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**Plan Hearings**

Environment Canterbury

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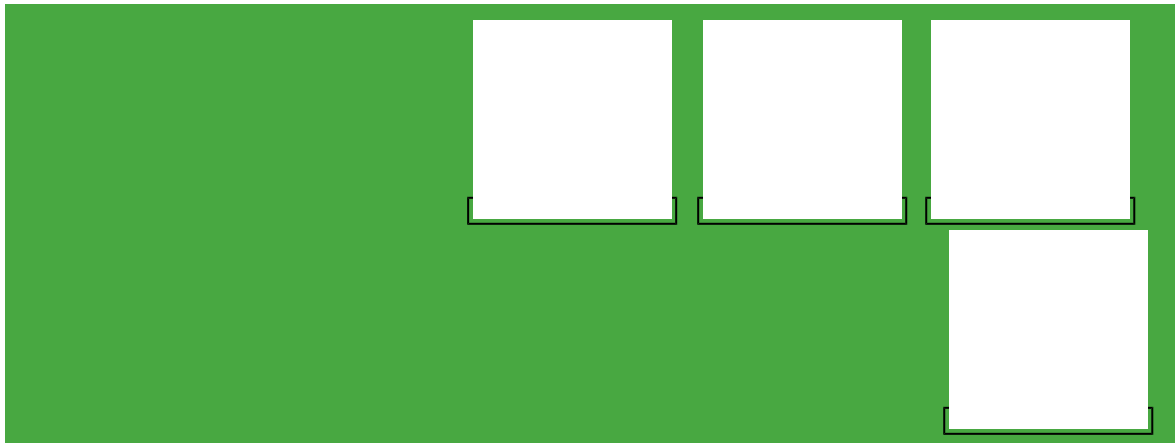
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[ ]

**BEFORE COMMISSIONERS APPOINTED  
BY THE CANTERBURY REGIONAL COUNCIL**

**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** of the First Schedule to the Act

**AND**

**IN THE MATTER** of Canterbury Regional Council proposed Plan Change 7 to  
the Canterbury Land and Water Regional Plan

**AND**

**IN THE MATTER** of submissions under clause 6 First Schedule

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

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**BRIEF OF EVIDENCE OF ANDREW NEIL BURTT**

**16 July 2020**

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## QUALIFICATIONS AND EXPERIENCE

1. My name is Andrew Neil Burr.
2. I am employed by Beef + Lamb New Zealand Ltd (B+LNZ) as Chief Economist.
3. I hold a B.Agr.Econ. from Massey University.
4. I have been employed by what is effectively B+LNZ 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 most 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.

## SCOPE OF EVIDENCE

5. I have been asked by B+LNZ to prepare evidence that provides background to the sheep and beef cattle livestock production sector – generally and in Canterbury. This includes:
  - Background to B+LNZ's Economic Service and its Sheep and Beef Farm Survey;
  - Background to sheep and beef farming enterprises in Canterbury; and
  - Sheep and Beef Farm Survey data for Canterbury as it relates to the proposed Plan Change 7 ("PC7"), namely data to demonstrate that sheep and beef farming is:
    - a significant industry in Canterbury;
    - complex and heterogeneous; and
    - becoming more efficient over time.
  - 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

6. Sheep and beef farming in Canterbury is conducted in diverse and complex ways, in diverse and complex environments.
7. On average, High Country farms are about 20-times the average area of Finishing farms in the region.
8. Overall, an average of over 90 per cent of a farm is used for grazing (but this varies considerably between farm types). The other area provides non-farming services – such as native vegetation cover – a substantial portion of New Zealand's native vegetation is on sheep and beef farms. Most of New Zealand's covenants that protect land in perpetuity under the QEII National Trust are on sheep and beef farms.

9. Sheep and beef farms have also generated significant eco-efficiency gains. Greenhouse gas emissions for the sheepmeat sector are 40 per cent lower than 1990 levels; and for the beef cattle sector they are down 10 per cent on 1990 levels.
10. The average stocking rate for commercial sheep and beef farms in Canterbury is was about the same in 2019-20 as it was in 1990-91. The weighted average Stocking Rate was 4.5 SU per grazing hectare, which is equivalent to just over one half per ha, in 2019-20.
11. The **application** of elemental Nitrogen, Phosphorus, Potassium and Sulphur is low.
12. Nutrient **losses** are low, with evidence of Dr Chrystal addressing this point in detail via B+LNZ's analysis of actual sheep and beef farms.
13. Canterbury's commercial sheep and beef farms generate revenue from multiple enterprises, which reflects a mix of objectives, risk management and natural capital of the properties.
14. The total numbers of sheep and beef cattle in Canterbury reduced over the past three decades, and there was a reduction in the number of commercial sheep and beef farms. This reflects farm conversions to other land uses, particularly on plains and closer to rivers. The more widely known revenue streams within commercial sheep and beef farming are support to the dairy sector by raising male calves for dairy beef, grazing of young dairy heifers as they mature towards producing milk and the grazing of dairy cows in winter.
15. Dairy farming has become a significant aspect of Canterbury as is widely known intuitively.
16. Dairy Grazing Revenue received by commercial sheep and beef farms averages eight per cent of total Gross Farm Revenue.
17. In the territorial authorities that cover the areas subject to the proposed Plan Change 7 ("PC7"):
  - The total number of **sheep decreased** between June 1990 and June 2019;
  - The total number of **beef cattle changed little** overall in those 30 years;
  - The total number of **dairy cattle increased steadily and substantially**;
  - The total number of **sheep and beef cattle stock units decreased** nearly 50 per cent; and
  - The **total number of stock units increased** by over 20 per cent.

## EVIDENCE

18. 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.
19. 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.
20. A core part of this is the Sheep and Beef Farm Survey, which was initiated after a 1949 enquiry by a 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”.

21. The Survey has been running continuously since 1950, which means it is in its 70th year and makes it the longest running primary sector survey in the world as far as I know.
22. The Survey has not remained static but has evolved and changed to meet needs of the industry and issues of the time.
23. The Survey framework and the operational structure of B+LNZ’s Economic Service supports making credible forecasts of production and farm outcomes.

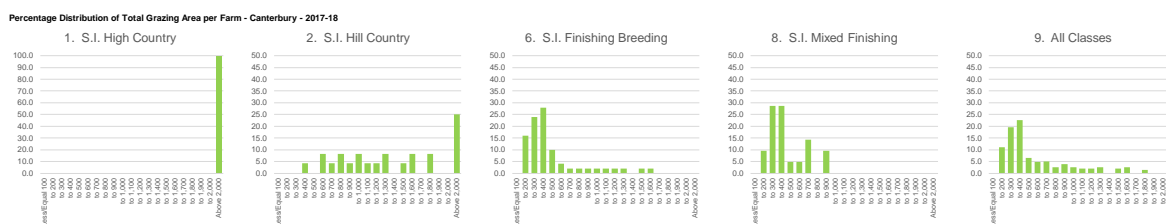
#### **Data limitations and constraints**

24. The Sheep and Beef Farm Survey is a sample survey in which the sample is randomly selected from the business frame, which is 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 is surveyed. That is not practicable.

#### **Background to sheep and beef farming in Canterbury**

25. The sheep and beef farming sector is complex and diverse in New Zealand, and Canterbury is no exception. Commercial sheep and beef farms have multiple enterprises for a variety of reasons, including:
  - The physical characteristics of the property;
  - The objectives of the owner(s); and
  - Because sheep and beef cattle complement each other on individual properties in several production and financial ways, e.g. to mitigate financial risks, to manage pasture, to manage parasites.
26. Sheep and beef farms in Canterbury vary considerably in area (Figure 1) and on other measures. The diversity of operations is often overlooked when the generic term “farm” is used. “Farm” oversimplifies what is a sheep and beef farm business because it understates their heterogeneity and overstates their homogeneity.
27. Over half the commercial sheep and beef farms in Canterbury are less than 400 ha in area, while about one-in-12 is over 2,000 ha (Figure 1).

**Figure 1: Percentage Distribution of Total Grazing Area per Farm - Canterbury - 2017-18**



28. Agriculture makes a significant contribution in Canterbury's regional economy. The share of GDP from agriculture, which was 5.9 per cent in the year ended March 2017, is 1.4-times the New Zealand average of 4.2 per cent, according to Statistics New Zealand Regional GDP data (MBIE, 2020). In 2018, Canterbury's GDP per person of ~\$57,000 was 98 per cent of the national average of ~\$58,300 (MBIE, 2020). These trends reflect what we know intuitively about Canterbury's economy, but clearly demonstrate the importance of agriculture and the businesses in Canterbury that further process farm outputs, which are considered manufacturing in national statistics, and supply farming.

### **Livestock Numbers and Livestock Units**

29. As discussed earlier, the conversion of land previously under sheep and beef farming systems into other land uses has led to a decrease in the numbers of sheep and beef cattle, nationally and in Canterbury. In turn, this has facilitated a relationship between commercial drystock farming and one of the main conversions – dairy – in which some commercial drystock farms have diversified by rearing male dairy calves for dairy beef, and by grazing dairy cattle (which includes the raising of, and grazing by, dairy heifers or the wintering of dairy cows or both). Comparative data for dairy livestock numbers have been included in this document to provide context for the sheep and beef data presented because of this relationship.

30. Since 1990-91, which we consider the season by which the vast majority of subsidy support had been removed after the mid-1980s deregulation by the Labour government that won the 1984 general election:

- The total number of **sheep decreased**;
- The total number of **beef cattle decreased**;
- The total number of **dairy cows increased significantly**; and
- The total number of **stock units increased**.

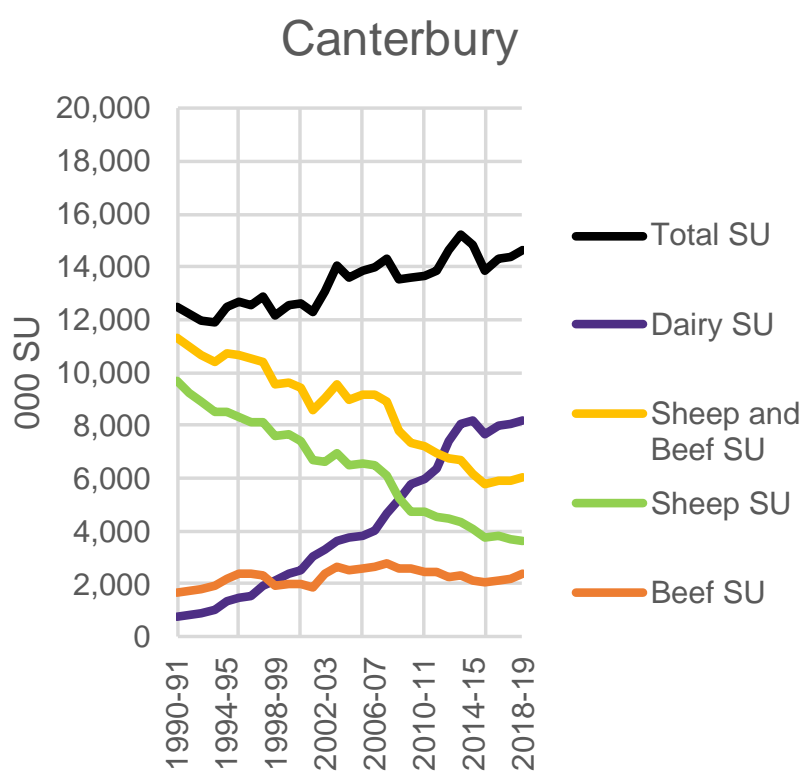
31. We are often asked the following questions about stock units:

- What is a 'stock unit'?; and
- Why use 'stock units'?

32. A stock unit, which is abbreviated to SU, reflects feed consumption or utilisation of animals.

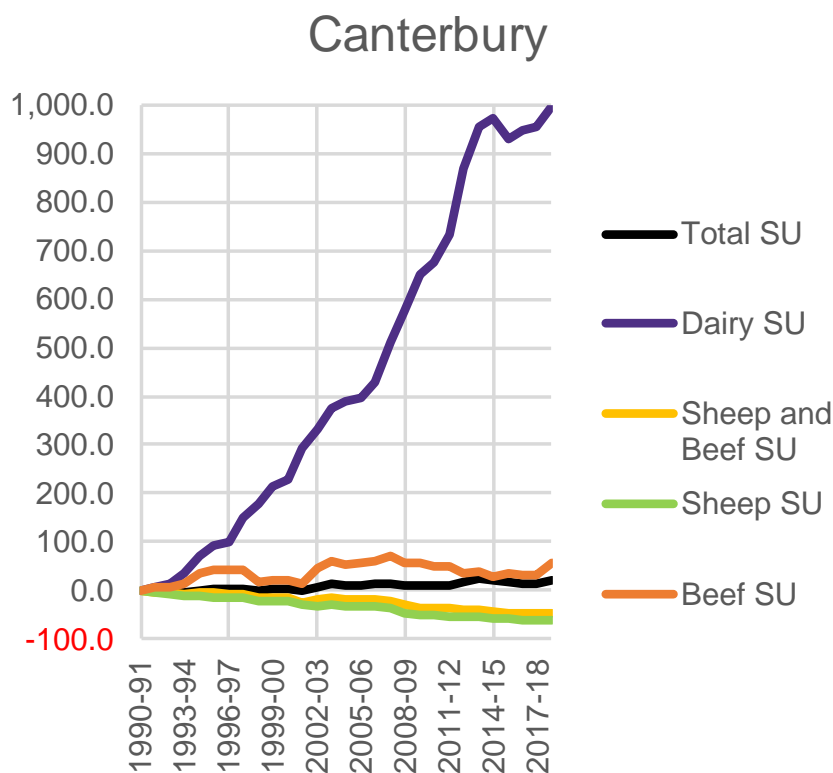
33. Using stock unit as a measure provides a means of comparing like-with-like. It provides a “common currency” that allows the counts of different species to be reported consistently, or, more colloquially, to compare apples with apples. It measures different livestock ages and classes relative to a breeding ewe. For example, a Friesian dairy cow is counted as 8.5 SU, i.e. a Friesian dairy cow consumes/demands 8.5 times the feed of a breeding ewe.<sup>1</sup>
34. Charts and other references to Stock Units in this document are the result of converting livestock numbers to *Stock Units* using the coefficients discussed here.

**Figure 2: Livestock Stock Units**



<sup>1</sup> 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 resulted from detailed research by Lincoln University.

Figure 3: Percentage Change in Livestock Stock Units between 1990 and 2019



35. As at 30 June 2019, Canterbury had:

- Around 16% of New Zealand's sheep;
- Around 13% of New Zealand's beef cattle; and
- Around 19% of New Zealand's dairy cows.<sup>2</sup>

36. We have analysed the trends within Canterbury region. Official New Zealand statistics<sup>3</sup> are provided at territorial authority (TA) level, so the analysis in this submission is uses data for territorial authorities that fit most closely in our opinion with the area that is the subject of proposed Plan Change 7 ("PC7"). Those TAs are Waimakariri, Timaru, Mackenzie and Waimate.

