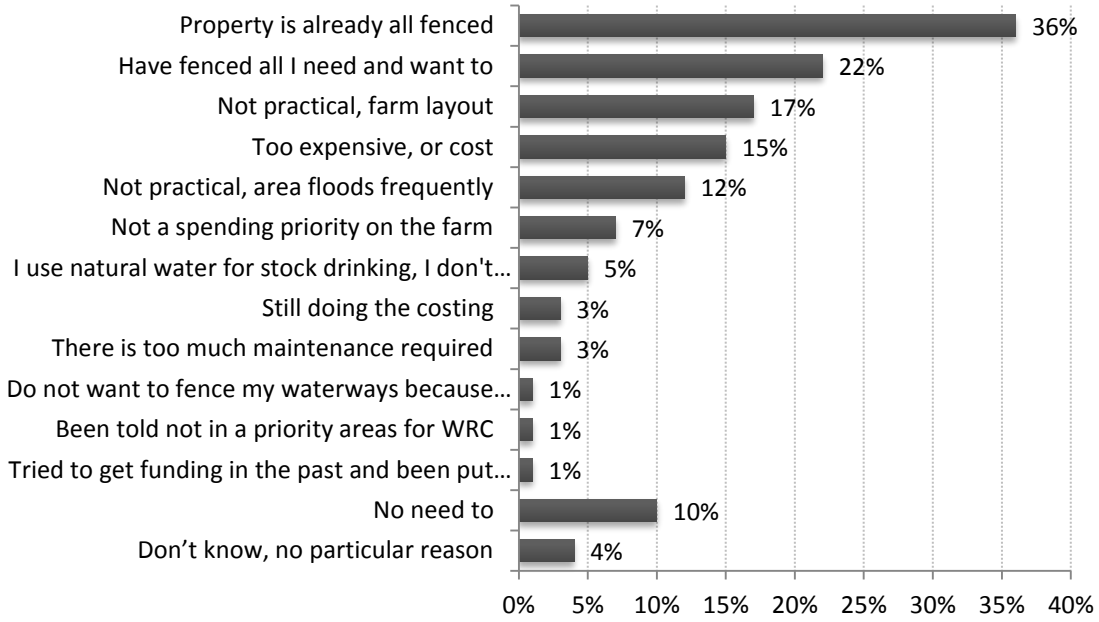
Base: Farmers who fenced waterways in last five years, n=250

12.1.2 Reasons for not fencing waterways

Farmers who hadn't fenced any waterways on their farm in the last five years (26%) were asked why they hadn't fenced waterways on their farm (Figure 68). Around a third of these farmers indicated that their farm was already all fenced (36%), 22% indicated that they had fenced all they needed and wanted to, 17% indicated that fencing the waterways was not practical due to farm layout, and 15% indicated that it would be cost prohibitive to fence the waterways. The proportion who mentioned that fencing the waterways was not practical as the area flooded frequently was 12%, while 7% indicated that fencing the waterways was not a spending priority on the farm currently, 5% had not fenced waterways as they relied on the natural water for stock, 3% indicated that they were still doing the costing and 3% felt there was too much maintenance required to fence the waterways. Meanwhile 10% of those who had not fenced their waterways in the past five years indicated there was no need to and 4% had no particular reason.

[104] What were the main reasons you fenced waterways on your farm? (Q85)

Figure 68: Reasons for not fencing[105]

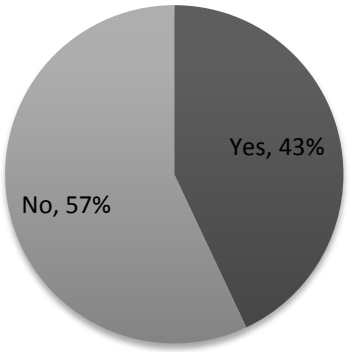


Base: Farmers who waterways on their farm, but had not fenced in last five year, n=117

12.2 Riparian planting

Of the farmers who had waterways on their farm (82%), 43% had planted trees, shrubs or forestry along any of the waterways on their farms in the last five years (Figure 69).

Figure 69: Riparian planting[106]



Base: Farmers who had waterways on their farm, n=367

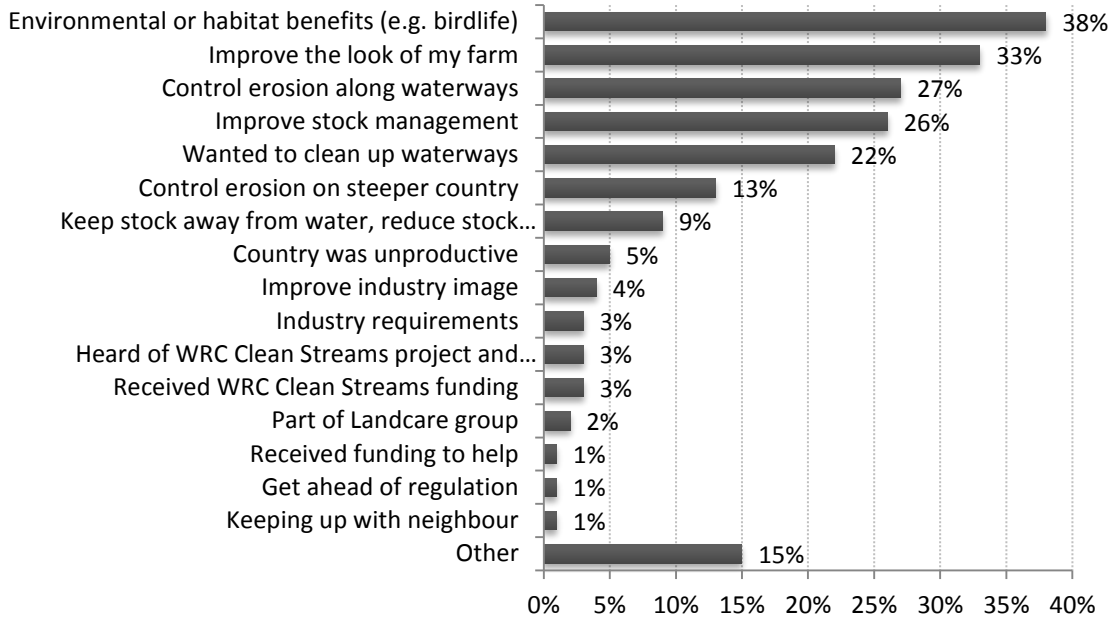
12.2.1 Reasons for riparian planting

Farmers who had planted trees, shrubs or forestry along any of the waterways on their farm in the last five years (35% of total sample) were asked what the main reasons were (Figure 70). Of these farmers, a higher proportion (38%) did so for the environmental and habitat benefits, 33% indicated planting along waterways as it improved the look of their farm, 27% planted along waterways to control erosion, 26% to improve stock management and 22% planted to clean up the waterways. The proportion who planted trees, shrubs and forestry to control erosion on steeper country was 13%, while 9% to keep stock away from water and reduce stock losses and 5% planted as the country was unproductive. Smaller proportions (4%) planted to improve industry image, 3% due to industry requirements, 3% because they heard of the WRC Clean Streams project and thought they could get on with it themselves and 3%

[105] Why haven’t you fenced waterways on your farm? (Q86)
[106] In the last five years have you planted trees, shrubs or forestry along any of the waterways on your farm? (Q87)

because they received WRC Clean Streams funding while 15% indicated an 'other' reason for planting along waterways.

Figure 70: Reasons for riparian planting[107]



Base: Farmers who planted along waterways in the last five years, n=157

Geographic variation

- Farmers who had a farm in Waipa were **much more** likely to state that they planted waterways to control erosion along waterways (45% compared to 27% for all).
- Farmers who had free draining soils were **much more** likely to state that they planted waterways because of another reason (19% compared to 15% for all).

