

Pastoral Farm Debt in Southland

A background paper for Environment Southland's Farm Debt Working Group



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Acknowledgement

Richard Copeland for his invaluable knowledge of the deer industry and banking in Southland.

Working citation

Moran, E., Doole, G., Neal, M., Burt, A., Fisher, A., Fung, L., Monge, J., and McDonald, N. (2021) Pastoral Farm Debt in Southland: A background paper for Environment Southland's Farm Debt Working Group. Internal paper, Environment Southland.

Executive Summary

The ability to borrow money and pay it back over time is an important tool for farm management, and it has both positive and negative sides to it. Farm debt can be relevant to the economic impact assessments of environmental policy that are undertaken by regional councils. This is the case for the 'limit-setting' process occurring in Southland under the *National Policy Statement for Fresh Water Management 2020*. A considerable amount of economic work has already been done through The Southland Economic Project¹ although it did not explicitly include farm debt. As well, there is a large body of research literature on different elements of farm debt and the economic impacts of environmental policy but it tends to circle around the topic without directly addressing it.

To address this gap, Environment Southland has set up a Farm Debt Working Group to give their free and frank advice to the Council on how the limit-setting process may impact farm debt in pastoral industries (dairy, sheep and beef, and deer). This paper will be used in the Farm Debt Working Group's first workshop in June 2021. It will also support the Working Group's advice in a more formal technical report on farm debt that will be developed in 2022. This paper is an opportunity for the industry groups, DairyNZ, Beef + Lamb New Zealand (B+LNZ), and the Deer Industry New Zealand (DINZ), to outline the nature of debt and the current debt position for pastoral industries in Southland.

Each industry group considered both debt and cashflow and uses their standard methodologies. DairyNZ modelled a synthetic population of the dairy farms in the region based on real farm data in Dairybase. B+LNZ used real farm data from the Southland and Otago sample in the Sheep and Beef Farm Survey. DINZ relied on an in-depth interview with a local banking expert supported with industry knowledge.

Dairy farm debt in New Zealand increased dramatically over the last 30 years because of high confidence in the industry, but more recently has been declining rapidly because of high commodity prices, low interest rates, and changes in bank policy. In Southland, total liabilities across the 1,000 or so dairy farm businesses in the region is often lower than elsewhere (DairyNZ, 2020). The main reasons are lower land prices historically and higher levels of milk production, with reliable pasture growth in late-summer and early-autumn. In 2018-19, the median farm's total liabilities was \$21.17 debt per kilogram of milk solids but there is a lot of variation between farms in terms of liabilities, leverage, and capacity to service debt. Although there is variability here also, most dairy farms are paying substantial amounts annually. It is predicted that around eight per cent of farms have Debt-to-Asset Ratios above 90 per cent and so are at high risk of insolvency. Also, around six per cent of farms have an Economic Value Added² below zero, indicating they are unable to cover their cost of capital in a year with an average milk price.

There are 1,000+ sheep and beef farm businesses in Southland – with most being lowland finishing farms. In 2018-19, 14 per cent of these farms had a Debt-to-Asset Ratio of more than 50 per cent, while 45 per cent of the farms had a Debt-to-Asset Ratio of less than ten per cent. On average, hill and high country farms, and finishing farms have a high level of equity, while finishing and breeding farms appear to be more variable. Although sheep and beef farms tend to carry less debt than dairy farms, their ability to use it effectively depends to a large extent on cashflow from one year to the next. In 2018-19, roughly one in five farms had a Farm Cash Surplus of less than \$80,000 – most of which is

¹ <https://www.es.govt.nz/environment/economy>

² Economic Value Added[®] is determined through adding operating profit and change in land value minus rent, interest, tax, and an equity charge.

then taken up with tax, principal repayments, farm family living expenses, and investment in farm infrastructure. Cashflow can fluctuate markedly between years and these fluctuations become more critical to manage as interest rates increase. Having multiple revenue streams (i.e. diversification) is an important way sheep and beef farmers remain financially sustainable. However, this strategy may put them more at risk from a freshwater management perspective (Moran *et al.*, 2019).