37. Following the trend across New Zealand, in the TAs that cover the areas subject to the proposed Plan Change 7 ("PC7"):

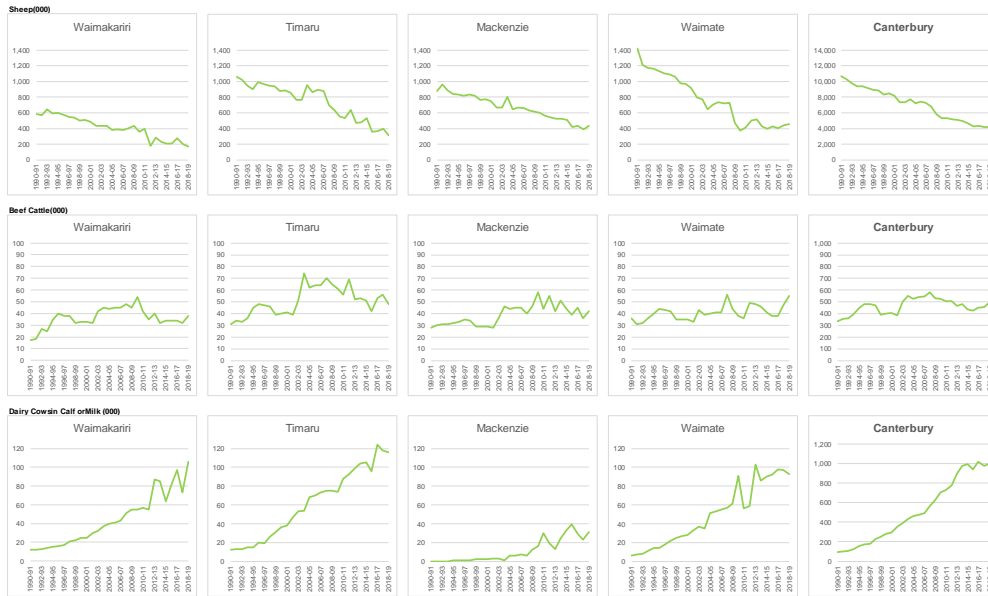
- The total number of sheep decreased;
- The total number of beef cattle changed little overall; and

<sup>2</sup> Agricultural Production Statistics, Statistics New Zealand (SNZ)

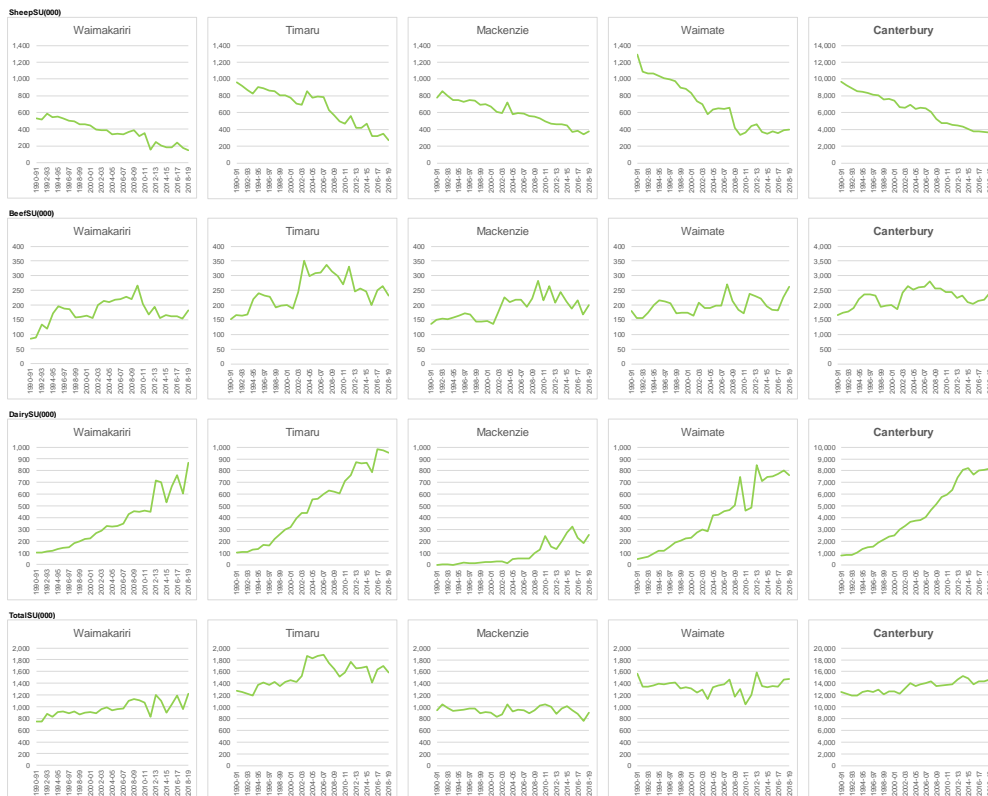
<sup>3</sup> Agricultural Production Statistics, Statistics New Zealand (SNZ)

- The total number of dairy cattle increased steadily (Figure 4).<sup>4</sup>

**Figure 4: Livestock Numbers (Absolute Numbers)**



**Figure 5: Livestock Units (“Stock Units”)<sup>5</sup>**



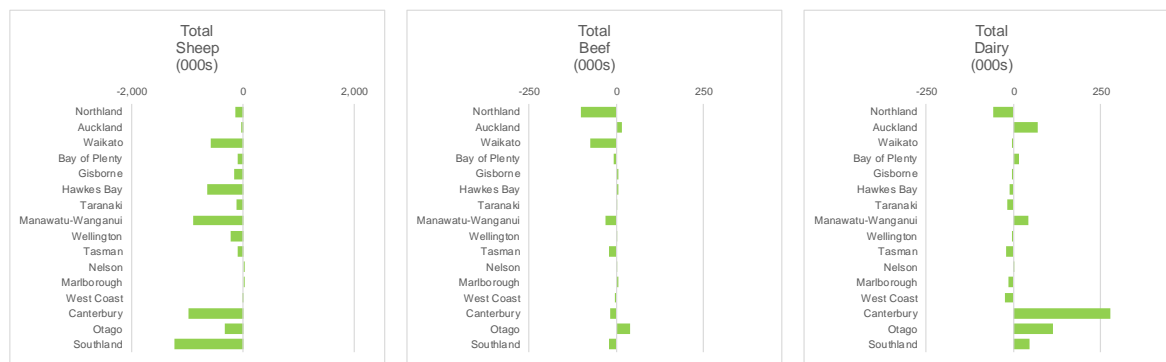
<sup>4</sup> Agricultural Production Statistics, Statistics New Zealand (SNZ)

<sup>5</sup> Data from SNZ converted to stock units using coefficients discussed in this document.

## 38. Focusing on more recent years, between 2009 and 2019:

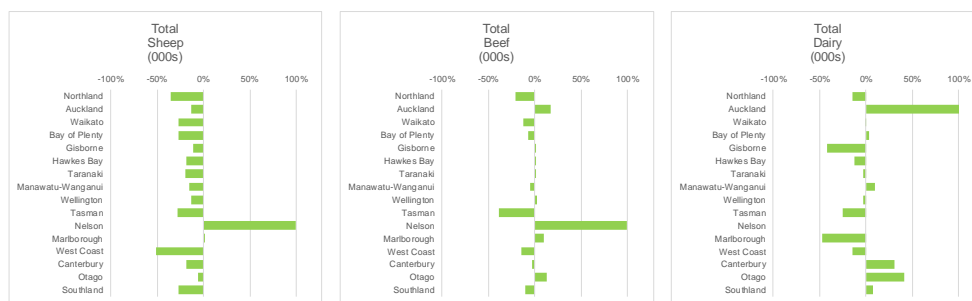
- The decrease in the *absolute number* of sheep in Canterbury was the second highest in New Zealand.
- The increase in the *absolute number* of dairy cattle in Canterbury was the highest in New Zealand (Figure 6).

Figure 6: Change in Livestock Numbers between 2009 and 2019 (000 head)

39. The *percentage change* in the number of:

- Sheep in Canterbury was the largest (-50%) in New Zealand;
- Beef cattle in Canterbury was minor;
- Dairy cattle in Canterbury was the second-highest (when Auckland, which is a minor region with around two per cent of total dairy cattle is excluded) in New Zealand (Otago recorded the highest percentage change) (Figure 7).

Figure 7: Change in Livestock Numbers between 2009 and 2019 (%)

40. The *absolute number* of:

- Sheep and beef cattle stock units *decreased* in Canterbury; and
- Dairy cattle stock units *increased* in Canterbury (Figure 8).

41. The largest decrease in the *absolute number* of sheep stock units in New Zealand occurred in Canterbury (Figure 8).

42. The largest increase in the *absolute number* of dairy cattle stock units in New Zealand occurred in Canterbury (Figure 8).

**Figure 8: Change in Livestock Units between 2009-10 and 2019-20 (000 SU)**



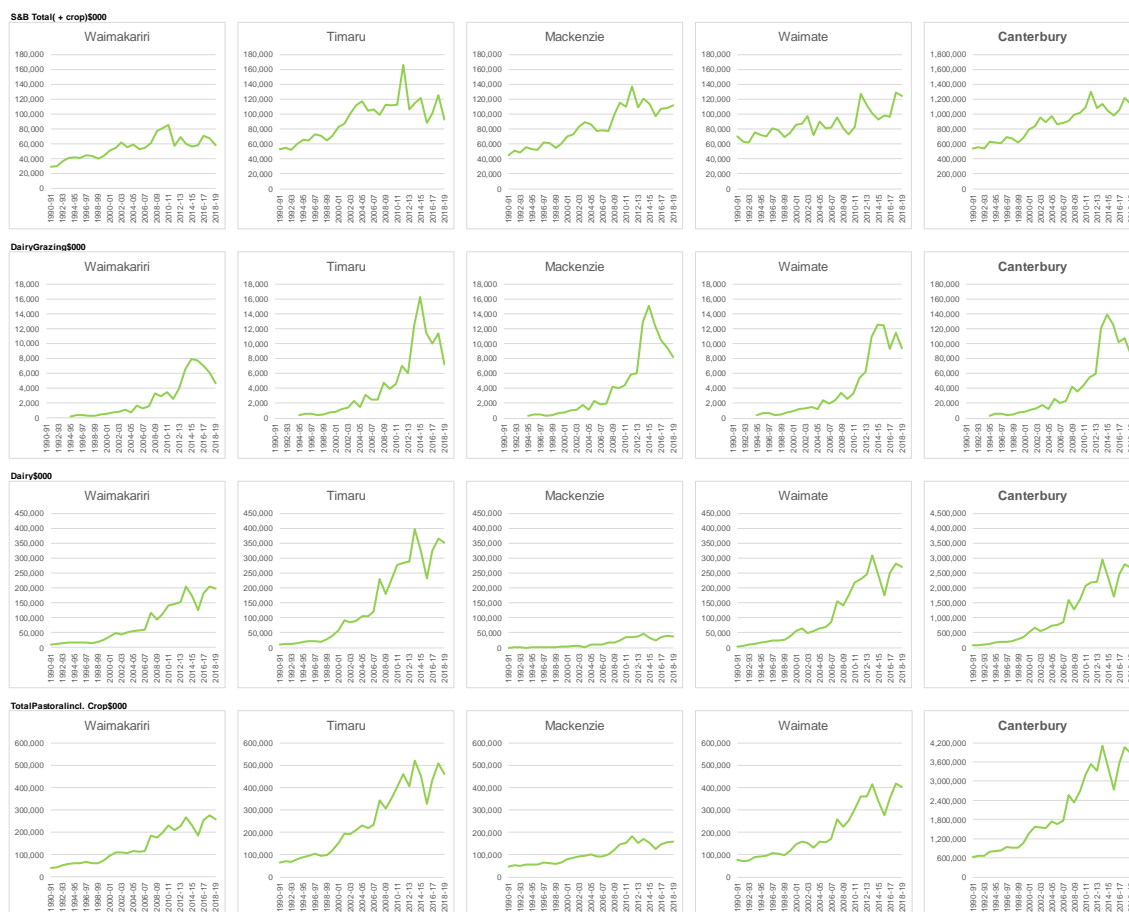
43. In summary:

- The percentage decrease in sheep stock units in Canterbury was similar to other major regions.
- Canterbury experienced a small percentage decrease in beef cattle stock units.
- Canterbury experienced a large percentage increase in dairy cattle stock units.
- There was little change in total stock units in Canterbury.

### **Sector Revenue – On-Farm**

44. Aggregate revenue on sheep and beef farms in Canterbury has been increasing gradually, and roughly doubled, to over \$1.1b in nominal terms (i.e. not adjusted for inflation) between 1990-91 and 2019-20 (Figure 9). This trend – increasing revenue – is the opposite of the trend in sheep and beef cattle numbers – fewer livestock and less total area, which indicates improved productivity.
45. Aggregate dairy grazing revenue received by sheep and beef farm businesses in Canterbury increased steadily in response to the farm-gate milk price and thus demand from dairy farmers. It peaked at about \$140m in 2014-15 and declined sharply when the farm-gate milk price declined (Figure 9).
46. As outlined earlier, the number of dairy cattle has increased rapidly, but the trend also reflects volatility in farm-gate milk prices, which is most clearly seen in recent years.

**Figure 9: Aggregate Production Valued at Farm-Gate for selected Territorial Authorities – Sheep and Beef, Dairy Grazing, Dairy, Total Pastoral (including crop)**



### **Sheep and beef farming is complex and heterogeneous**

47. Within Canterbury, 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, and that diversity is combined with the diversity that is farmers as humans and how they adapt their businesses 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 manage carefully their resources. As a result, they are resilient and responsive to climate, weather and market signals.

48. This includes the connections throughout the value chain. Certain sheep and beef farms, particularly hill country, specialise in breeding stock that are sold as “store stock” to other farms that finish them for processing. Often, farms that are primarily arable farms, finish livestock (particularly lambs in Canterbury) after crops have been harvested. This is an integrated market system of livestock flow – from breeding ...to finishing ...to processing ...to sales to both domestic and export markets.



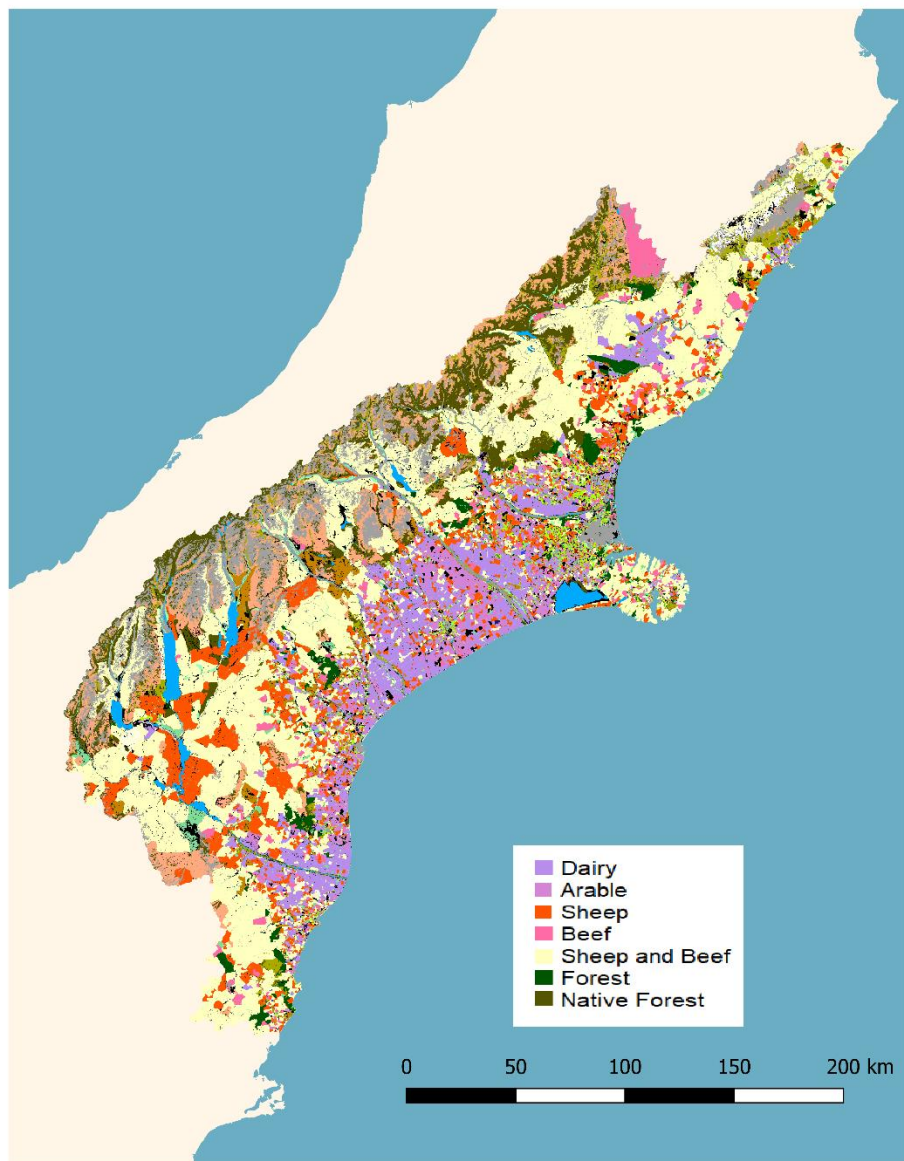
49. Since the reforms in the 1980s and the expansion of dairy onto what was prime sheep finishing land, a bigger proportion of the lambs born on hill country is finished on hill country.
50. We estimate that in 1990-91 around 30 per cent of the lambs processed in New Zealand were finished on hill country, and 70 per cent was finished on finishing land. In recent seasons, the ratio has moved closer to 50:50, i.e. 50 per cent of lamb processing is of lambs finished in hill country.

