

BEFORE THE INDEPENDENT COMMISSIONERS

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the Proposed Waikato Regional Plan Change 1-
Waikato and Waipā River Catchments and
Variation 1 to proposed Plan Change 1

AND

IN THE MATTER of submissions under clause 6 First Schedule

BY **BEEF + LAMB NEW ZEALAND LIMITED**
Submitter

BRIEF OF EVIDENCE OF ANDREW NEIL BURTT
15 February 2019

FLETCHER VAUTIER MOORE
LAWYERS
PO BOX 3029
RICHMOND 7050

Telephone: (03) 543 8301
Facsimile: (03) 543 8302
Email: cthomsen@fvm.co.nz
Solicitor: CP Thomsen

TABLE OF CONTENTS

BACKGROUND	3
QUALIFICATIONS AND EXPERIENCE	3
EXPERT WITNESS CODE OF CONDUCT	3
SCOPE OF EVIDENCE	4
EXECUTIVE SUMMARY	4
EVIDENCE	6
BACKGROUND TO B+LNZ'S ECONOMIC SERVICE AND ITS SHEEP AND BEEF FARM SURVEY	6
DATA LIMITATIONS AND CONSTRAINTS	6
BACKGROUND TO SHEEP AND BEEF FARMING IN WAIKATO	7
LIVESTOCK NUMBERS AND LIVESTOCK UNITS	9
LIVESTOCK UNITS SPECIFICALLY IN WAIKATO-WAIPA CATCHMENTS	26
KEY PHYSICAL AND FINANCIAL FEATURES OF COMMERCIAL SHEEP AND BEEF FARMS IN WAIKATO-BOP	27
SECTOR REVENUE – ON-FARM	29
SHEEP AND BEEF FARMING IS COMPLEX AND HETEROGENEOUS	34
TYPES OF COMMERCIAL SHEEP AND BEEF FARMS	36
NUMBER OF COMMERCIAL SHEEP AND BEEF FARMS	36
PHYSICAL CHARACTERISTICS OF COMMERCIAL SHEEP AND BEEF FARMS	38
FERTILISER USE	46
GROSS FARM REVENUE	50
PROFITABILITY	63
MEAT PROCESSING AND MARKETS	66

FUTURE OUTLOOK FOR SHEEP AND BEEF FARMING IN WAIKATO	71
CONCLUSION	71
APPENDIX 1: DESCRIPTION OF B+LNZ SHEEP AND BEEF FARM SURVEY	73

BACKGROUND

QUALIFICATIONS AND EXPERIENCE

1. My name is Andrew Neil Burt.
2. I am employed by Beef + Lamb New Zealand Ltd (B+LNZ) as Chief Economist.
3. I hold a Bachelor of Agricultural Economics from Massey University.
4. I have been employed by B+LNZ (under its previous names and iterations) since the mid-1980s. I started as a Research Economist with the then New Zealand Meat & Wool Boards' Economic Service. In mid-1990, I moved to the New Zealand Meat Producers Board and have spent the majority of the period since then in trade policy analysis and advocacy in both New Zealand and overseas – in Brussels and Washington DC. I spent three years in Brussels and nearly 10 – in two tranches – in Washington DC representing New Zealand sheep and beef farmers. In 2012, I returned to New Zealand to manage what is now the B+LNZ Economic Service.
5. In preparing this evidence I have reviewed the reports and statements of evidence of other experts giving evidence relevant to my area of expertise, including:
 - (a) Expert evidence of Mr Richmond Beetham;
 - (b) Expert evidence of Dr Jane Chrystal; and
 - (c) Expert evidence of Mr Richard Parkes.

EXPERT WITNESS CODE OF CONDUCT

6. I have read the Code of Conduct for Expert Witnesses in the Environment Court's 2014 Practice Note and agree to comply with it. I confirm that the opinions I have expressed represent my true and complete professional opinions. The matters addressed by my evidence are within my field of professional expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

7. I have been asked by B+LNZ to prepare evidence that provides background to the sheep and beef cattle sector. This includes:
 - (a) Background to B+LNZ's Economic Service and its Sheep and Beef Farm Survey;
 - (b) Background to sheep and beef farming enterprises in Waikato; and
 - (c) Sheep and Beef Farm Survey data for Waikato-BOP as it relates to the proposed PC1, namely data to demonstrate that sheep and beef farming is:
 - (i) a significant industry in Waikato;
 - (ii) complex and heterogeneous; and
 - (iii) becoming more efficient over time.
 - (d) A description of the B+LNZ Sheep and Beef Farm Survey is attached as Appendix 1: Description of B+LNZ Sheep and Beef Farm Survey.

EXECUTIVE SUMMARY

8. Sheep and beef farming in Waikato is conducted in diverse and complex ways in diverse and complex environments.
9. On average, Hard Hill Country farms are twice the area of Intensive Finishing farms.
10. Overall, an average of under 80 percent of a farm is used for grazing. The other 20+ percent provides non-farming services – such as native vegetation cover – a substantial portion of New Zealand's native vegetation is on sheep and beef farms. The majority of New Zealand's covenants that protect land in perpetuity under the QEII National Trust are on sheep and beef farms.
11. Sheep and beef farms have also generated significant eco-efficiency gains. Greenhouse gas emissions for the sheepmeat sector are down 40 percent on 1990 levels; for the beef cattle sector they are down 10 percent on 1990 levels.

12. The average stocking rate for sheep and beef farms in Waikato declined between 1990-91 and 2016-17. The weighted average stocking rate was 9.2 SU per effective hectare, which is equivalent to just over one cow per ha, in 2016-17.
13. This reflects conversions of better land closer to the rivers' main stems to dairying while Hard Hill and Hill Country farms continued to farm with regard to the natural capital of their properties and with long-term sustainability – economically, environmentally and socially – in mind.
14. Hard Hill Country farms have proportionally more sheep than Intensive Finishing farms. As a result, revenue from sheep and wool combined accounts for about 40 percent of total gross farm revenue – 60 percent on Hard Hill Country and 13.5 percent on Intensive Finishing farms on average.
15. Dairy Grazing Revenue averages seven percent of total gross farm revenue.
16. Dairy dominates the region, as is widely known intuitively.
17. The number of **sheep decreased** – by 60 percent between 1990-91 and 2017-18.
18. The number of **beef cattle decreased** – by 25 percent.
19. The number of **dairy cows increased** – by over 20 percent.
20. The total number of **Stock Units** – was unchanged.
21. The **application** of elemental Nitrogen, Phosphorus, Potassium and Sulphur is low.
22. Nutrient **losses** are low, with other evidence, particularly that of Dr Chrystal, addressing this point in detail via B+LNZ's analysis of actual sheep and beef farms.

EVIDENCE

BACKGROUND TO B+LNZ'S ECONOMIC SERVICE AND ITS SHEEP AND BEEF FARM SURVEY

23. The data discussed in this evidence statement largely comes from the B+LNZ Sheep and Beef Farm Survey, which is conducted by B+LNZ's Economic Service.
24. B+LNZ's Economic Service provides credible, authoritative and independent information analysis about the sheep and beef value chain, and farming in particular, in New Zealand that supports informed decision-making.
25. A core part of this is the Sheep and Beef Farm Survey, which was initiated after a 1949 Royal Commission that was instructed by the government of the day to "Inquire into and Report Upon the Sheep-Farming Industry", concluded "there is no consistency of facts on which we can rely".
26. The Survey has been running continuously since 1950, which means it is approaching its 70th year and makes it the longest running primary sector survey on earth as far as I know.
27. It has not remained static but has evolved and changed to meet needs of the industry and issues of the time.
28. The Survey framework and the operational structure of B+LNZ's Economic Service supports making credible forecasts of production and farm outcomes.

DATA LIMITATIONS AND CONSTRAINTS

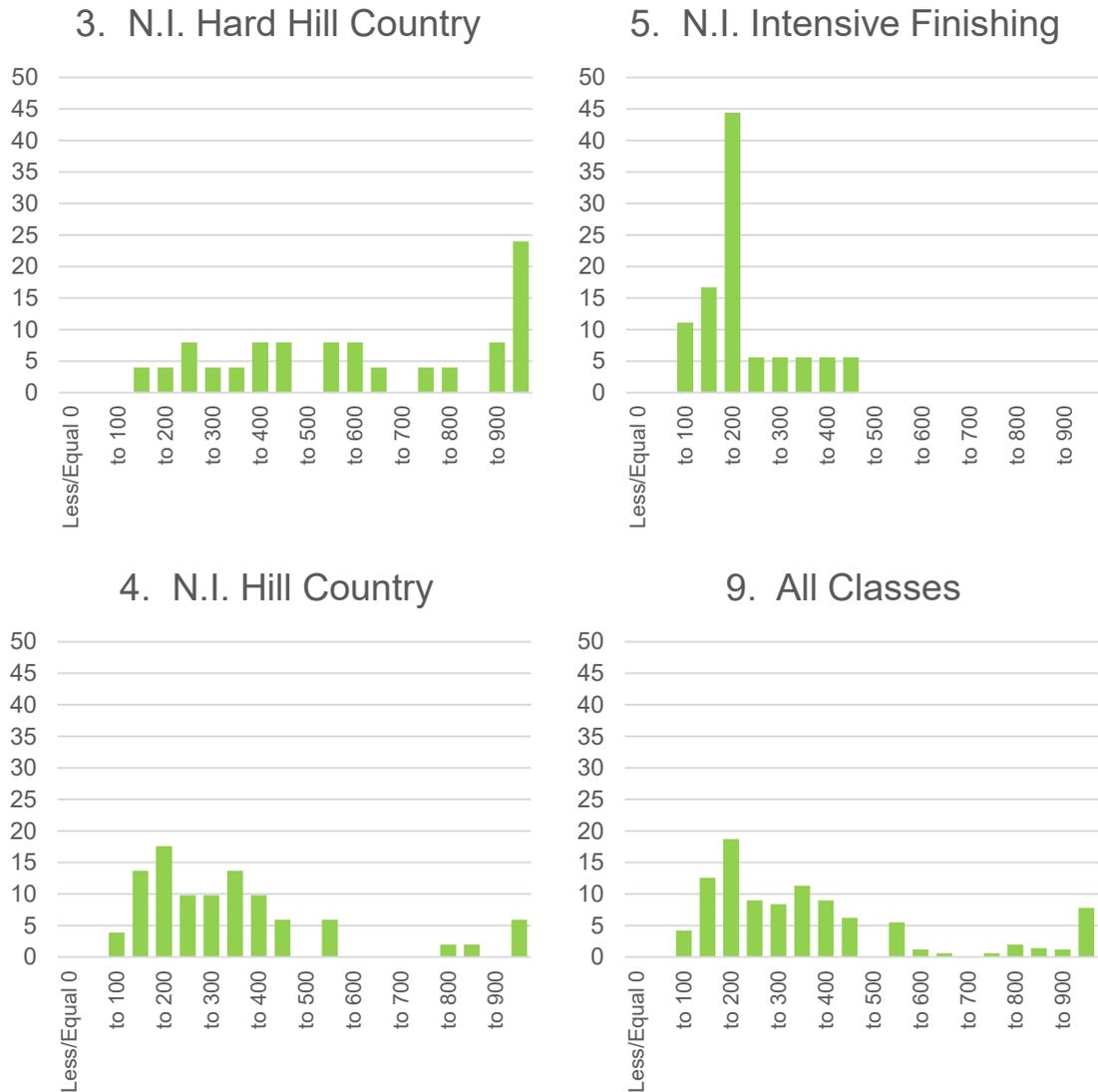
29. The Sheep and Beef Farm Survey is a sample survey in which the sample is randomly selected from the business frame used in the country's census of agricultural producers to reflect New Zealand's livestock base. Statistical methods can be used to reliably represent the real world, albeit with some measure of variability/uncertainty. Generally, the discipline of statistics reduces such uncertainty, but absolute knowledge cannot be assured until the population of farms across a region and timeframes envisaged by policy measures are surveyed.

30. Notwithstanding these constraints I still consider the data that is collected in the Survey reliably informs the Sector's forecasting described above.

BACKGROUND TO SHEEP AND BEEF FARMING IN WAIKATO

31. The sheep and beef farming sector is complex and diverse in New Zealand, and Waikato is no exception. Commercial sheep and beef farms have multiple enterprises for a variety of reasons, including:
- (a) The physical characteristics of the property;
 - (b) The objectives of the owner(s); and
 - (c) Because sheep and beef cattle complement each other on individual properties in a number of production and financial ways, e.g. to mitigate financial risks, to manage pasture, to manage parasites.
32. Sheep and beef farms in Waikato-BOP vary considerably in size and on other measures for such reasons.
33. Figure 1 shows the distribution of size according to the Sheep and Beef Farm Survey. It emphasises the diversity of the size of operations that is often overlooked when the generic term "farm" is used. I am concerned that "farm" oversimplifies what a sheep and beef farm is because it understates the heterogeneity and overstates the homogeneity of them.

Figure 1: Percentage Distribution of Total Effective Area per farm – Waikato-BOP – 2016-17



34. A quarter of Hard Hill Country farms exceed 900 ha, while only six percent of Hill Country farms are over 900 ha and none of the Intensive Finishing farms are over 900 ha.

35. Waikato relies heavily on agriculture, defined in broad terms to include farming and further processing. The share of GDP from agriculture, which was 6.0 percent in the year ended March 2016, is about double the New Zealand average of 3.1 percent, according to Statistics New Zealand Regional GDP data (MBIE, 2019). This is skewed towards dairy farming and processing. In 2017, Waikato's GDP per person of ~\$49,500 was 88 percent of the national average of ~\$56,400 (MBIE, 2019). These trends

reflect what we know intuitively about Waikato's economy, e.g. the significance of the dairy industry and a large population centre, but clearly demonstrates the importance of agriculture and the businesses in Waikato that further process farm outputs, and supply farming.

LIVESTOCK NUMBERS AND LIVESTOCK UNITS

36. The charts in Figure 2-8 provide an overview of the trends in livestock numbers in Waikato, Waipa, South Waikato and Matamata-Piako districts. They are based on the Agricultural Production Census (APC), which is funded by the Ministry for Primary Industries (MPI) and conducted by Statistics New Zealand (SNZ). They start at 1990-91 which we consider the season by which the vast majority of support had been removed after the mid-1980s deregulation by the Labour government that won the 1984 general election.
37. Points to note:
- (a) Dairy dominates the districts, as is widely known intuitively.
 - (b) The number of sheep decreased – by 60 percent over the period.
 - (c) The number of beef cattle decreased – by 25 percent over the period.
 - (d) The number of dairy cows increased – by over 20 percent over the period.
 - (e) The total number of Stock Units – was unchanged over the period.
38. As at 30 June 2017¹ Waikato, Waipa, South Waikato and Matamata-Piako districts combined had:
- (a) Around 1.7% of New Zealand's sheep;
 - (b) Around 6.7% of New Zealand's beef cattle; and
 - (c) Around 13.9% of New Zealand's dairy cows.

¹ We expect that the 30 June 2018 figures, which were the result of the 2018 Agriculture Production Survey (APS), will be released in May 2019.

Figure 2: Livestock Numbers – Sheep (000s)

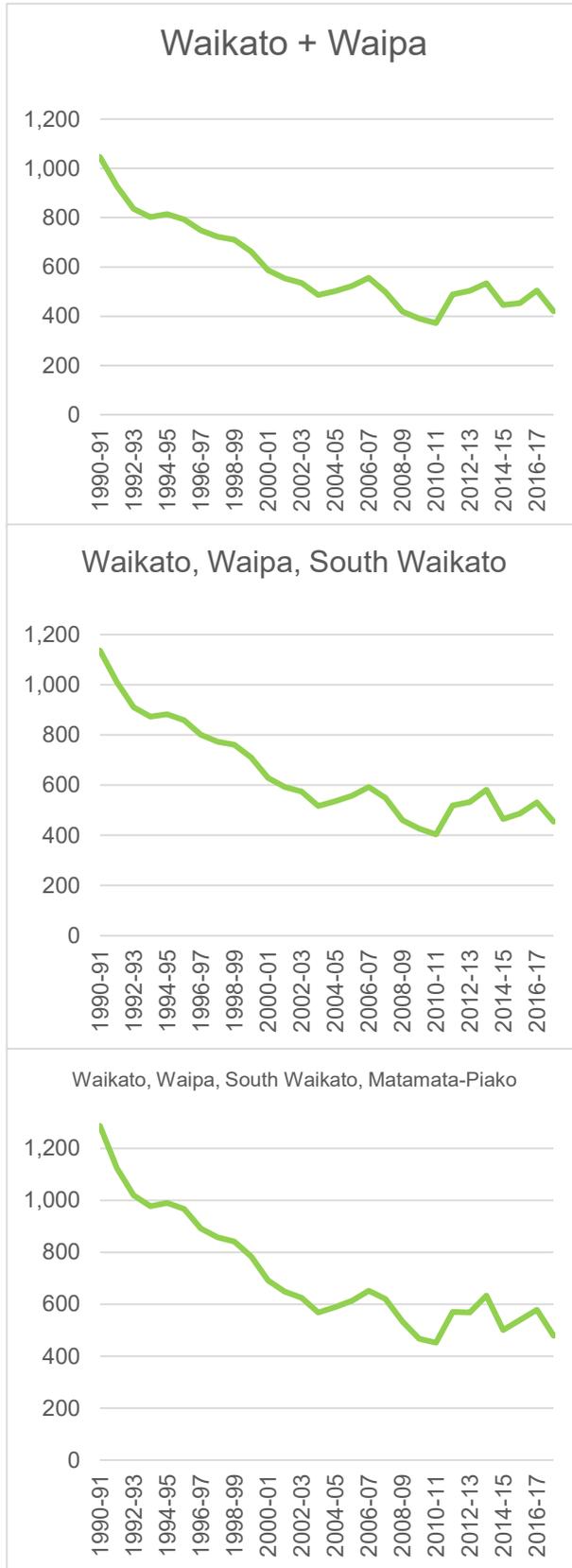
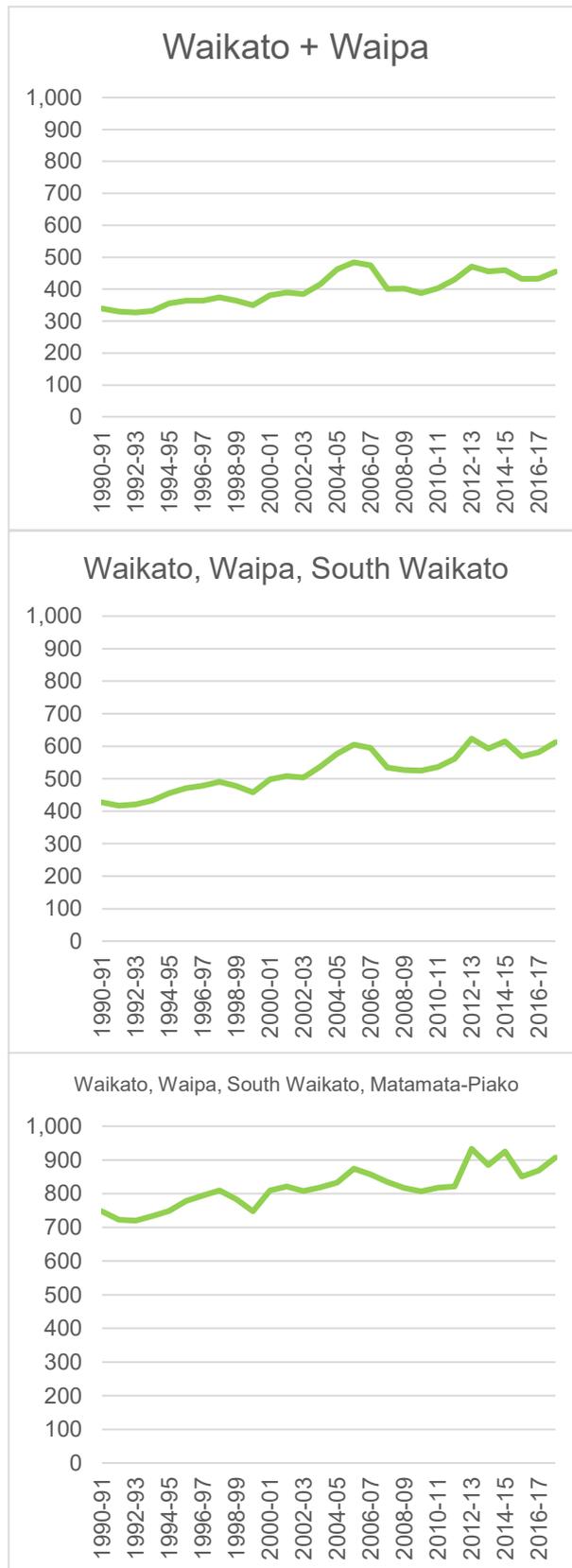


Figure 3: Livestock Numbers – Beef Cattle (000s)



Figure 4: Livestock Numbers – Dairy Cows in Calf or Milk (000s)



39. We are often asked the following questions about stock units:
- (a) What is a “stock unit”?; and
 - (b) Why use “stock units”?
40. A stock unit, which is abbreviated to SU, reflects feed consumption or utilisation of animals.
41. A stock unit provides a means of comparing like-with-like. It provides a “common currency” that allows the counts of different species to be reported consistently, or, more colloquially, to compare apples with apples. It measures different livestock ages and classes relative to a breeding ewe. For example, a Friesian dairy cow was calculated to be 8.5 stock units, i.e. a Friesian dairy cow has 8.5 times the feed consumption/demand of a breeding ewe.
42. The factors used to convert stock numbers to stock units are available in the “Definitions” tab on B+LNZ’s [Benchmarking Tool page](#) on the B+LNZ website. They are those that resulted from detailed research by Lincoln University.