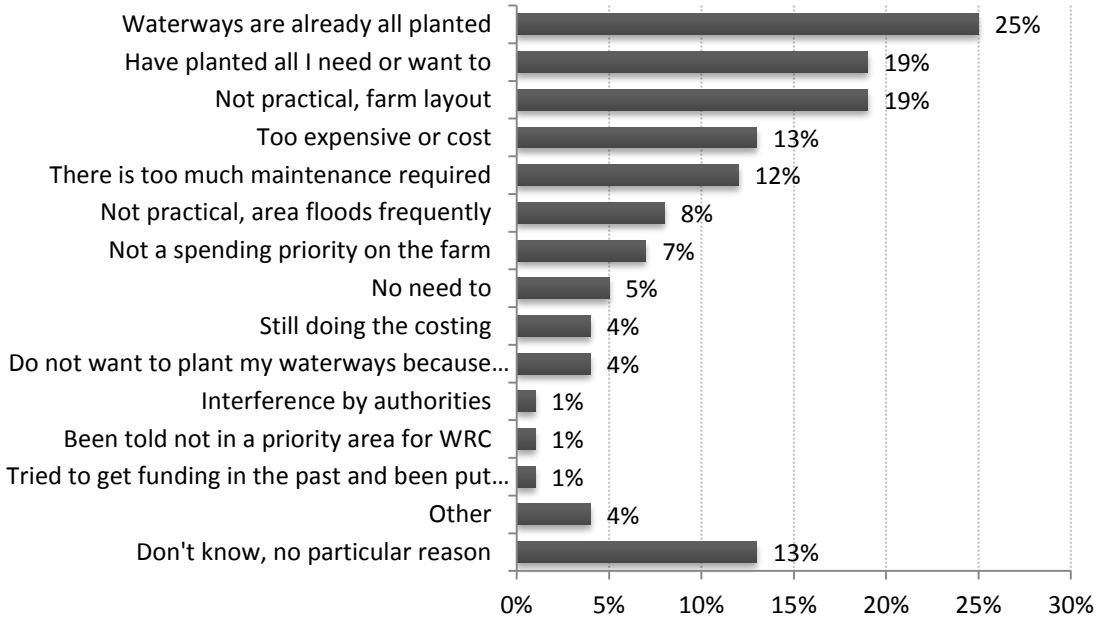
12.2.2 Reasons for not planting along waterways

Farmers who hadn't planted along any of the waterways on their farm in the last five years (46% of total sample) were asked why (Figure 71). A quarter of these farmers (25%) indicated that their waterways were already all planted, while 19% indicated that they had planted all they needed or wanted to and 19% indicated that it is not practical to plant trees, shrubs or forestry next to waterways due to their farm's layout. The proportion who mentioned cost and indicated that it would be too expensive to plant along waterways on their farm was 13% while 12% felt that trees, shrubs or forestry along waterways required too much maintenance.

A smaller proportion of farmers (8%) indicated that it was not practical to plant along waterways due to frequent flooding, 7% indicated that spending on planting is not a priority on the farm, 5% felt there was no need to plant along waterways, 4% were still doing the costing and 4% did not want to plant along waterways because of pests/weeds, while 13% of farmers indicated that they had no particular reason as to why they had not planted along waterways on their farm.

[107] What were the main reasons you planted along the waterways on your farm? (Q88)

Figure 71: Reasons for not planting along waterways[108]



Base: Farmers who had waterways on their farm, but had not planted in the last five years, n=210

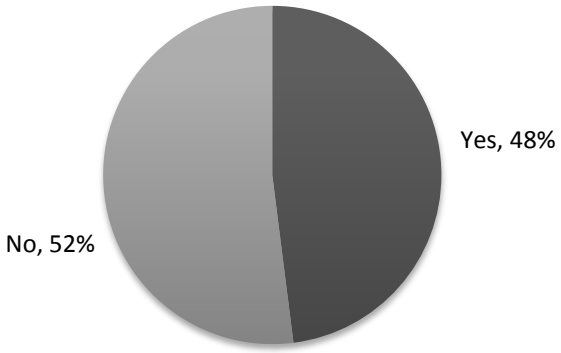
Farm characteristics variation

- Farmers who had a farm size of 401 hectares or more were **much more** likely to state that they had not planted waterways because it was too expensive/cost (28% compared to 13% for all).
- Farmers who had a farm size of between 101 and 200 hectares were **much more** likely to state that they had not planted waterways because there is too much maintenance required (29% compared to 12% for all).

12.3 Presence of wetlands, swamps or boggy areas on farms

Overall 48% of farmers had wetlands, swamps or boggy areas on farm (Figure 72).

Figure 72: Presence of wetlands, swamps or boggy areas on farms[109]



Base: All farmers, n=450

[108] Why haven't you planted along waterways on your farm? (Q89)
[109] Do you have any wetlands, swamps or boggy areas on your farm? (Q90)

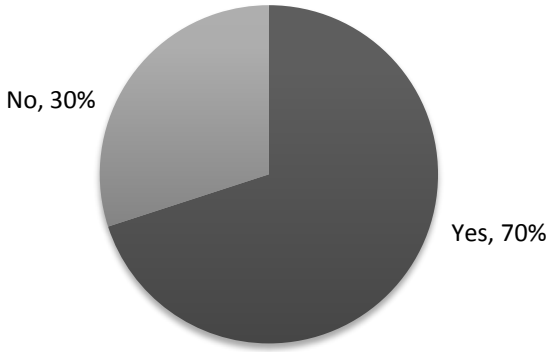
Geographic variation

- Farmers who had a farm topography that was mostly rolling with some steep areas were **much more** likely to have wetlands, swamps or boggy areas (58% compared to 48% for all).
- Farmers who had ash soils were **much more** likely to have wetlands, swamps or boggy areas (54% compared to 48% for all).

12.3.1 Fencing or retiring wetlands, swamps or boggy areas

Farmers who had wetlands, swamps or boggy areas on their farm (48%) were asked if they had fenced off or retired any of them from production (Figure 73). A high proportion (70%) had fenced off or retired these from production.

Figure 73: Fencing or retiring wetlands, swamps or boggy areas[110]

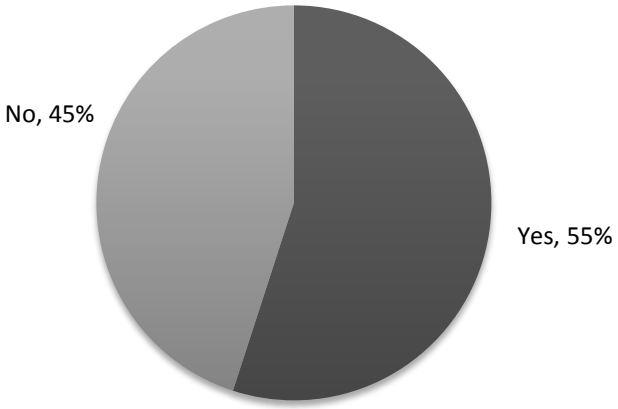


Base: Farmers who had wetlands, swamps or boggy areas on farm, n=215

12.4 Installing culverts or bridges on stock crossings

Overall 55% of farmers had installed culverts or bridges on any streams or drains where they had stock crossings on farm (Figure 74).

Figure 74: Installing culverts or bridges on stock crossings[111]



Base: All farmers, n=450

Geographic variation

- Farmers who had a farm topography that was mostly rolling with some steep areas were **much more** likely to have installed culverts or bridges on any streams where they have stock crossing (67% compared to 55% for all).

[110] Have you fenced off or retired any of these [wetlands, swamps or boggy areas] from production? (Q91)
[111] Have you installed culverts or bridges on any streams where you have stock crossing on your farm? (Q92)

- Farmers who had ash soils were **much more** likely to have installed culverts or bridges on any streams where they have stock crossing (63% compared to 55% for all).