There are an estimated 210 'majority deer' or 'specialist deer' properties in Southland (a farm business may be more than one property). The deer industry's main focus is on venison production, although there is a transition occurring towards velvet production, which may carry more debt (once adjusted for scale). Well performing operators are acquiring more land, and they take on debt to achieve it, whereas smaller operators are coming under pressure, and there are few new entrants. Deer farms are unlikely to have high levels of farm debt up but there are some that are operating successfully at around 50 per cent Debt-to-Equity Ratio. These farms tend to be stud breeders, good velvet operations, and may have trophy hunting arms to their business. Most deer farms usually have multiple revenue streams but it is unclear how much of an influence this has on a deer farmer's ability to secure debt.

For many farms debt is an essential business management tool and an important determinant of farm resilience. However, it appears that debt is used quite differently across pastoral farming in Southland and there are few farm businesses, other than in the dairy industry, that have a Debt-to-Asset Ratio higher than 50 per cent. While some drystock farms are able to operate successfully at these levels because they have good cashflow, it is unlikely that many are able to support higher levels of farm debt without good sources of off-farm income. In the dairy industry between six and eight per cent of farms appear to be financially vulnerable.

It is difficult to consider farm debt in isolation of farm context because it is dependent on so many factors. With this in mind, this paper suggests two main perspectives for the Farm Debt Working Group to consider in determining its advice:

1. Farm debt is determined by many factors, such as cashflow, farm size, production system, a farmer's ability and skills, efficiency, profitability, and land values. How do these factors, both individually and together, influence the socio-economic impacts of environmental policy; and
2. How will the socio-economic impacts of environmental policy impact the uses of farm debt as a business management tool in the future (e.g. farm and industry growth, farm size, farm succession)?

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1 Introduction

Fundamentally, farms are businesses and, for many, debt is an essential business management tool. Farm debt can have both positive and negative sides for a farm business.

On the positive, it gives new entrants to farming the ability to buy a property, and helps existing farmers grow and change their farms by investing in projects, such as expansion, infrastructure, transition, and succession. More profitable farmers often leverage their equity to buy more land. Debt is also used in the operation of farm businesses, to manage cashflow as income and expenditure fluctuate across a year, as a buffer for production systems that are highly exposed to product-price volatility, or both.

On the negative side, high levels of debt in relation to equity can affect the level of solvency³ of a farm business. Farmers are often faced with taking on considerable debt to fund farm purchase, but then face persistent challenges to maintain sufficient cashflows to cover operating expenses, interest, and principal repayments (Oltmans, 1995). Debt levels are also influenced by changes in the market values for land over time.

Although debt is part of modern farming, it is not necessarily well understood outside of professional services to agriculture, such as banking and accountancy. Despite this, it is a topic of interest to the communities most likely affected. Consequently, farm debt is directly relevant to economic impact assessments of policy, and particularly environmental policy, that are regularly undertaken by organisations and agencies such as regional councils.

The total level of debt in the dairy industry has been a growing public concern and the Reserve Bank identified it as a risk in its November 2015 Financial Stability Report. Farm debt, however, is not just limited to the dairy industry and is relevant across the agricultural sector more broadly. As well, the importance of cash (or liquidity) has risen with changes in bank lending policy following the Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry (2017 - 2019) as well as increasing policy to address a range of environmental issues.

There is already a large body of research literature on farm debt for developed economies and regions, but it tends to focus either on relationships between farm debt and other financial variables (e.g. profitability, cashflow, or product prices) or the relationship between profitability and environmental policy (e.g. Doole et al., 2013). In other words, this literature tends to circle around the topic of farm debt and the economic impacts that may be created by environmental policy without directly addressing it. However, two recent papers (Doole, 2019; Harris 2019) seek to address this gap in the context of the Waimakariri Water Management Strategy Zone in Canterbury. It is timely to consider this topic for pastoral farms in Southland.

1.1 Purpose

This paper is an opportunity for the industry groups: DairyNZ, Beef + Lamb New Zealand (B+LNZ), and the Deer Industry New Zealand (DINZ) to outline the nature of debt and the current debt position for pastoral industries in Southland (dairy, sheep and beef, and deer). Each industry group has different resources to draw on. In the following, quantitative data is used where it is available and qualitative information based on expert knowledge is brought in as needed. Contextual information on

³ Solvency is possessing adequate assets to cover liabilities as reflected by positive equity (also called net worth).

