BEFORE THE   Canterbury Regional Council

IN THE MATTER OF   Plan Change 5

                                                                to the

                                                Canterbury Land & Water

                                                          Regional Plan

STATEMENT OF EVIDENCE OF ANDREW NEIL BURTT

On behalf of

BEEF + LAMB NEW ZEALAND

Dated 22 July 2016

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STATEMENT OF EVIDENCE OF ANDREW NEIL BURTT

Introduction

Qualifications and Experience

1. My name is Andrew Neil Burtt. I am the Chief Economist for Beef + Lamb New Zealand Limited.

2. I hold a B.Agr.Econ. from Massey University.

3. I have been employed by B+LNZ and its predecessor organisations since 1985, when I commenced working for the then New Zealand Meat and Wool Boards' Economic Service. Since, I have been privileged to have worked for New Zealand sheep and cattle farmers in Europe, New Zealand and North America, where I spent around nine years from 1999 to 2006 and from 2010 to 2012, after which I returned to Wellington to lead B+LNZ's Economic Service.

4. I have contributed to a number of regional council processes through the provision and analysis of Sheep and Beef Farm Survey data.

Scope of evidence

5. Background to B+LNZ's Economic Service;

6. Description of the Sheep and Beef Farm Survey; and

7. Description of Sheep and Beef Farm Survey data for the Canterbury region as it relates to Plan Change 5.

The B+LNZ Economic Service

8. In 1949 a Royal Commission was established to "Inquire Into and Report Upon the Sheep-Farming Industry".[1] It found that: "There is considerable division of opinion with no unchallenged premises of facts from which deductions could be safely made to formulate conclusions and proposals".

9. The Commission's recommendation included the amalgamation of the then Meat and Wool Boards to collect and document factual information concerning farm production and economics.

10. This quickly led to the development of a survey of sheep and beef farms with actual farm data for analysis. The Survey evolved rapidly to characterise each farm business as one of eight Farm Classes.

11. The Survey was originally owned 50:50 by the Meat Board and Wool Board, and the Economic Service ran as a standalone group until 2004 when it was merged into Meat & Wool New Zealand, which is now Beef + Lamb New Zealand Ltd.

12. So, the Survey has been running continuously for 66 years, and to my knowledge it is the longest running primary sector survey on earth.

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[1] Royal Commission to Inquire Into and Report Upon the Sheep-Farming Industry in New Zealand http://nlnzcat.natlib.govt.nz/vwebv/holdingsInfo?bibId=952146)

The B+LNZ Sheep and Beef Farm Survey

13. The Survey is conducted of a sample of over 500 farms per year, which represents about 4.5 per cent of commercial Sheep and Beef Farms.[2] The sample is drawn to represent the productive base of the industry as measured by stock units (see Figure 1).

14. It is stratified by Region, Farm Class and Location.

15. The Survey collects data for the whole farm business, characterising each farm on over 2000 metrics, that cover:

    i.   Production, e.g. meat weights, wool grades, real calving and lambing percentages;
    ii. Inputs e.g. fertiliser (NPKS), animal health, labour (hours), repairs and maintenance (R&M);
    iii. Reconciliations of livestock, wool production and sales, feed, and cash crops; and
    iv. 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.

16. The Survey is about actual data, not intentions. To do this, a small team of Economic Service Managers (ESMs) is employed to:

    i.   visit each farm annually for a production and financial interview;
    ii.   conduct two other surveys – of livestock numbers and lambing – using the same Survey sample/framework;
    iii. obtain, standardise and balance financial accounts;
    iv.   create 'real' livestock reconciliations;
    v.   annually calculate a basic property valuation using available data from QV (Quotable Value Limited);
    vi.   canvas and solicit new farms, which have been randomly selected by Statistics New Zealand;
    vii. manage the relationship with each farmer's accountant.
    viii. forecast returns to an animal species and age level;
    ix.   biannually forecast Income and Production by class and region;
    x.   promote new metrics (e.g. environmental) and clarify/improve existing data definitions; and
    xi.   address industry stakeholders at key times during the season.