Farm characteristics variation

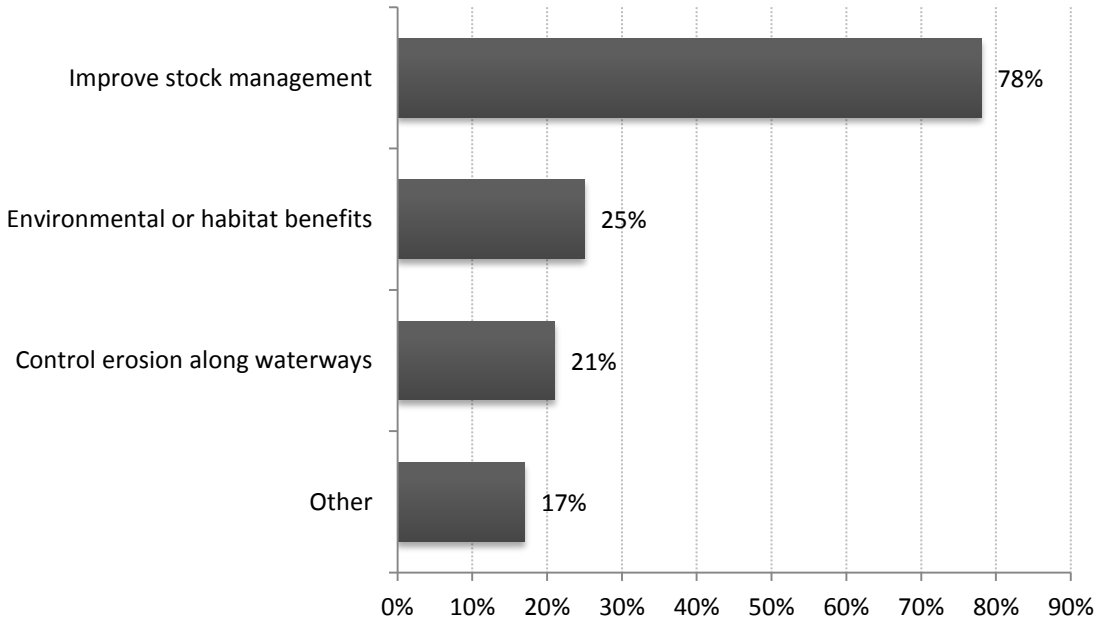
- Farmers who ran bulls were **much more** likely to have installed culverts or bridges on any streams where they have stock crossing (68% compared to 55% for all).
- Farmers who ran sheep were **much more** likely to have installed culverts or bridges on any streams where they have stock crossing (65% compared to 55% for all).
- Farmers who ran lambs were **much more** likely to have installed culverts or bridges on any streams where they have stock crossing (69% compared to 55% for all).
- Farmers who had a farm size of between 201 and 400 hectares were **much more** likely to have installed culverts or bridges on any streams where they have stock crossing (70% compared to 55% for all).
- Farmers who had a farm size of 401 hectares or more were **much more** likely to have installed culverts or bridges on any streams where they have stock crossing (73% compared to 55% for all).

12.4.1 Reasons for installing a culvert or bridges on stock crossings

Farmers who had installed culverts or bridges on streams or drains where they had stock crossings on farm (55%) were asked what motivated them to install them (Figure 75). Of these farmers, a high proportion (78%) were motivated by improving stock management, 25% indicated that environmental and habitat benefits motivated the installation and 21% indicated that the installation controlled erosion along waterways.

Meanwhile 17% had other motivators for installing culverts or bridges on any streams where they have a stock crossing.

Figure 75: Reasons for installing culverts or bridges on stock crossings[112]



Base: Farmers who had installed culverts or bridges on waterways, n=246

[112] What motivated you to install them [culverts or bridges]? (Q93)

Geographic variation

- Farmers who had a farm topography that was mostly flat with some rolling areas were **much more** likely to have installed culverts or bridges on any streams where they have stock crossing <u>for another reason</u> (26% compared to 17% for all).

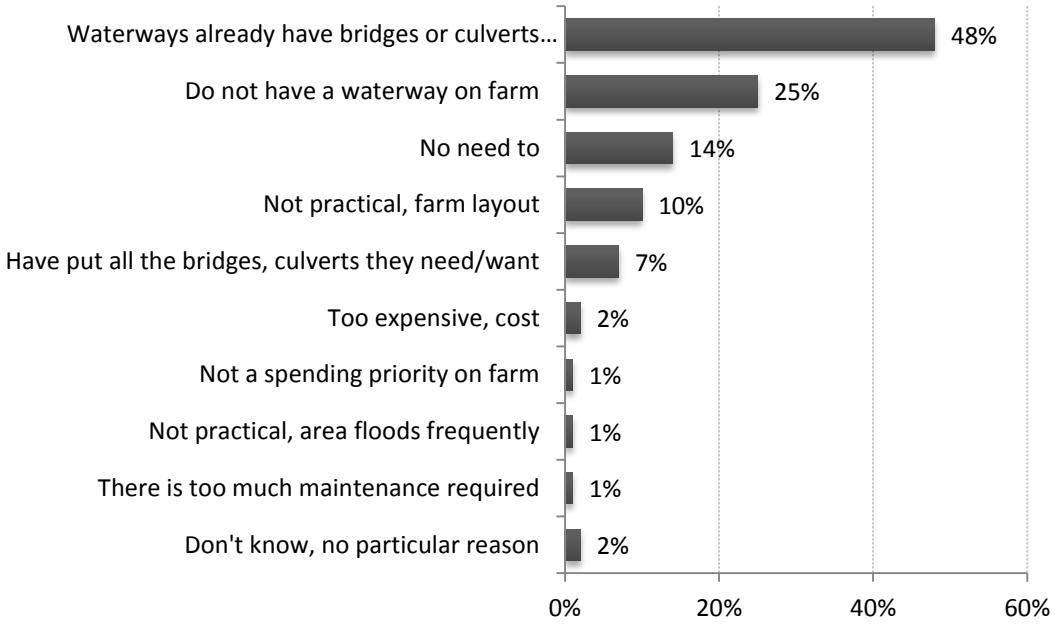
12.4.2 Reasons for not installing culverts or bridges on stock crossings

Farmers who hadn't installed culverts or bridges on any streams where they had a stock crossing (45%) were asked why (Figure 76).

Of these farmers, almost half (48%) already had bridges and culverts at stock crossings, 25% did not have a waterway on farm and 14% indicated that there was no need to install bridges or culverts.

The proportion of farmers who indicated that it was not practical to install bridges or culverts due to the farm layout was 10%, while 7% felt they had all the bridges or culverts that they needed, 2% cited cost; with 1% mention each of bridges and culverts not being a spending priority, being unpractical due to frequent flooding, and requiring too much maintenance, as reasons for not installing culverts or bridges.

Figure 76: Reasons for not installing culverts or bridges on stock crossings[113]



Base: Farmers who had not installed culverts or bridges on waterways, n=204

Geographic variation

- Farmers who had clay loam soils were **much more** likely to have not installed culverts or bridges on any streams where they have stock crossing <u>because it is too expensive/cost</u> (8% compared to 2% for all).
- Farmers who had clay soils were **much more** likely to have not installed culverts or bridges on any streams where they have stock crossing <u>because it is too expensive/cost</u> (6% compared to 2% for all).
- Farmers who had clay loam soils were **much more** likely to have not installed culverts or bridges on any streams where they have stock crossing <u>because it is not practical, the area floods frequently</u> (6% compared to 1% for all).

[113] Why haven't you installed culverts or bridges on any streams where you have stock crossing on your farm? (Q94)

Farm characteristics variation

- Farmers who had a farm size of 50 hectares or less were **much more** likely to have not installed culverts or bridges on any streams where they have stock crossing because they do not have a waterway on their farm (42% compared to 25% for all).
- Farmers who ran dairy heifers were **much more** likely to have not installed culverts or bridges on any streams where they have stock crossing because they do not need to (24% compared to 14% for all).
- Farmers who ran lambs were **much more** likely to have not installed culverts or bridges on any streams where they have stock crossing because there is too much maintenance required (7% compared to 1% for all).