Southland's agricultural sector and its pastoral industries is available in The Southland Economic Project: Agriculture and Forestry Report (Moran et al., 2017)⁴.

The purpose of this paper is two-fold. First, it is a starting point for the Farm Debt Working Group to use at its first workshop in June 2021. Second, it will be supporting information to the Working Group's advice when a more formal technical report of farm debt is developed in 2022. Environment Southland set up the Farm Debt Working Group to provide free and frank advice on the influence of farm debt on the socio-economic impacts of setting limits for fresh water under the *National Policy Statement for Freshwater Management 2020*.

2 Definition of farm debt and relevant financial measures

The definition of farm debt by the Farm Debt Mediation Act (2019)⁵ is a debt incurred by a farmer (whether as principal debtor or guarantor) that:

- a) at the time it is incurred, is incurred solely or principally for the purpose of conducting a primary production business or any related activities; and
- b) is secured wholly or partly by a security interest in farm property (whether granted by the farmer or a guarantor).

A range of measures is used in the finance literature to measure farm debt, and the ability to service loan re-payments. These measures are also relevant to considerations around business viability and financial resilience. No single measure is preferred over another, and it is the broader view gained from the use of several measures that helps provide true insight into the solvency of a firm. Examples of key measures are included below, and most are used in this paper.

2.1 Debt measures

- The Debt-to-Asset Ratio measures the financial position of the business as the creditors' claims against the operation as a share of total farm business asset value. In other words, it measures the proportion of a farm's assets that is financed with debt. A farm business with a Debt-to-Asset Ratio greater than 100 per cent is typically classified as insolvent. Hence, a farm with such a ratio above 90 per cent or 95 per cent is seen as high risk from a debt point of view. A smaller Debt-to-Asset Ratio indicates greater farm equity and less risk of insolvency. Lenders use Debt-to-Asset Ratios—or similar measures of net worth—to assess insolvency risk and will charge higher interest rates to farms above their established risk thresholds (Ma et al., 2020; Wolf et al., 2016).
- The Leverage Multiplier in the Dupont Ratio (Parrino et al., 2011) is the ratio of assets to equity. Not all debt is equivalent, in terms of its value to the farm business. A higher Leverage Multiplier expresses benefits arising from growth of the asset base—and therefore in the scale of the business—but also denotes an increase in downside risk associated with greater gearing.

⁴ <https://www.es.govt.nz/environment/economy>

⁵ <https://www.legislation.govt.nz/act/public/2019/0073/latest/LMS165226.html>

2.2 Cashflow measures

- The Interest Cover Ratio is the ratio of operating profit to interest expense for a given period, usually a year. It indicates the capacity for a business to afford its debt payments in the given period. For example, an Interest Cover Ratio of 3.0 denotes that the business's Operating Profit is three times its interest payments. A higher value of this measure is better for a business.
- Farm Cash Surplus and Operating Profit are profitability measures that affect the ability to service debt, pay down principal, and invest in the farming operation. The average annual profitability of a farm fluctuates with climate, prices, expenditure and other factors. It also varies widely across individual farms.

2.3 Economic Value Added[®]

Economic Value Added[®] is seen as a holistic measure of the financial performance of a farm because it includes the cost of capital (debt and equity) (Doole and Shadbolt, 2021). Economic Value Added[®] consists of operating profit plus capital gain/loss minus rent, tax, interest, and the opportunity cost of equity. Considering interest and the opportunity cost of equity means that the cost of capital for the farm is captured. Careful definition is needed to consistently measure these quantities across industries in the agricultural sector.

2.4 Thresholds

Sound farm financial management requires investment in well-performing assets – i.e. those that are productive and generate good returns on that investment – and debt is a tool that is used to fund those assets. Where a farm investment is in a less productive asset, or there is a less efficient operator, financial losses may be capitalised into the business and increase debt. These two sides of debt can make it difficult to assess whether a particular level is too low or too high for a business, especially without also considering cashflow.