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[2] 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 per cent of its revenue from sheep, beef cattle, long-term dairy grazing and crops. (Beef + Lamb New Zealand Economic Service, 2016)

Figure 1: Sample vs. Population
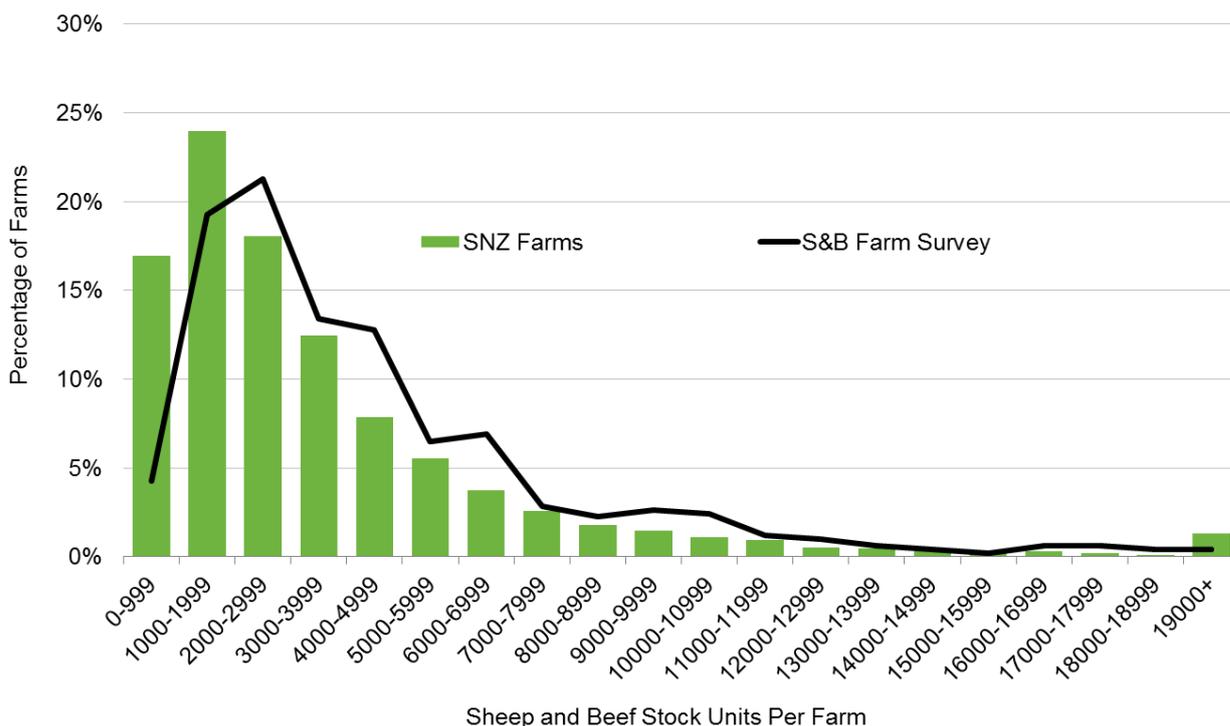
Sampling Unit

17. The sampling unit in the Sheep and Beef Farm Survey is the farm, which may involve more than one owner, and the prime source of the data is the farmer. To qualify for inclusion in the sample, a farm has to winter at least 750 sheep or their 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:
    i. 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);
    ii. At least 80 per cent of the stock units on the property must be sheep and/or beef cattle stock units; and
    iii. The farm must be run as an ordinary commercial sheep and beef farm (i.e. not as a stud or dealer-type farm).

Statistical Requirements

18. Since the Sheep and Beef Farm Survey is based on random sampling, there are two fundamental principles that have been observed:
    i. The sample has been made large enough to avoid the undue influence of abnormal items; and
    ii. The selection of farms has been made at random, so that each and every unit of the population has had an equal chance of being selected.

19. The Sheep and Beef Farm Survey sample is:
    i. randomly selected;
    ii. representative of the New Zealand population of commercial sheep and beef farms;
    iii. stratified according to size, defined by total stock units;
    iv. stratified according to geography; and
    v. stratified according to type (Farm Class).

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20. The sample is drawn by Statistics New Zealand from Agricultural Production Census records using the above criteria. During the first farm visit, the B+LNZ staff makes a final determination whether the farm qualifies for the Survey, because the Statistics New Zealand data about the farm are limited.