13 Farmer awareness and involvement in local groups and projects

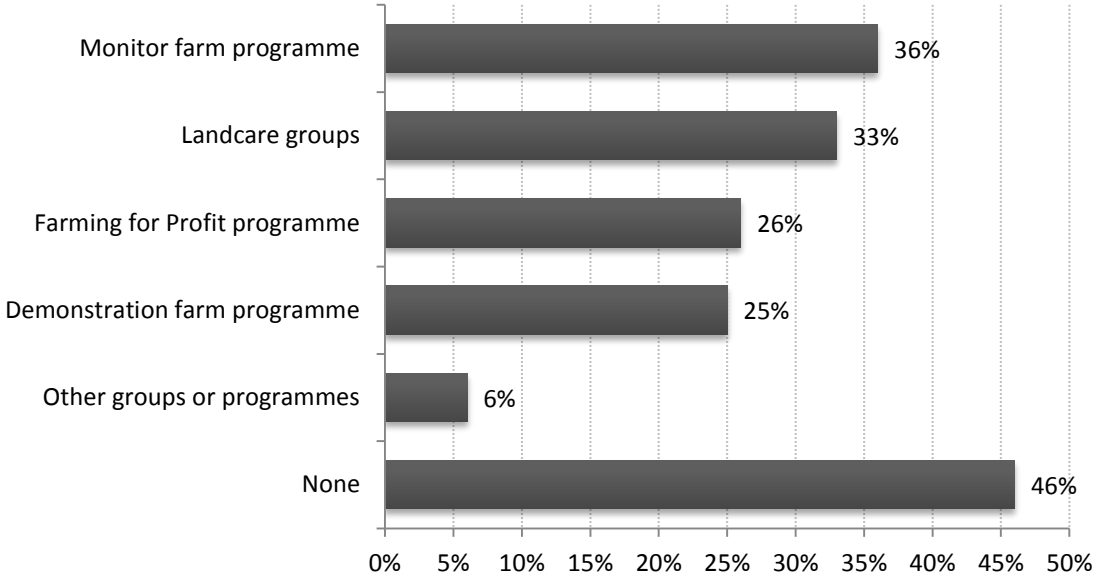
In this section farmer awareness of local groups, projects and involvement in these groups and projects is explored.

This report concludes with farmers identifying actions they felt the council could take that would be useful in supporting farmers to undertake environmental management actions.

13.1 Awareness of local groups and projects

Farmers were asked what groups or projects they were aware of that had taken place in the last few years (Figure 77). The proportion of farmers who were aware of the monitor farm programme was 36%, while 33% were aware of Landcare groups, 26% were aware of the farming for profit programme and 25% of the demonstration farm programme. A smaller proportion of farmers listed other groups or projects in their local areas (6%), including eight mentions of water quality related programmes and seven mentions of possum control programmes. Almost half the proportion of farmers (46%) were not aware of any groups or projects in their local area.

Figure 77: Awareness of local groups or projects[114]



Base: All farmers, n=450

13.2 Involvement with local groups and projects

Farmers who were aware of local groups and programmes were asked which they had been involved with.

13.2.1 Monitor farm programme

Farmers who were aware of the monitor farm programme (36%) were asked if they had been involved with it[115]. A quarter (26%) had been involved with the programme (n=161).

[114] Finally we are going to ask you a few questions about projects in your area. Thinking about your local district, what groups or projects are you aware of that have taken place in the last few years? (Q95)
[115] Of these groups or projects, which have you been involved with? (Q96)

13.2.2 Landcare groups

Of those farmers who were aware of Landcare groups (33%)[116], 22% had been involved with one (n=149).

13.2.3 Farming for profit programme

Of those farmers who were aware of the farming for profit programme (26%)[117], 22% had been involved with the programme (n=119).

13.2.4 Demonstration farm programme

Of those farmers who were aware of the demonstration farm programme (25%)[118], 21% had been involved with it (n=113).

13.2.5 Other groups and programmes

Of those farmers who were aware of other groups and programmes (6%)[119], 22% had been involved with one, including planting and biodiversity groups, water quality projects and possum control programmes (n=27).

13.3 Useful actions to support environmental management

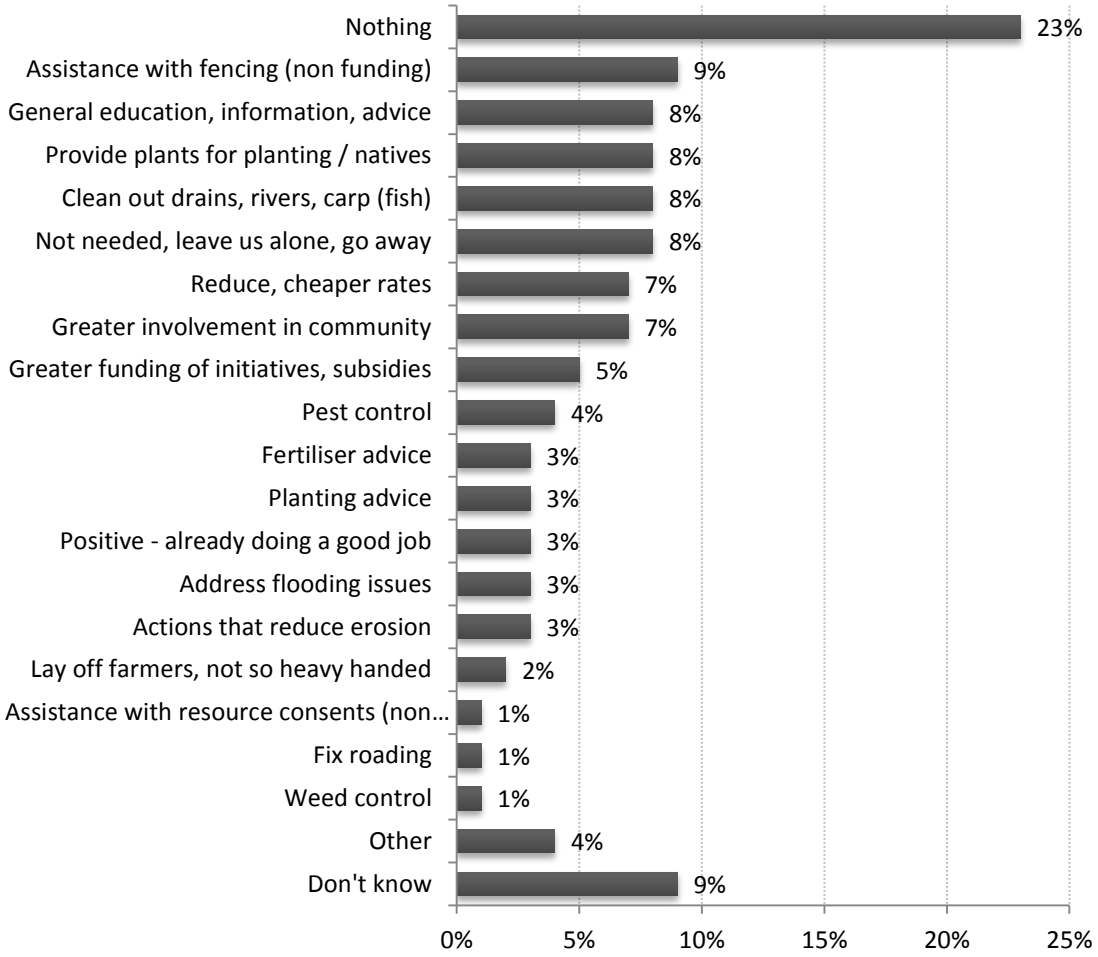
Farmers were asked to identify what actions the council could undertake in their district that would help farmers with environmental management on farm (Figure 78).

There were low mentions of specifics, 23% identified no actions, 9% were undecided (don't know), 8% indicated that farmers wanted to be left alone or action not needed and a further 2% requested Waikato Regional Council to be less heavy handed.

Some farmers identified specific actions that would help farmers including 9% identifying non-funding assistance with fencing and 8% requesting additional information, education or advice. The provision of plants or native plants and cleaning out of drains, rivers and carp was suggested by 8%. Reduced rates and greater involvement in the community received 7% each, and 5% mentioned greater subsidies and funding of initiatives. 'Other' responses were varied with four mentions of lifestyle subdivision and two mentions of running bulls on the appropriate country.

[116] Of these groups or projects, which have you been involved with? (Q96)
[117] Of these groups or projects, which have you been involved with? (Q96)
[118] Of these groups or projects, which have you been involved with? (Q96)
[119] Of these groups or projects, which have you been involved with? (Q96)

Figure 78: Useful actions to support environmental management[120]



Base: All farmers, n=450

[120] What do you think would be the most useful action the Waikato Regional Council could take in your district to help you with environmental management on your farm? (Q97)

References

Environment Waikato (Waikato Regional Council) 2008. The condition of rural water and soil in the Waikato Region. Hamilton, Environment Waikato.