However, various thresholds or benchmark figures are used for measures of debt across the agricultural sector. Usually, benchmarks used to determine farm performance are specific to a region and a certain farming class. These thresholds are particularly valuable when they consider movements over time, given that product prices and/or climate can have a large influence on the magnitude of annual measures. However, broad guidelines also exist at the national level.

In the dairy industry, a Debt-to-Asset Ratio of 25 per cent or below is considered good, while a Debt-to-Asset Ratio of around 50 per cent is the average for the NZ dairy sector (DairyNZ, 2020). A Debt-to-Asset Ratio of 90 per cent may be used to classify a loan as non-performing, provided the farmer is also unable to earn positive profits in the current year and at the long-term average milk price (Dunstan et al., 2015). Interest Cover Ratios of 1.0, 2.0, and 3.0 indicate high, moderate, and low risk, respectively, in terms of a business's ability to cover its liabilities. A farm with a negative Economic Value Added[®] is going backward financially, while a positive Economic Value Added[®] indicates wealth creation.

3 The nature of debt in Southland's pastoral industries

3.1 The dairy industry

Dairy debt increased dramatically between 1990 and 2010 because of high confidence in the industry. National dairy production grew rapidly over this time with cows, area, and milk production increasing by 88, 73, and 252 per cent respectively, driven by multiple factors including:

- (a) sustained, high milk prices driven by enduring demand for dairy products, particularly from China;
- (b) low land prices given the lower profitability of current and alternative land uses;
- (c) availability of affordable irrigation technology and water;
- (d) a willingness of banks to loan funds on an interest-only basis; and
- (e) a certain level of hype, particularly around capital gain, that served to increase the pace and scale of transformation.

Dairy debt has declined rapidly more recently. Dairy farmers are now paying more principal because of sustained higher milk prices, low interest rates, and pressure from agricultural lenders. In the last four years, the share of dairy debt across the national agricultural lending portfolio has fallen from 69 per cent to 63 per cent (RBNZ, 2021). Over this time, the number of potentially stressed dairy loans has almost halved (RBNZ, 2021). Accordingly, where dairy debt was once seen as a primary risk to the nation's financial stability, concerns are now shifting to residential and commercial property sectors.

Dairy farming in Southland has expanded rapidly since 1990 and Southland is now the third largest dairy region in New Zealand, behind Waikato and Canterbury. There are now just under 1,000 dairy farms covering 218,000 hectares of land (milking platforms) (Environment Southland data, May 2021), as well additional land for dairy support, and five per cent of the total land used for dairy in the region is irrigated (Moran et al., 2017). The dairy industry in Southland is an important source of revenue for the regional economy. Further, it is nationally important, given its high level of profitability relative to dairy production in other regions.

Debt per kilogram of milk solids (MS) is often lower in Southland compared to most other regions (DairyNZ, 2020), given lower land prices historically and higher levels of milk production associated with reliable pasture growth in late-summer and early-autumn. Figure 1 presents the distribution of total liabilities on Southland dairy farms in 2018-19. The median is \$21.17/kg MS, while the 25th and 75th percentiles are \$15.70/kg MS and \$26.28/kg MS, respectively.