Statistical Methods Employed

21. Once farms have been randomly selected, B+LNZ staff classify each farm by Farm Class (representing farming system) and size.

22. In addition to the random selection of farms, several other statistical techniques are employed to reduce the random sampling error. These are:
    i.   Stratification; and
    ii. The use of variable sampling fractions.

Stratification

23. This means that 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:
    i.   Geographical Stratification;
    ii.   Size Stratification; and
    iii. Farm Class Stratification.

    ### Geographical
24. 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
25. 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". In carrying out this stratification, farms are randomly selected in proportion to the distribution of sizes within the geographical stratification. A deviation from rigorous adherence to the population distribution of size groups is caused by the need to have at least 25 to 30 farms in a stratum before it is of any analytical use.

    ### Farm Class
26. The Survey results are classified into eight Farm Classes, described later. While these cannot cover every sheep and beef farm type completely, this has proved a satisfactory method of classification.

27. The pattern of sheep and beef farm revenue in the Survey sub-groups illustrates the major differences between groups. For example, wool revenue is dominant in the South Island High Country, and beef cattle produce a high proportion of revenue on North Island properties. Cash crops contribute to farm revenue on North and South Island intensive farms.

28. **Relevant Farm Class descriptions to Canterbury Region**:
    i.   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.

    ii.   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.

      iii.   **Class 6**   **South Island finishing-breeding farms**

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.

      iv.   **Class 7**   **South Island intensive finishing farms**

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.

      v.   **Class 8**   **South Island mixed cropping and finishing farms**

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.

Variable Sampling Fractions

29. The use of variable sampling fractions for different strata can lead to considerable gains in accuracy in cases where the material is known to have a wide deviation from the mean, and especially if the sampling fraction can be made proportional to the strata distribution. This technique has been used to advantage and variations in the sampling fractions reflect this approach.

Weighted Average All Classes Data

30. To obtain regional and national pictures, "Weighted Average All Classes" figures are used. These are obtained by weighting the average of each 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. 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.

31. 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.

32. 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.

33. An understanding of the "Weighted Average All Classes" data is best given by an example. Consider the South Island high country farms (Class 1) that make up around 1.5 per cent of the total sheep and beef farm population covered by the Survey. This percentage is the weight that Class 1 data have in the "Weighted All Classes Average" data. In contrast, North Island Hill Country farms make up around 30 per cent of the sheep and beef farm population and so their weight in the New Zealand "Weighted Average All Classes" data is most significant.

34. Analysis of New Zealand's official statistics has shown that less than 15 per cent of the beef cattle herd and around five per cent of the sheep flock are run on non-commercial sheep and beef holdings. Most of the livestock within this group are on small holdings and lifestyle blocks.

Physical and Unit Price Data

35. All physical data and unit price data recorded in the Survey are collected independently of farm accounts from source documents and farm records for the farming year ending 30 June. All data are subject to extensive validation checks at the individual farm level to ensure accuracy. This feature of the Survey is necessary to provide an accurate and robust representation of the sheep and beef farm industry, and to provide a sound base for the Economic Service's forecasting systems.

36. Though physical data are shown in farm accounts they tend to be summarised and do not provide sufficient detail to describe the physical characteristics within the industry.

Farm Accounts

37. Details of the financial results for Survey farms are derived largely from the farm accounts. In the past, many farm accounts were completed to provide only the necessary information for the preparation of taxation returns, and for ensuring that the appropriate amount of tax was paid.

38. The depth of the analysis of farm accounts has to be governed by the standard of the majority of the accounts that are received. By making use of staff field work and the physical data that is provided, it is usually possible to reduce large omnibus items, such as "Farm Purchases" or "Farm Working Expenses", to a satisfactory level of detail.

39. It should also be noted that there is a degree of variation in the balance dates of the individual farms. Most farms have balance dates from 31 March to 30 June. Although the physical production calculations are taken to 30 June, no attempt is made to convert all financial records to a 30 June balance.

40. There also is a mix of ownership structures. Generally, single owners dominate, with smaller proportions as partnerships, and other forms, such as companies and trusts.