Davies A 2012. Beef and sheep farming – grazing management practices in the Waikato region. Waikato Regional Council Technical Report 2011/16. Hamilton, Waikato Regional Council.

Davies A and Topperwien K 2011. Dairy farming grazing practices in the Waikato region. Waikato Regional Council Technical Report 2011/17. Hamilton, Waikato Regional Council.

Kaine G 2004. Consumer behaviour as a theory of innovation adoption in agriculture (Social Research Working Paper 01/04). Hamilton, AgResearch.

Kaine G 2008. The adoption of agricultural innovations. Unpublished doctoral dissertation, University of New England, Armidale, New South Wales.

Kaine G 2014a. Farm context and winter grazing practices in the Waikato dairy industry. Waikato Regional Council Technical Report 2014/32. Hamilton, Waikato Regional Council.

Kaine G 2014b. Farm context and winter grazing practices in the Waikato sheep and beef Industries. Waikato Regional Council Technical Report 2014/38. Hamilton, Waikato Regional Council.

Ritchie H 2007. On farm nutrient management practice: research and applicability to Upper Waikato. Environment Waikato Technical Report 2007/42. Hamilton, Waikato Regional Council.

Versus Research Ltd and Davies A 2012. Waikato Regional Council dairy winter grazing survey 2011. Waikato Regional Council Technical Report 2012/30. Hamilton, Waikato Regional Council.

Waikato Regional Council 2014. Healthy Rivers: Plan for Change/Wai Ora: He Rautaki Whapapaipai - Frequently asked questions about the Waikato and Waipa Rivers. Retrieved from http://www.waikatoregion.govt.nz/Council/Policy-and-plans/Plans-under-development/Healthy-Rivers---Plan-for-Change/Frequently-asked-questions-about-the-Waikato-and-Waipa-river/ [accessed 20 November 2014]

Appendix 1: questionnaire

The questionnaire used for this research is provided below. Please note that codes with an *asterisk* were added after the initial pilot and codes highlighted in yellow were included as post-codes at the conclusion of the interviewing.

Q.1 Hello, this is _____ calling ON BEHALF of Waikato Regional Council. We are doing a survey about management practices on sheep and beef farms which will take about 20 minutes. Can I please speak to the person who makes the DAY TO DAY decisions about stock management practices on your farm?
IF YES - CONTINUE
IF NO – RESCHEDULE / END SURVEY

IF NEEDED – ABOUT VERSUS
We're calling from Versus Research, an independent research company, hired by Waikato Regional Council. We're doing a short survey to help us find out more about how people manage their winter grazing.

IF NEEDED - CONFIDENTIALITY
All answers provided are held in complete confidentiality. We report summary results about groups of farmers (for example, 50% of farmers said...) and we do not identify which individuals have said what. No names are recorded.

IF NEEDED - WHERE WE GOT PHONE NUMBER
Phone numbers have been randomly selected from the AsureQuality database.

COMPLAINTS
Justine Young, Senior Policy Advisor, Waikato Regional Council, 0800 800 401

If you have more than one farm, please answer in regard to the farm that you are on for all the questions in the survey. Can I please confirm that we are talking about the farm at _____ Road?

FARM CHARACTERISTICS

We will start by asking some questions about your farm and its characteristics.

Q.1 So, to begin with, which District Council area are you in?

PROMPT ONLY IF NECESSARY – SINGLE ANSWER ONLY

Hauraki	1
Hamilton	2
Matamata-Piako	3
Otorohanga	4
South Waikato	5
Taupo	6
Waipā	7
Waikato	8
Waitomo	9
Rotorua	10
DO NOT READ OUT - Other	11

Q.2 And are you an…

Owner-operator	1
Owner (not working on the farm regularly)	2
Farm manager	3
DO NOT READ OUT - Other	4

Q.3 How many effective hectares or acres is your farm?

Hectares _____

Acres _____

Q.4 What is the topography of your farm?

(Please select one)

Mainly flat..... 1
Some flat and some rolling 2
Mainly rolling 3
Mainly rolling and some steep 4
Mainly steep 5

(SKIP Q5 IF DON'T ANSWER 1,2 to Q4)

Q.5 What types of soils do you have on your flats?

(Please select all that apply)

	YES	NO
Pumice	☐	☐
Ash	☐	☐
Loam	☐	☐
Clay Loam	☐	☐
Clay	☐	☐
Peat	☐	☐
Silt	☐	☐
DO NOT READ OUT - Other SPECIFY		
Don't know		

(SKIP Q6 IF DON'T ANSWER 2,3,4 to Q4)

Q.6 What types of soils do you have on your rolling country?

(Please select all that apply)

	YES	NO
Pumice	☐	☐
Ash	☐	☐
Loam	☐	☐
Clay Loam	☐	☐
Clay	☐	☐
Peat	☐	☐
Silt	☐	☐
DO NOT READ OUT - Other SPECIFY		
Don't know		

(SKIP Q7 IF DON'T ANSWER 4,5 to Q4)

Q.7 What types of soils do you have on your steep country?
(Please select all that apply)

	YES	NO
Pumice	☐	☐
Ash	☐	☐
Loam	☐	☐
Clay Loam	☐	☐
Clay	☐	☐
Peat	☐	☐
Silt	☐	☐
DO NOT READ OUT - Other SPECIFY		
Don't know		

Q.8 How do you choose what livestock enterprises to run on your farm?
(Please select all that apply)

DO NOT PROMPT – MULTIPLE ANSWER

Schedule prices 1
Input costs..... 2
Profitability 3
Seasonal conditions..... 4
Management preferences 5
Country not suitable for sheep 6
Country not suitable for cattle 7
DO NOT READ OUT - Other 8
What we have always done 9
Suits the topography of the farm..... 10
Preference/lifestyle 11

Q.9 Do you have to manage for facial eczema in your district?
(Please select one)

Yes 1
No..... 2

FERTILISER AND SOILS

We are now going to ask you some questions about your winter management practices. We are talking to a range of different sheep and beef farmers so some of these questions will be more relevant to you than others. We will start with fertiliser and soil management.

Q.10 Have you applied a capital fertiliser dressing in the last 5 years?
(Please select one)

Yes 1

No 2

PROMPT: Typically phosphate

Q.11 Do you apply phosphate as a maintenance fertiliser?
Yes 1
No 2

IF 'NO' GO TO Q15

Q.12 When do you apply phosphate as a maintenance fertiliser?
(Please select all that apply)

	YES	NO
Spring	☐	☐
Autumn	☐	☐
Winter	☐	☐

Q.13 Where do you apply phosphate as a maintenance fertiliser?
(Please select all that apply)

	YES	NO
Where the dairy heifers graze	☐	☐
Where the dairy cows graze	☐	☐
Where the beef cattle graze	☐	☐
Where the sheep graze	☐	☐
Because it gets too wet to feed out supplements	☐	☐
DO NOT READ OUT – Other SPECIFY	☐	☐

Q.14 As an estimate, how many kilograms per hectatre of phosphorus fertiliser did you last apply?

Kilograms per hectare _____
Dont know _____

This amount should be up to 45 kg/hectare. If more, confirm amount. If amount is correct, confirm that the unit of measure is per hectare. Note if the amount given is for the entire farm.

Q.15 Do you apply nitrogen fertiliser?
Yes 1
No 2

IF 'NO' GO TO Q19

Q.16 When do you apply nitrogen fertliser? .....
(Please select all that apply)

	YES	NO
Spring	☐	☐
Autumn	☐	☐
Winter	☐	☐

Q.17 Where do you apply nitrogen?
(Please select all that apply)

	YES	NO
Where the dairy heifers graze	☐	☐
Where the dairy cows graze	☐	☐
Where the beef cattle graze	☐	☐
Where the sheep graze	☐	☐
Because it gets too wet to feed out supplements	☐	☐
DO NOT READ OUT – Other SPECIFY	☐	☐
Cropping areas		
Whole farm		
Varies/where needed		

Q.18 As an estimate, how many kilograms per hectare of nitrogen fertiliser (e.g. urea) did you last apply ?