Figure 5: Livestock Units (“Stock Units”) – Sheep SU (000s)

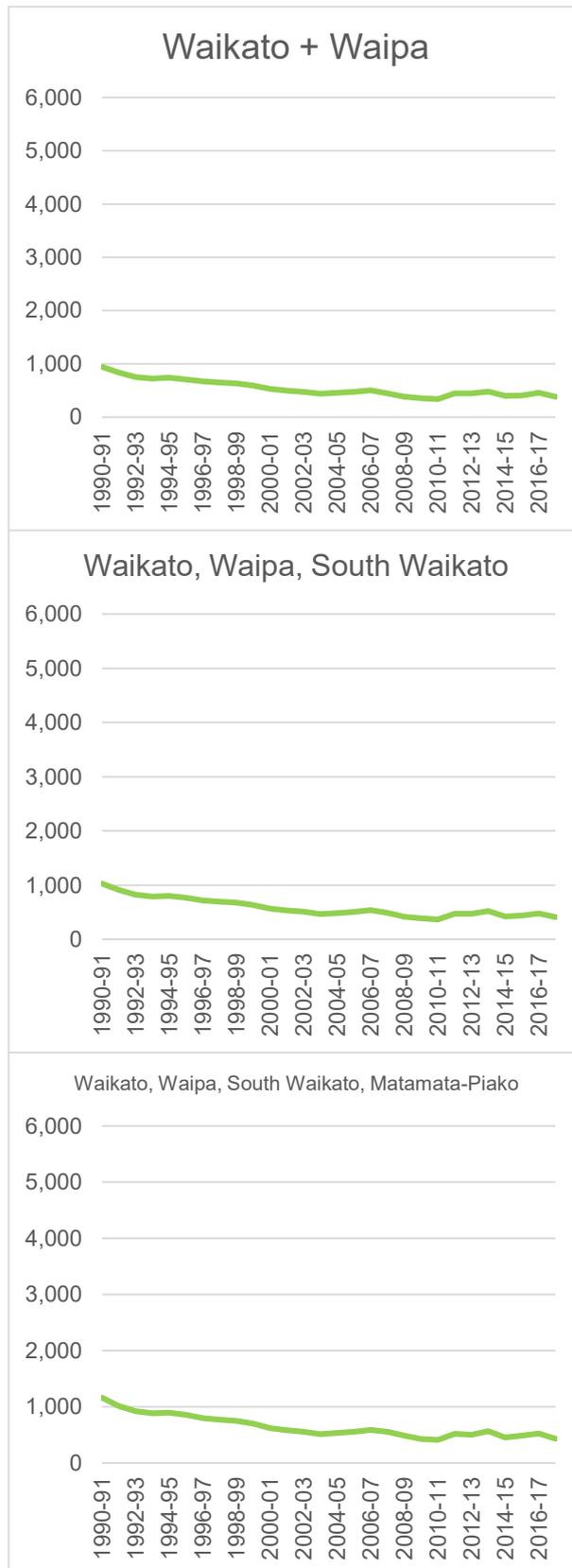


Figure 6: Livestock Units (“Stock Units”) – Beef SU (000s)



Figure 7: Livestock Units (“Stock Units”) – Dairy SU (000s)

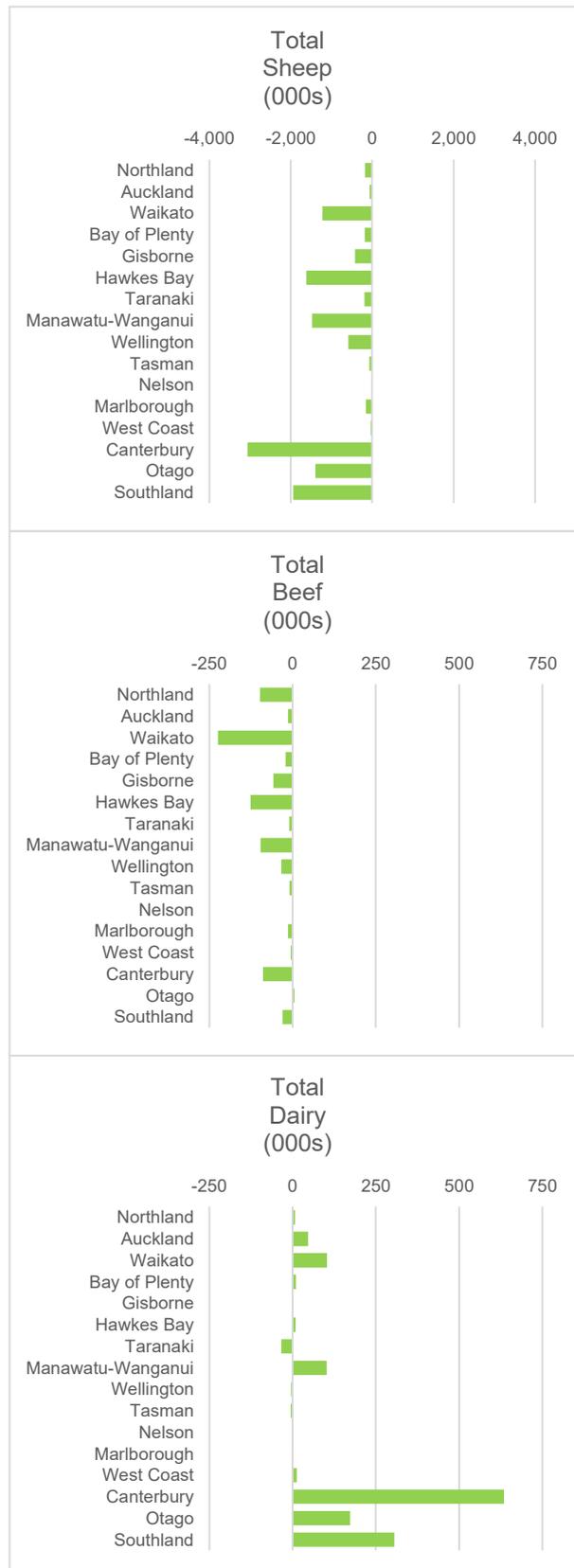


Figure 8: Livestock Units (“Stock Units”) – Total SU (000s)



43. Figure 9 and Figure 10 show the absolute and percentage changes in Livestock *Numbers* between 1990-91 and 2017-18 for each of the regions in New Zealand for each species – sheep, beef cattle and dairy cattle.
44. Figure 9 shows:
- (a) The absolute *number* of sheep decreased in Waikato;
 - (b) The absolute *number* of beef cattle decreased in Waikato;
 - (c) The absolute *number* of dairy cattle increased in Waikato;
 - (d) The decreases in the absolute *number* of sheep in South Island regions were more than those in Waikato;
 - (e) Waikato experienced the largest increase in the absolute *number* of dairy cattle in the North Island, but South Island regions experienced considerably larger increases.

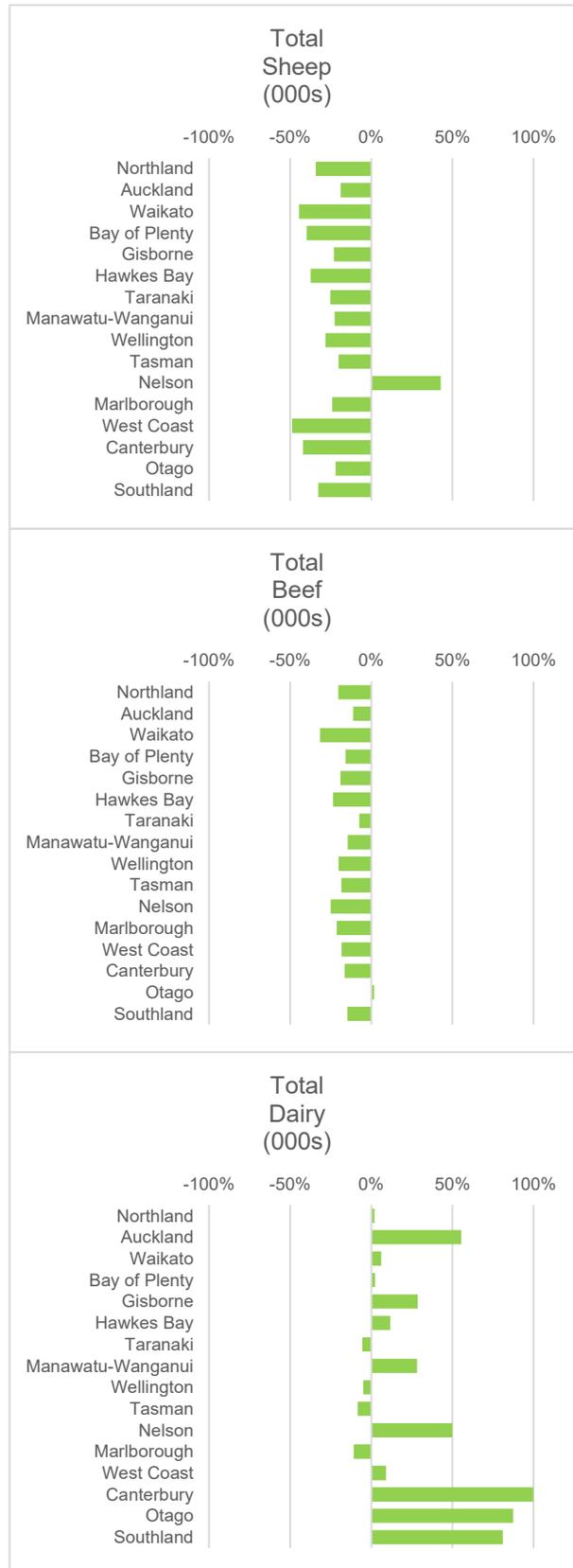
Figure 9: Change in Livestock Numbers between 1990-91 and 2017-18.



45. Figure 10 shows:

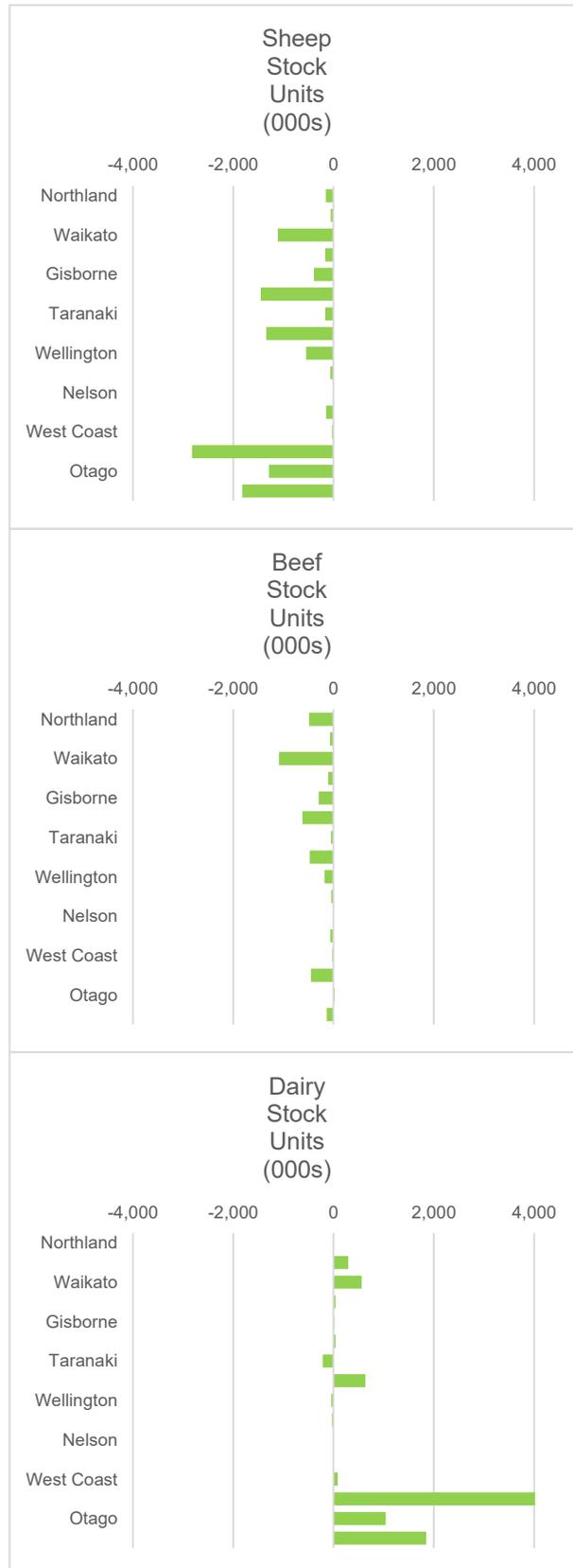
- (a) There was a large *percentage* decrease in the number of sheep in all regions except Nelson, which is a unitary authority with few livestock;
- (b) The largest *percentage* decrease in beef cattle occurred in Waikato;
- (c) Auckland experienced the largest *percentage* increase in dairy cattle in the North Island (albeit from a low base), and there were large *percentage* increases in the South Island.

Figure 10: Change in Livestock Numbers between 1990-91 and 2017-18 (%)



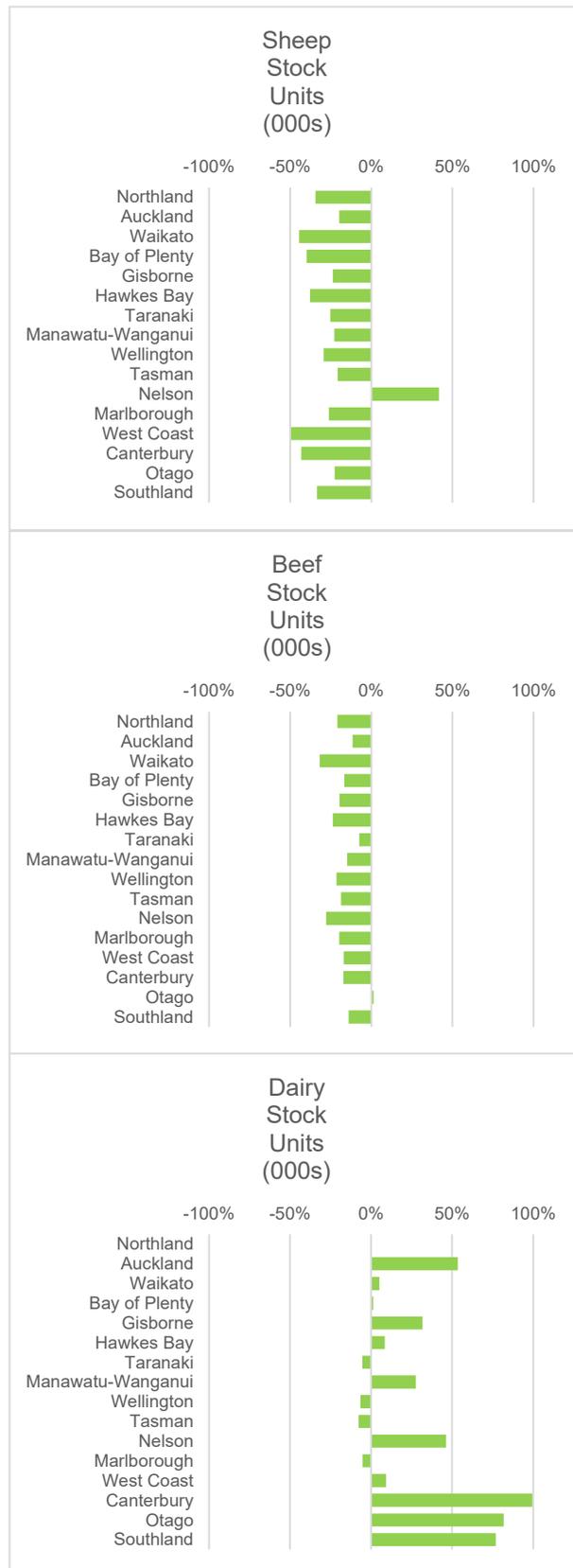
46. Figure 11 and Figure 12 show the absolute and percentage changes in Livestock *Units* between 1990-91 and 2017-18 for each of the regions in New Zealand for each species – sheep, beef cattle and dairy cattle.
47. Figure 11 shows:
- (a) The absolute *number* of sheep and beef cattle stock units decreased in Waikato;
 - (b) The absolute *number* of dairy cattle stock units increased in Waikato;
 - (c) There were larger absolute decreases in the number of sheep stock units in South Island regions than in Waikato;
 - (d) Waikato experienced the largest absolute decrease in beef cattle stock units; and
 - (e) Manawatu-Wanganui experienced the largest absolute increase in dairy cattle stock units in the North Island, followed closely by Waikato, while South Island regions experienced considerably larger increases.

Figure 11: Change in Livestock Units between 1990-91 and 2017-18 (000 SU)



48. Figure 12 shows:
- (a) There was a large *percentage* decrease in the number of stock units in all regions except Nelson, which is a unitary authority with few livestock;
 - (b) The largest *percentage* decrease in beef cattle stock units occurred in Waikato;
 - (c) Auckland experienced the largest *percentage* increase in dairy cattle stock units in the North Island (albeit from a low base); and
 - (d) There were large *percentage* increases in dairy stock units in the South Island.