Limitations and constraints

41. The process is necessarily based on a sample due to limited resources and because 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 the region and across the timeframes envisaged by policy measures is surveyed. That is not practicable for such policy development.

42. The analysis is somewhat limited by the fact that information gathered in this process cannot be expected to represent fully the nuances of human behaviour of individual farmers and their response – individually and collectively – to policy that is presently unknown.

43. In my opinion, the use of actual data from a sample of actual farms from across the population of New Zealand farms provides a better base for assessing the impacts of policy than can be done using models of "typical" or "average" farms that have been created by "experts", because the latter inevitably reduces the level of complexity that exists in the sector and region.

Sheep and Beef Farms in Canterbury

44. The term "sheep and beef farms" is widely used in the industry to refer to "traditional" pastoral farms that run sheep and beef cattle but almost universally have a range of other enterprises.

45. Sheep and beef cattle are typically run concurrently together on the vast majority of drystock farms in New Zealand. This is because the two stock types complement each other, by providing farm/livestock management, land management, pasture and risk management benefits to the farmer/owner. Generally, this complementarity results from:

   i.   Sheep and beef cattle having different feed requirements so pasture growth and utilisation can be balanced by farming a combination of animal species;
   ii.   Beef cattle can be used to manage poorer quality feed in summer and autumn that results from rapid growth, particularly on hill country, where it is difficult, usually impossible, to operate equipment used to harvest grass that is conserved as hay, baleage or silage;
   iii.   Sheep and cattle are generally not affected by the same types of parasites, so cattle and sheep can be used to manage pasture and minimise exposure to parasites; and
   iv.   Sheep and cattle have different revenue streams, providing a means to mitigate revenue risk.

46. Almost all sheep and beef farms have some form of revenue from sources other than sheep and beef cattle, e.g. from deer, cropping, grazing in of other farmers' livestock (such as dairy heifers) and farm forestry. This diversity means sheep and beef farms are complex businesses to operate, analyse and understand.

47. Generally, Canterbury exhibits the same characteristics as elsewhere in the country, though the diversity in this region is significant – from large high country stations (Farm Class 1) to mixed cropping and finishing farms (Farm Class 8), which are mostly on the plains, and we consider are almost unique to Canterbury.

Number of Farms

48. B+LNZ estimates there were approximately 2,900 commercial sheep and beef farms in Canterbury in 2014-15. That is about 25 per cent of the estimated total number of commercial sheep and beef farms in New Zealand.
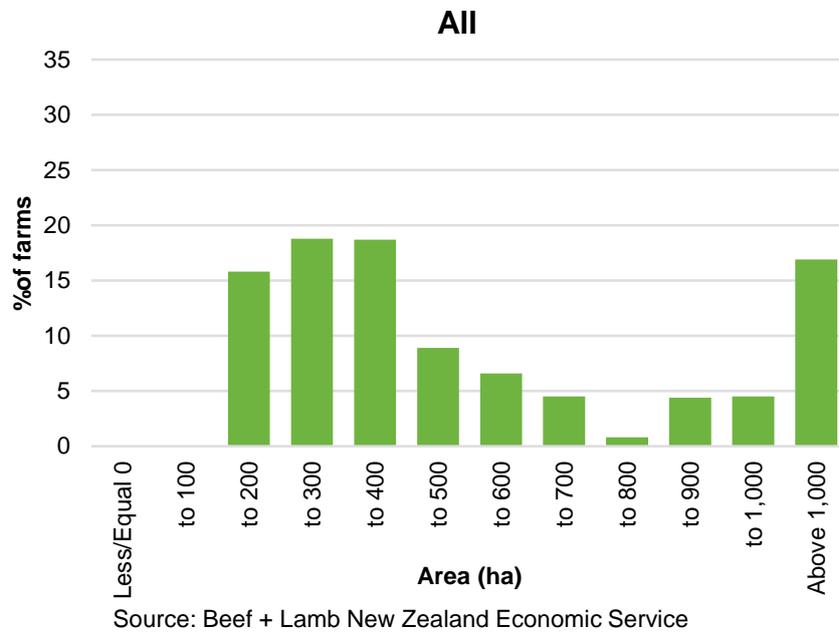
49. In the Sheep and Beef Farm Survey sample for 2014-15:

   i.   Twelve Farm Class 1 High Country farms averaged over 8700ha effective area, ranging from 2300ha to over 39,000ha;
   ii.   Twenty-four Farm Class 2 Hill Country farms averaged over 1500ha, ranging from 300-4800ha;
   iii.   Fifty Farm Class 6 Finishing Breeding farms averaged 380ha and ranged from 130-1300ha; and
   iv.   Twenty Farm Class 8 Mixed Finishing farms averaged nearly 420ha with a range of 120-980ha.

Effective Area

Figure 2 shows the wide range of farm sizes in Canterbury. Over 15 per cent of commercial sheep and beef farms are over 1000ha. These are primarily in the hill and high country.

Figure 2: Distribution of Total Effective Area per Farm – Canterbury – 2014-15

Source: Beef + Lamb New Zealand Economic Service

"Wintering"

59. Winter Feed Area sown is recorded in the Sheep and Beef Farm Survey.[3] The following comments apply to commercial sheep and beef farms in Canterbury.

Figure 3 shows that Winter Feed Area is less than or equal to 10 per cent of Effective Area on two-thirds of farms in Canterbury.

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[3] . When the first significant use is as winter feed even though it may stay for some later grazing. It includes feed crops such as oaten hay and maize silage if they are sown for on-farm use and grass sown to remain down for less than one year.

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Figure 3: Winter Feed Area as % of Effective Area – Canterbury – 2014-15

All
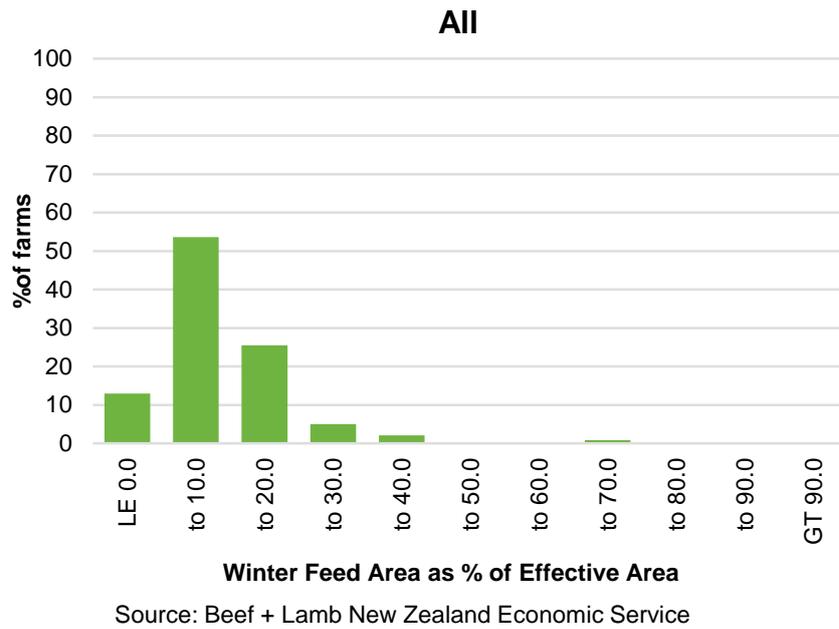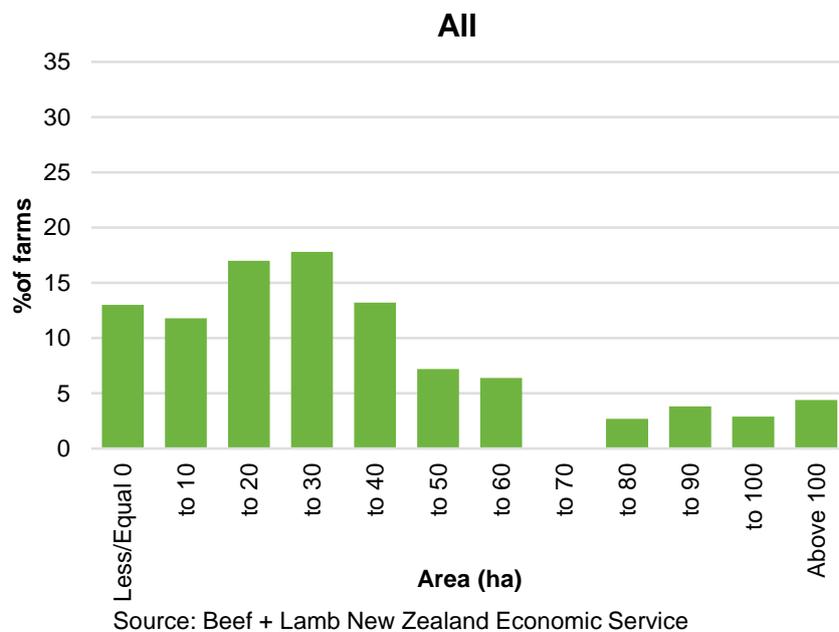