### ***Land Use***

51. Figure 10 shows land use by farm type in Canterbury. The map was developed using methodology created for B+LNZ by Manaaki Whenua – Landcare Research usingASUREQuality's AgriBase Spatial Database 2018 (for farm industry types) combined with Manaaki Whenua's Land Cover Database (LCDB) v4.1 2015 (for natural cover such as forests).

Figure 10: Land Use Types 2018

## LUMASS Land Use (96.18% area assigned) PC7 Canterbury



### ***Types of Commercial Sheep and Beef Farms***

52. B+LNZ characterises “farms” (i.e. farm businesses) into eight farm classes, which, for the avoidance of doubt, combine physical (including environmental considerations), financial, and family factors. This creates a richer picture of the reality of the complexity of sheep and beef farming because it is broader than just Land Use Capability (LUC) class. Each farm owner takes account of the constraints provided by physical characteristics of the property when conducting business to meet

the family’s objectives so that farming is sustainable – economically, which is about resource use, i.e. physical and financial capital; socially and culturally.

53. The Farm Classes that are relevant in Canterbury are:

- Farm Class 1 – South Island High Country;
- Farm Class 2 – South Island Hill Country;
- Farm Class 6 – South Island Finishing Breeding; and
- Farm Class 8 – South Island Mixed Finishing.

54. Their characteristics are described in Appendix 1: Description of B+LNZ Sheep and Beef Farm Survey.

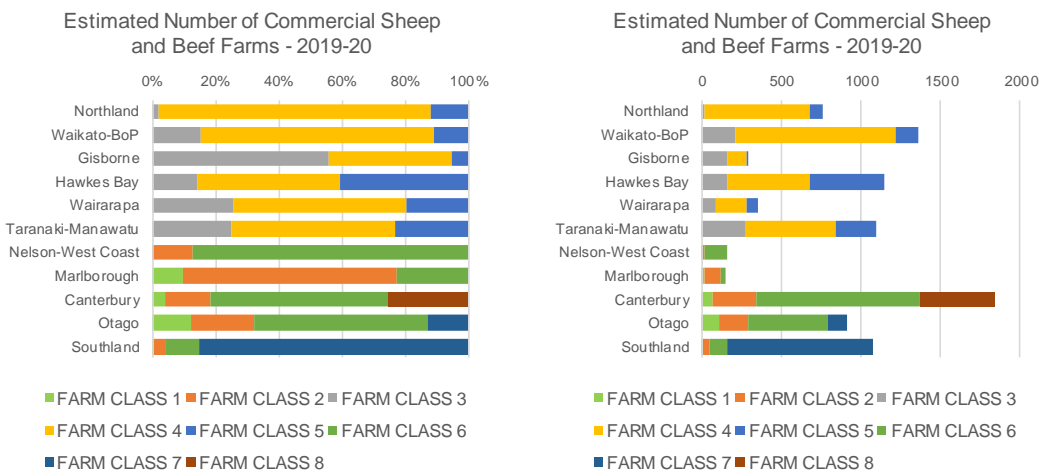
**Number of Commercial Sheep and Beef Farms**

55. The number of commercial sheep and beef farms has declined as farms have amalgamated and in particular as dairy conversions have occurred (Figure 11). This trend is most noticeable in Farm Class 6 (Finishing Breeding), which is the most populous category (Figure 11 and Figure 12).

**Figure 11: Number of Commercial Sheep and Beef Farms by Farm Class**



**Figure 12: Estimated Proportion and Number of Commercial Sheep and Beef Farms by Region**



**Physical Characteristics of Commercial Sheep and Beef Farms**

**Number of Farms**

56. We estimate<sup>6</sup> that in Canterbury there are:

- Around 70 **Farm Class 1 High Country** farms;
- Around 270 **Farm Class 2 South Island Hill Country** farms;
- Around 1,035 **Farm Class 6 South Island Breeding Finishing** farms;
- Around 465 **Farm Class 8 South Island Mixed Finishing** farms; and therefore
- Around 1,840 **commercial sheep and beef farm businesses** in total.

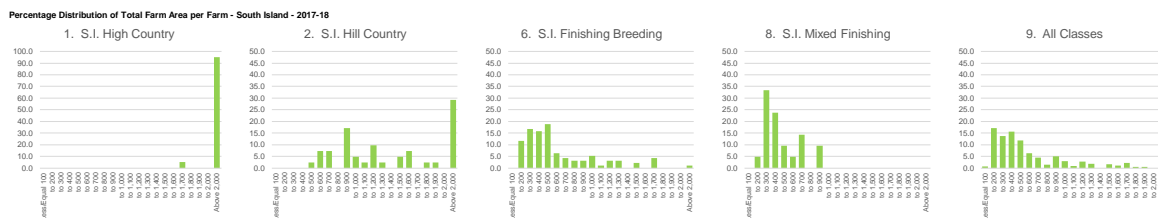
**Area**

57. In B+LNZ’s 2017-18 Survey, the grazing area is about 1,035 ha on average, but the size varies greatly (Figure 13). Note that the scales of the vertical axes in Figure 13 differ, with Farm Class 1 averaging around 9,000 ha, Farm Class 2 around 1,800 ha, and Farm Classes 6 and 8 average around 400 ha.

**Figure 13: Average Grazing Area of Commercial Sheep and Beef Farms in Canterbury**



**Figure 14: Distribution of Total Farm Area by Farm Class - Canterbury - 2017-18**



**Farm Class 1 South Island High Country**

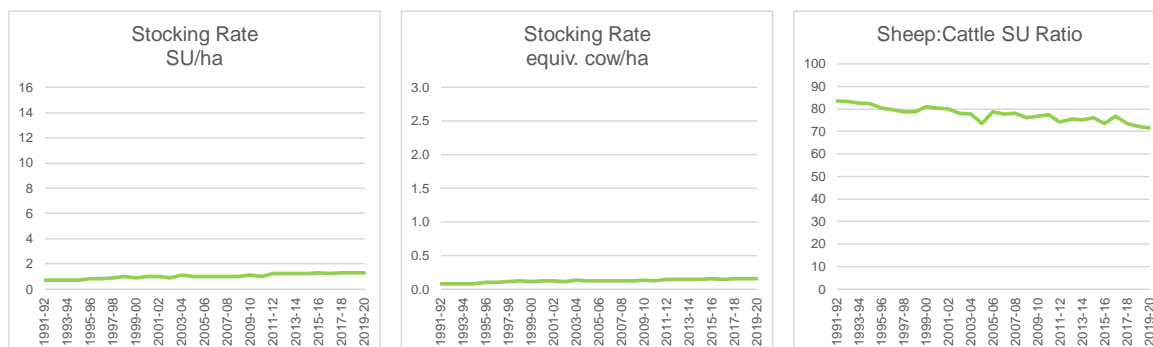
58. Farm Class 1 is the smallest group by number, but they are large farms – physically and as businesses.

59. In B+LNZ’s 2017-18 Survey, 95 per cent of these farms in Canterbury were over 2,000 hectares in total area (Figure 14). They carry thousands of stock units, but have a low stocking rate – an

<sup>6</sup> From New Zealand’s official statistics that are collated by Statistics New Zealand.

average of one SU/ha, which is equivalent to less than one eighth of a Friesian cow per hectare – and the split between sheep and beef cattle SU averaged about 75:25 (Figure 15).

**Figure 15: Stocking Rate on Farm Class 1 High Country Sheep and Beef Farms in Canterbury**

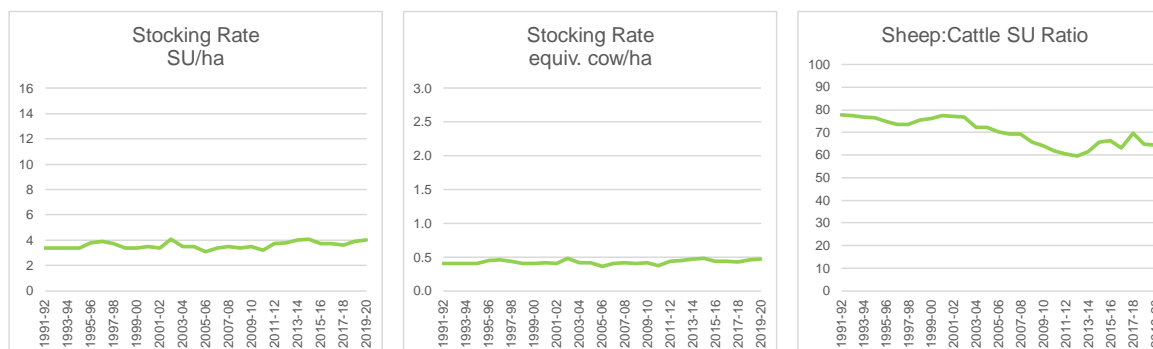


### ***Farm Class 2 South Island Hill Country***

60. Farm Class 2 farms have the second-largest area on average, and thus they are also large farms – physically and as businesses – that operate differently.

61. In B+LNZ's 2017-18 Survey, less than 30 per cent of these farms in Canterbury were over 2,000 hectares in total area (Figure 15). They, too, carry many stock units, but have a low stocking rate – an average of about 4.0 SU/ha, which is equivalent to less than half a Friesian cow per hectare – and the split between sheep and beef cattle SU averaged about 70:30 (Figure 16).

**Figure 16: Stocking Rate on Farm Class 2 Hill Country Sheep and Beef Farms in Canterbury**

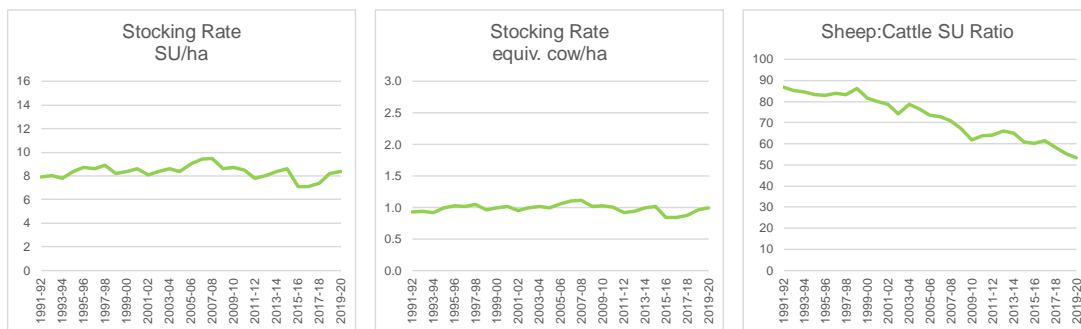


### ***Farm Class 6 South Island Breeding Finishing***

62. This is the most populous farm type in Canterbury (Figure 11).

63. On average, they had a grazing area of around 450 hectares (Figure 13) and around 3,400 SU in total at the start of the 2017-18 season (i.e. mid-winter (1 July)) and thus had a stocking rate of about 7.5 SU/ha, which is equivalent to a less than one cow per hectare, and the ratio of sheep to beef cattle SU was about 60:40 but declined to 50:50 recently (Figure 17).

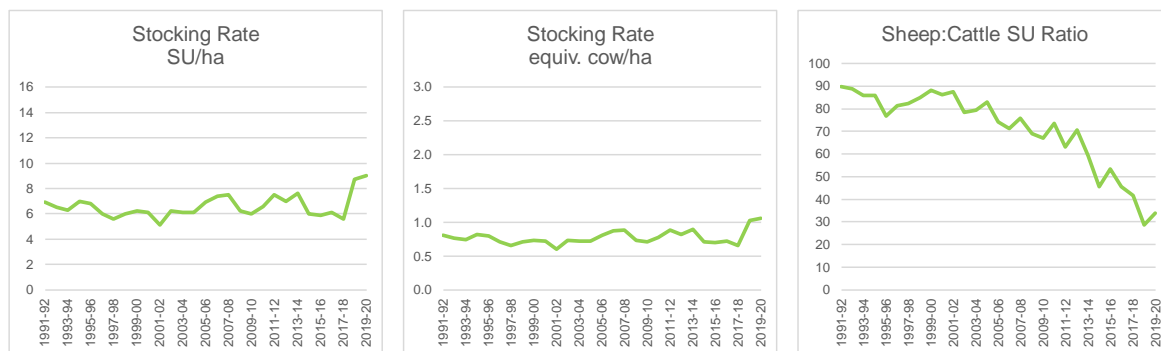
**Figure 17: Stocking Rate on Farm Class 6 Finishing Breeding Sheep and Beef Farms in Canterbury**



**Farm Class 8 South Island Mixed Finishing**

64. On average, Farm Class 8 farms had a grazing area of around 400 hectares (Figure 13) and around 2,200 SU in total at the start of the 2017-18 season (i.e. mid-winter (1 July)) and thus had a stocking rate of about 5.5 SU/ha, which is equivalent to about 0.7 cows per hectare, and the ratio of sheep to beef cattle SU was 40:60 (Figure 18).

**Figure 18: Stocking Rate on Farm Class 8 Mixed Finishing Sheep and Beef Farms in Canterbury**



**Overview of the characteristics of commercial sheep and beef farms in Canterbury**

65. This section discusses the characteristics of commercial sheep and beef farms in Canterbury.

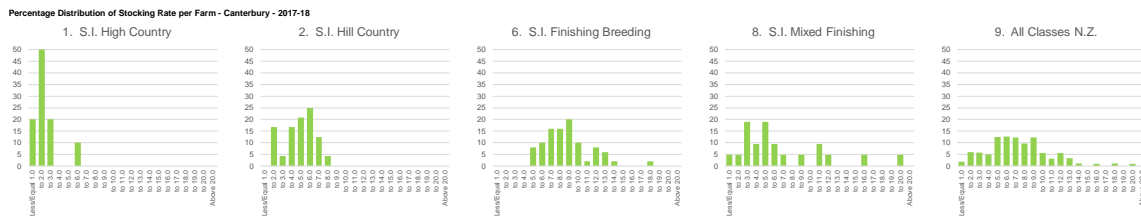
**Stocking Rate**

66. The average number of livestock on each farm class varies, which reflects the overall size of the farms in the farm class. While Farm Class 1 South Island High Country farms have a large number of livestock per farm (Figure 19), they have a low number of livestock per hectare (Figure 20).