Kilograms per hectare _____
Dont know _____

This amount should be up to 45 kg/hectare. If more, confirm amount. If amount is correct, confirm that the unit of measure is per hectare. Note if the amount given is for the entire farm.

Q.19 How do you normally decide how much fertiliser to apply?
(Please select all that apply)

DO NOT PROMPT – MULTIPLE ANSWER

Advice from a fertiliser representative 1
Obtain advice from an independent consultant... 2
Results of soil tests... 3
Apply the same amount every year ……..... 4
Use a nutrient budget 5
Use your own observation /Visual appearance of paddocks.....6
Use past experience 7
Results of tissue tests (foliage)……..... 8
Soil moisture levels 9
Farm finances/budget - how much money I have.....10

Other 11
No response / don't know.....12

Q.20 How often do you test your soils?
(Please select one)

Every year..... 1
Every couple of years 2
Every few years 3
Never 4

Q.21 What is your Olsen P?
Score ..... _____
Dont know ..... _____

Q.22 Do you have a fertiliser management plan?
(Please select one)

Yes..... 1
No 2

PROMPT: A FERTILISER MANAGEMENT PLAN is a plan to help you make decisions about when to apply fertiliser.

Q.23 Do you have a nutrient budget?
(Please select one)

Yes..... 1
No 2

PROMPT: A NUTRIENT BUDGET is an ESTIMATE of the total loss of nutrients from your production system and takes into account Fertiliser management, Effluent management, Soil management, Pasture management, Production and stock management, Riparian management, Cropping management and Management of waterways, silage pits, offal holes and farm dumps.

Q.24 Do you have a nutrient management plan?
(Please select one)

Yes..... 1
No 2

PROMPT: A NUTRIENT MANAGEMENT PLAN is based on a NUTRIENT BUDGET and identifies MANAGEMENT ACTIONS to minimise any loss of nutrients from your production system. These actions can include Fertiliser management, Effluent management, Soil management, Pasture management, Production and stock management, Riparian management, Cropping management and Management of waterways risk from hot spots: silage pits, offal holes and farm dumps.

WINTER CROPPING

Q.25 Do you grow a winter crop?
(Please select one)

Yes..... 1
No 2

IF 'NO' GO TO Q32

Q.26 Thinking about your winter cropping area, is it...
(Please select one)

Mainly flat 1
Mainly rolling 2
Mainly steep 3

Q.27 Do you grow a winter crop to fill a feed deficit?
(Please select one)

Yes..... 1
No 2

IF 'NO' GO TO Q29

Q.28 What winter crops do you grow for feed?
(Please select all that apply)

DO NOT PROMPT – MULTIPLE ANSWER

Turnips 1
Swedes 2
Kale 3
Choumoellier 4
Chicory..... 5
Lucerne..... 6
Other 7

Q.29 Do you grow a winter crop as a component of a pasture renewal programme?
(Please select one)

Yes..... 1
No 2

IF 'NO' GO TO Q31

Q.30 What winter crops do you grow for pasture renewal?
(Please select all that apply)

DO NOT PROMPT – MULTIPLE ANSWER

Turnips 1
Swedes 2
Kale 3
Choumoellier 4
Chicory..... 5
Lucerne..... 6
Other 7

Q.31 Do you usually let stock graze your winter crop to bare soil?
(Please select one)

Yes 1
No 2

WATERLOGGED SOILS AND PUGGING

We are now going to ask you some questions about your experiences with waterlogged soils and pugging.

Q.32 Overall how prone would you say your farm is to pasture damage or pugging in winter? Is it…
(Please select one)

Very prone 1
Prone 2
Not very prone 3
Not at all prone 4

Q.33 Do your farm soils get waterlogged?
(Please select one)

Every year..... 1
Most years 2
Every second or third year..... 3
Every five years or so 4
Never 5

IF 'NOT AT ALL PRONE' AND 'NEVER' GO TO Q51, OTHERWISE CONTINUE

IF ANSWERED 'NEVER' FOR Q33 GO TO Q43

Q.34 What proportion of your farm would you say is at risk of getting waterlogged in most years?
(Please select one)

None of it 1
Less than one-quarter..... 2
Between one-quarter and a half 3
Between a half and three-quarters 4
More than three-quarters..... 5

Q.35 Which months do you usually experience waterlogged soils in?
(Please select all that apply)

	YES	NO
May	☐	☐
June	☐	☐
July	☐	☐
August	☐	☐
September	☐	☐
October	☐	☐
DO NOT READ OUT - Other	☐	☐
None of these months		

Q.36 Are your soils generally waterlogged for?
(Please select one)

Only a day or so at a time..... 1
A week or two at a time 2

Continuously for about a month 3
Continuously for two months or more..... 4

Q.37 Do waterlogged soils stop you from fully grazing the land that gets waterlogged in winter?
(Please select one)

Yes..... 1
No 2

Q.38 Do waterlogged soils limit pasture growth on the land that gets waterlogged in winter?
(Please select one)

Yes..... 1
No 2

Q.39 Do waterlogged soils stop you from fully grazing the land that gets waterlogged in <u>spring</u>?
(Please select one)

Yes..... 1
No 2

Q.40 Do waterlogged soils limit pasture growth on the land that gets waterlogged in <u>spring</u>?
(Please select one)

Yes..... 1
No 2

Q.41 Do waterlogged soils have an unfavourable impact on your pasture composition?
(Please select one)

Yes..... 1
No 2

Q.42 Do waterlogged soils prevent or delay fertiliser spreading?
(Please select one)

Often 1
Sometimes 2
Rarely 3
Never 4

IF 'NOT AT ALL PRONE' FOR Q32 GO TO Q51

Q.43 Which areas on your farm are at risk of pugging?
(Please select all that apply)

	YES	NO
My flat country	☐	☐
My rolling country	☐	☐
My steep country	☐	☐
None of it	☐	☐

Q.44 Does pugging stop you from fully grazing the land that gets waterlogged in winter?
(Please select one)

Yes 1
No 2

Q.45 Does pugging limit pasture growth on the land that gets waterlogged in winter?
(Please select one)

Yes 1
No 2

Q.46 Does pugging stop you from fully grazing the land that gets waterlogged in spring?
(Please select one)

Yes 1
No 2

Q.47 Does pugging limit pasture growth on the land that gets waterlogged in spring?
(Please select one)

Yes 1
No 2

Q.48 Does pugging have an unfavourable impact on your pasture composition?
(Please select one)

Yes 1
No 2

Q.49 Does pugging have an unfavourable impact on your soil structure?
(Please select one)

Yes 1
No 2

Q.50 I am going to read out four statements. Please tell me the one that best describes your situation
(Please select one)

1 You cannot graze waterlogged paddocks for even a couple of hours without experiencing too much pugging damage.

2 Initially, you can graze waterlogged paddocks for a few hours without too much damage but on the next rotation you cannot graze wet paddocks even for a few hours without experiencing too much pugging damage.

3 Most of the time you can graze waterlogged paddocks for a few hours without too much damage but stock cannot be left on all day.

4 You can graze pretty well all day without any pugging unless conditions are really severe.

SACRIFICE PADDOCKS

Q.51 Do you usually have a sacrifice paddock in winter?
(Please select one)

Yes 1
No 2

IF 'NO' GO TO Q56

Q.52 Thinking about your sacrifice paddock, is it...
(Please select one)

Mainly flat 1
Mainly rolling 2
Mainly steep 3

Q.53 Do you sacrifice the same paddocks each winter?
(Please select one)

Yes 1
No 2

Q.54 Does the sacrifice paddock usually border a waterway or drain?
(Please select one)

Yes 1
No 2

Q.55 Do you use winter crop paddocks as sacrifice paddocks?
(Please select one)

Yes 1
No 2

MANAGING BULLS TO AVOID PUGGING

We are now going to ask you some questions about livestock management over winter.