Source: Beef + Lamb New Zealand Economic Service

Figure 4 shows that approximately 40 per cent of farms (farm businesses) have less than 20ha of winter feed area, and therefore 60 per cent have more than 20ha. 20 per cent have more than 50ha.

Figure 4: Distribution of Winter Feed Area per Farm – Canterbury – 2014-15

All

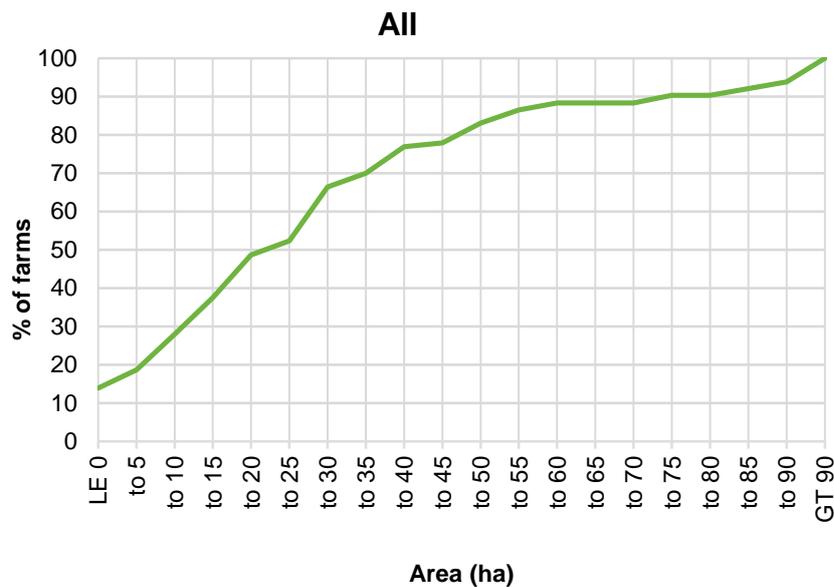Source: Beef + Lamb New Zealand Economic Service

This can be seen differently by presentation of cumulative proportion of farms.

Figure 5 shows the cumulative percentage of farms against increasing Winter Feed Area per Farm. It shows:

i. About 15 per cent of farms do not have Winter Feed Area;
ii. About 50 per cent of farms have up to 20ha of Winter Feed Area (so half the farms have more than 20ha of Winter Feed Area);
iii. About 80 per cent of farms have up to 45ha of Winter Feed Area (or 60 per cent of farms have 20-45ha of Winter Feed Area); and
iv. About 10 per cent of farms have more than 75ha of Winter Feed Area.