**Figure 19: Distribution of Total SU on Commercial Sheep and Beef Farms in Canterbury**



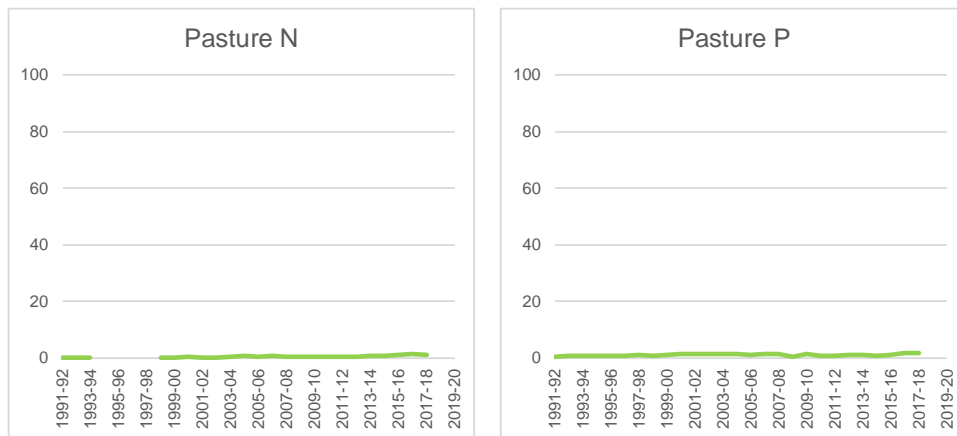
**Figure 20: Distribution of Stocking Rate on Commercial Sheep and Beef Farms in Canterbury**



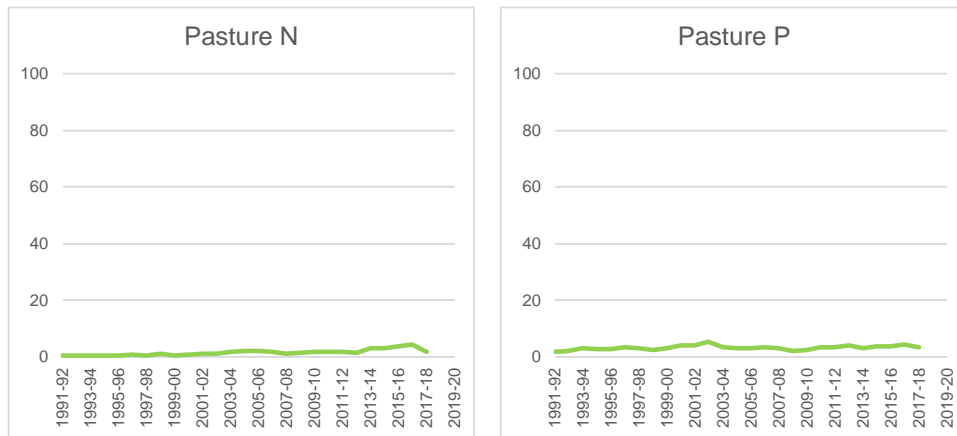
**Fertiliser Use**

- 67. The **application** of elemental N, P, K and S is low on commercial sheep and beef farms.
- 68. Nutrient **losses** from case study farms, which are a subset of the farms included in this analysis, are covered in Dr Jane Chrystal’s evidence.
- 69. The following charts show the **application** of elemental N and P on commercial sheep and beef farms in Canterbury because N and P are freshwater contaminants of particular interest in the region.

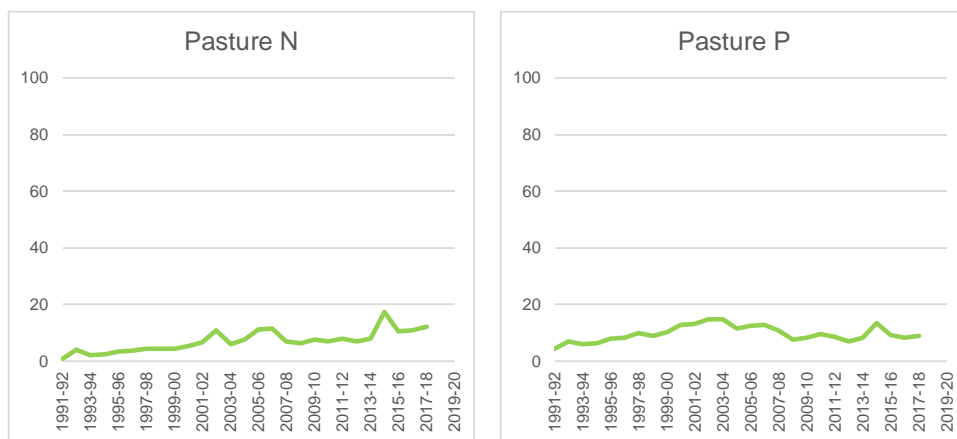
**Figure 21: Application of Elemental Components of Fertiliser applied to Pasture on Farm Class 1 – High Country – Canterbury**



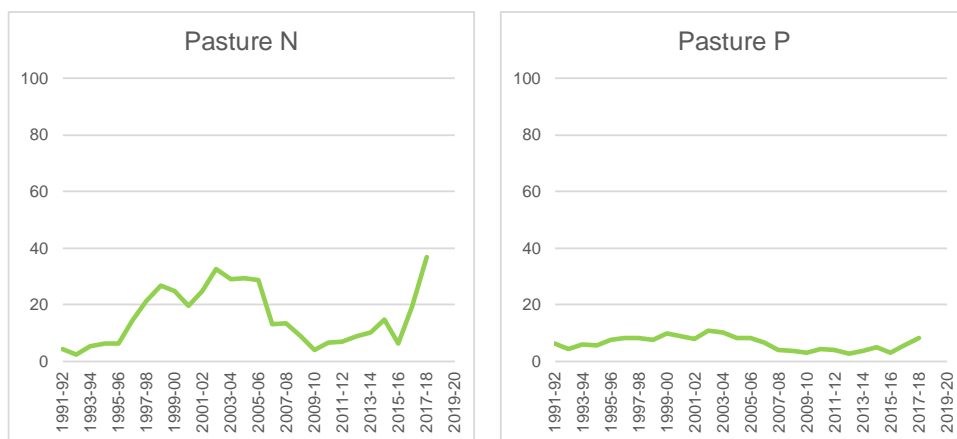
**Figure 22: Application of Elemental Components of Fertiliser applied to Pasture on Farm Class 2 – Hill Country – Canterbury**



**Figure 23: Application of Elemental Components of Fertiliser applied to Pasture on Farm Class 6 – Breeding Finishing – Canterbury**



**Figure 24: Application of Elemental Components of Fertiliser applied to Pasture on Farm Class 8 – Mixed Finishing – Canterbury**





## Gross Farm Revenue

70. Farmers on commercial sheep and beef farms manage multiple enterprises to generate revenue. The mix of enterprises on an individual farm reflects a mix of complex objectives.

### Weighted Average All Classes

71. The Weighted Average of All Farm Classes in Canterbury provides a useful overview for broad understanding of the sector though one needs to recognise the complexity and diversity of farms around the average.

72. On average, as a proportion of Gross Farm Revenue:

- Combined *Sheep+Wool* Revenue has declined as Wool revenue has declined;
- *Cattle* Revenue (i.e. from beef cattle) has increased a little;
- *Dairy Grazing* Revenue has increased but remains less than 10 per cent of Gross Farm Revenue; and
- *Cash Crop* Revenue from cash crops increased, then decreased in recent seasons as dairy conversions flourished, and due to the vagaries of markets for cash crops. *Cash Crop Revenue* includes revenue for all crops that use land that is part of the pastoral farming rotation, e.g. sale of straw, residues remaining after harvesting grain and seed crops, all grains (e.g. wheat, barley, oats, maize), process crops (e.g. vegetables, oil seeds), field crops (e.g. potatoes, field peas), feed crops sown specifically for off-farm sale (e.g. cereal and maize silage), and small seed crops (grass seed, clover).

73. Overall, sheep and beef farm systems are stable and reflect the natural capital of the land.

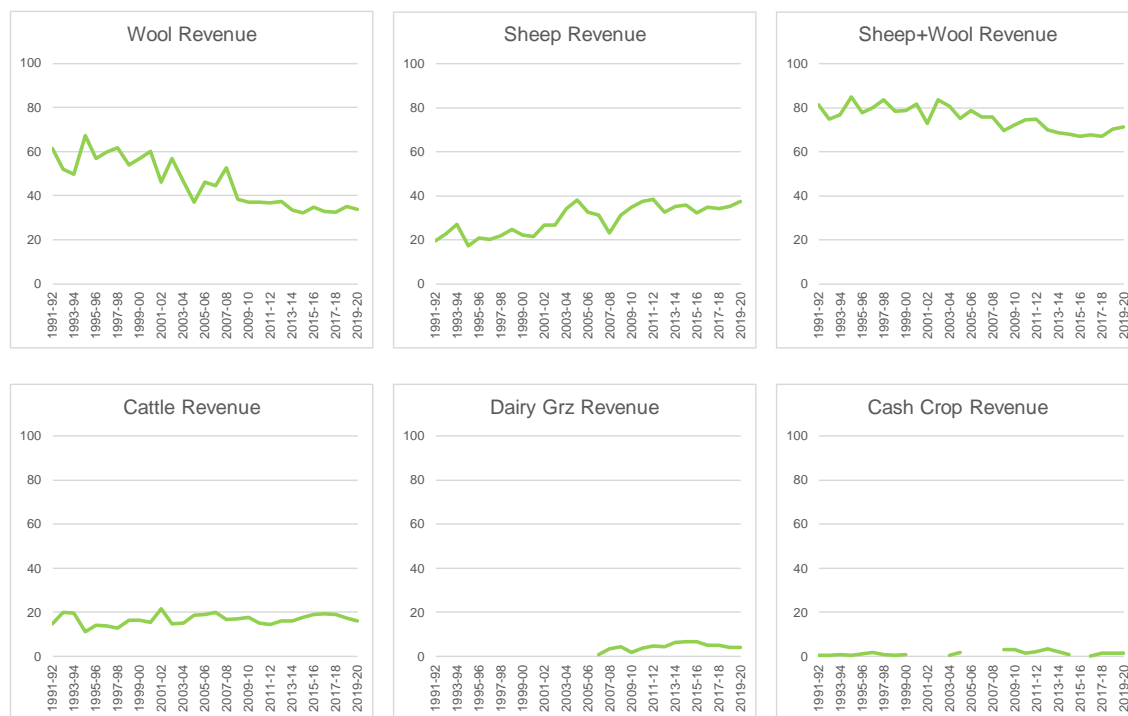
**Figure 25: Farm Class 9 – Weighted Average All Classes – Canterbury**



### **Farm Class 1 – South Island High Country**

74. The proportion of Gross Farm Revenue from *Sheep+Wool* generally has been 70-80 per cent – 80 per cent in the 1990s and early 2000s, with improving lamb/sheep returns offsetting a decline in wool returns. Revenue from beef cattle as a percentage of Gross Farm Revenue has been broadly stable. Dairy grazing and cash crop revenues are minor.

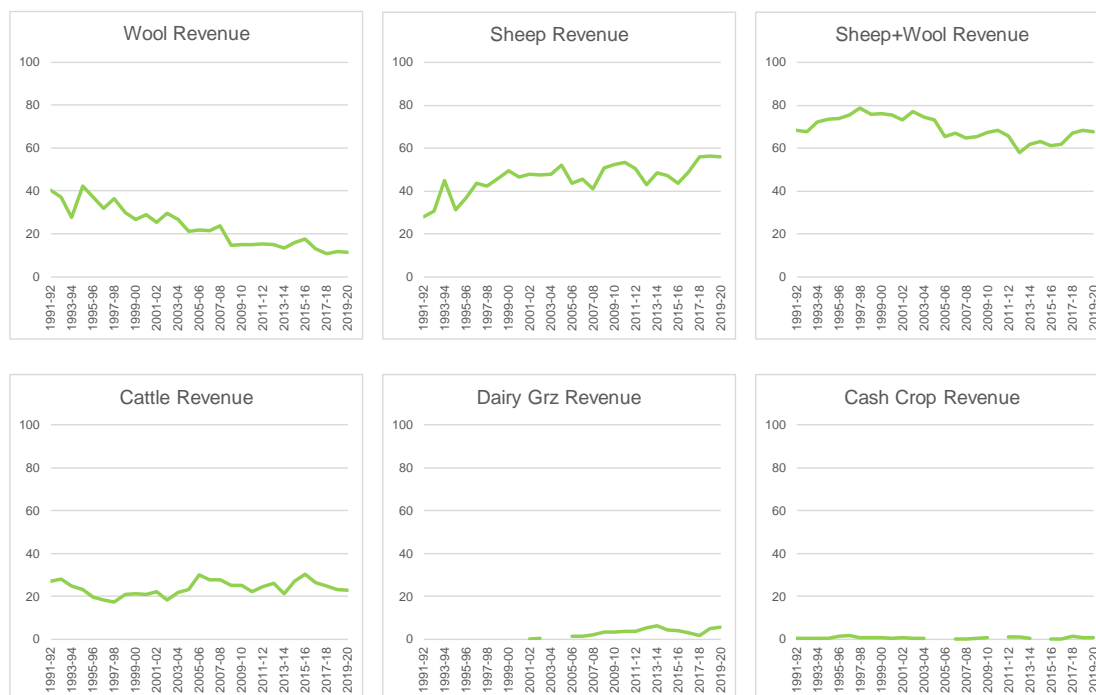
**Figure 26: Farm Class 1 – High Country – Canterbury**



### **Farm Class 2 – South Island Hill Country**

75. The proportion of Gross Farm Revenue from *Sheep+Wool* generally has been 60-80 per cent – rising from about 70 per cent in 1990-91 to 80 per cent as sheepmeat returns recovered from low levels in the late 1980s after deregulation and then falling as wool returns declined. Revenue from beef cattle as a percentage of Gross Farm Revenue has been broadly stable – at 20-30 per cent of Gross Farm Revenue – with fluctuations reflecting cattle prices rather than policy changes on farms. Dairy grazing and cash crop revenues are minor.

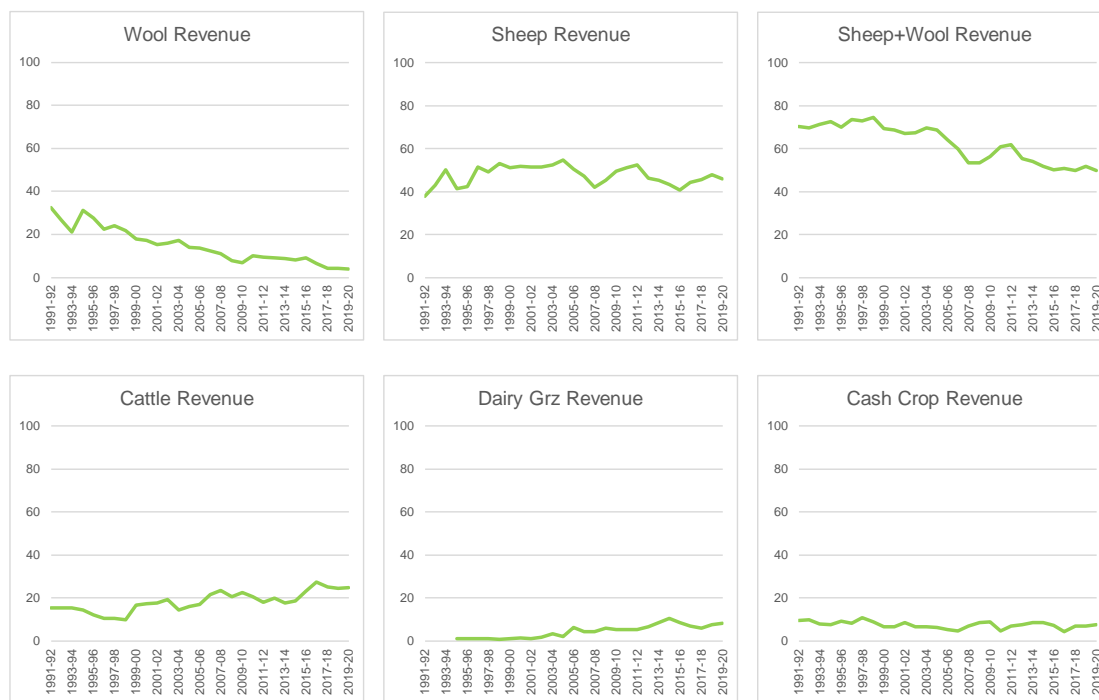
**Figure 27: Farm Class 2 – Hill Country – Canterbury**



**Farm Class 6 – South Island Breeding Finishing**

76. Wool's contribution to Gross Farm Revenue has declined from around 30 per cent to less than five per cent. This has had the effect of more than offsetting improvements in sheep revenue such that *Sheep+Wool* has declined from contributing 70 per cent in 1990-91 to 50 per cent in 2019-20. Revenue from beef cattle as a percentage of Gross Farm Revenue has been broadly stable, while dairy grazing revenue has provided a greater share of Gross Farm Revenue and cash crop revenue has been broadly stable (fluctuating with markets).