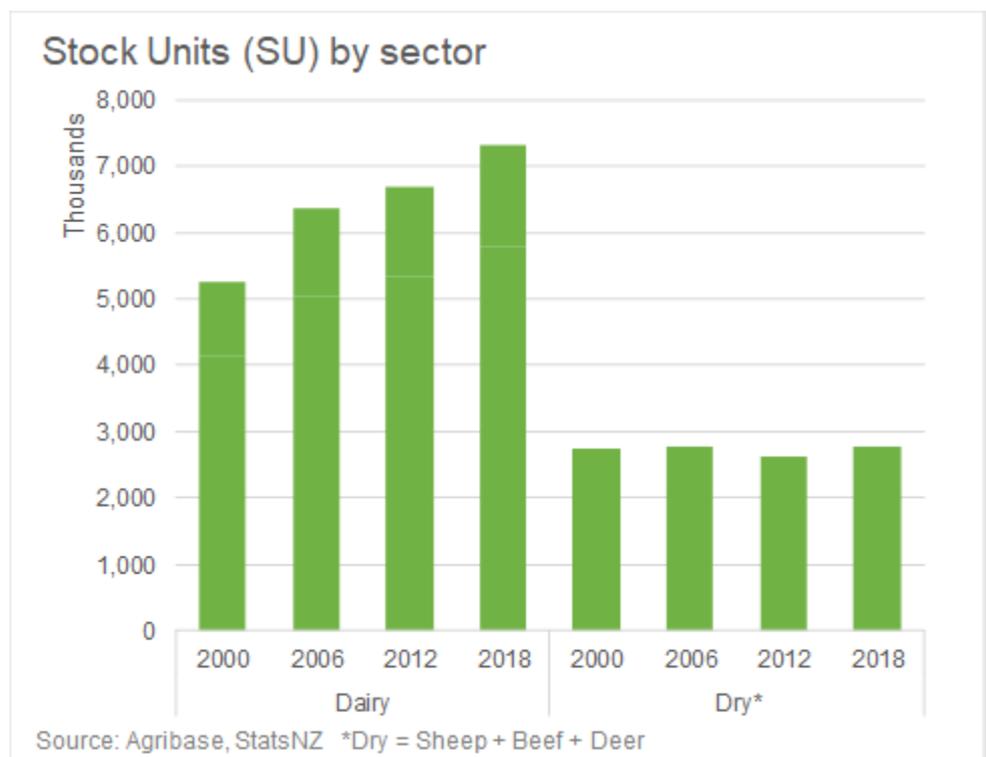
Figure 12: Change in Livestock Units between 1990-91 and 2017-18 (%)



LIVESTOCK UNITS SPECIFICALLY IN WAIKATO-WAIPA CATCHMENTS

49. To provide a further perspective and specifically for the Waikato-Waipā catchments, we analysed data from other sources, namely AgriBase, which is owned and operated by AsureQuality, the Agricultural Production Census (APC), NIWA (National Institute of Water and Atmospheric Research) and Landcare Research. There are differences in the primary purposes for which data are collected, however, the trend is the same, and as outlined earlier.
50. There has been a steady increase in dairy cattle and the number of stock units on drystock farms, which includes sheep, beef cattle and deer, has remained little changed, but has declined as a proportion of total livestock units in the catchments.

Figure 13: Livestock Units by Sector in Waikato-Waipā Catchments Combined



KEY PHYSICAL AND FINANCIAL FEATURES OF COMMERCIAL SHEEP AND BEEF FARMS IN WAIKATO-BOP

51. Key information about commercial sheep and beef farms in Waikato-BOP is shown in Table 1.
52. The figures shown are averages – simple averages for like farms and a weighted average for the Weighted Average All Classes figures, which take into account the different proportions each individual Farm Class makes up of the total. That is, the sample is drawn in proportion to stock units, which are the productive base of the industry.
53. The Survey analyses and reports on farm businesses, which primarily means combining financial accounts and usually there is more than one set of accounts associated with a “farm”. Further, the financial structures of farm businesses vary greatly, for various reasons.
54. In summary:
 - (a) On average, Hard Hill Country farms are twice the area of Intensive Finishing farms.
 - (b) Overall, an average of under 80 percent of a farm is used for grazing. The other 20+ percent provides non-farming services.
 - (c) Hard Hill Country farms have proportionally more sheep than Intensive Finishing farms. As a result, revenue from sheep and wool combined accounts for about 40 percent of total gross farm revenue – 60 percent on Hard Hill Country and 13.5 percent on Intensive Finishing farms on average.
 - (d) Dairy Grazing Revenue averages seven percent of total gross farm revenue.
 - (e) The average number of dairy cattle on hand at balance date is just over 50 per farm.
 - (f) The weighted average stocking rate was 9.2 SU per effective hectare, which is equivalent to just over one cow per ha.
 - (g) These farms have the equivalent of about 1.5 FTEs on average.

Table 1: Key Physical and Financial Features of Commercial Sheep and Beef Farms in Waikato-BOP 2016-17

Physical, production and financial statistics		Farm Class 3:	Farm Class 4:	Farm Class 5:	Farm Class 9:
		North Island Hard Hill Country	North Island Hill Country	North Island Intensive Finishing	All Classes Weighted Average
Farms in Sample	No.	25	51	18	94
Total Farm Area	ha.	986	418	232	480
Effective Area	ha.	671	342	197	373
Effective Area	% of Total	68	82	85	78
Sheep	No.	3,576	1,593	624	1,771
Cattle – Beef	No.	414	359	342	365
Cattle – Dairy	No.	10	66	34	54
Deer	No.	0	6	11	6
Goats	No.	0	1	0	1
Sheep to Cattle² Ratio	% Sheep	62	45	24	47
Sheep	SU	3,274	1,445	545	1,608
Cattle – All	SU	2,044	1,789	1,730	1,820
Deer	SU	0	9	19	9
Goat	SU	0	0	0	0
Total	SU	5,318	3,243	2,294	3,437
Stocking Rate	SU/eff. ha.	7.9	9.5	11.6	9.2
Labour Units	FTE	1.70	1.43	1.47	1.47
Lambing Performance	%	125.1	128.9	123	127.5
Calving Performance	%	81.9	82.6	85.7	82.9
Wool Sold	kg/sheep at open	4.9	5.0	5.0	4.4
Wool Sold	kg	17,695	8,000	3,112	7,862
Wool Sold	kg/eff. ha.	26	23	16	21
Lambs Sold	No.	2,058	1,434	472	1,552
Sheep³ Sold	No.	362	180	101	199
Cattle Sold - Prime	No.	131	94	243	141
Wool Revenue	% of total	8.7	5.0	1.5	5.3
Sheep Revenue	% of total	51.5	34.1	12.0	35.0
Sheep + Wool Revenue	% of total	60.2	39.1	13.5	40.3
Cattle Revenue	% of total	35.4	45.1	54.9	44.3
Dairy Grazing Revenue	% of total	1.3	9.0	4.8	7.0
Sub-Total	% of total	96.9	93.2	73.2	91.6

Source: B+LNZ Economic Service Sheep and Beef Farm Survey

² All cattle, i.e. beef plus dairy cattle

³ Prime Ewes Sold

SECTOR REVENUE – ON-FARM

55. The charts in Figures 14-17 provide an overview of the estimated value of production at the farm gate. This values all on-farm production at prices received for production as it leaves the farm.
56. Sheep and beef has been increasing gradually, and roughly doubled, to just under \$200m in nominal terms (i.e. not adjusted for inflation). Note that this trend is the opposite of the trend in sheep and beef cattle numbers, which was described earlier, i.e. fewer livestock and less total area.
57. Dairy grazing revenue increased steadily – in response to the farm-gate milk price – and declined sharply when the farm-gate milk price turned down.
58. Dairy production has increased more rapidly, but the trend also reflects volatility in farm-gate milk prices, which is most clearly seen in recent years.

Figure 14: Estimated value of production at the farm gate – S&B Total (+ crop) (\$000)

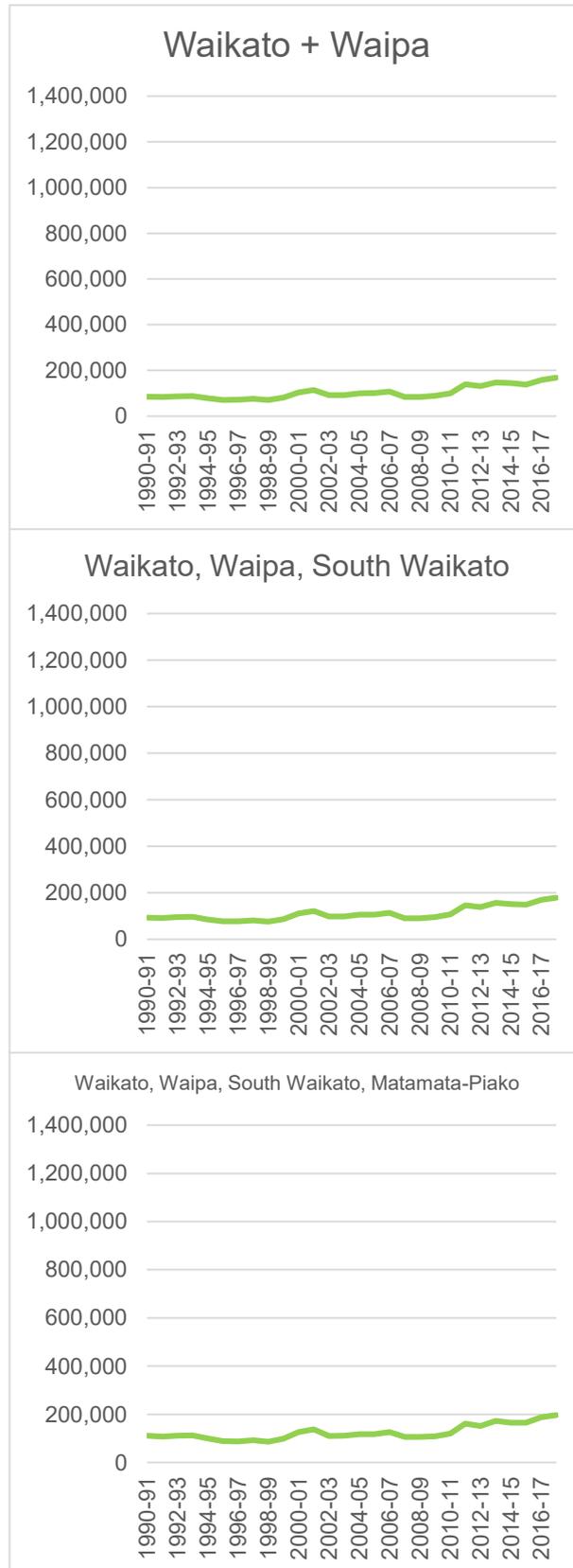


Figure 15: Estimated value of production at the farm gate – Dairy Grazing (\$'000)

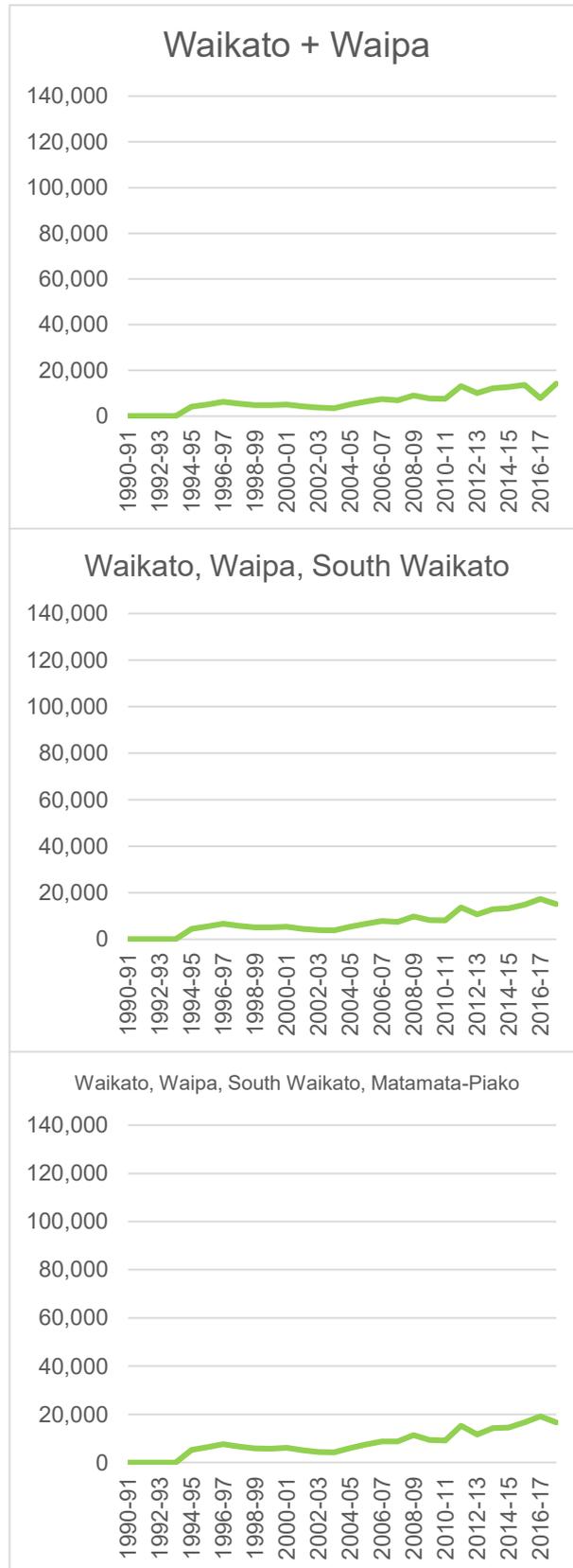


Figure 16: Estimated value of production at the farm gate – Dairy (\$000)



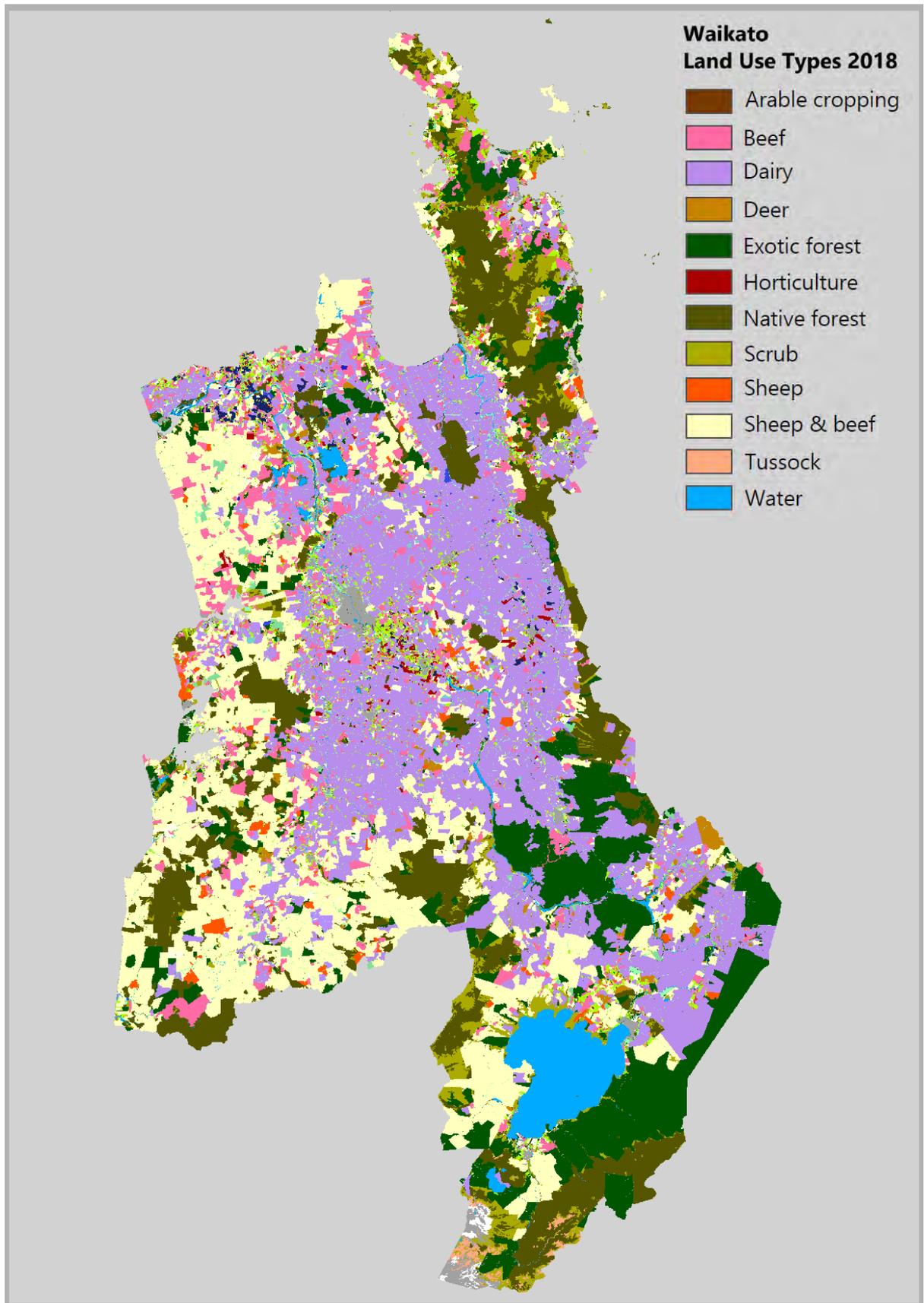
Figure 17: Estimated value of production at the farm gate – Total Pastoral inc. Crop (\$'000)



SHEEP AND BEEF FARMING IS COMPLEX AND HETEROGENEOUS

59. Within Waikato, sheep and beef farming is carried out on all land types, climate zones, and topographies, and there are considerable differences in farm size. Thus, sheep and beef farming is as diverse as these characteristics combined with the diversity that is farmers as humans and they adapt to those factors while endeavouring to meet their objectives. The fundamental principle is to optimise the farming systems to take account of the natural capital of the land and the farming business's objectives. This includes intra-seasonal patterns of pasture growth and means sheep and beef farmers have to manage carefully their resources and as a result they are resilient and responsive to climate, weather and market signals.
60. This includes the connections throughout the value chain. Certain sheep and beef farms, particularly hill country, specialise in breeding stock that are sold as so-called store stock to other farms that finish them for processing. This is an integrated market system of stock flow – from breeding to finishing to processing to sales to both domestic and export markets.
61. Since the reforms in the 1980s and the expansion of dairy onto what was prime sheep finishing land, a bigger proportion of the lambs born on hill country is finished on hill country.
62. In 1990-91, we estimate around 30 percent of the lambs processed in New Zealand were finished on hill country, and 70 percent were finished on finishing land. In 2016-17, the split is close to 50:50 – 50 percent of lamb processing is of lambs finished in hill country.
63. Figure 18 shows the Land Use Types in Waikato region.

Figure 18: Land Use Types 2018 (Landcare Research, 2019)



TYPES OF COMMERCIAL SHEEP AND BEEF FARMS

64. B+LNZ characterises farms (farm businesses) into eight farm classes, which, for the avoidance of doubt, combine physical and financial characteristics that are broader than just Land Use Capability (LUC) class. The constraints provided by physical characteristics of a farmer's property are taken into account when they are conducting business to meet their family's objectives so that their farming is sustainable – economically, which is about resource use – i.e. physical and financial capital; socially and culturally.
65. The Farm Classes that are relevant in the North Island and thus Waikato, are:
- (a) Class 3 - North Island Hard Hill Country;
 - (b) Class 4 - North Island Hill Country; and
 - (c) Class 5 - North Island Intensive Finishing, where “intensive” relates to production levels (as distinct from environmental intensity).
66. Their characteristics are described in Appendix 1: Description of B+LNZ Sheep and Beef Farm Survey

NUMBER OF COMMERCIAL SHEEP AND BEEF FARMS

67. The number of commercial sheep and beef farms has declined as farms have amalgamated and, in particular, as dairy conversions have occurred (see Figure 19). This trend is most noticeable in Farm Class 5 “Intensive Finishing farms”.