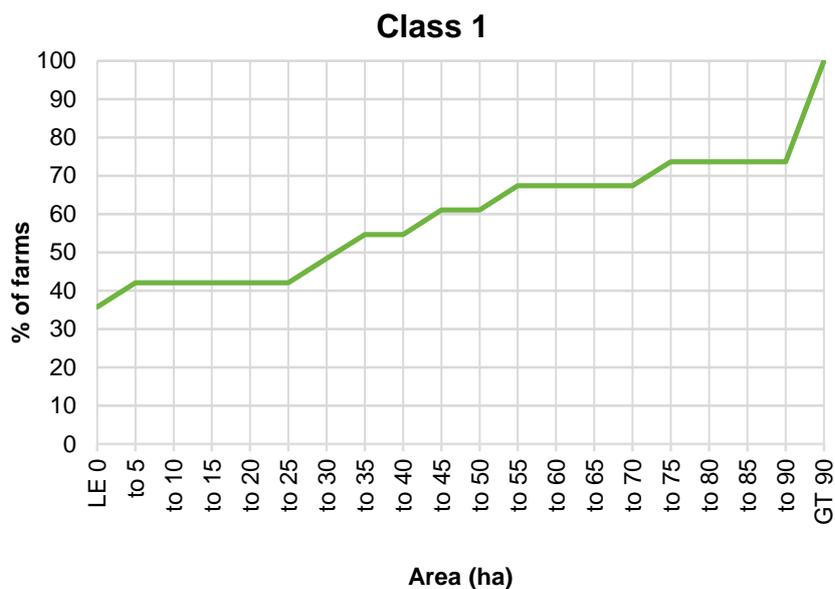**Figure 5: Winter Feed Area per Farm – Cumulative % of Farms – Canterbury – 2014-15**

Source: Beef + Lamb New Zealand Economic Service

This is elaborated by Farm Class in the following charts:

i. Around two-thirds of Farm Class 1 farms have over 20ha of Winter Feed Area (see Figure 6), however they are large farms/stations. Recalling they averaged 8700ha means that the proportion of the farm that is in Winter Feed Area is small, but it is important to farm management and the farm business.
ii. Around half the Farm Class 2 farms have over 20ha of Winter Feed Area (see Figure 7). They are smaller than Farm Class 1 farms, but still relatively large – with an average over 1500ha and a range of 300-4800ha.
iii. About half the Farm Class 6 farms have over 20ha of Winter Feed Area (see Figure 8).
iv. And about two-thirds of the Farm Class 8 farms have over 20ha of Winter Feed Area (see Figure 9).

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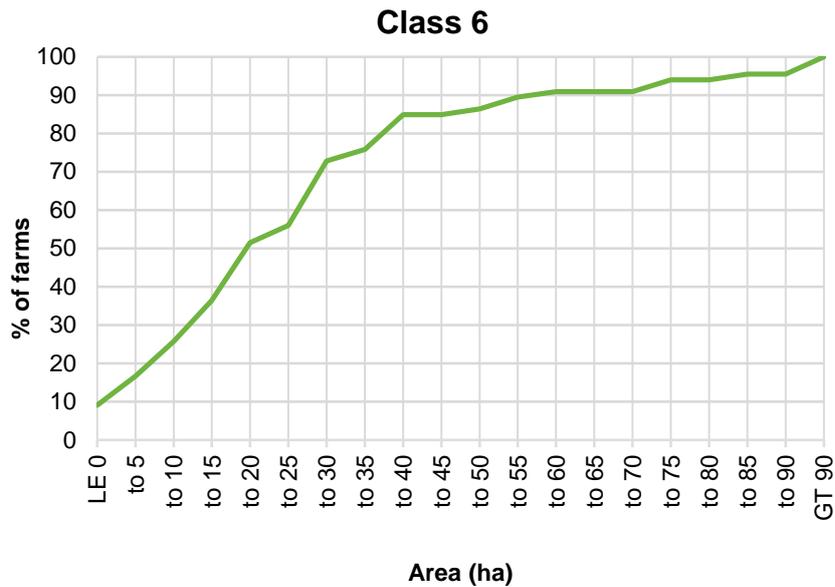**Figure 6: Winter Feed Area per Farm – Cumulative % of Farms – Canterbury – 2014-15**

Class 1

Source: Beef + Lamb New Zealand Economic Service

Figure 7: Winter Feed Area per Farm – Cumulative % of Farms – Canterbury – 2014-15

Class 2

Source: Beef + Lamb New Zealand Economic Service

Figure 8: Winter Feed Area per Farm – Cumulative % of Farms – Canterbury – 2014-15

Class 6

Source: Beef + Lamb New Zealand Economic Service

Figure 9: Winter Feed Area per Farm – Cumulative % of Farms – Canterbury – 2014-15

Class 8

Source: Beef + Lamb New Zealand Economic Service

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