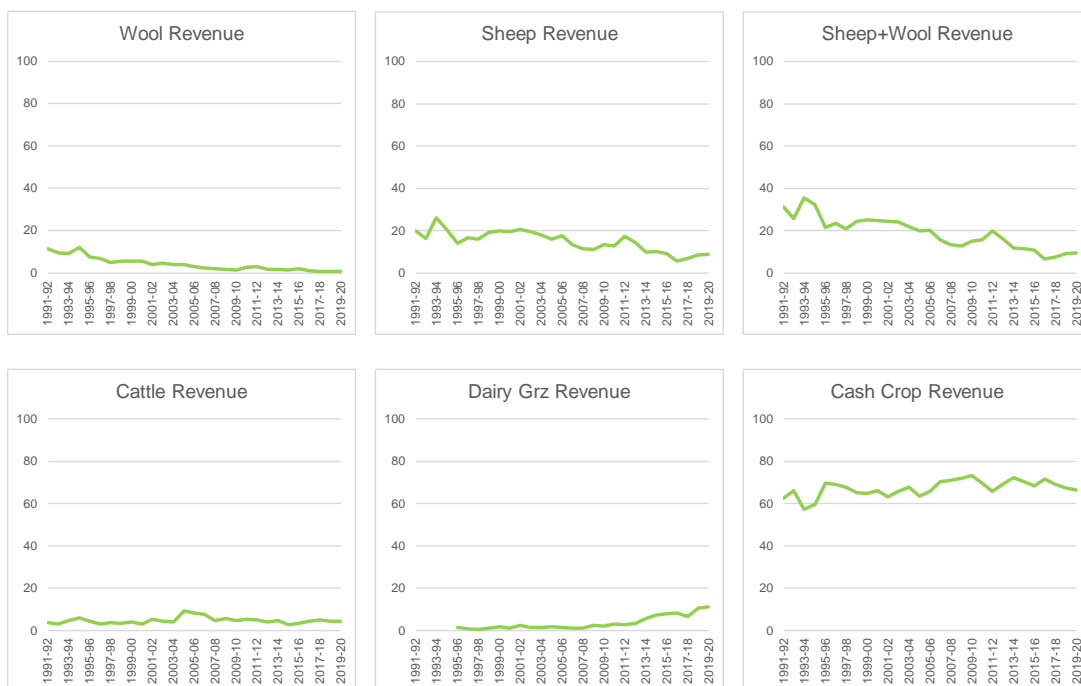
**Figure 28: Farm Class 6 – Breeding Finishing – Canterbury**



**Farm Class 8 – South Island Mixed Finishing**

77. Farms in this Farm Class are what are widely considered primarily cropping farms, however, we estimate they finish around 6 per cent of the lambs that are processed in New Zealand, and 15 per cent of lambs processed in the South Island. As a result of the farming model, wool's contribution to Gross Farm Revenue has always been minor. Cash Crop revenue contributes 60-70 per cent of Gross Farm Revenue, with *Sheep+Wool* having declined around 30 per cent in 1990-91 to 10 per cent in 2019-20. Revenue from *Beef Cattle* is minor but has been broadly stable, while *Dairy Grazing* revenue has provided a steadily greater share of Gross Farm Revenue.

**Figure 29: Farm Class 8 – Mixed Finishing – Canterbury**



**Irrigation Charges**

78. This metric provides a proxy for the number of farms that irrigate and the level of irrigation.

79. In B+LNZ’s 2017-18 Survey, over half the farms did not incur any irrigation charges and thus did not irrigate. At the All Classes level, that is influenced by Farm Class 8 Mixed Finishing farms, which focus on cash cropping, and which have a much wider distribution: note that the proportion that did not incur any irrigation expenditure is the same as the proportion that spent over \$250 per ha on irrigation (Figure 30).

**Figure 30: Distribution of Irrigation Charges per hectare by Farm Class - Canterbury - 2017-18**



**Winter Feed**

80. In B+LNZ’s 2017-18 Survey, around 70 per cent of farms in Canterbury had winter feed area equivalent to less than 10 per cent of the grazing area of the farm. That is, around 12.5 per cent had no winter feed area and a further 58 per cent had less than 10 per cent. One-quarter had winter feed area between 10 and 20 per cent, which means five per cent of farms had more than 20 per cent in winter feed area. None had more than 40 per cent (Figure 31).

**Figure 31: Distribution of Winter Feed Area by Farm Class - Canterbury - 2017-18**



**Cash Crop**

81. In B+LNZ’s 2017-18 Survey, over 60 per cent of commercial sheep and beef farms in Canterbury had did not receive revenue from cash crop. That may seem high but is influenced by Farm Class 8 Mixed Finishing farms that focus on cash cropping (but also finish about 15 per cent of the lambs that are processed in the South Island) (Figure 32).

**Figure 32: Distribution of Cash Crop Revenue by Farm Class - Canterbury - 2017-18**



**“Dairy Grazing”**

82. “Dairy grazing”, “winter grazing” and “intensive grazing” mean 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.

83. In B+LNZ’s 2017-18 Survey, around three-quarters of the sheep and beef farms in Canterbury did not receive revenue from long-term dairy grazing (when grazing dairy heifers is a regular and significant feature of the farm operations). For a further 20 per cent of farms, dairy grazing revenue was equivalent to up to 20 per cent of their gross farm revenue. Therefore, about five per cent of farms received dairy grazing revenue equivalent to more than 20 per cent of Gross Farm Revenue. The distribution by Farm Class varied too, with Farm Class 8 Mixed Finishing farms on average receiving dairy grazing revenue that is equivalent to a higher proportion of gross farm revenue than other farm classes (Figure 33).

**Figure 33: Distribution of Dairy Grazing Revenue by Farm Class - Canterbury - 2017-18**





**Figure 36: Dairy Grazing Revenue by Farm Class - Canterbury**



**Figure 37: Dairy Grazing Revenue as a Percentage of Gross Farm Revenue by Farm Class - Canterbury**

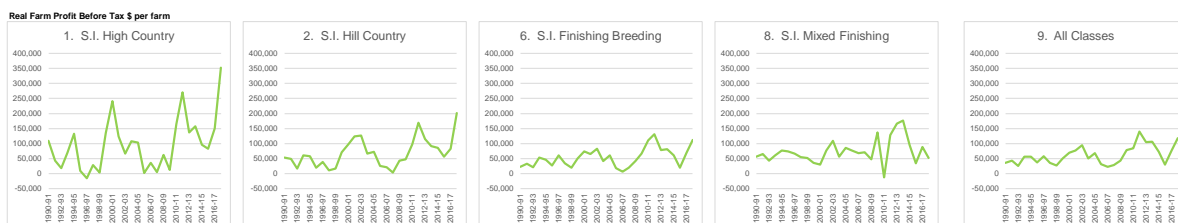


**Profitability**

89. Profitability in sheep and beef farming has fluctuated over time. It weakened and was low 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.

90. There are two important points about the patterns in inflation-adjusted profitability (Figure 38). The pattern between Farm Classes is similar, which reflects the interconnectedness and interdependencies of Farm Classes; and the peaks and troughs reflect the mix of livestock and cash crops, and the fortunes of each.

**Figure 38: Inflation-adjusted Farm Profit Before Tax per Farm - Canterbury**



91. However, per-farm measures do not take account of farm size – absolute differences between farm types changes in farm size over time, which for the sheep and beef farming sector (particularly in Canterbury) varies considerably (Figure 1). The use of per-hectare – and specifically per **grazing** hectare – measures allows farms of different sizes to be compared on a consistent basis (Figure 39). Why EBITR (Earnings Before Interest, Tax and Rent) and not EBIT, which is sometimes used



for comparisons? Rent is a cost of capital in our view. The absolute difference may vary but the trend in both is broadly similar.

92. Profitability per hectare for Farm Class 1 farms is low relative to other Farm Classes but there is considerable variability in the average profitability over time of Farm Class 8 farms.

**Figure 39: Inflation-adjusted Earnings Before Interest, Tax and Rent per hectare - Canterbury**



### Outlook for Sheep and Beef Farming in Canterbury

93. 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 strive to achieve their goals over the long term.
94. A key factor in 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.
95. Canterbury's 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 outlook depends substantially on export markets, some of which were in a period of transition prior to the global COVID-19 pandemic. Underlying 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.
96. However, COVID-19 has added considerable uncertainty to the outlook because the world has not experienced such a disruption for decades.
97. Farming systems in Canterbury 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. Farming and food production was considered an essential service during the national response to the global COVID-19 pandemic and activity continued with little interruption on farms, but there was some disruption to meat processing as a result of meat processing protocols that were introduced to maintain the health and safety of meat processing employees.

## CONCLUSION

98. Livestock production and meat processing are major economic activities in Canterbury. The sheep and beef livestock production 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.
99. The sheep and beef livestock production sector is adaptable and resilient. It is continually making efficiency gains in response to market signals. 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.
100. 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.
101. The red meat industry, including both livestock production and processing, accounts for:
- Over 92,000 New Zealand (full-time equivalent) jobs, which is 4.7 percent of total national employment;
  - Nearly \$12 billion in industry added value; and
  - Around \$4.6 billion in household income, including direct and flow-on effects.<sup>7</sup>

**DATED 16 July 2020**



Andrew Neil Burt

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<sup>7</sup> B+LNZ <https://beeflambnz.com/sites/default/files/news-docs/NZRM-Industry-summary.pdf>

## Appendix 1: Description of B+LNZ Sheep and Beef Farm Survey

### Background

- 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:
  - Reconciliations of livestock, wool production and sales, feed, and cash crops;
  - Production, such as meat weights, wool grades, calving and lambing percentages;
  - Inputs, such as fertiliser (Nitrogen, Phosphorus, Potassium, and Sulphur), animal health, labour, repairs and maintenance, interest, and rates; and
  - 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.
- The Survey is about actual data, not intentions.
- To qualify for the Survey, a farm has to winter at least 750 sheep (or equivalent sheep plus beef cattle stock units ), 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:
  - At least 70 per cent of the farm revenue must be derived from sheep, or sheep plus beef cattle (except in the case of mixed finishing farms of Canterbury);
  - At least 80 per cent of the stock units on the property must be sheep and/or beef cattle SU; and
  - The farm must be run as an ordinary commercial sheep and beef farm (i.e. not as a stud or dealer-type farm).
- The sampling unit and analysis in the Sheep and Beef Farm Survey is of the farm and farm business.

### How is the data collected?

- A small team of Economic Service Managers is employed by B+LNZ to collect and analyse data for the Survey. Their role is to:
  - visit each farm annually for a production and financial interview;
  - conduct two other surveys – of livestock numbers and lambing – using the same Survey sample/framework;
  - obtain, standardise and balance financial accounts;
  - create accurate and realistic livestock reconciliations;

- calculate a property valuation using data available from Quotable Value Ltd;
- 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;
- manage the relationship with each farmer's accountant;
- forecast returns to an animal species and age level;
- biannually forecast Income and Production by Farm Class and production region;
- clarify/improve existing data definitions and promote new metrics (e.g. environmental); and
- address industry stakeholders at key times during the season.

#### **How is the sample managed to ensure it is statistically representative?**

- To ensure the Survey sample is statistically representative, the following methods are used:
  - Survey farms are randomly selected;
  - The population is stratified by farm size, location; and type (Farm Class);
  - Variable sampling fractions; and
  - At least 25 farms are included in each stratum to avoid outliers skewing the results.

#### **Random selection**

- 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**

- 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.
- Three main kinds of stratification are used.

#### ***Geographical Stratification***

- 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***

- 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 (measured by SU) within the geographical stratification.

### ***Farm Class Stratification***

- The Survey results are classified into eight Farm Classes (Table 1). 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.

**Table 1: Farm Class Descriptions**

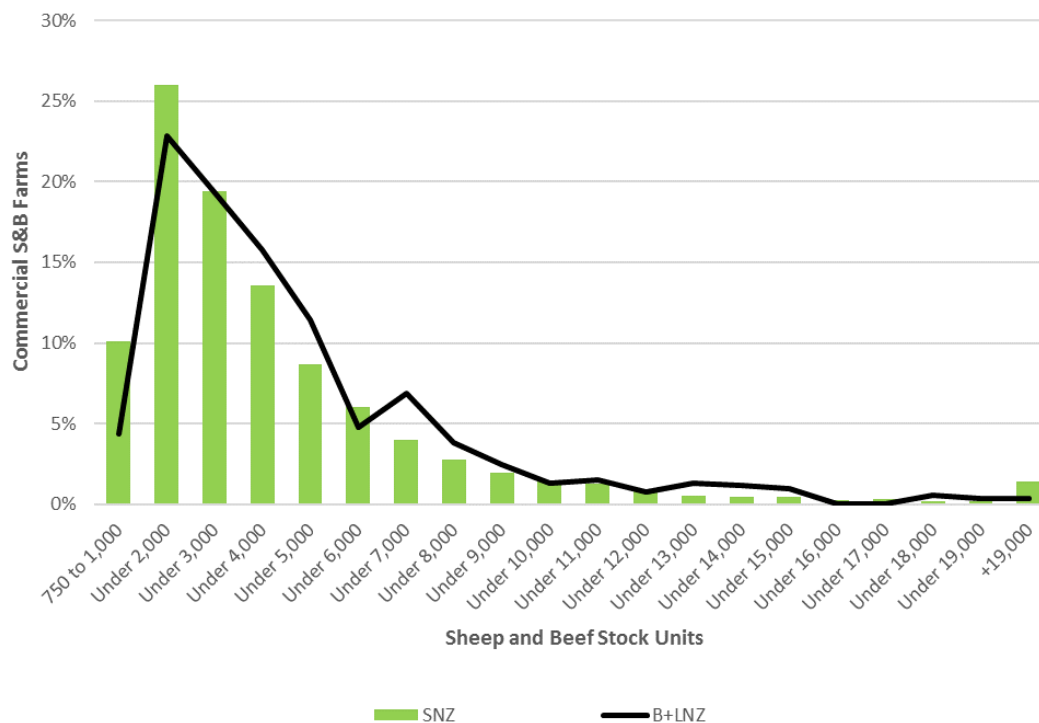
Class 1 - South Island high country	Extensive run country at high altitude carrying fine wool sheep, with wool as the main source of revenue. Located mainly in Marlborough, Canterbury and Otago.
Class 2 - South Island hill country	Mainly mid-micron wool sheep mostly carrying between two and seven stock 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?**

- Farms included in the Survey represent about 4.5 per cent of commercial Sheep and Beef Farms in New Zealand by number. The sample is drawn to represent the productive base of the industry, as measured by stock units<sup>8</sup>.

**Figure 40: 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**

- 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 population. The weighting process allows each Farm Class to be represented in proportion to its relative importance in the sheep and beef farm industry.
- For example, South Island high country farms (Farm Class 1) make up around 1.5 per cent 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 per cent of the sheep and beef farm population, so their weight in the New Zealand “Weighted Average All Classes”

<sup>8</sup> 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).

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.

- 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.
- 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.
- Further, it is important to record that farms are distributed around the average.