Figure 19: Number of Commercial Sheep and Beef Farms by Farm Class

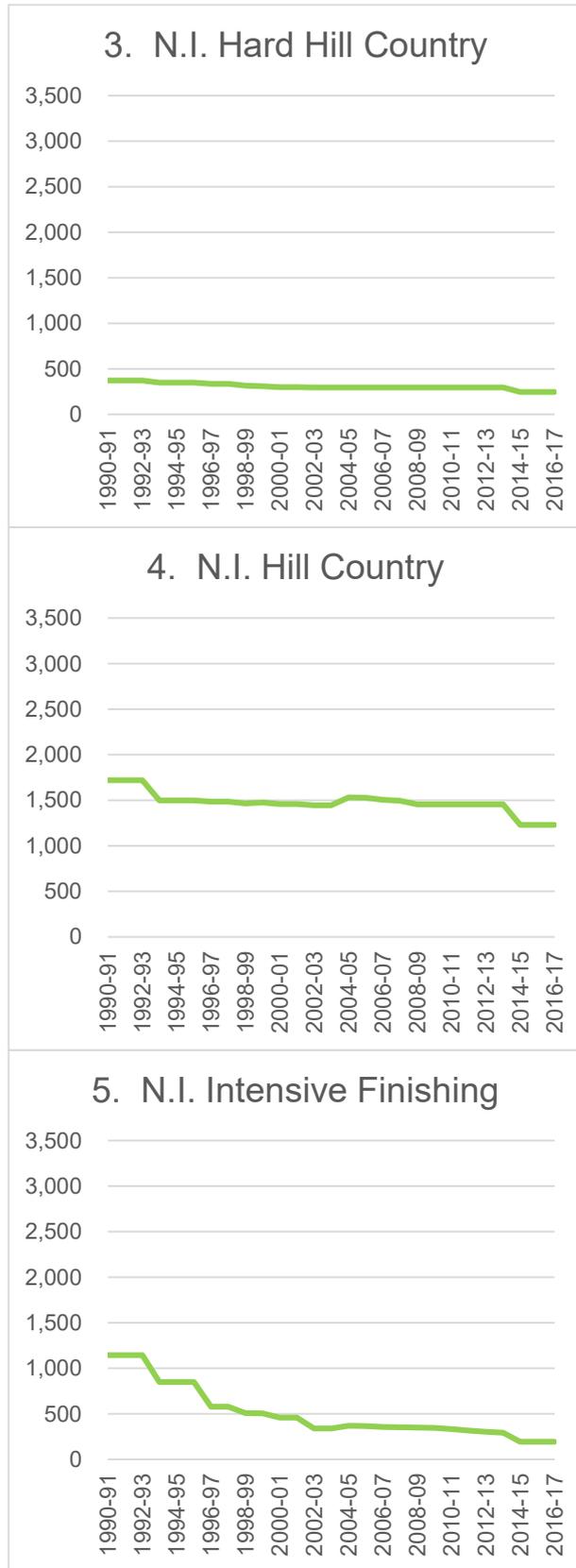
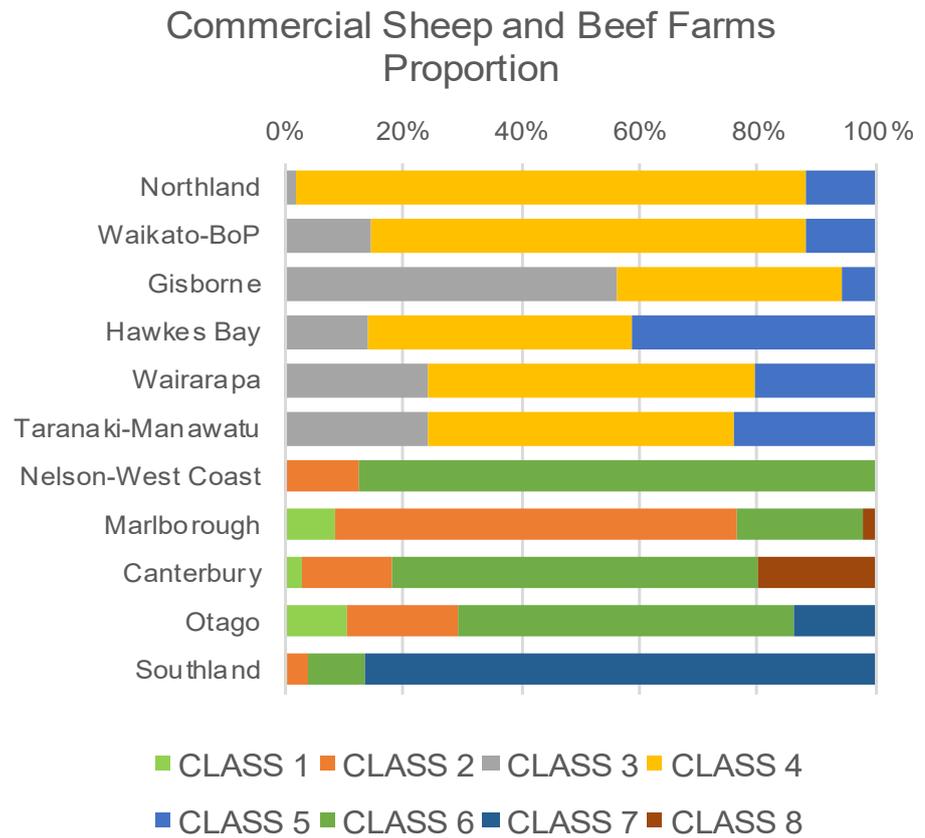


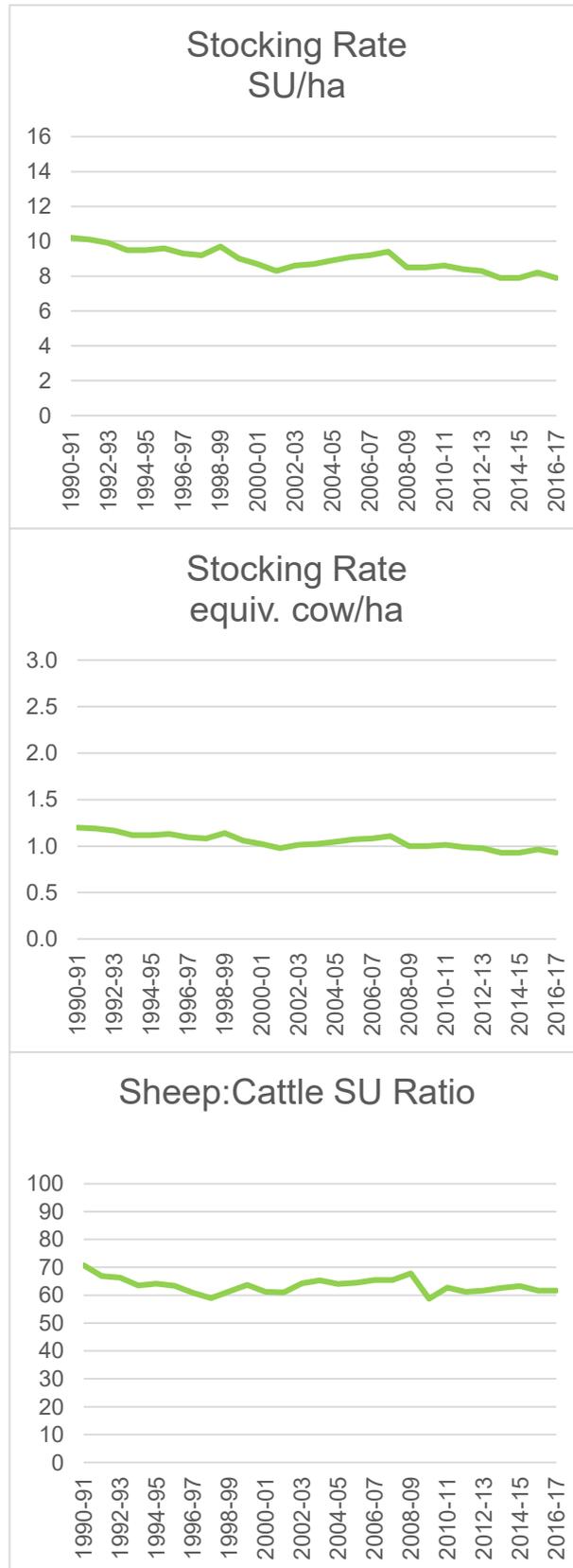
Figure 20: Estimated Proportions of Commercial Sheep and Beef Farms by Region



PHYSICAL CHARACTERISTICS OF COMMERCIAL SHEEP AND BEEF FARMS

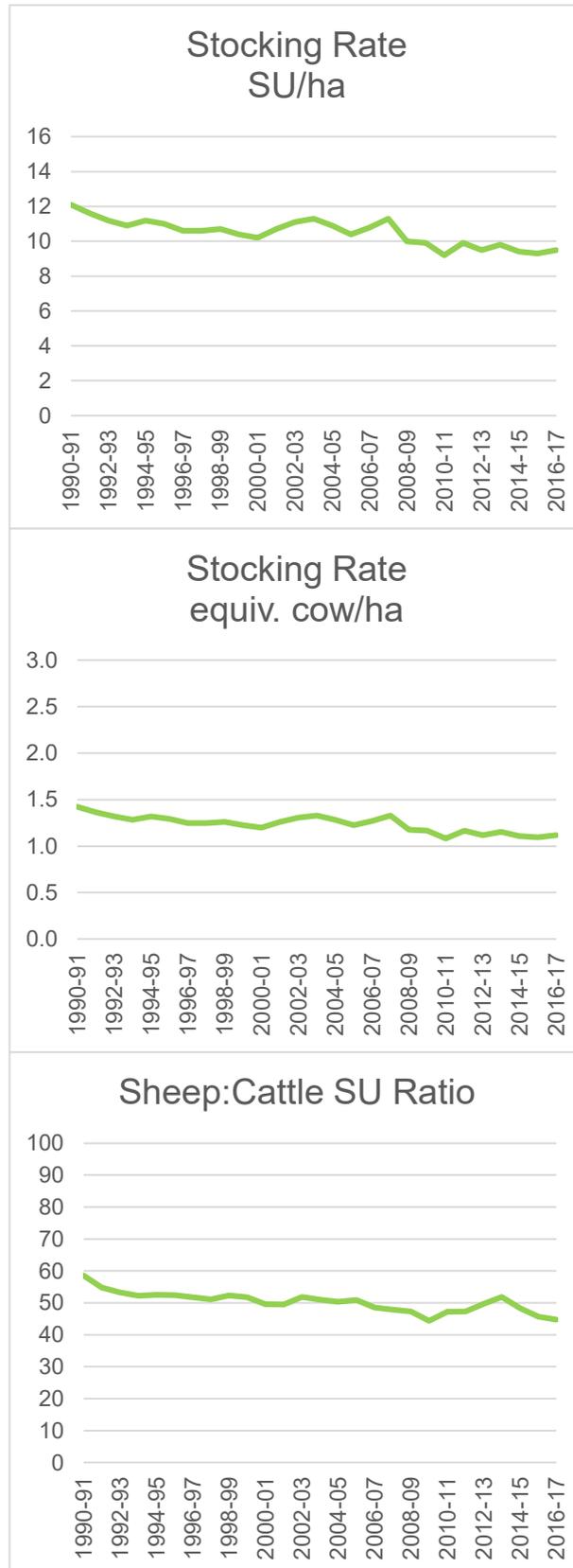
- 68. We estimate, from New Zealand’s official statistics that are collated by Statistics New Zealand, there are 245 **Farm Class 3 Hard Hill Country farms** in Waikato-BOP.
- 69. The Survey results estimate the effective area is about 670 ha on average (see Figure 24: Total Effective Area of Commercial Sheep and Beef Farms in Waikato-BOP). Over 40 percent of these farms exceed 900 hectares in total area. These farms carry thousands of Stock Units (SU), but have a low stocking rate – an average of around 8 SU/ha, which is equivalent to less than one Friesian cow per hectare – and the split between sheep and beef cattle SU averaged about 60:40.

Figure 21: Stocking Rate on Farm Class 3 Hard Hill Country Sheep and Beef Farms in Waikato-BOP



70. The most populous farm type – in Waikato-BOP and New Zealand generally – is **Farm Class 4 Hill Country**. We estimate there were around 1,230 in 2016-17.
71. On average, they had an effective area of around 342 hectares (see Figure 24: Total Effective Area of Commercial Sheep and Beef Farms in Waikato-BOP), carried around 3,240 SU in total at the start of the season (i.e. mid-winter (1 July)) and thus had a stocking rate of about 9.5 SU/ha, which is equivalent to about 1.1 cows per hectare, and the split between sheep and beef cattle SU was 45:55.

Figure 22: Stocking Rate on Farm Class 4 Hill Country Sheep and Beef Farms in Waikato-BOP



72. The least common farm type by number in Waikato-BOP is **Farm Class 5 North Island Intensive Finishing**. We estimate there were around 195 farms in 2016-17.
73. On average, they had an effective area of just under 200 hectares (see Figure 24: Total Effective Area of Commercial Sheep and Beef Farms in Waikato-BOP), and about 2,300 SU or an average stocking rate of about 11.6 SU/ha – which is equivalent to about 1.4 cows per hectare – and the split between sheep and beef cattle SU averages about 25:75.

Figure 23: Stocking Rate on Farm Class 5 Intensive Finishing Sheep and Beef Farms in Waikato-BOP

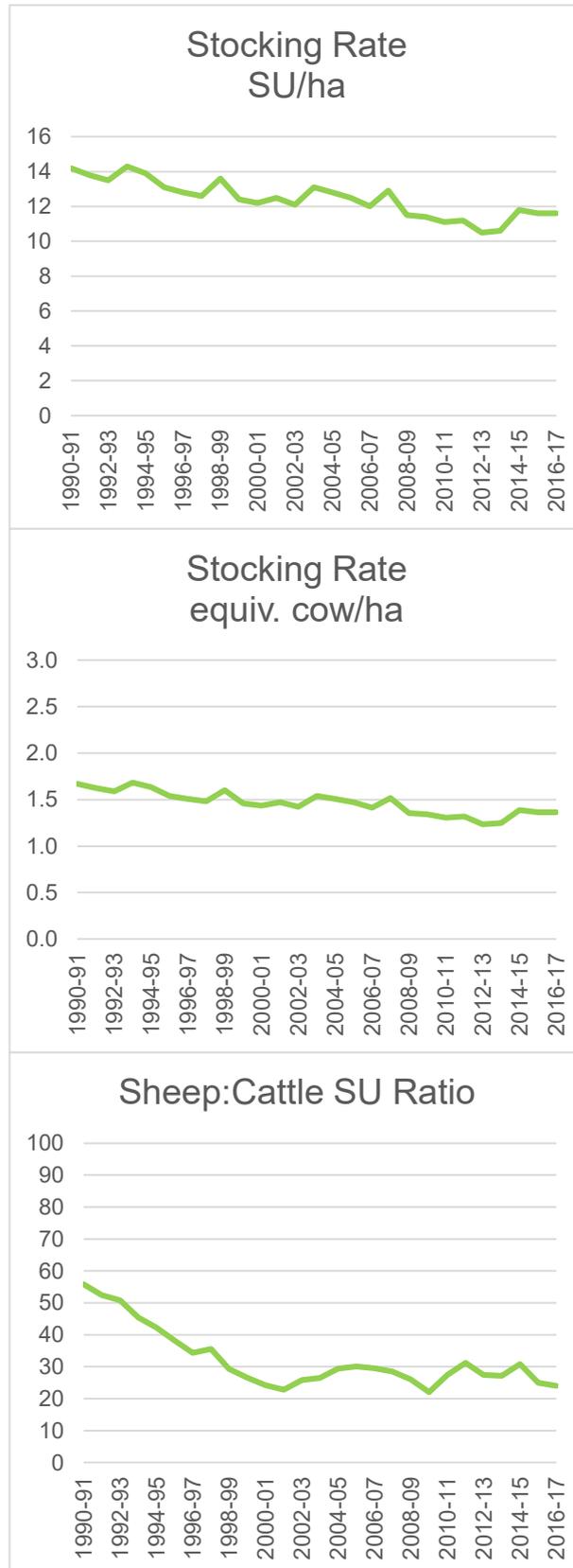


Figure 24: Total Effective Area of Commercial Sheep and Beef Farms in Waikato-BOP (ha)

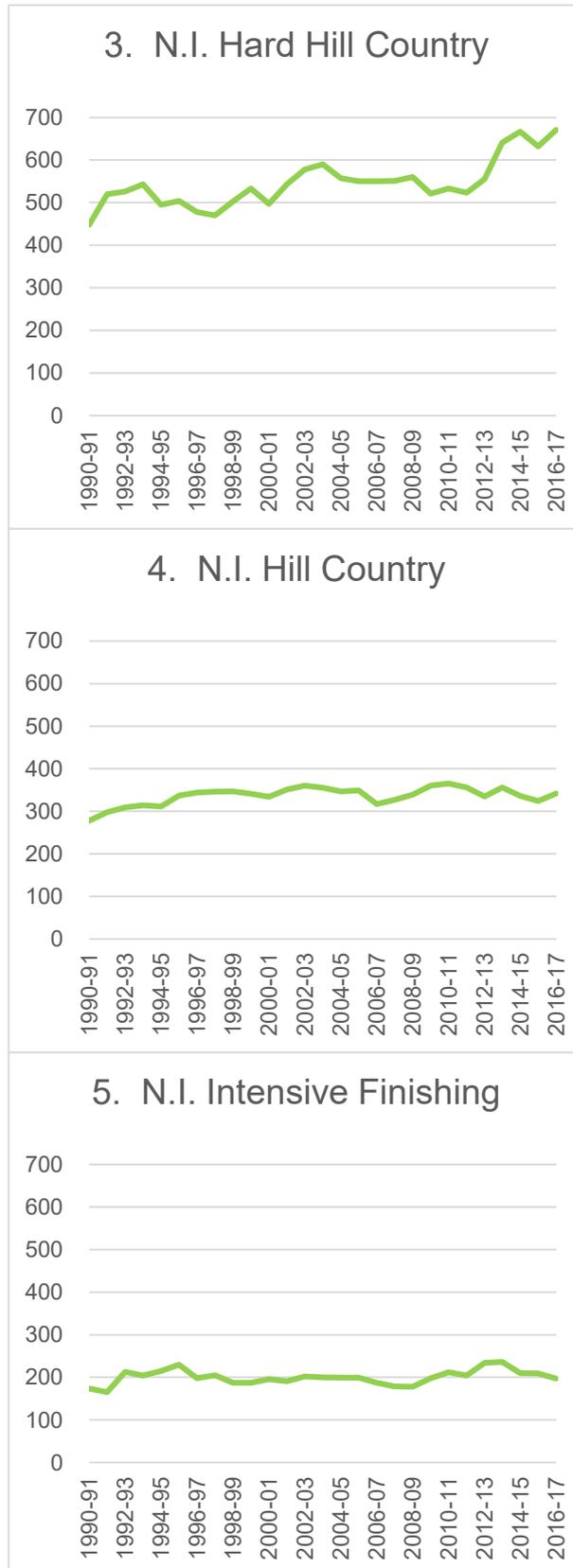
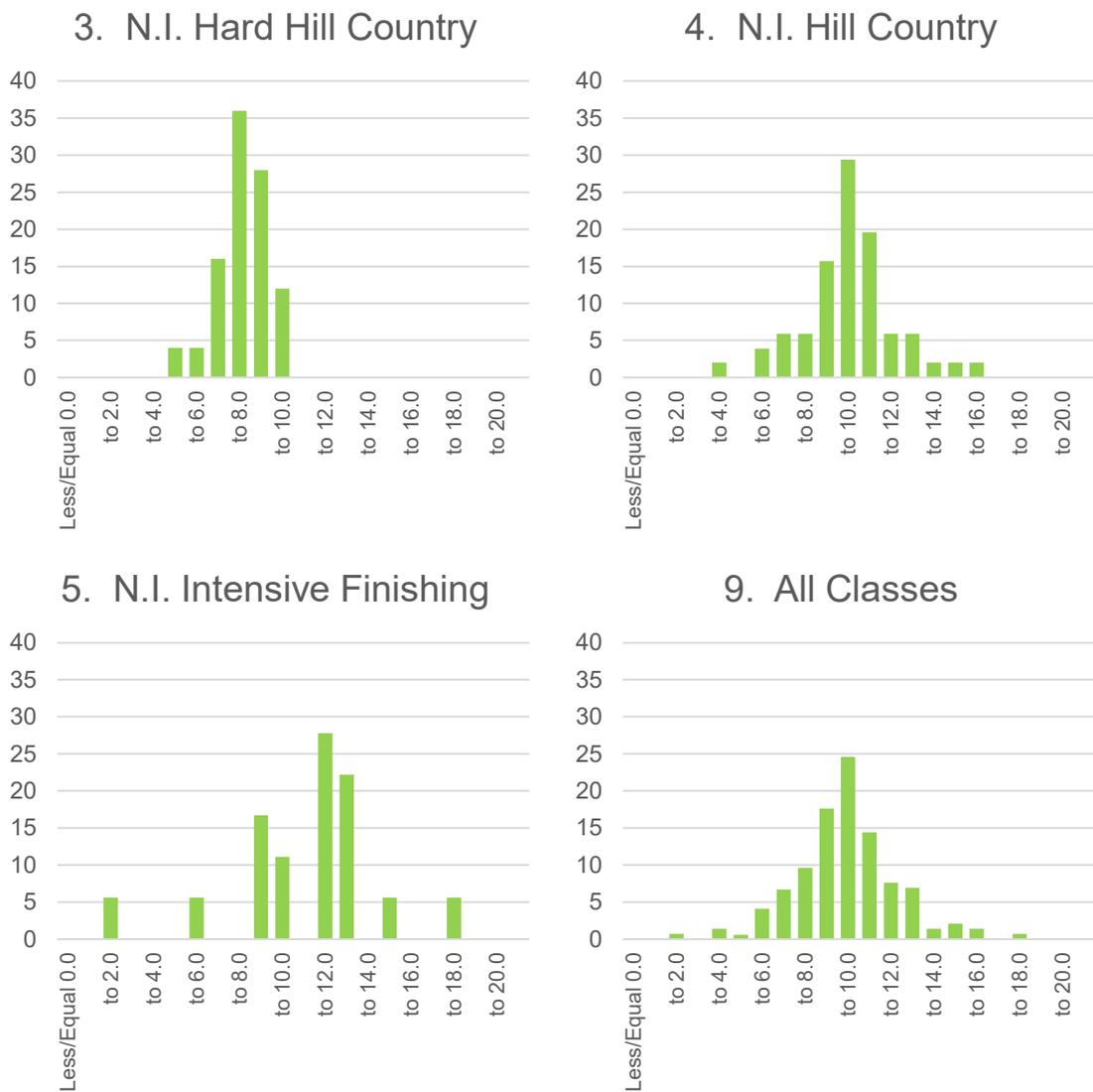


Figure 25: Distribution of Total SU on Commercial Sheep and Beef Farms in Waikato-BOP – 2016-17 (%)



Figure 26: Distribution of Stocking Rate on Commercial Sheep and Beef Farms in Waikato-BOP (%)



FERTILISER USE

74. The following figures show time-series information about fertiliser **applications** on sheep and beef farms.
75. In summary, the application of elemental N, P, K and S is low.
76. Nutrient **losses** from case study farms, which are a subset of the farms included in this analysis, are covered in others' evidence, particularly that of Dr Jane Chrystal.