Q.56 Do you usually run bulls?
Yes 1
No 2

IF 'NO' GO TO Q60

Q.57 How many?....._____

IF ANSWERED 'NOT AT ALL PRONE' TO Q32 AND 'NEVER' TO Q33 GO TO Q59

Q.58 Thinking about your usual practice with bulls, when you have waterlogged soils or pugging do you?
(Please select all that apply)

	YES	NO
Set stock them over a larger area	☐	☐
Put them in a sacrifice paddock	☐	☐
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
Move them to drier paddocks / better paddocks	☐	☐
Move them to flatter paddocks	*☐*	*☐*
Alter rotation length	☐	☐

DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

GO TO Q60

Q.59 Thinking about your usual practice with bulls, in winter do you?
(Please select all that apply)

	YES	NO
Set stock them over a larger area	☐	☐
Put them in a sacrifice paddock	☐	☐
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
Move them to drier paddocks / better paddocks	☐	☐
Move them to flatter paddocks	*☐*	*☐*
Alter rotation length	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

MANAGING DAIRY HEIFERS TO AVOID PUGGING

Q.60 Do you usually run dairy heifers?
(Please select one)

Yes 1
No 2

IF 'NO" GO TO Q64

Q.61 How many?....._____

IF ANSWERED 'NOT AT ALL PRONE' TO Q32 AND 'NEVER' TO Q33 GO TO Q63 OTHERWISE CONTINUE

Q.62 Thinking about your usual practice with dairy heifers, when you have waterlogged soils or pugging do you?
(Please select all that apply)

	YES	NO
Set stocking over a larger area	☐	☐
Graze them on a winter crop	☐	☐
Back fence, strip graze or break feed	☐	☐
Put them in a sacrifice paddock	☐	☐
Stand them off **WHERE?**	☐	☐

DO NOT PROMPT Winter cropping areas ..... 1 Races, yards or laneways ..... 2 Sacrifice paddocks ..... 3 Feedpad ..... 4 A purpose built stand off or loafing pad 5		
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
Graze them on a larger area / more paddocks	☐	☐
Move them to drier paddocks / better paddocks	☐	☐
Alter rotation length	☐	☐
Return them to their owner before waterlogged soils are a problem	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

GO TO Q64

Q.63 Thinking about your usual practice with dairy heifers, in winter do you?
(Please select all that apply)

	YES	NO
Set stock over a larger area	☐	☐
Graze them on a winter crop	☐	☐
Back fence, strip graze or break feed	☐	☐
Put them in a sacrifice paddock	☐	☐
Stand them off **WHERE?**	☐	☐
DO NOT PROMPT Winter cropping areas ..... 1 Races, yards or laneways ..... 2 Sacrifice paddocks ..... 3 Feedpad ..... 4 A purpose built stand off or loafing pad 5		
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
Graze them on a larger area / more paddocks	☐	☐

Move them to drier paddocks / better paddocks	☐	☐
Alter rotation length	☐	☐
Return them to their owner before waterlogged soils are a problem	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

MANAGING DAIRY COWS TO AVOID PUGGING

Q.64 Do you usually run dry dairy cows over winter?
(Please select one)

Yes 1
No 2

IF 'NO" GO TO Q68

Q.65 How many?....._____

IF ANSWERED 'NOT AT ALL PRONE' TO Q32 AND 'NEVER' TO Q33 GO TO Q67

Q.66 Thinking about your usual practice with dairy cows, when you have waterlogged soils or pugging do you?
(Please select all that apply)

	YES	NO
Set stocking over a larger area	☐	☐
Graze them on a winter crop	☐	☐
Back fence, strip graze or break feed	☐	☐
Put them in a sacrifice paddock	☐	☐
Stand them off **WHERE?**	☐	☐
DO NOT PROMPT Winter cropping areas .....1 Races, yards or laneways .....2 Sacrifice paddocks .....3 Feedpad .....4 A purpose built stand off or loafing pad.....5		
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
Graze them on a larger area / more paddocks	☐	☐
Move them to drier paddocks / better paddocks	☐	☐
Return them to their owner before waterlogged soils are a problem	☐	☐

Alter rotation length	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

GO TO Q68

Q.67 Thinking about your usual practice with dairy cows, in winter do you?
(Please select all that apply)

	YES	NO
Set stock over a larger area	☐	☐
Graze them on a winter crop	☐	☐
Back fence, strip graze or break feed	☐	☐
Put them in a sacrifice paddock	☐	☐
Stand them off **WHERE?**	☐	☐
DO NOT PROMPT Winter cropping areas ..... 1 Races, yards or laneways ..... 2 Sacrifice paddocks ..... 3 Feedpad ..... 4 A purpose built stand off or loafing pad 5		
Feed out purchased supplements	☐	☐
Feed out hay or silage	*☐*	*☐*
Graze them on a larger area / more paddocks	☐	☐
Move them to drier paddocks / better paddocks	☐	☐
Return them to their owner before waterlogged soils are a problem	☐	☐
Alter rotation length	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

MANAGING SHEEP TO AVOID PUGGING

Q.68 Do you usually run sheep?
(Please select one)

Yes 1
No 2

IF 'NO" GO TO Q73

Q.69 How many?....._____

Q.70 Which sheep enterprises do you operate on your farm?
(Please select all that apply)

	Yes	No
Breeding	☐	☐
Trading	☐	☐
Finishing	☐	☐
None		

IF ANSWERED 'NOT AT ALL PRONE' TO Q32 AND 'NEVER' TO Q33 GO TO Q72

Q.71 Thinking about your usual practice with sheep, when you have waterlogged soils or pugging do you?
(Please select all that apply)

	YES	**NO**
Set stock them over a larger area	☐	☐
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
Graze them on a larger area / more paddocks	☐	☐
Move them to drier paddocks / better paddocks	☐	☐
Put them on the steeper country	☐	☐
Sell some of them before winter	☐	☐
Put them on a winter crop	☐	☐
Alter rotation length	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

GO TO Q73

Q.72 Thinking about your usual practice with sheep, in winter do you?
(Please select all that apply)

	YES	**NO**
Set stock them over a larger area	☐	☐
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
Graze them on a larger area / more paddocks	☐	☐

Move them to drier paddocks / better paddocks	☐	☐
Put them on the steeper country	☐	☐
Sell some of them before winter	☐	☐
Put them on a winter crop	☐	☐
Alter rotation length	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

MANAGING LAMBS TO AVOID PUGGING

Q.73 Do you usually run lambs?
(Please select one)

Yes 1
No 2

IF 'NO' GO TO Q78

Q.74 How many?....._____

Q.75 Which lamb enterprises do you operate on your farm?
(Please select all that apply)

Fattening	☐	☐
Trading	☐	☐
Finishing	☐	☐
None		

IF ANSWERED 'NOT AT ALL PRONE' TO Q32 AND 'NEVER' TO Q33 GO TO Q77

Q.76 Thinking about your usual practice with lambs, when you have waterlogged soils or pugging do you?
(Please select all that apply)

	YES	NO
Set stock them over a larger area	☐	☐
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
Graze them on a larger area / more paddocks	☐	☐
Move them to drier paddocks / better paddocks	☐	☐
Put them on the steeper country	☐	☐
Sell some of them before winter	☐	☐
Put them on a winter crop	☐	☐

Reduce rotation length	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

GO TO Q78

Q.77 Thinking about your usual practice with lambs, in winter do you?
(Please select all that apply)

	YES	NO
Set stock them over a larger area	☐	☐
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
Graze them on a larger area / more paddocks	☐	☐
Move them to drier paddocks / better paddocks	☐	☐
Put them on the steeper country	☐	☐
Sell some of them before winter	☐	☐
Put them on a winter crop	☐	☐
Reduce rotation length	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

MANAGING BEEF CATTLE TO AVOID PUGGING

Q.78 Do you usually run beef cattle?
(Please select one)

Yes 1
No 2

IF 'NO" GO TO Q83

Q.79 How many?....._____

Q.80 Which beef enterprises do you operate on your farm?
(Please select all that apply)

Breeding	☐	☐
Trading	☐	☐
Finishing	☐	☐
None		

IF ANSWERED 'NOT AT ALL PRONE' TO Q32 AND 'NEVER' TO Q33 GO TO Q82

Q.81 Thinking about your usual practice with beef cattle, when you have waterlogged soils or pugging do you?
(Please select all that apply)