**Appendix 2: Detailed Charts**

**Figure 41: Livestock Numbers by Territorial Authority**

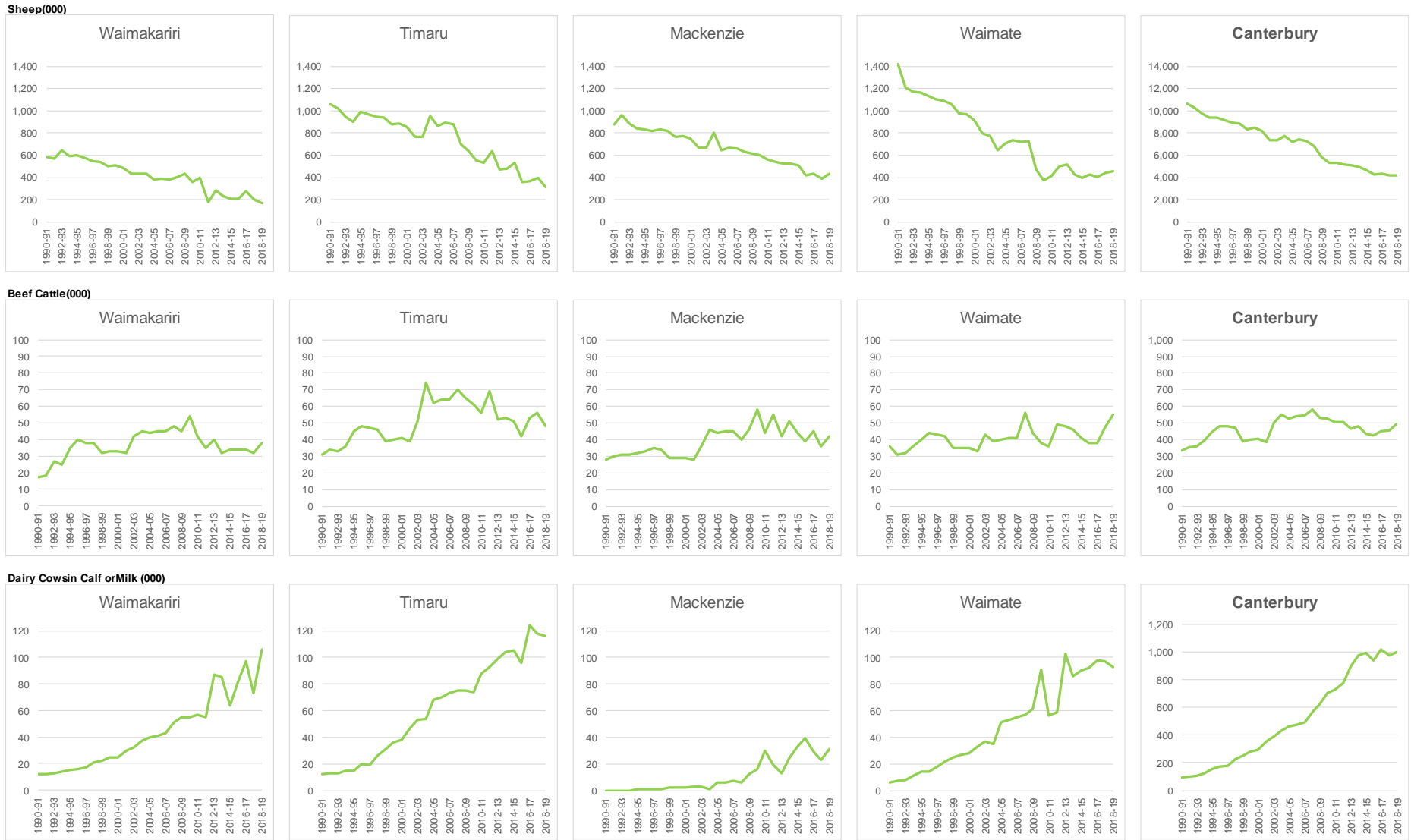
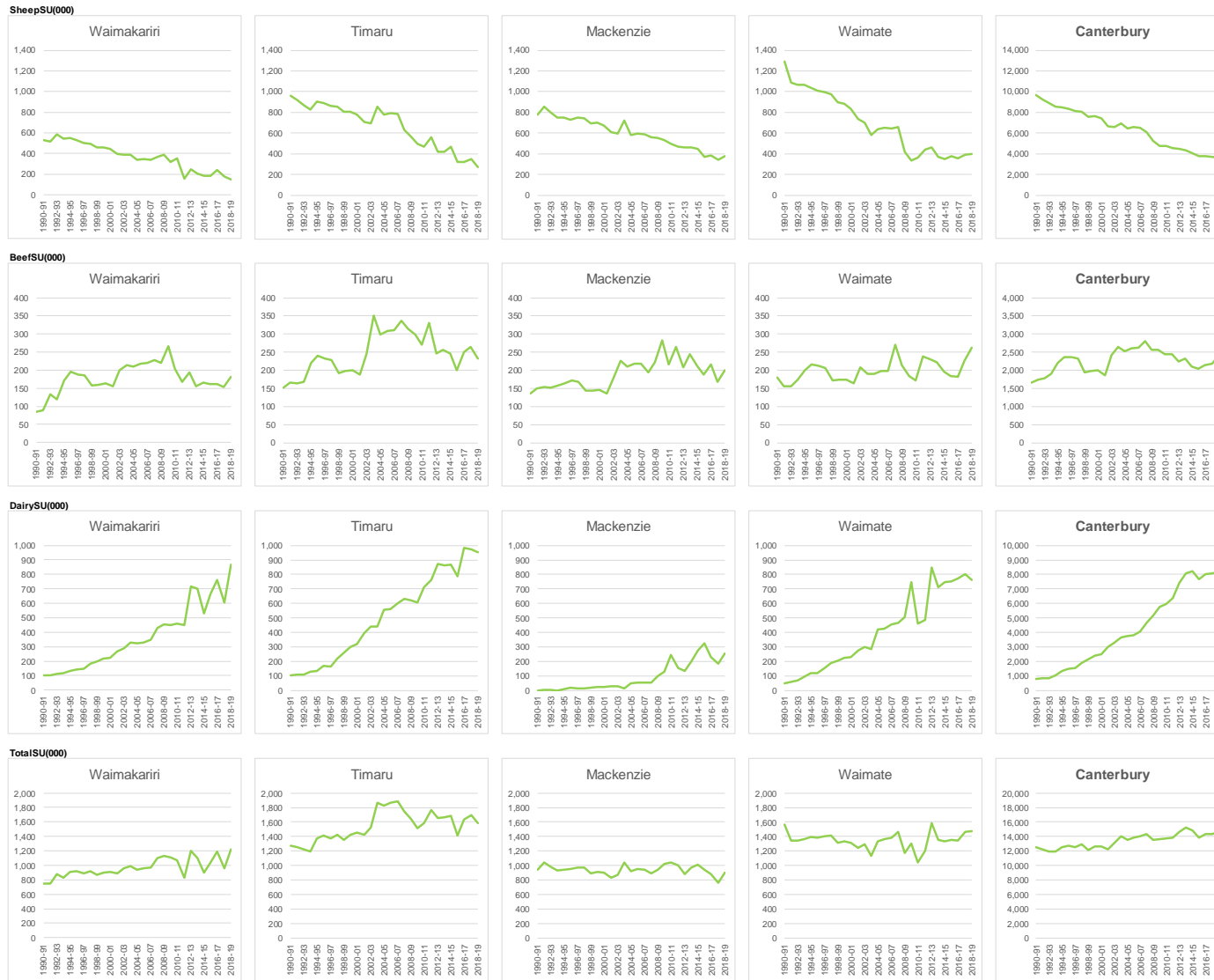
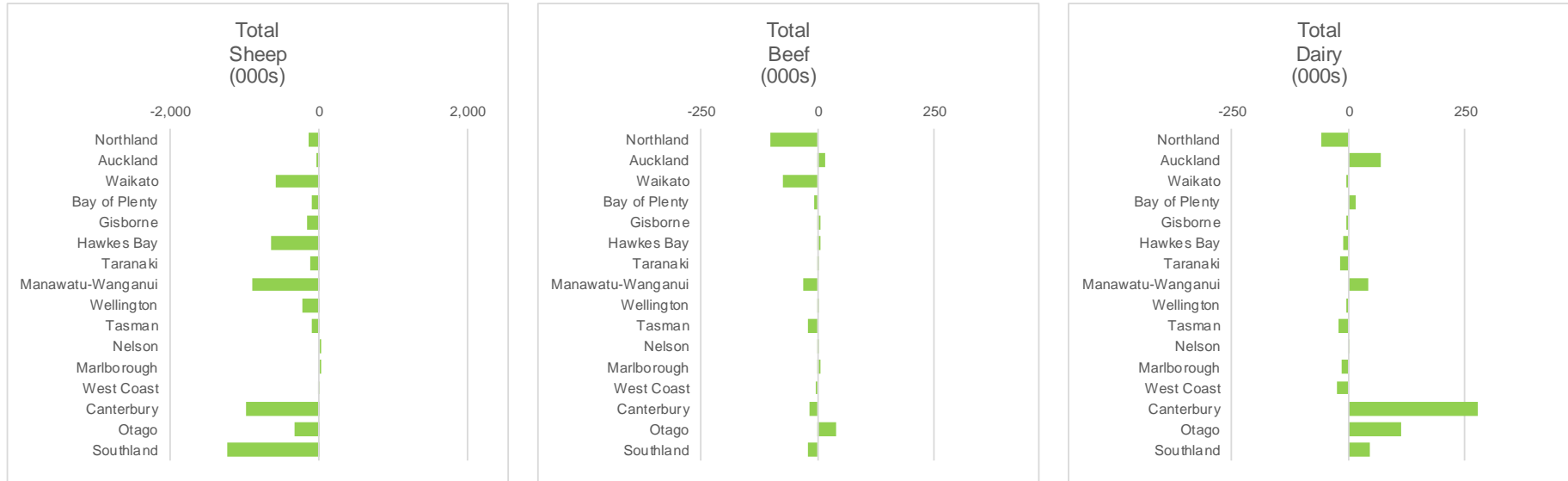


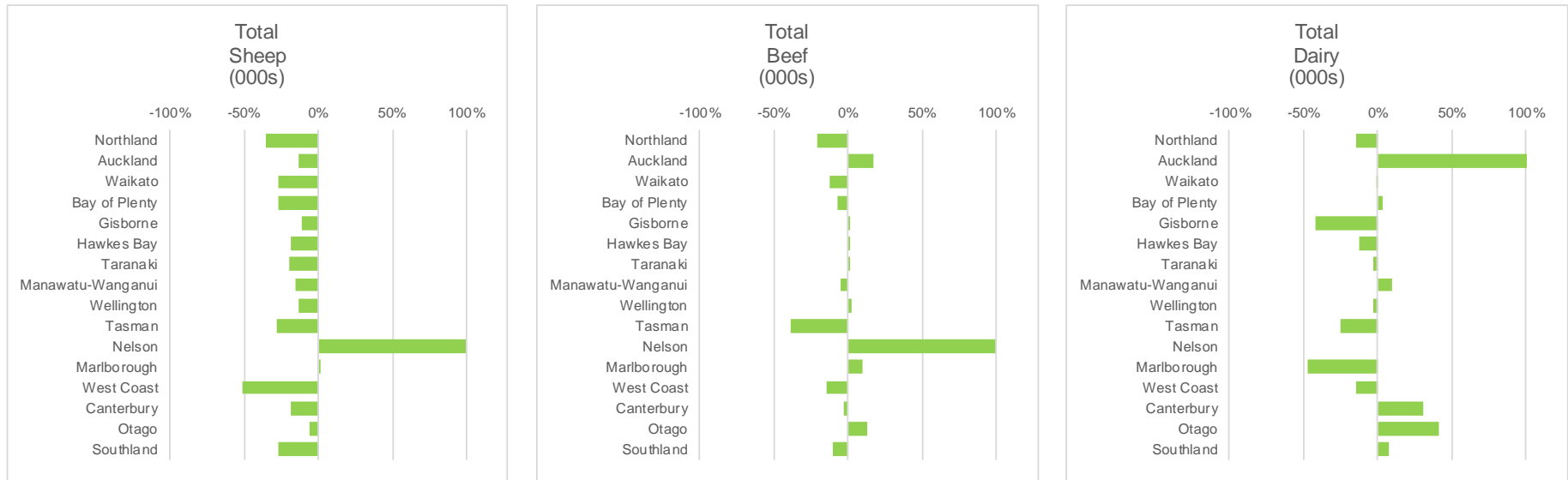
Figure 42: Livestock Units (“Stock Units”) by Territorial Authority



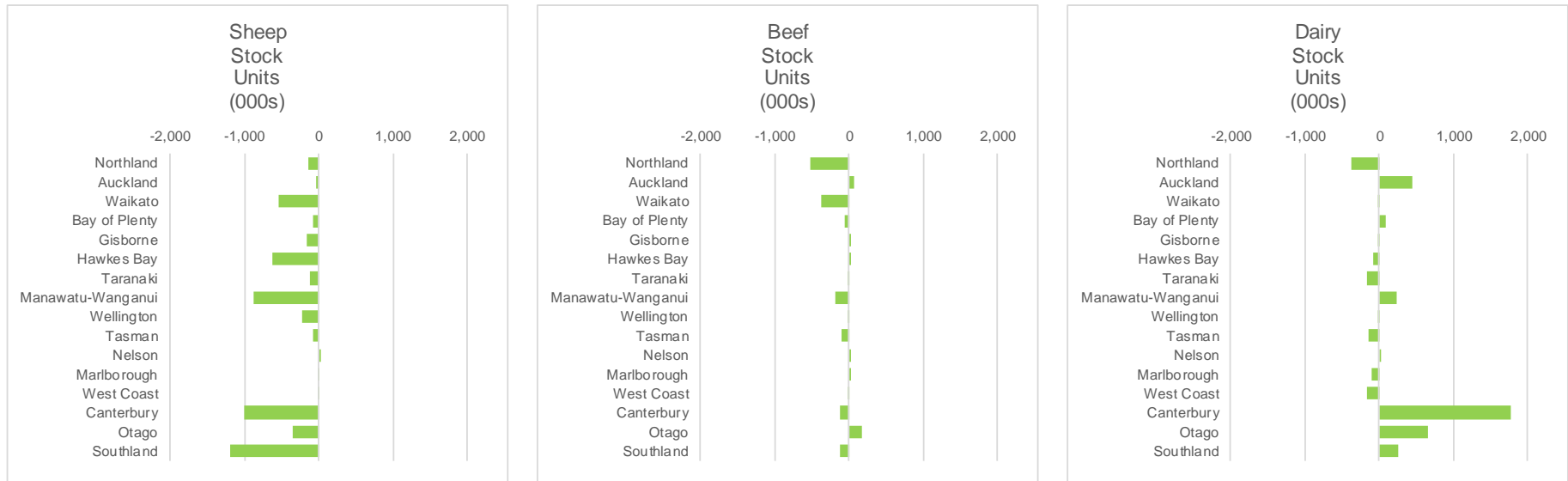
**Figure 43: Change in Livestock Numbers between 2009 and 2019 (000 head)**



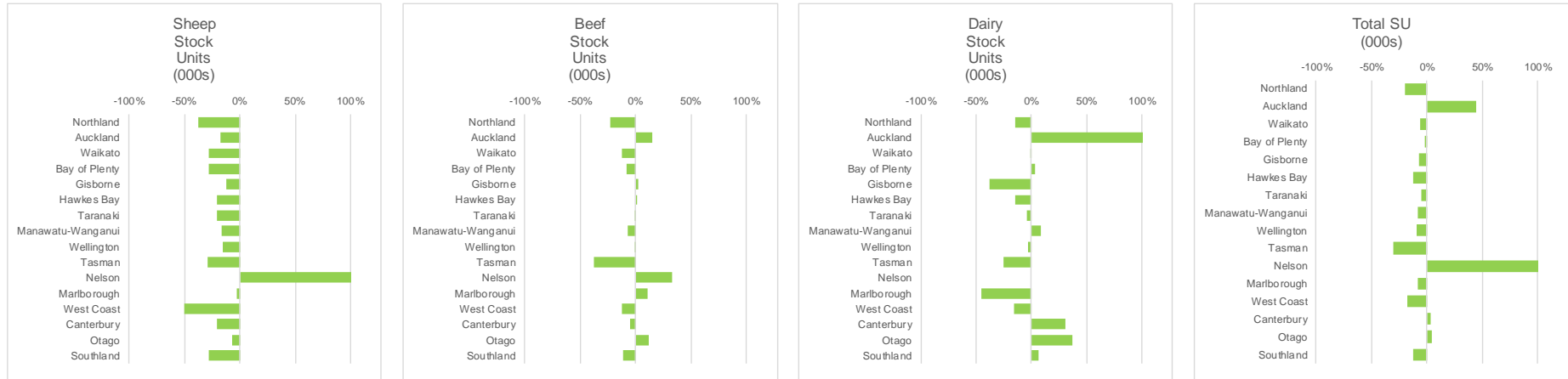
**Figure 44: Change in Livestock Numbers between 2009 and 2019 (%)**