Figure 27: Farm Class 3 – Hard Hill Country – Waikato-BOP (kg/ha)

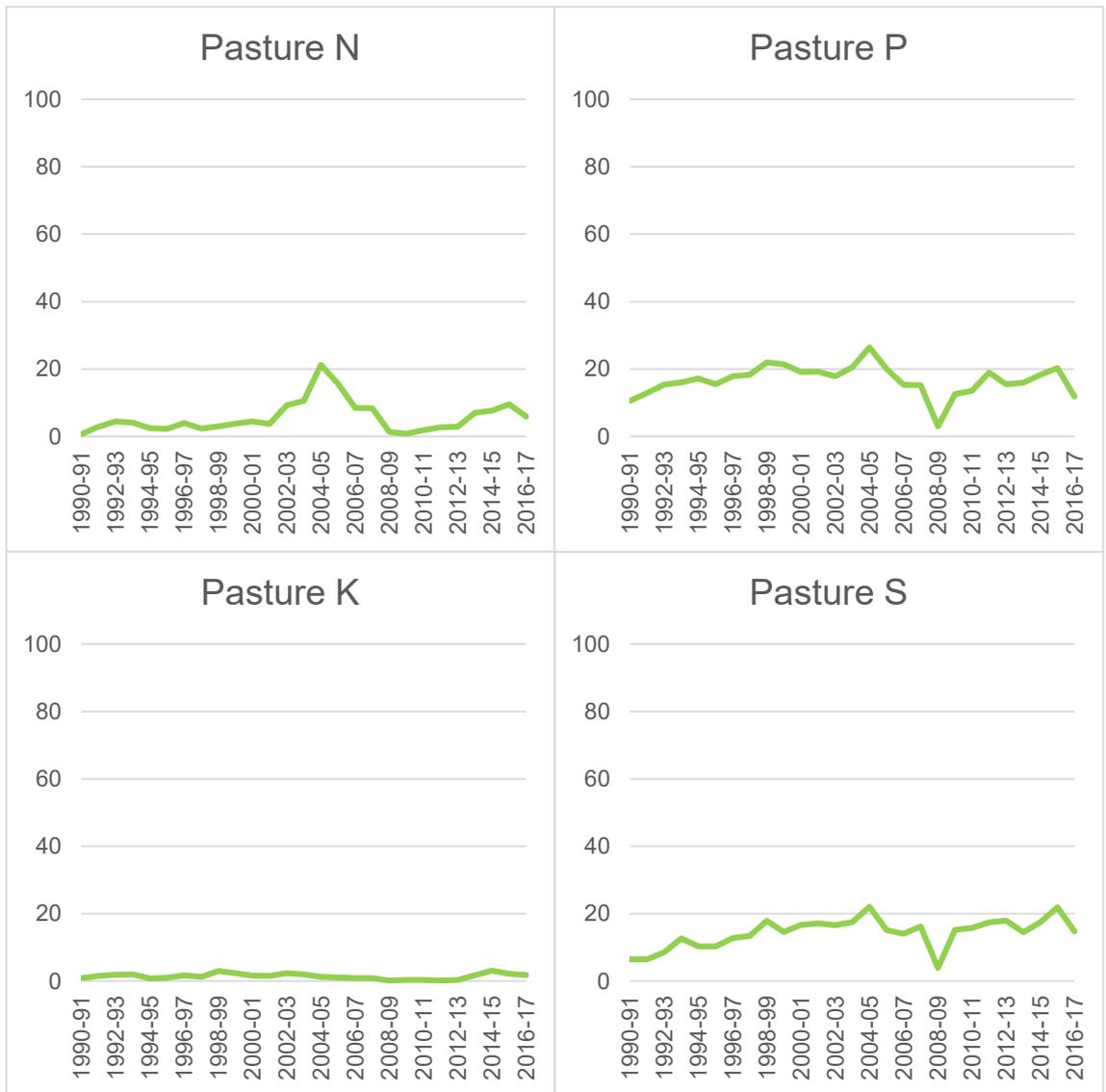


Figure 28: Farm Class 4 – Hill Country – Waikato-BOP (kg/ha)

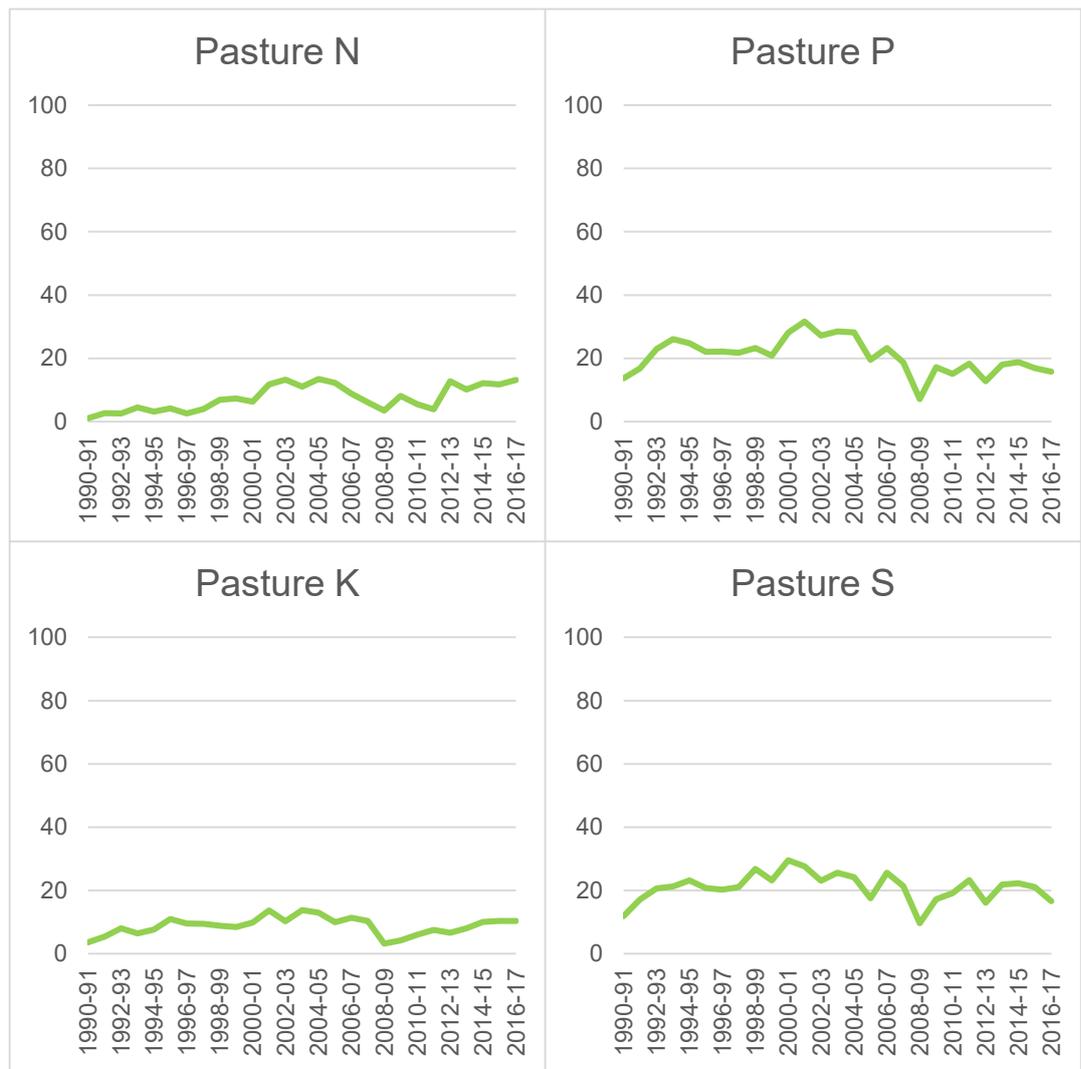
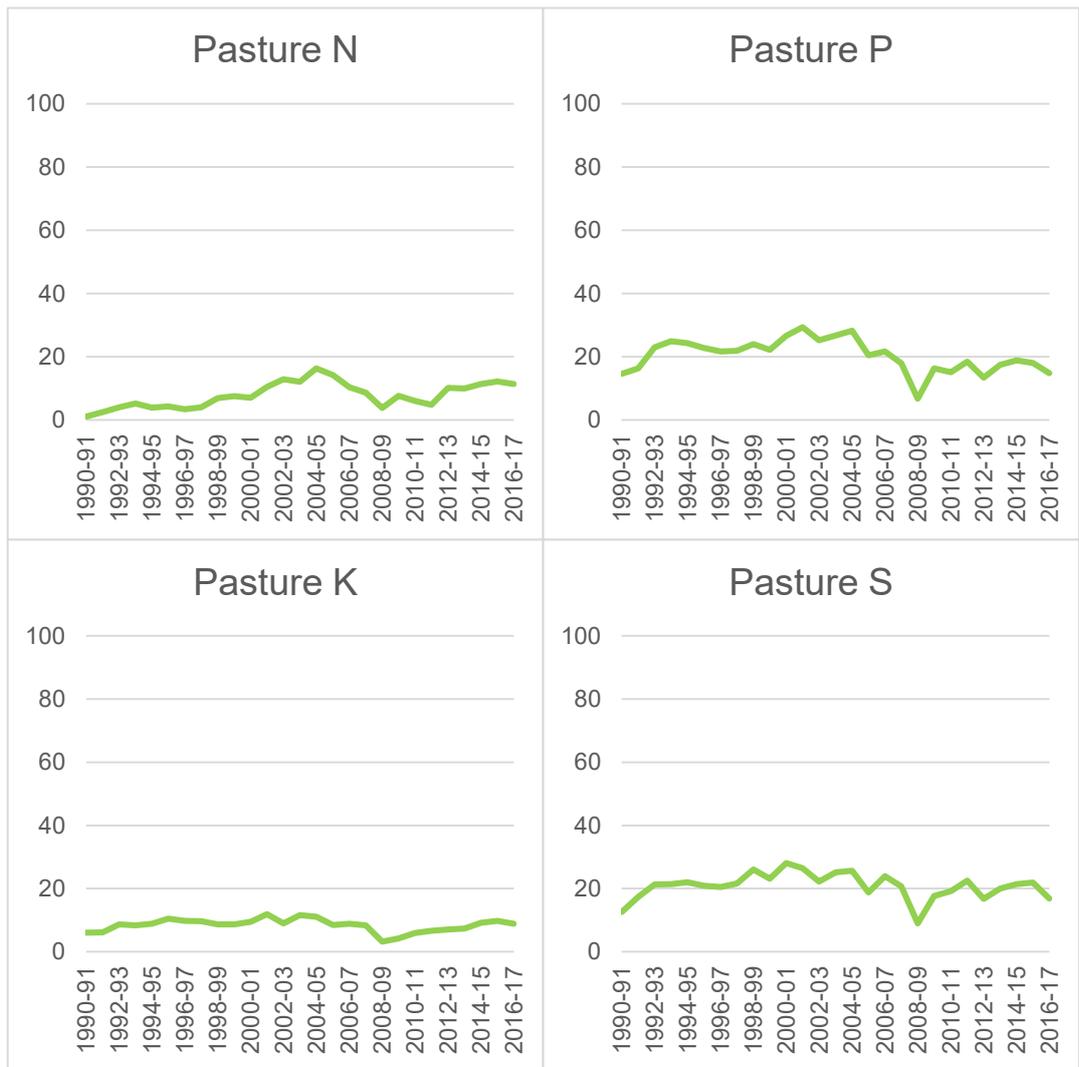


Figure 29: Farm Class 5 – Intensive Finishing – Waikato-BOP (kg/ha)



Figure 30: Farm Class 9 – Weighted Average All Classes – Waikato-BOP (kg/ha)



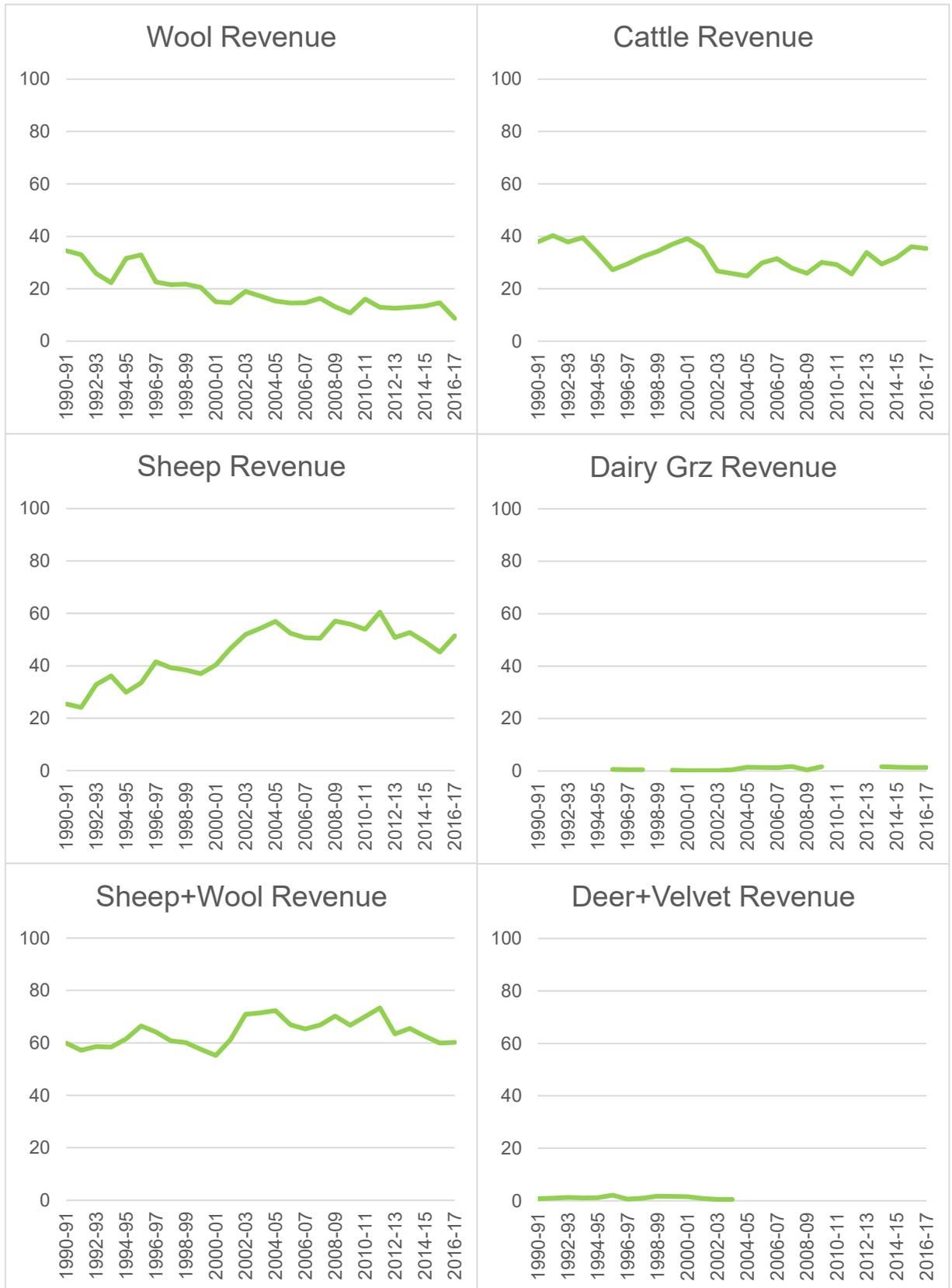
GROSS FARM REVENUE

77. Figure 31, Figure 32 and Figure 33 show the trends in sources of Gross Farm Revenue from the different Farm Classes of commercial sheep and beef farms in Waikato-BOP from 1990-91 to 2016-17.
78. Figure 34 shows the weighted average for all Farm Classes in Waikato-BOP, which provides a useful overview for broad understanding of the sector though one needs to consider the complexity and diversity of farms around the average.

FARM CLASS 3 – NORTH ISLAND HARD HILL COUNTRY

79. Figure 31 shows that the proportion of Gross Farm Revenue from *Sheep+Wool* generally has been 60-70 per cent – around 60 per cent in the 1990s, rising towards 70 per cent in the 2000s, and falling in the 2010s as cattle prices improved. The trend is mirrored in cattle revenue. And, dairy grazing revenue is almost non-existent.