	YES	NO
Reduce rotation length	☐	☐
Back fence, strip graze or break feed	☐	☐
Put lighter cattle on the steeper country	☐	☐
Put them in a sacrifice paddock	☐	☐
Move to set stocking across the whole farm	☐	☐
Graze them on a larger area / more paddocks	☐	☐
Move them to drier paddocks / better paddocks	☐	☐
Stand off my cattle **WHERE?**	☐	☐
DO NOT PROMPT Winter cropping areas ..... 1 Races, yards or laneways ..... 2 Sacrifice paddocks ..... 3 Feedpad ..... 4 A purpose built stand off or loafing pad 5		
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
I sell some cattle before winter	☐	☐
I put them on a winter crop	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

GO TO Q83

Q.82 Thinking about your usual practice with beef cattle, in winter do you?
(Please select all that apply)

	YES	NO
Reduce rotation length	☐	☐
Back fence, strip graze or break feed my cattle	☐	☐
Put lighter cattle on the steeper country	☐	☐
Put them in a sacrifice paddock	☐	☐
Move to set stocking across the whole farm	☐	☐
Graze them on a larger area / more paddocks	☐	☐

Move them to drier paddocks / better paddocks	☐	☐
Stand off my cattle **WHERE?**	☐	☐
DO NOT PROMPT Winter cropping areas .....1 Races, yards or laneways .....2 Sacrifice paddocks .....3 Feedpad .....4 A purpose built stand off or loafing pad.....5		
Feed out purchased supplements	☐	☐
Feed out hay and silage	*☐*	*☐*
I sell some cattle before winter	☐	☐
I put them on a winter crop	☐	☐
DO NOT READ OUT - Other	☐	☐
Doesn't change how I manage the farm		

Q.83 Do you graze any other stock on your farm?

Yes 1

DO NOT PROMPT
Deer ..... a
Goats ..... b
Pigs c
Horses..... d
Alpacas ..... e
Other ..... f

No 2

RIPARIAN AND FORESTRY

The following questions are about waterways and forestry on your farm.

Q.84 Have you fenced any waterways on your farm in the last 5 years?
(Please select one)

Yes 1
No 2
No, I don't have any waterways on my farm 3

IF 'NO' GO TO Q86

IF 'NO I DON'T HAVE ANY' GO TO Q90

Q.85 What were the main reasons you fenced waterways on your farm?
(Please select all that apply)

DO NOT PROMPT – MULTIPLE ANSWER

Improve stock management 1
Country was unproductive..... 2
Control erosion on steeper country 3
Environmental or habitat benefits 4
Control erosion along waterways 5
Improve the look of my farm 7
Keep stock away from water/reduce stock losses 8
Wanted to clean up waterways 9
Received funding to help 8
Received WRC Clean Streams funding 10
Heard of WRC Clean Streams project and thought I'd get on with it myself .. 11
Get ahead of regulation..... 12
Industry requirements 13
Improve industry image 14
Keeping up with neighbour 16
Part of Landcare group..... 18
Other 19

GO TO Q87

Q.86 Why haven't you fenced waterways on your farm?
(Please select all that apply)

DO NOT PROMPT – MULTIPLE ANSWER

Property is already all fenced 1
Have fenced all I need or want to..... 2
Do not have a waterway on my farm..... 3
Still doing the costing 4
Not a spending priority on the farm 5
Not practical, area floods frequently 6
Not practical, farm layout 7
Too expensive or cost 8
Do not want to fence my waterways because of pests/weeds 9
Interference by authorities..... 10
Been told not in a priority area for Waikato Regional Council..... 11
Tried to get funding in the past and have been put off..... 12
I use natural water for stock drinking/I don't have water reticulation 13
There is too much maintenance required..... 14
Other 15
No need to..... 16
Don't know/No particular reason 17

Q.87 In the last 5 years have you planted trees, shrubs or forestry along any of the waterways on your farm?
(Please select one)

Yes 1
No 2

IF 'NO" GO TO Q89

Q.88 What were the main reasons you planted along the waterways on your farm?
(Please select all that apply)

DO NOT PROMPT – MULTIPLE ANSWER

Improve stock management 1
Country was unproductive 2
Control erosion on steeper country 3
Environmental or habitat benefits (e.g. birdlife) 4
Control erosion along waterways 5
Improve the look of my farm 6
Keep stock away from water/reduce stock losses 7
Wanted to clean up waterways 8
Received funding to help 9
Received WRC Clean Streams funding 10
Heard of WRC Clean Streams project and thought I'd get on with it myself 11
Get ahead of regulation 12
Industry requirements 13
Improve industry image 14
Keeping up with neighbour 15
Part of Landcare group 16
Other 17

GO TO Q90

Q.89 Why haven't you planted along waterways on your farm?
(Please select all that apply)

DO NOT PROMPT – MULTIPLE ANSWER

Waterways are already all planted 1
Have planted all I need or want to 2
Do not have a waterway on my farm 3
Still doing the costing 4
Not a spending priority on the farm 5
Not practical, area floods frequently 6
Not practical, farm layout 7
Too expensive or cost 8
Do not want to plant my waterways because of pests/weeds 9
Interference by authorities 10
Been told not in a priority area for Waikato Regional Council 11
Tried to get funding in the past and have been put off 12
There is too much maintenance required 13
Other 14
No need to 15
Don't know/no particular reason 16

Q.90 Do you have any wetlands, swamps or boggy areas on your farm?
(Please select one)

Yes 1
No 2

IF 'NO' GO TO Q92

Q.91 Have you fenced off or retired any of these from production?
(Please select one)

Yes 1
No 2

Q.92 Have you installed culverts or bridges on <u>any</u> streams where you have a stock crossing on your farm?
(Please select one)

Yes 1
No 2

IF 'NO' GO TO Q94

Q.93 What motivated you to install them ?
(Please select all that apply)

DO NOT PROMPT – MULTIPLE ANSWER

Improve stock management 1
Environmental or habitat benefits 2
Control erosion along waterways 3
Other 4

GO TO Q95

Q.94 Why haven't you installed culverts or bridges on any streams where you have stock crossing on your farm?

DO NOT PROMPT – MULTIPLE ANSWER

Waterways already have bridges or culverts installed 1
Have put in all the bridges or culverts I need or want to 2
Do not have a waterway on my farm 3
Still doing the costing 4
Not a spending priority on the farm 5
Not practical, area floods frequently 6
Not practical, farm layout 7
Too expensive or cost 8
Interference by authorities 9
Been told not in a priority area for Waikato Regional Council 10
Tried to get funding in the past and have been put off 11
There is too much maintenance required 12
Other 13
No need to 14
Don't know/no particular reason 15

PROJECT INVOLVEMENT

Finally we are going to ask you a few questions about projects in your area.

Q. 95 Thinking about your local district, what groups or projects are you aware of that have taken place in the last few years?
(Please select all that apply)

	YES	NO
Monitor farm programme	☐	☐
Farming for Profit programme	☐	☐
Demonstration farm programme	☐	☐

Landcare groups	☐	☐
None	☐	☐
DO NOT READ OUT - Other SPECIFY	☐	☐

ONLY INCLUDE 'YES' RESPONSES IN Q96

Q.96 Of these groups or projects, which have you been involved with?
(Please select all that apply)

	YES	NO
Monitor farm programme	☐	☐
Farming for Profit programme	☐	☐
Demonstration farm programme	☐	☐
Landcare groups	☐	☐
None	☐	☐
DO NOT READ OUT - Other SPECIFY	☐	☐

Q.97 What do you think would be the most useful action that Waikato Regional Council could take in your district to help you with environmental management on your farm?

Q.98 That's the end of the survey. Do you have any comments about what we have been discussing tonight that you would like to pass on to Waikato Regional Council?

Q. 99 Would you be prepared to participate in an interview about managing your farm in winter?

Thank you very much for your time. Just to confirm, you have been speaking with NAME from Versus Research on behalf of Waikato Regional Council.

Male 1
Female 2

Appendix 2: Map of the Waikato and Waipa River catchments