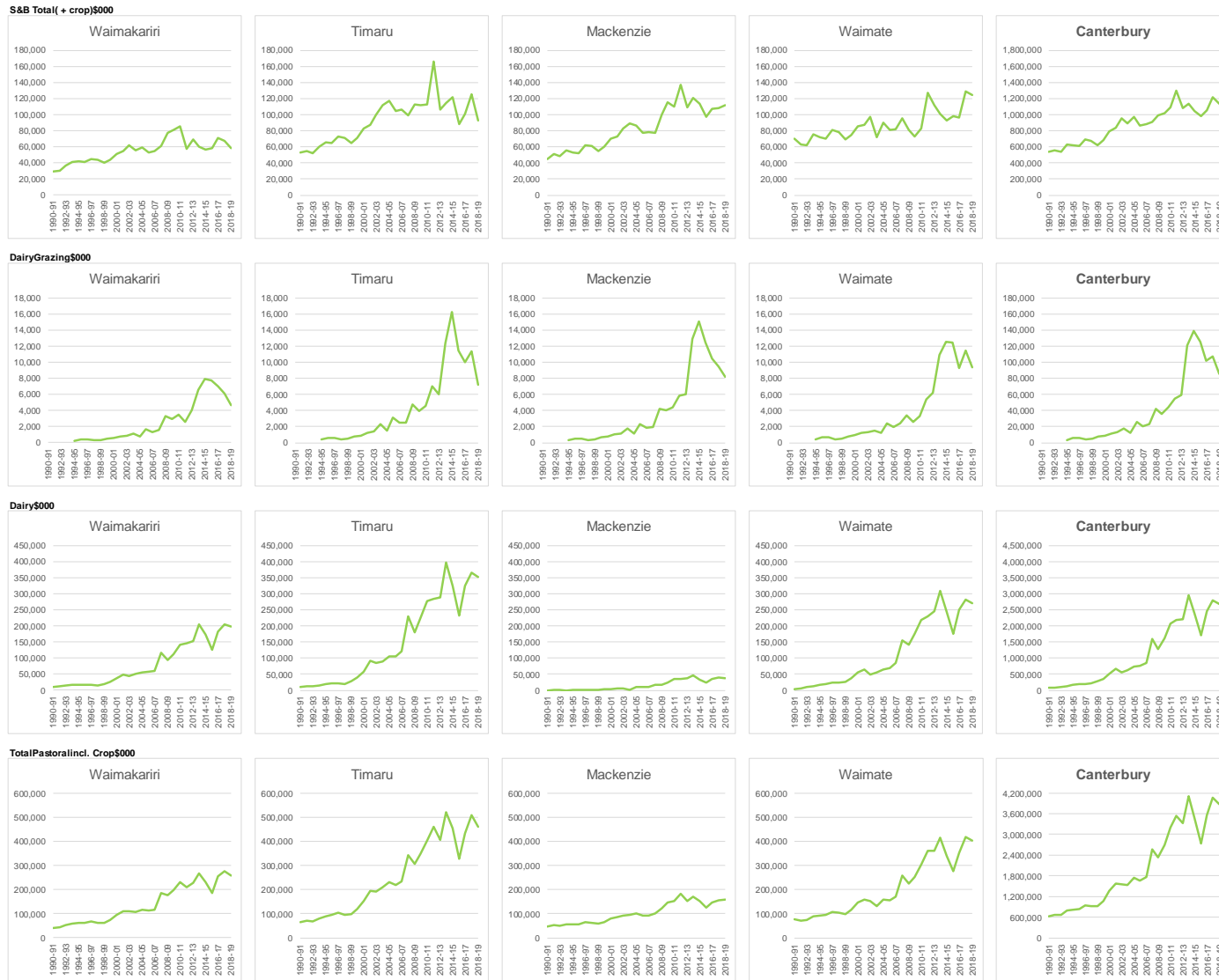
**Figure 45: Change in Livestock Units between 2009-10 and 2019-20 (000 SU)**



**Figure 46: Change in Livestock Units between 2009-10 and 2019-20 (%)**

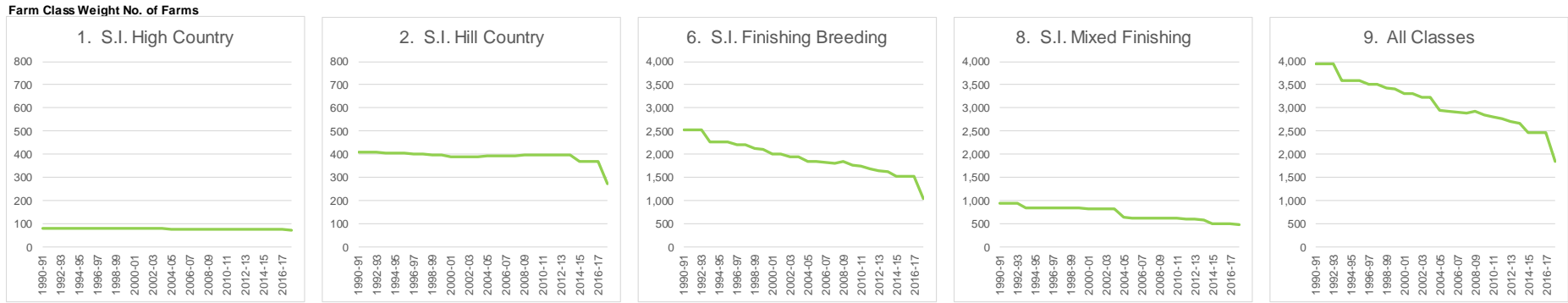


**Figure 47: Aggregate Production Valued at Farm-Gate for selected Territorial Authorities – Sheep and Beef, Dairy Grazing, Dairy, Total Pastoral (including crop)**

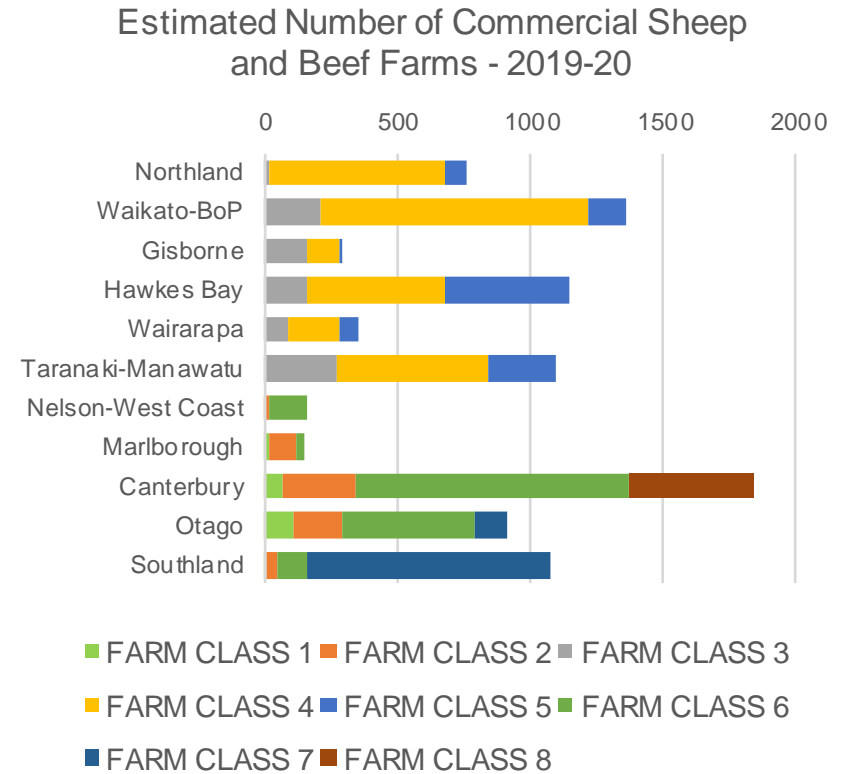
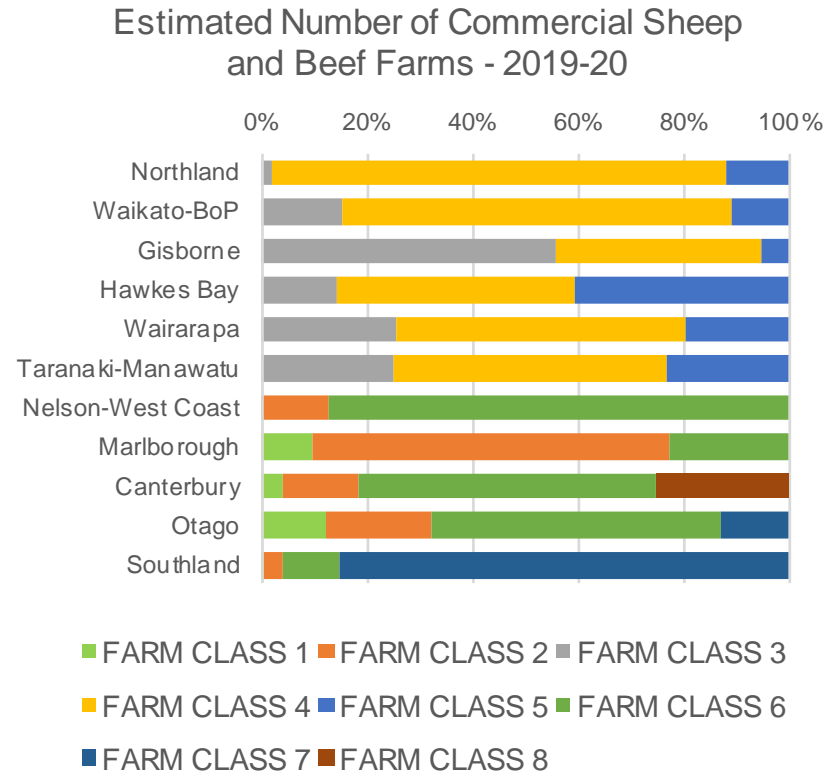




**Figure 48: Number of Commercial Sheep and Beef Farms by Farm Class**



**Figure 49: Estimated Proportion and Number of Commercial Sheep and Beef Farms**



**Figure 50: Average Grazing Area of Commercial Sheep and Beef Farms in Canterbury**



**Figure 51: Distribution of Total Farm Area by Farm Class - Canterbury - 2017-18**



Figure 52: Stocking Rate on Farm Class 1 High Country Sheep and Beef Farms in Canterbury

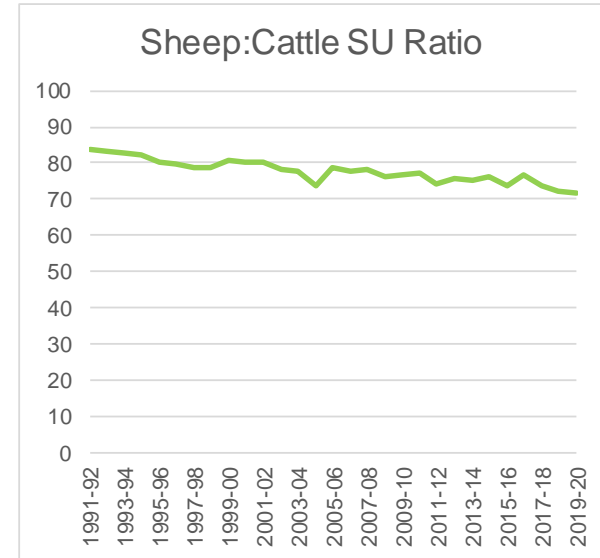
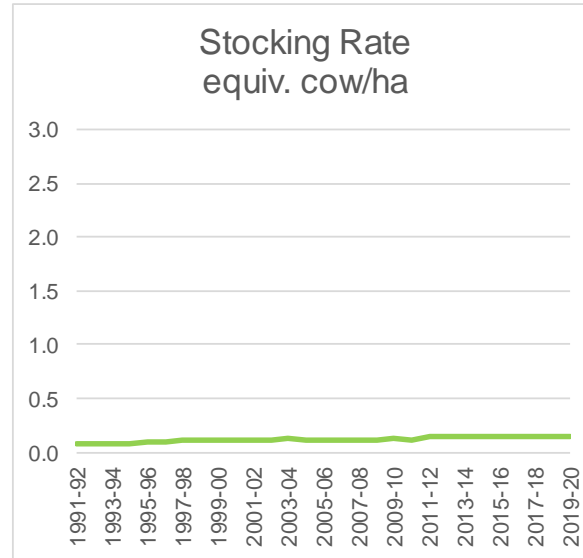
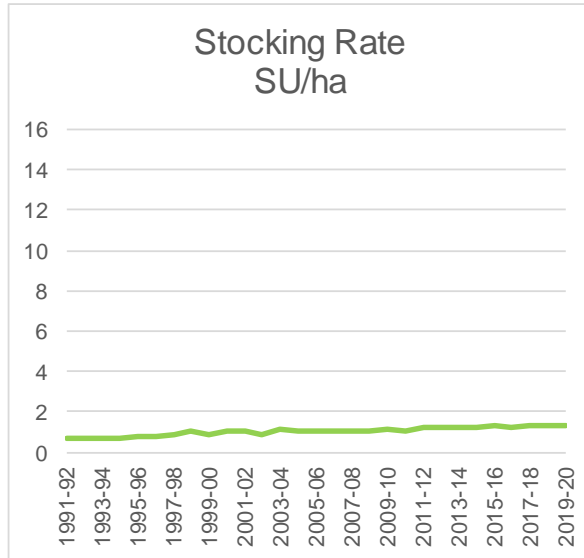
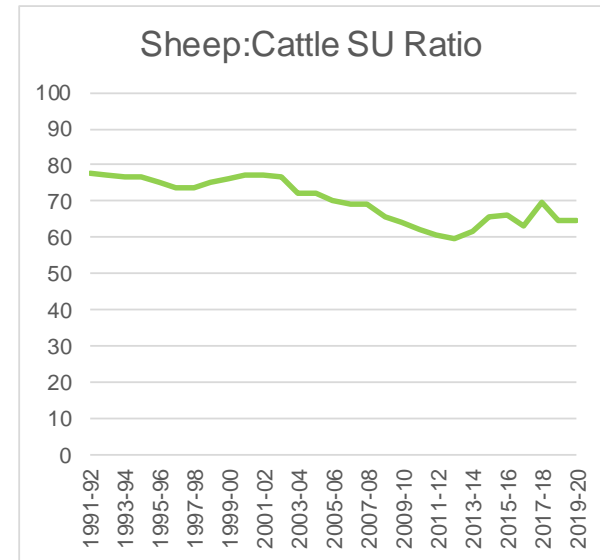
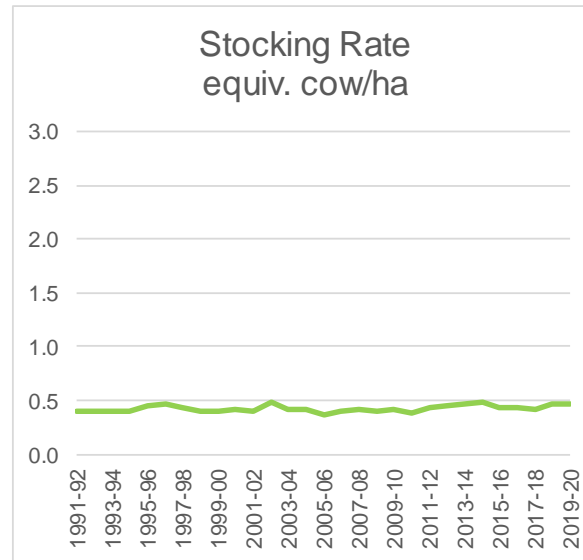
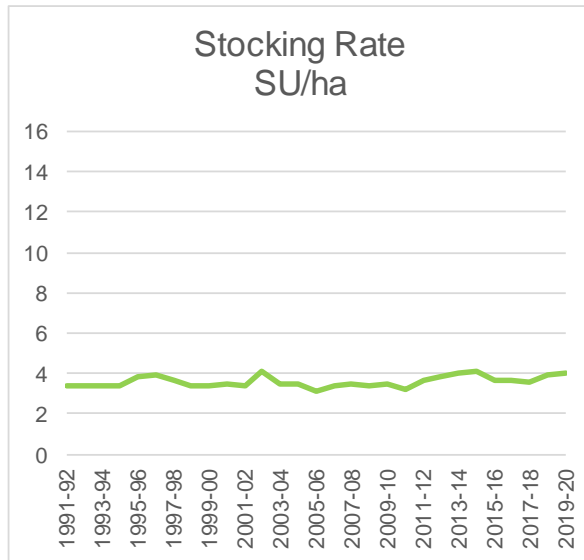