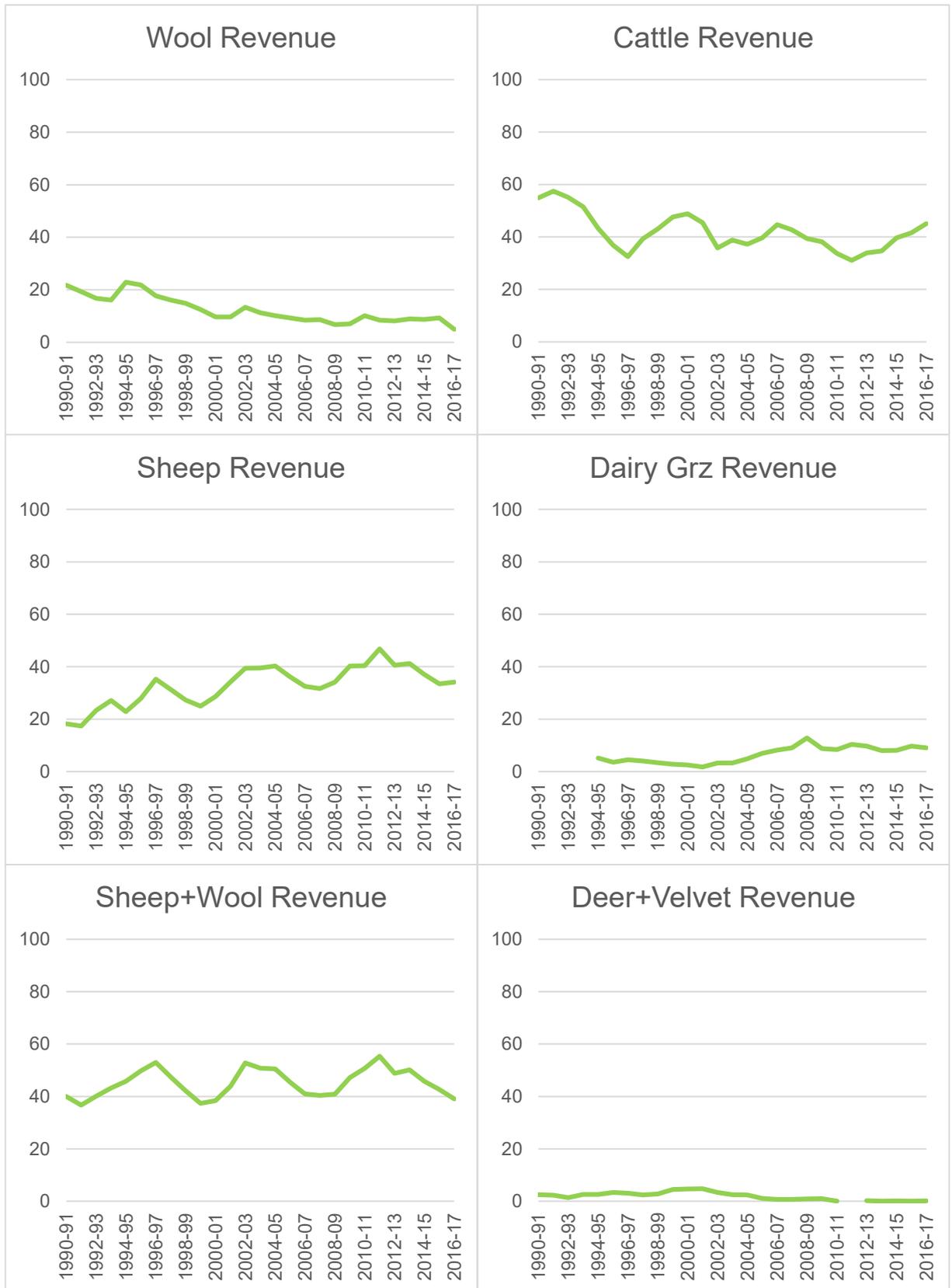
Figure 31: Farm Class 3 – Hard Hill Country – Waikato-BOP (%)



FARM CLASS 4 – NORTH ISLAND HILL COUNTRY

80. Figure 32 shows dairy grazing revenue averaged around 10 percent of Gross Farm Revenue for the 2010s, with the proportion from sheep increasing, the proportion that is wool revenue decreasing and the proportion that is cattle revenue fluctuating around 40 percent, and rising in the 2010s as beef and thus cattle prices improved.

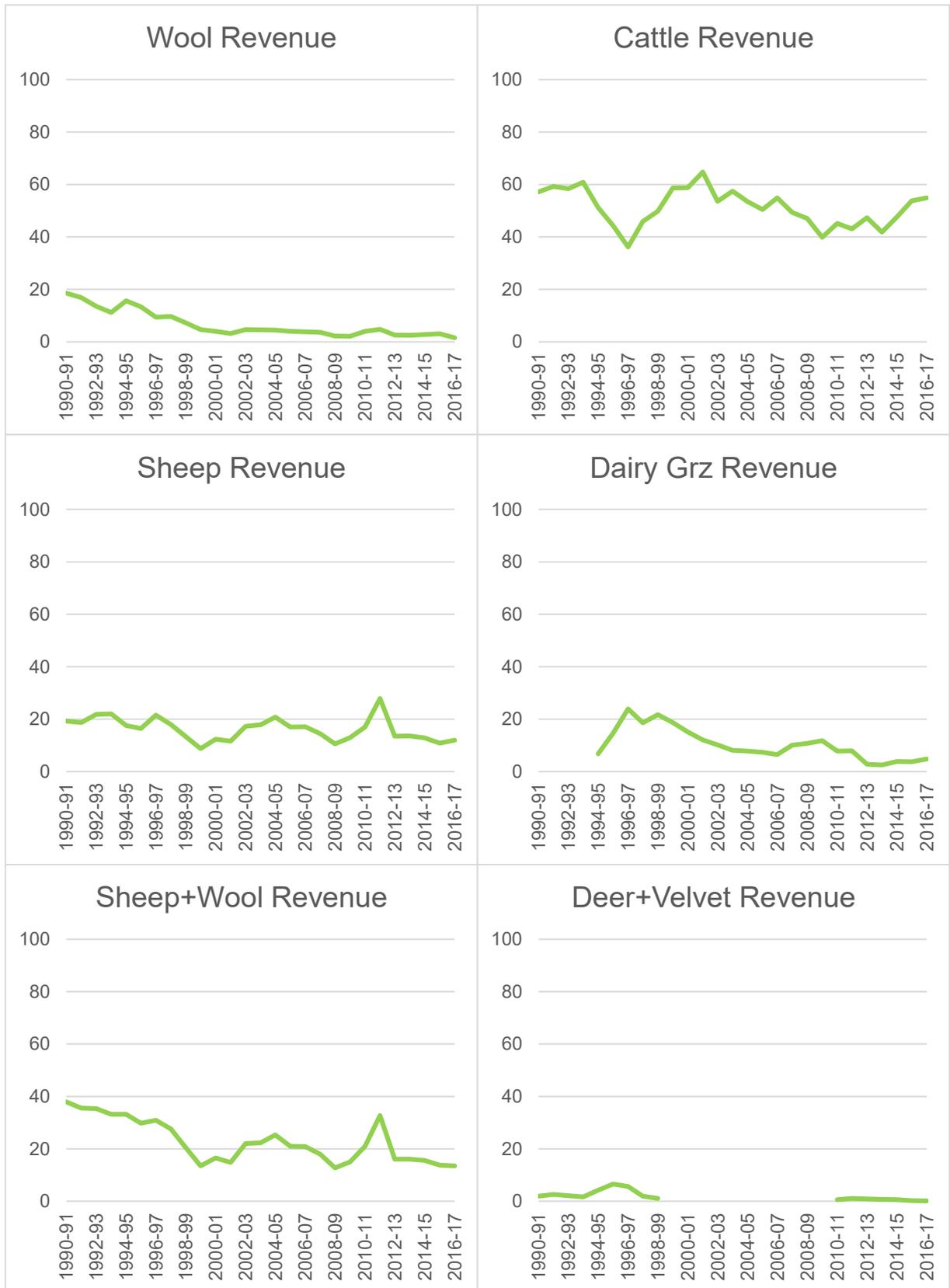
Figure 32: Farm Class 4 – Hill Country – Waikato-BOP (%)



FARM CLASS 5 – NORTH ISLAND INTENSIVE FINISHING

81. In contrast with the other farm classes, cattle revenue is a more significant contributor to Gross Farm Revenue (see Figure 33), and *Sheep+Wool* revenue is a smaller proportion. In the mid-1990s, dairy grazing revenue accounted for around 20 per cent of Gross Farm Revenue, its proportion declined steadily to less than five per cent, as returns for sheep and beef cattle improved, and as the number of sheep and beef farms declined when dairy conversions occurred.

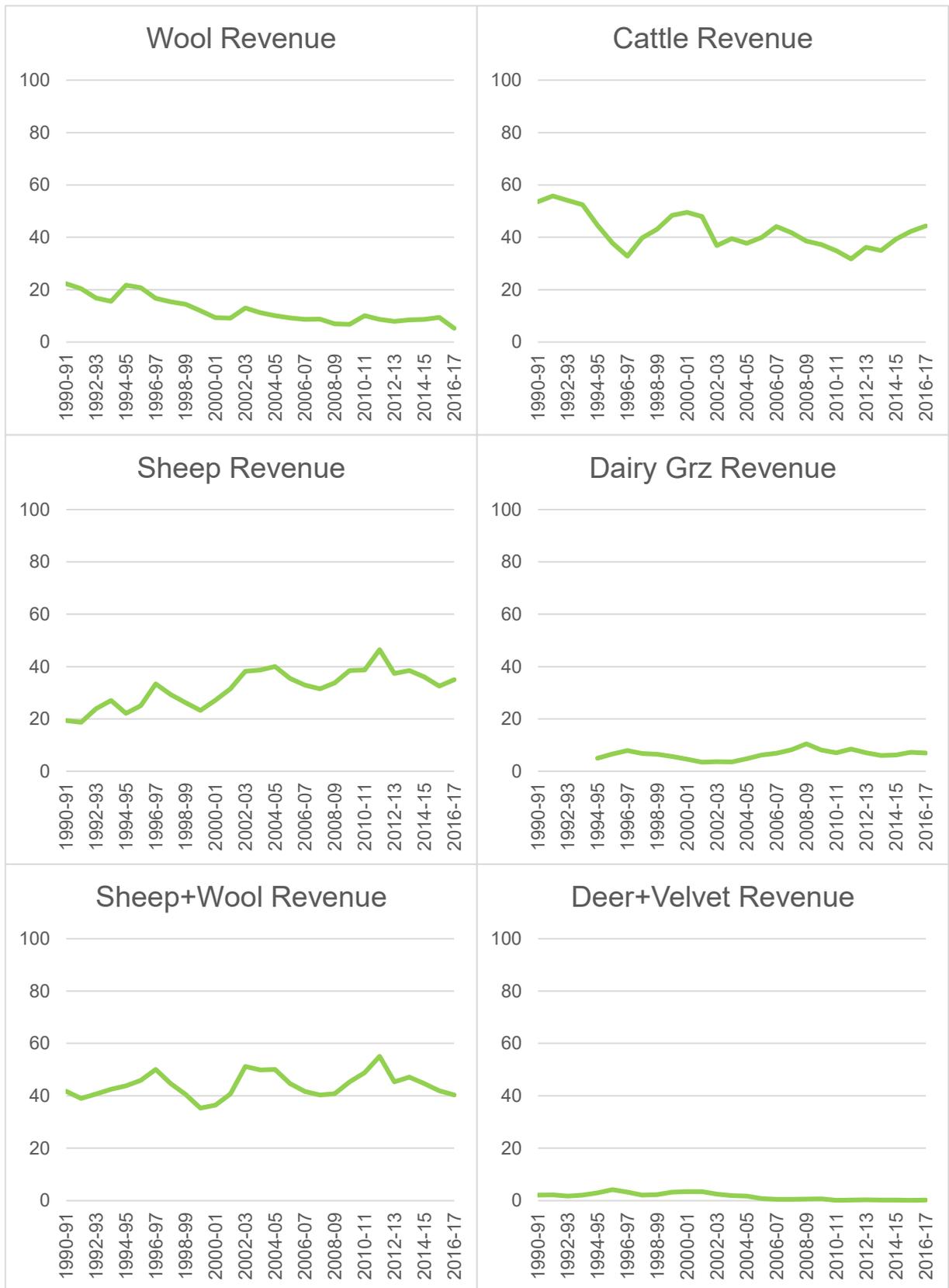
Figure 33: Farm Class 5 – Intensive Finishing – Waikato-BOP (%)



FARM CLASS 9 – WEIGHTED AVERAGE ALL CLASSES

82. The Weighted Average for All Classes combines these into a regional average. On average, dairy grazing revenue reached a peak of just over 10 percent of Gross Farm Revenue in 2008-09, with the proportion from sheep broadly increasing, and the proportion from wool decreasing. The proportion that is cattle revenue has fluctuated around 40 percent, rising in the 2010s.

Figure 34: Farm Class 9 – Weighted Average All Classes – Waikato-BOP (%)



DAIRY GRAZING REVENUE

83. “Winter/dairy/intensive grazing” means different things to different people because of the diversity and complexity of sheep and beef farming and the business relationships between sheep and beef farmers and those wanting to graze out their livestock.
84. Dairy grazing revenue is defined in the Sheep and Beef Farm Survey as revenue earned from grazing dairy livestock – of any age.
85. Dairy grazing revenue grew steadily through the 2000s on Hill Country farms (see Figure 35), while it declined on Intensive Finishing farms.
86. However, to put this in perspective:
 - (a) Dairy grazing revenue averages 6-8 percent of Gross Farm Revenue (see Figure 36); and
 - (b) Around three-quarters of sheep and beef farms in Waikato BOP do not earn any revenue from dairy grazing (see Figure 37). As can be seen from Figure 37, 95 percent of Hard Hill Country farms, over 70 percent of Hill Country farms and about 70 percent of Intensive Finishing farms did not earn revenue from dairy grazing.
87. This situation has applied to sheep and beef farms for a number of years.

Figure 35: Dairy Grazing revenue (\$ per ha)

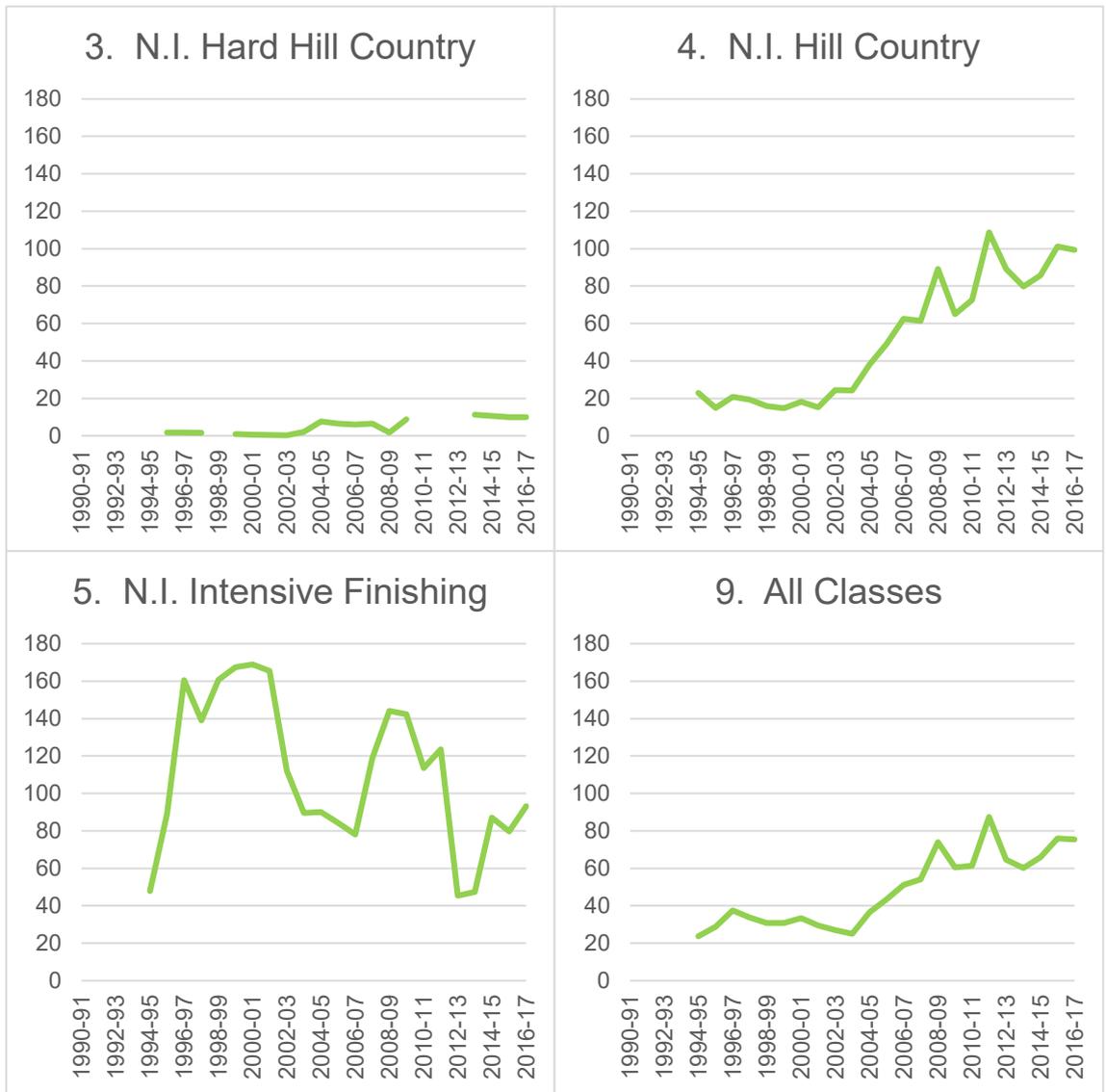


Figure 36: Dairy Grazing revenue as a % of Gross Revenue

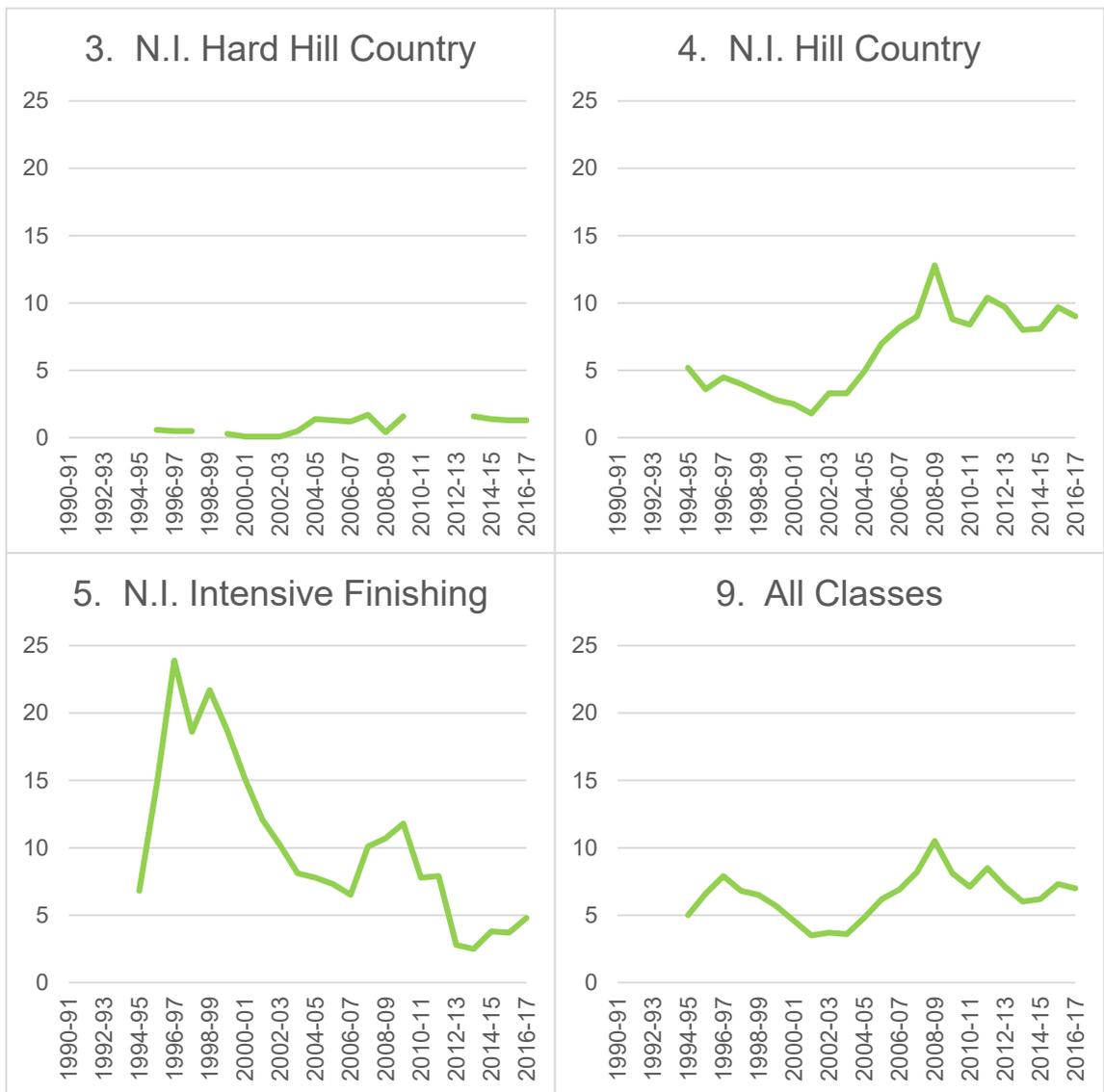


Figure 37: Distribution of Dairy Grazing revenue as a % of Total Gross Revenue –
 Waikato-BOP – 2016-17

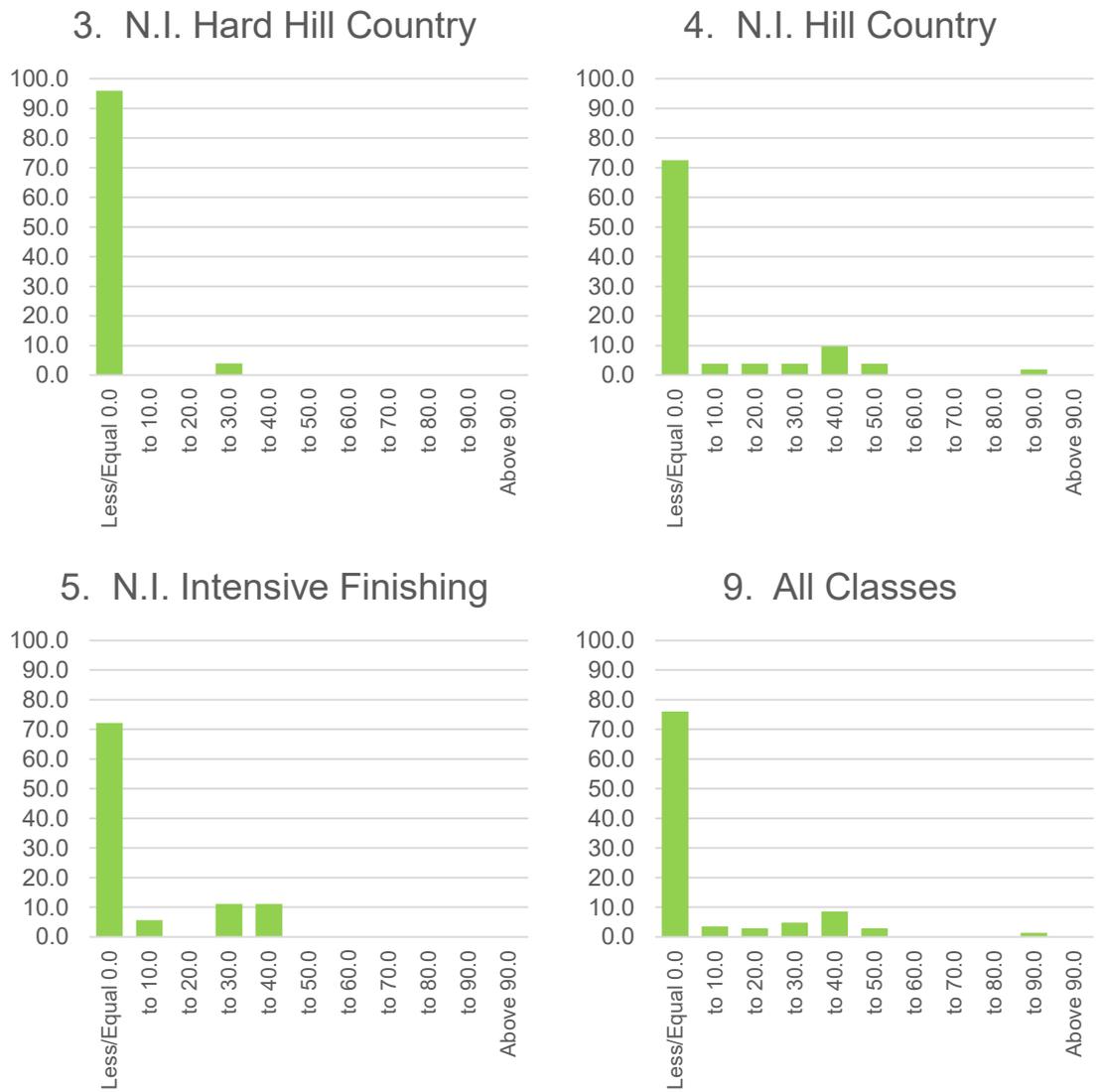
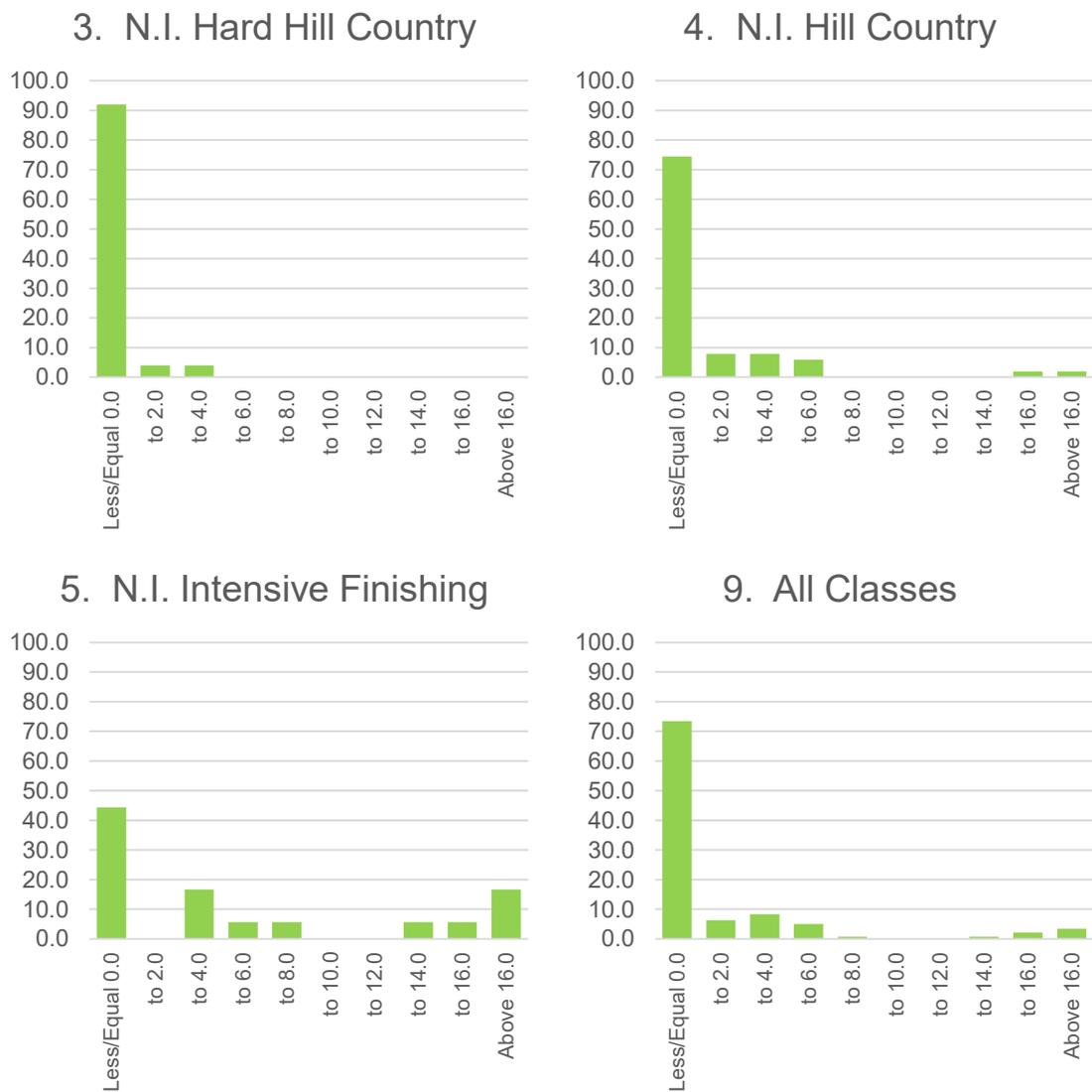


Figure 38: Distribution of Winter Feed Area as a % of Total Effective Area – Waikato-BOP – 2016-17



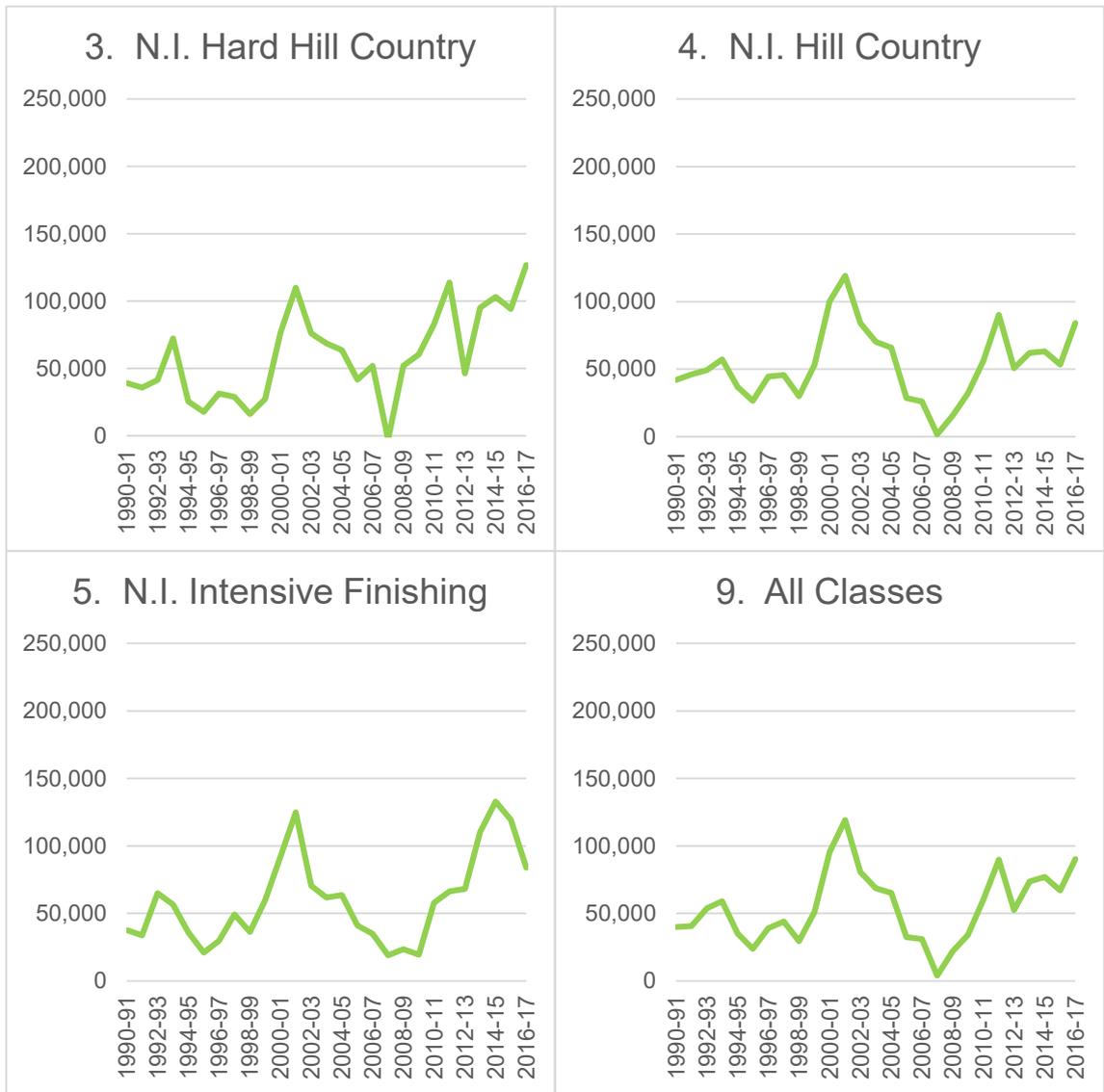
PROFITABILITY

88. Profitability in sheep and beef farming has fluctuated over time. It weakened during the 1980s and 1990s following deregulation, and improved in the early 2000s as depreciation of the New Zealand dollar boosted revenue. Subsequent fluctuations have been the result of the volatility of product prices, and seasonal conditions, which impacted on productivity. It is important to note the diverse range of products that come from sheep and beef farms. This reflects farmers’ approach to risk management as they respond to the limitations imposed by the factors of production – land, labour and capital – and to the physical and financial environment.

89. Figure 39: Inflation-adjusted Farm Profit Before Tax per Farm shows inflation-adjusted profitability (using real⁴ farm profit before tax) for sheep and beef farms in Waikato-BOP between 1990-91 and 2016-17. While the numbers are expressed in 2004-05 terms, there are two important points about the patterns:
- (a) the pattern between Farm Classes is similar, which reflects the interconnectedness and interdependencies of Farm Classes; and
 - (b) the peaks and troughs reflect the mix of livestock and the fortunes of each.

⁴ That is, adjusted for inflation

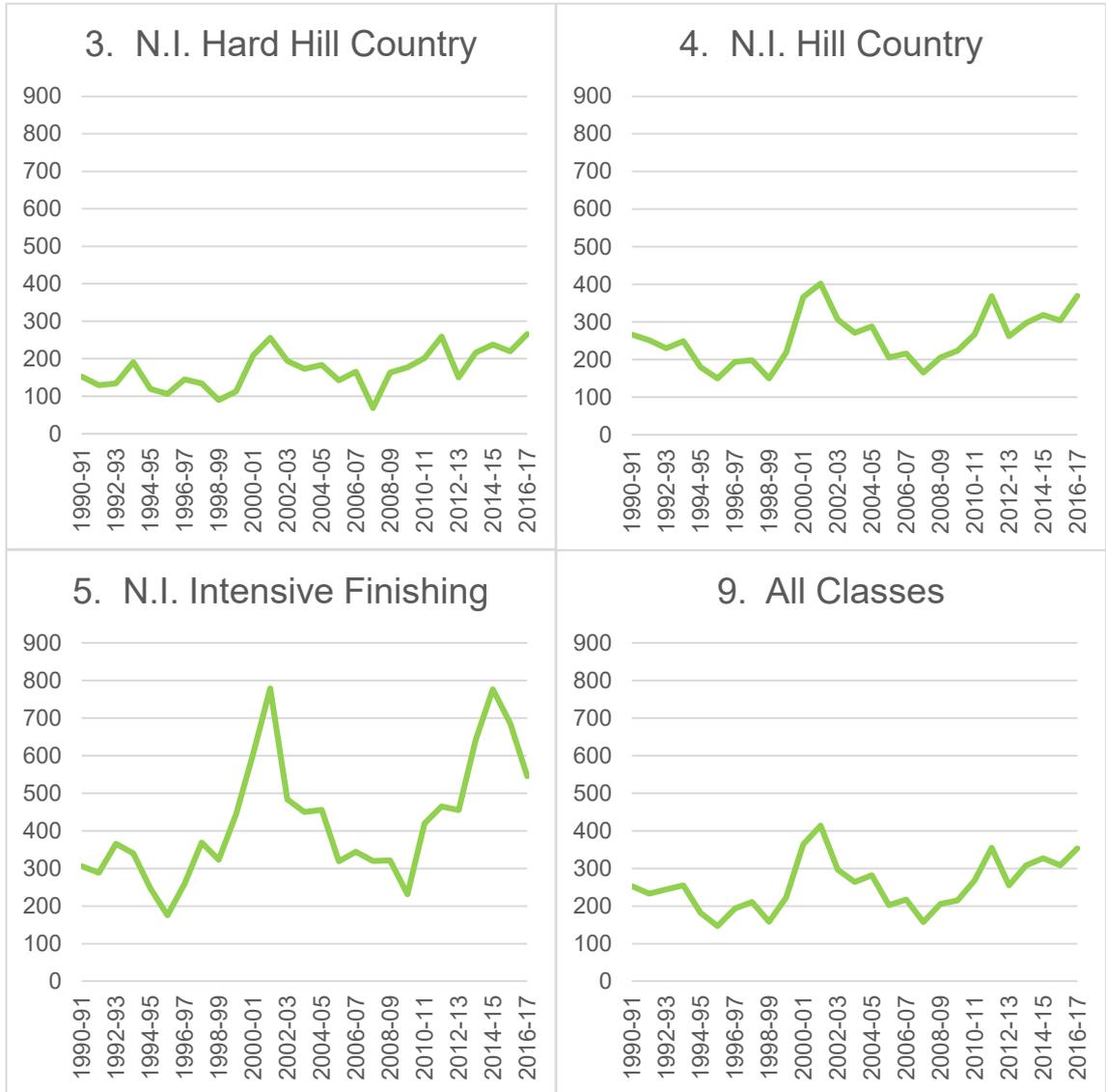
Figure 39: Inflation-adjusted Farm Profit Before Tax per Farm (\$)



90. However, per-farm measures do not take account of farm size, which for the sheep and beef industry varies considerably as shown earlier (see Figure 24). The use of per hectare – and specifically per **effective** hectare – measures allows comparison between farms of different sizes on a consistent basis. Figure 40 shows the average financial performance for each of the farm classes in Waikato-BOP using inflation-adjusted Earnings Before Interest Tax and Rent (EBITR). Why EBITR and not EBIT? Rent is a cost of capital in our view.

91. Intensive Finishing farms have had to compete with dairy.

Figure 40: Inflation-adjusted Earnings Before Interest, Tax and Rent per hectare (\$)



MEAT PROCESSING AND MARKETS

- 92. The sheep and beef industry is important to Waikato because of the value it adds to the economy and the jobs it creates. In addition, the farm servicing sector is considerable.
- 93. The dairy farming and meat processing industries are related because of the processing of cull dairy cattle and bobby calves that occurs in Waikato.
- 94. New Zealand’s drystock industries mainly focus on the export of meat and meat products. Table 2 shows over 90% of lamb and mutton, and nearly 90% of beef production, is exported. Consequently, New Zealand’s meat

processors and exporters, and their suppliers of livestock, rely heavily on exporting to a wide range of markets.

Table 2: Share of New Zealand pastoral products exported 2017-18

Product	Export share (%)	Export value (\$ million)
Wool	91%	\$558
Lamb*	94%	\$3,358
Mutton*	97%	\$760
Beef and Veal*	88%	\$3,628
Deer [\$294m] + Other	96%	\$1,383
Total		\$24,469

* Includes co-products

Source: B+LNZ Economic Service, Statistics New Zealand

MEAT PROCESSORS

95. This section gives a brief overview of the main processors in Waikato and then discusses key export markets for lamb and beef. These export markets are particularly relevant for the sheep and beef industry's future prospects.
96. The tariff-rate quota allocations for sheep and goat meat and high quality beef exports to the EU, and for beef and veal exports to the US indicate New Zealand meat processors' production volumes. Two of the three companies in New Zealand with the largest quota allocations for sheep and goat meat to the EU and beef and veal to the US have processing plants in Waikato: Silver Fern Farms Ltd., whose corporate office is in Dunedin, and Affco New Zealand Ltd, which is based in Horotiu. Other quota holders have plants in Waikato, e.g. Greenlea Premier Meats Limited, which is based in Hamilton. See [Meat Processing in New Zealand](#).
97. Table 3 shows the tariff-rate quota allocations for companies with a plant in Waikato. In total, these companies account for:
 - (a) 39% of the quota allocations for the EU sheep and goat meat;
 - (b) 58% of the quota allocations for the EU high quality beef; and

(c) 63% of the quota allocations for the US beef and veal meat.