Figure 53: Stocking Rate on Farm Class 2 Hill Country Sheep and Beef Farms in Canterbury



**Figure 54: Stocking Rate on Farm Class 6 Finishing Breeding Sheep and Beef Farms in Canterbury**

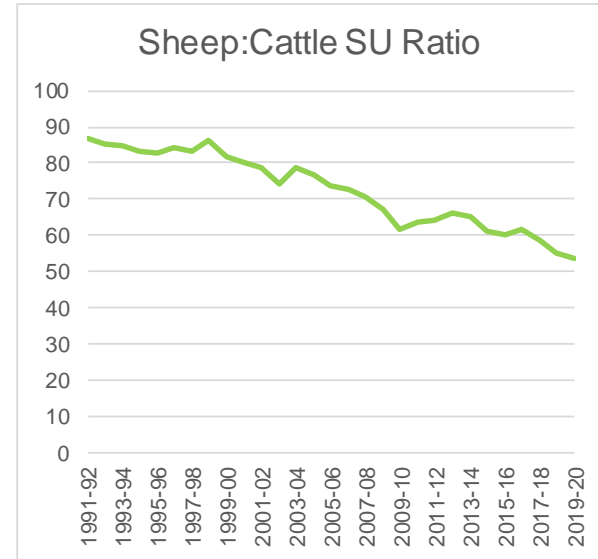
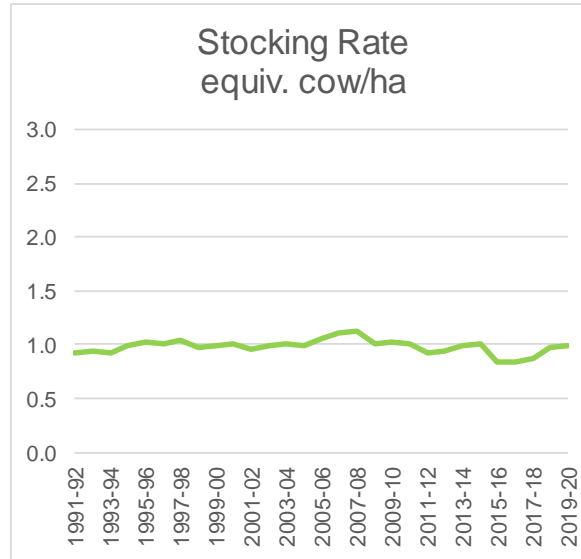
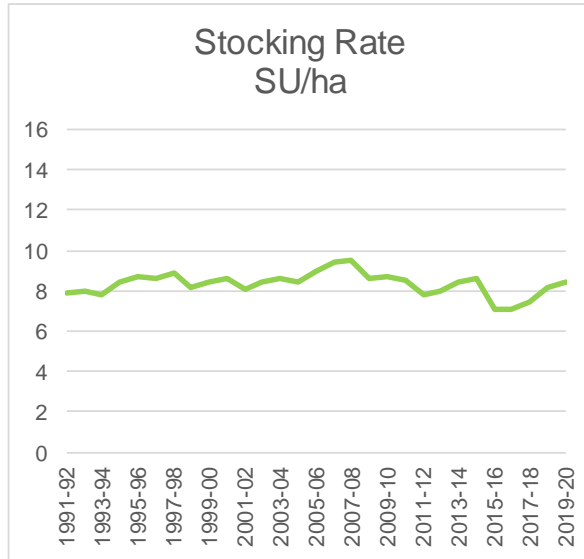


Figure 55: Stocking Rate on Farm Class 8 Mixed Finishing Sheep and Beef Farms in Canterbury

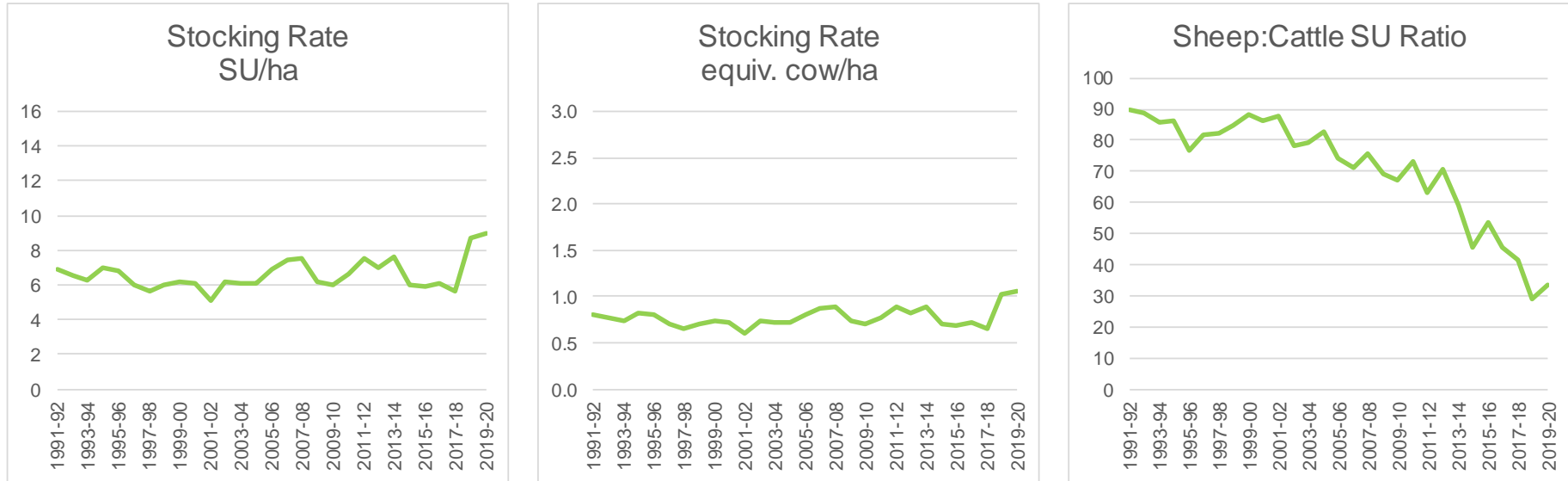
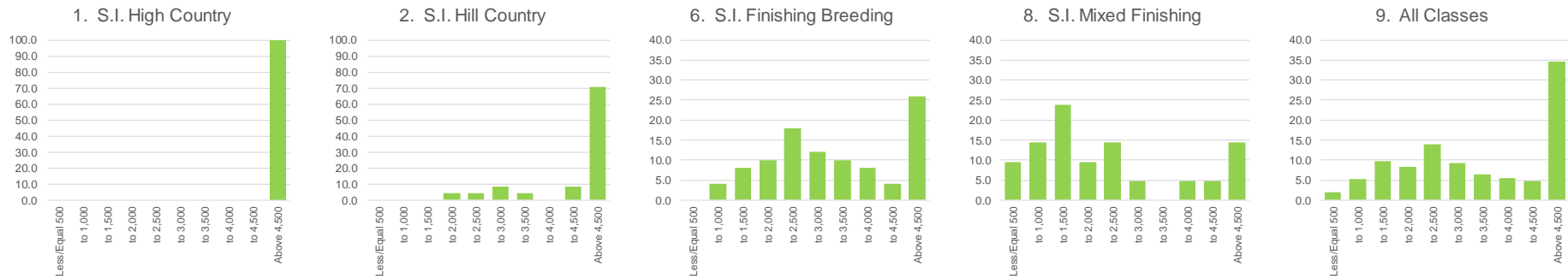


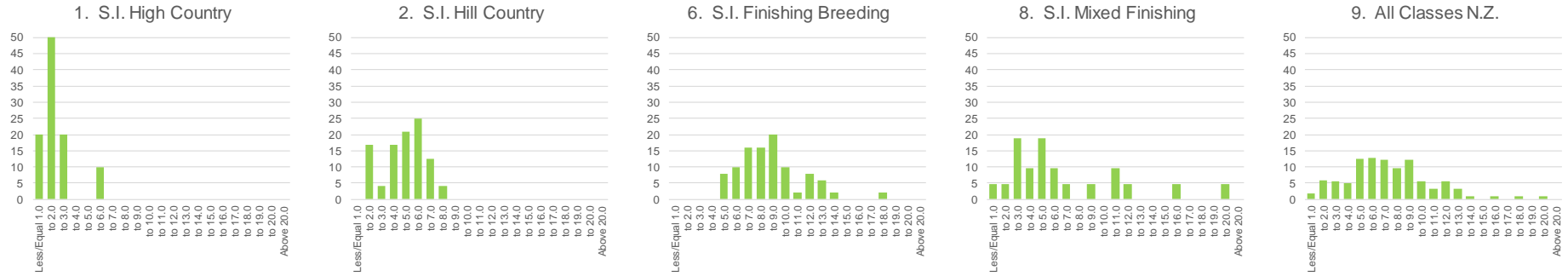
Figure 56: Distribution of Total SU on Commercial Sheep and Beef Farms in Canterbury

Percentage Distribution of Total S.U. at Open per Farm - Canterbury - 2017-18



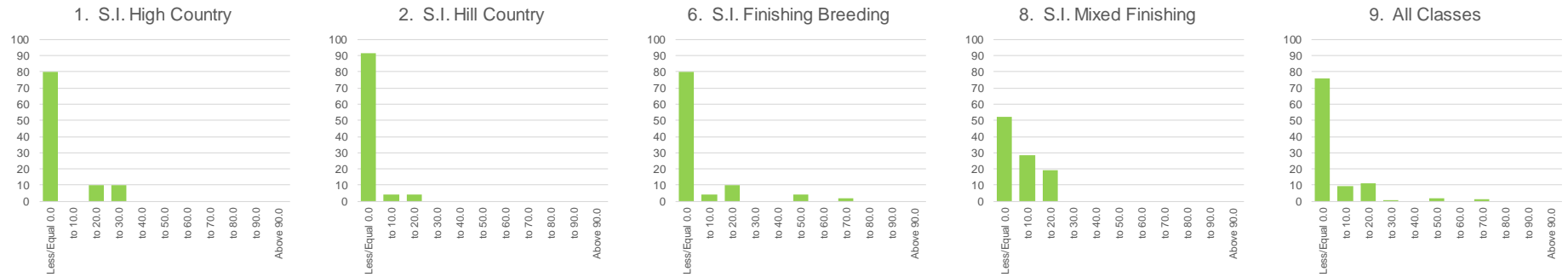
**Figure 57: Distribution of Stocking Rate on Commercial Sheep and Beef Farms in Canterbury**

Percentage Distribution of Stocking Rate per Farm - Canterbury - 2017-18



**Figure 58: Distribution of Dairy Grazing Revenue by Farm Class – Canterbury – 2017-18**

Distribution of Dairy Grazing per Cent of Total Gross Revenue - Canterbury - 2017-18





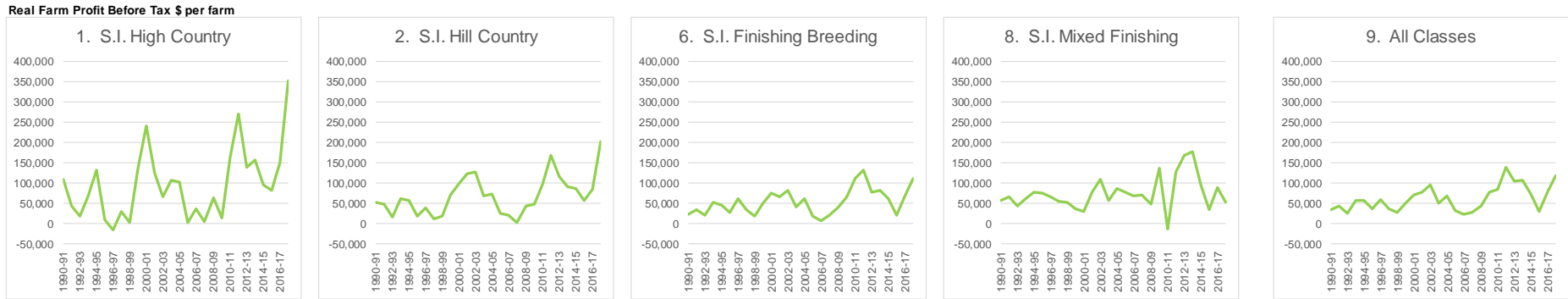
**Figure 59: Dairy Grazing Revenue by Farm Class - Canterbury**



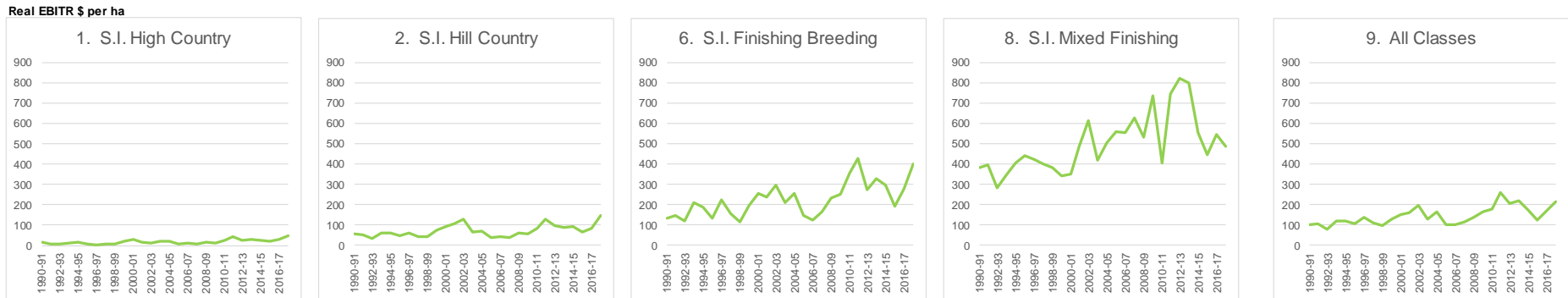
**Figure 60: Dairy Grazing Revenue as a Percentage of Gross Farm Revenue by Farm Class - Canterbury**



**Figure 61: Inflation-adjusted Farm Profit Before Tax per Farm - Canterbury**

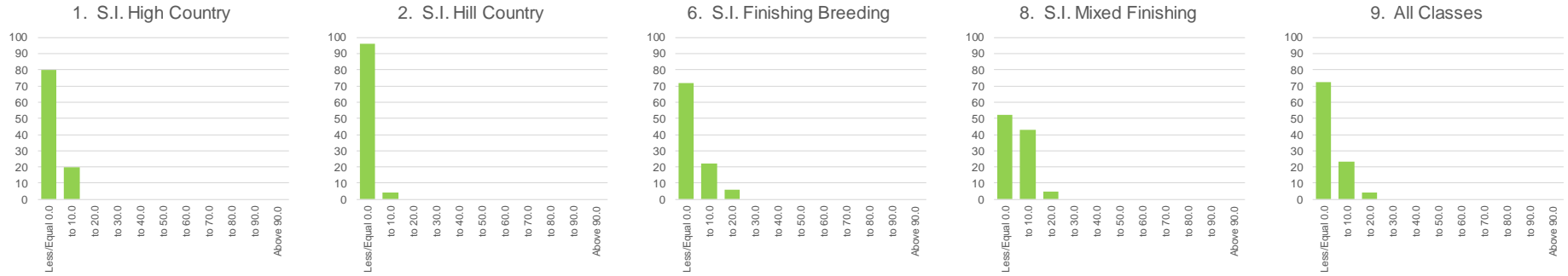


**Figure 62: Inflation-adjusted Earnings Before Interest, Tax and Rent per hectare - Canterbury**



**Figure 63: Casual Grazing Revenue as a Percentage of Gross Farm Revenue by Farm Class - Canterbury – 2017-18**

Distribution of Casual Grazing Revenue per Cent of Total Gross Revenue - Canterbury - 2017-18



**Figure 64: Cash Crop Revenue as a Percentage of Gross Farm Revenue by Farm Class - Canterbury**

Distribution of Crop/Grain & Seeds Revenue per Cent of Total Gross Revenue - Canterbury - 2017-18