Table 3: 2019 Tariff-rate quota allocations for companies with a processing plant in Waikato

	European Union sheep and goat meat ⁵		European Union High Quality Beef ⁶		United States beef and veal meat ⁷	
	tonnes c.w.e.	Share of NZ total %	tonnes net product weight	Share of NZ total %	tonnes p.w.	Share of NZ total %
Silver Fern Farms Ltd.	44,355	19	403		64,308	30
Affco New Zealand Ltd.	35,905	16	233		40,299	19
Greenlea Premier Meats Ltd.	-	-	90		19,377	9
Te Kuiti Meat Processors Ltd	4,528	2	-		-	-
UBP Ltd.	-	-	28		10,326	5
Crusader Meats New Zealand Ltd.	5,124	2	-		208	0
Total	89,912	39	754	58	134,518	63
NZ total	228,389	100	1,300	100	213,402	100

Source: New Zealand Meat Board

⁵ <https://www.nzmeatboard.org/assets/Documents/46964d0fc6/2019-European-Union-Sheepmeat-and-Goatmeat-Quota-Allocations-NZ-Gazette-5-Dec-2018.pdf>

⁶ <https://www.nzmeatboard.org/assets/Documents/01e163f010/2018-2019-EU-High-Quality-Beef-TRQ-Allocation.pdf>

⁷ <https://www.nzmeatboard.org/assets/Documents/35a0c81f73/2019-United-States-Beef-and-Veal-Quota-Allocations-NZ-Gazette-5-Dec-2018.pdf>

MEAT SALES

98. There is no publicly available information about sales patterns because the information is commercially sensitive. However, it is reasonable to assume that the pattern of sheep and beef exports from Waikato is similar to that for New Zealand as a whole. One caveat: a higher proportion of Waikato's meat production is beef production than the New Zealand average.

LAMB EXPORTS

99. New Zealand exports lamb to nearly 100 countries but there are some key export markets. China, the UK, the US, Germany and the Netherlands accounted for 35 percent of total value and 34 percent of total volume. The UK is a longstanding market for New Zealand lamb but it was overtaken by China in 2016-17. However, the two markets have different demands as is reflected in the different average value figures shown in Figure 41.

100. The US and other EU countries remain important, however, there is a significant difference in the value of the products (as measured in \$ per tonne) between these two export markets. China moved up from eighth most important market by value in 2007-08 to largest in 2016-17. It has traditionally been a market for lower value cuts but more recently higher value cuts, such as shoulders and legs, are beginning to feature, reflecting new growth opportunities.

Figure 41: Top Lamb Export Markets by Value – September Year

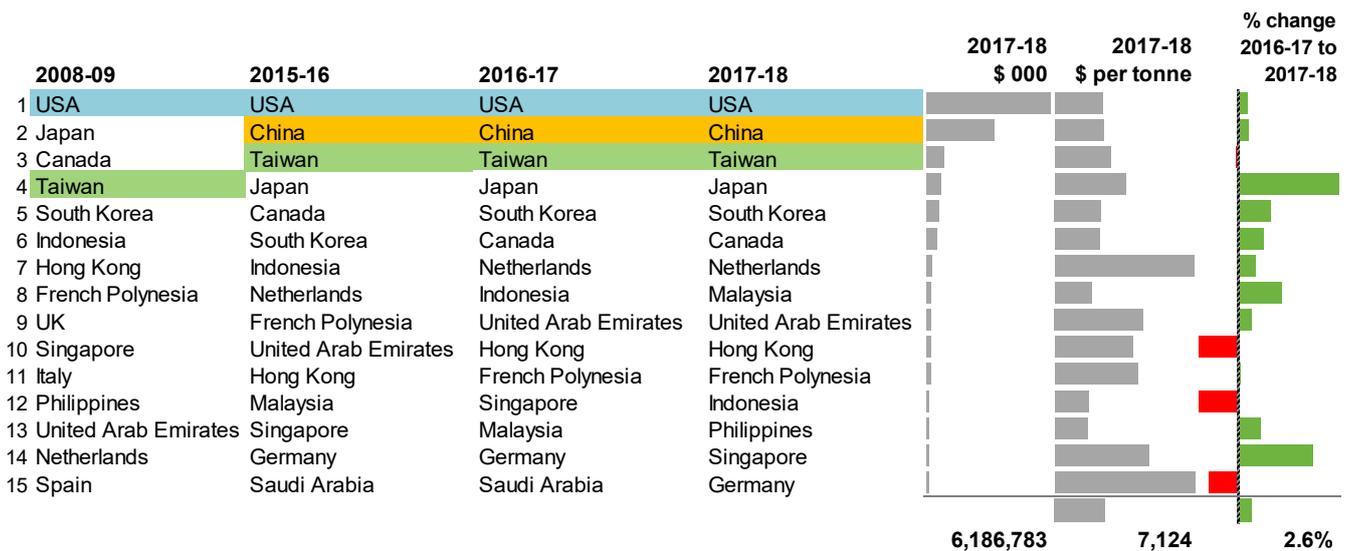


Source: Beef + Lamb New Zealand Economic Service

BEEF AND VEAL EXPORTS

101. The US and China are the key markets for beef exports. New Zealand has a long history of supplying lean beef to the US, primarily for blending with, and adding value to, fat that is trimmed from steers and heifers that are finished in feedlots – in the US mostly, and Canada – for the production of ground beef. Americans consume the majority of their beef in ground beef form. Frozen New Zealand beef provides a valuable ingredient because, among other things, it is consistent, production is reliable, it has superior food safety credentials, there are well-established supply chain processes, including processing in New Zealand, shipping services, business practices, commercial and legal remedies if needed, and distribution through the US system. Market significance is reflected through export volumes, which are predominantly ingredient beef and sold at a low price per tonne. Exports to China, which was New Zealand's second largest market by value in 2017-18, have increased from less than 500 tonnes in 2007-08, to over 100,000 tonnes in 2017-18. This reflects a large increase in demand as supply chains develop and for lower value cuts.

Figure 42: Top Beef & Veal Export Markets by Value – September Year



Source: Beef + Lamb New Zealand Economic Service

102. Meat processors and exporters produce and export a wide range of items including hides and skins, tallow and offal – edible and inedible. These make significant contributions to New Zealand's merchandise exports.

FUTURE OUTLOOK FOR SHEEP AND BEEF FARMING IN WAIKATO

103. Farmers, processors, exporters and others in the value chain have been adapting to new circumstances for over a century as market signals and incentives change, and as they strive to meet demands of customers – both in New Zealand and overseas. Farmers are managers of multiple projects, environments and constraints as they work towards their goals over the long term.
104. A key factor in the future will be maintaining flexibility to be able to continue adapting as the world changes while achieving the goals of the community, of which farmers are a part.
105. Waikato livestock farmers produce the raw material for a wide range of products that are exported to customers around the world. Consequently, the sheep and beef farming sector's future outlook depends substantially on export markets, some of which are in a period of transition. Demand continues to grow for well-produced items, the definition of which goes wider than the physical product to include all the added value from processing to reliably delivering the product to customers. Well-produced items require ongoing investment in the value chain and in the relationships between the wide range of participants in the value chain.
106. Farming systems in Waikato have responded well over many years to changing circumstances, while managing many risks, some of which are fully under the control of the farmer and some of which can be managed but are not fully controlled by the farmer.

CONCLUSION

107. Agriculture is a major economic activity in Waikato and is becoming increasingly important to the region over time. The sheep and beef sector is significant in the region and a major employer. These factors combined mean that the sheep and beef sector is inextricably linked to the region's viability and economic success.
108. The New Zealand sheep and beef sector's total value of production is \$10.4 billion with exports worth \$7.5 billion and domestic sales worth an additional \$2.9 billion in 2018. The sector has 80,000 employees, of which 59,000 are directly employed with an additional 21,000 indirectly employed.

The sector supports 5,877 direct jobs in Waikato, and contributes GDP of \$294 million.

109. The sector exports over 90 percent of its production, it is New Zealand's second largest goods exporter and New Zealand's largest manufacturing industry. The health and wellbeing of the red meat sector within New Zealand is important to the economy and regional New Zealand, accounting for 3.2 percent of gross domestic product.
110. The sheep and beef industry is an adaptable and resilient sector, and is continually making efficiency gains in red meat production. Through continued innovation and adoption of technology, which should not be understood to be limited to digital technologies, sheep and beef farmers have increased meat production, while decreasing total animal numbers, and while losing their most productive land to other land uses. To remain resilient into the future, sheep and beef farmers need flexibility to adjust their systems to respond to changing conditions.
111. Farming is not always profitable. Any new on-ground actions must be spread over a number of years to manage the volatility that occurs from fluctuating physical and financial performance.

Dated this 15 day of February 2019

Mr Andrew Burt

APPENDIX 1: DESCRIPTION OF B+LNZ SHEEP AND BEEF FARM SURVEY

BACKGROUND

112. The B+LNZ Sheep and Beef Farm Survey (the Survey) is conducted using a random sample of over 500 farms (“farm businesses”) each year. Data for the whole farm business are collected and analysed, and recorded in a computer database, characterising each farm on over 2000 metrics, including:
- (a) Reconciliations of livestock, wool production and sales, feed, and cash crops;
 - (b) Production, such as meat weights, wool grades, calving and lambing percentages;
 - (c) Inputs, such as fertiliser (Nitrogen, Phosphorus, Potassium, and Sulphur), animal health, labour, repairs and maintenance, interest, and rates; and
 - (d) Full financial analysis of revenue and expenditure, the balance sheet and flow of funds to identify the cash flows in and out of the business.
113. The Survey is about actual data, not intentions.
114. To qualify for the Survey, a farm has to winter at least 750 sheep (or equivalent sheep plus beef cattle Stock Units (SU)), must be privately operated (i.e. not run by the State), and must not be run in conjunction with another property. In addition, three other conditions must be satisfied:
- (a) At least 70 percent of the farm revenue must be derived from sheep, or sheep plus beef cattle (except in the case of mixed finishing farms of Canterbury);
 - (b) At least 80 percent of the Stock Units (SU) on the property must be sheep and/or beef cattle SU; and
 - (c) The farm must be run as an ordinary commercial sheep and beef farm (i.e. not as a stud or dealer-type farm).
115. The sampling unit and analysis in the Sheep and Beef Farm Survey is of the farm and farm business.

HOW ARE THE DATA COLLECTED?

116. A small team of Economic Service Managers (presently eight) is employed to collect and analyse data for the Survey. Their role is to:
- (a) visit each farm annually for a production and financial interview;
 - (b) conduct two other surveys – of livestock numbers and lambing – using the same Survey sample/framework;
 - (c) obtain, standardise and balance financial accounts;
 - (d) create accurate and realistic livestock reconciliations;
 - (e) calculate a property valuation using data available from Quotable Value Ltd;
 - (f) canvas and solicit new farms, which have been randomly selected by Statistics New Zealand and whose principals have authorised SNZ to provide B+LNZ with the PII (personally identifiable information) required to contact the farmer;
 - (g) manage the relationship with each farmer’s accountant;
 - (h) forecast returns to an animal species and age level;
 - (i) biannually forecast Income and Production by Farm Class and production region;
 - (j) clarify/improve existing data definitions and promote new metrics (e.g. environmental); and
 - (k) address industry stakeholders at key times during the season.

HOW IS THE SAMPLE MANAGED TO ENSURE IT IS STATISTICALLY REPRESENTATIVE?

117. To ensure the survey sample is statistically representative, the following methods are used:
- (a) Survey farms are randomly selected;
 - (b) The population is stratified by farm size, location; and type (Farm Class);
 - (c) Variable sampling fractions; and

- (d) At least 25 farms are included in each stratum to avoid outliers skewing the results.

RANDOM SELECTION

118. The sample is drawn by Statistics New Zealand from Agricultural Production Census records using the above criteria. During the first farm visit, B+LNZ staff will make a final determination on whether the farm qualifies for the Survey.

STRATIFICATION

119. The population is divided into groups (strata) that are more or less homogeneous. Each stratum is sampled at random which ensures that groups within the population are adequately represented.

120. Three main kinds of stratification are used:

Geographical Stratification

121. The aim is to spread the total sample of farms over the vast majority of sheep and beef farming districts in New Zealand, by a process of random selection proportionate to the sheep and beef farm populations.

Size Stratification

122. Initially, all farms with fewer than 750 stock units and Crown properties are excluded. This reduces the population to those defined as “commercial sheep and beef farms”. Farms are then randomly selected in proportion to the distribution of sizes within the geographical stratification.

Farm Class Stratification

123. The Survey results are classified into eight Farm Classes, see Table 4. It must be stressed that this classification is about the nature of the farm business, which includes, but is not limited to, topography, and the way in which the farm is managed, not solely Land Use Capability (LUC) class, with which it is sometimes confused.

124. In Waikato, the relevant Farm Classes are 3, 4 and 5.

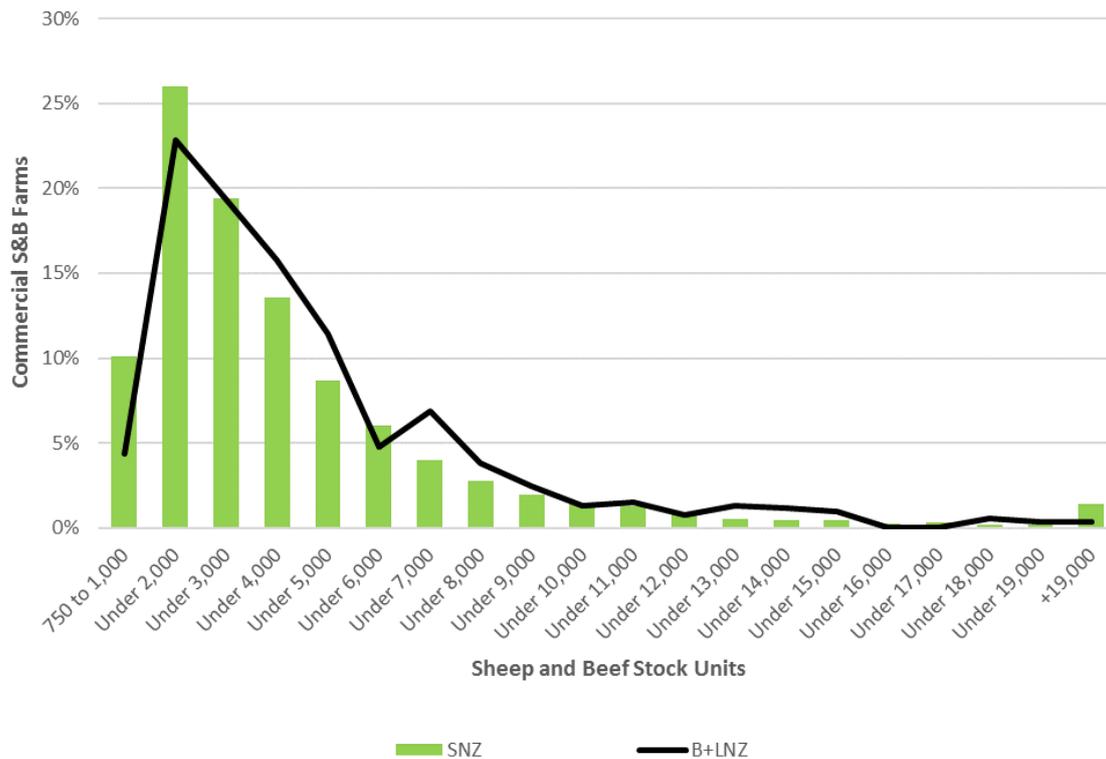
Table 4: Farm Class Descriptions

Class 1 - South Island high country	Extensive run country at high altitude carrying fine wool sheep, with wool as the main source of revenue. Located mainly in Marlborough, Canterbury and Otago.
Class 2 - South Island hill country	Mainly mid-micron wool sheep mostly carrying between two and seven stock units per hectare. Three quarters of the stock units wintered are sheep and one quarter beef cattle.
Class 3 - North Island hard hill country	Steep hill country or low fertility soils with most farms carrying six to 10 stock units per hectare. While some stock are finished a significant proportion are sold in store condition.
Class 4 - North Island hill country	Easier hill country or higher fertility soils than Class 3. Mostly carrying between seven and 13 stock units per hectare. A high proportion of sale stock sold is in forward store or prime condition.
Class 5 - North Island intensive finishing	Easy contour farmland with the potential for high production. Mostly carrying between eight and 15 stock units per hectare. A high proportion of stock is sent to slaughter and replacements are often bought in.
Class 6 - South Island finishing-breeding	A more extensive type of finishing farm, also encompassing some irrigation units and frequently with some cash cropping. Carrying capacity ranges from six to 11 stock units per hectare on dryland farms and over 12 stock units per hectare on irrigated units. Mainly in Canterbury and Otago. This is the dominant farm class in the South Island.
Class 7 - South Island intensive finishing	High producing grassland farms carrying about 10 to 14 stock units per hectare, with some cash crop. Located mainly in Southland, South and West Otago.
Class 8 - South Island mixed cropping and finishing	Located mainly on the Canterbury Plains. A high proportion of their revenue is derived from grain and small seed production as well as stock finishing.

HOW DO SAMPLE DATA RELATE TO POPULATION DATA?

125. Farms included in the Survey represent about 4.5 percent of commercial Sheep and Beef Farms in New Zealand by number.⁸ The sample is drawn to represent the productive base of the industry, as measured by Stock Units (SU)⁹

Figure 43: Commercial Sheep and Beef Farm Population vs. Sheep and Beef Farm Survey Sample



“WEIGHTED AVERAGE ALL CLASSES” FIGURES ARE USED TO PRESENT REGIONAL AND NATIONAL PICTURES

126. Weighted averages are calculated by weighting the average of each metric of the eight Farm Classes by their proportion of farms to total farms in the

⁸ A commercial sheep and beef farm is defined by a number of criteria, the most significant of which are that the farm winters at least 750 sheep and beef Stock Units and earns at least 70 percent of its revenue from sheep, beef cattle, long-term dairy grazing and crops. **Invalid source specified.**

⁹ One Stock Unit (SU) is the equivalent of one breeding ewe that weighs 55 kg and bears one lamb. The amount of feed consumed by this ewe over a year is approximately 550 kg dry matter (including the feed consumed by her lamb up to weaning, at about 3.5 months). (Trafford and Trafford, 2011).

population. The weighting process allows each Farm Class to be represented in proportion to its relative importance in the sheep and beef farm industry.

127. For example, consider the South Island high country farms (Farm Class 1) that make up around 1.5 percent by number of the total sheep and beef farm population covered by the Survey. This percentage is the weight that Farm Class 1 data have in the “Weighted Average All Classes” data. In contrast, North Island Hill Country farms make up around 30 percent of the sheep and beef farm population, so their weight in the New Zealand “Weighted Average All Classes” data is more significant. The simple average of the individual Farm Class averages cannot be used because this would assume that each Farm Class is of equal importance within the industry, which it is not. The weights used to calculate the “Weighted Average All Classes” data are reviewed regularly using the population frame discussed earlier.
128. The “Weighted Average All Classes” figures are used to describe trends for the whole industry at the regional and national level. These averages provide a guide to the physical and financial characteristics of the sheep and beef farm sector and are useful to evaluate trends, policy changes and shifts in economic conditions.
129. The “Weighted Average All Classes” data provide a concise statement of the “average” situation in the sheep and beef industry at a point in time. The “Weighted Average All Classes” data should be used with discretion and only after a full understanding of its derivation is gained.
130. Further, it is important to record that farms are distributed around the average.