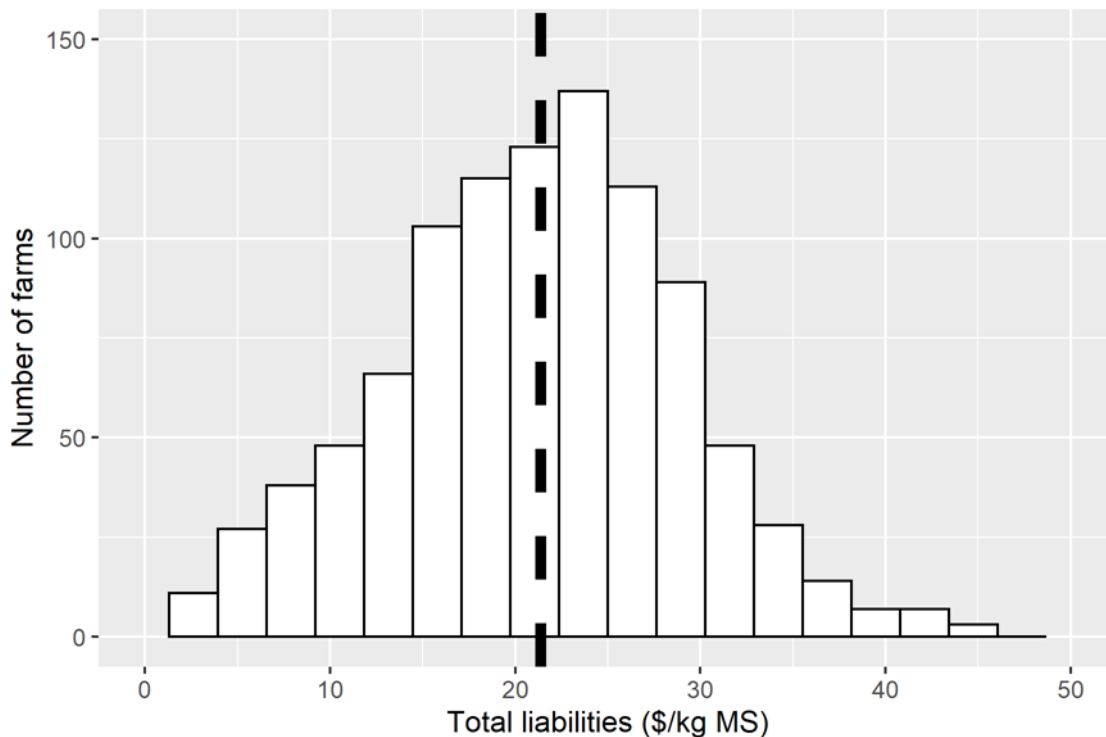


Figure 1: Distribution of total liabilities on Southland dairy farms 2018-19.

3.2 The sheep and beef industry⁶

There is a diverse range of systems, practices, farm policies, profitability, and debt levels amongst the commercial sheep and beef farms in Southland, of which there are over 1,000. These farms cover four of the eight ‘farm classes’⁷ used by B+LNZ in its Sheep and Beef Farm Survey: South Island High Country (Farm Class 1), South Island Hill Country (Farm Class 2), South Island Finishing – Breeding Farms (Farm Class 6), and South Island Finishing Farms (Farm Class 7). There are 920 farms (or 85%) classed as finishing farms. Although there are far fewer high country and hill country farms, they are larger than the finishing farms. A considerable number of farms across the four sheep and beef farm classes have little or no debt.

In 2018-19, finishing farms in Southland (Farm Class 7) had an average total area of 265 ha, carried 2,456 Stock Units and had total assets of almost \$5.9 million per farm. In contrast, finishing – breeding farms (Farm Class 6) were, on average, three times the scale in area, carrying twice as many stock units (4,741) and had total assets of \$8.3 million per farm. High and hill country farms in Otago-

⁶ B+LNZ used data in sections 3.2 and 4.2 of this paper sourced from their annual Sheep and Beef Farm Survey, which is a random sample and representative of the variability across the sector. In 2018-19 there were 87 farms in the Sheep and Beef Farm Survey from Southland and Otago. The Sheep and Beef Farm Survey began in 1950 and is used as the base for the Economic Service's forecasts of meat and wool production and trends in the sector, by linking physical production together with financial returns and the capital structure of farms. <https://beeflambnz.com/data-tools/sheep-beef-farm-survey>

⁷ A description of the Farm Classes in Southland and more contextual information is available in the Sheep and Beef Chapter in Part Two of the Agriculture and Forestry Report. A description is also available on the B+LNZ website <https://beeflambnz.com/data-tools/farm-classes>

Southland⁸ (Farm Classes 1 and 2) have an average area of 7,866 ha and 1,520 ha respectively – within this the farms ranged in size from just over 500 ha to just under 12,000 ha. The weighted average total liabilities was \$687,974 per farm in 2018-19. There is a considerable range of debt across farm classes. Debt-to-Asset Ratio distributions for sheep and beef farms are included in section 4.2.

In Southland, the value of total assets for sheep and beef farms has hovered around \$6 million per farm on average for the decade. Debt was relatively stable in the 1990s and increased by an average of 11 per cent per annum from 2000 to 2009, from \$198,000 to \$546,000 per farm. Figure 2 shows this trend over time.

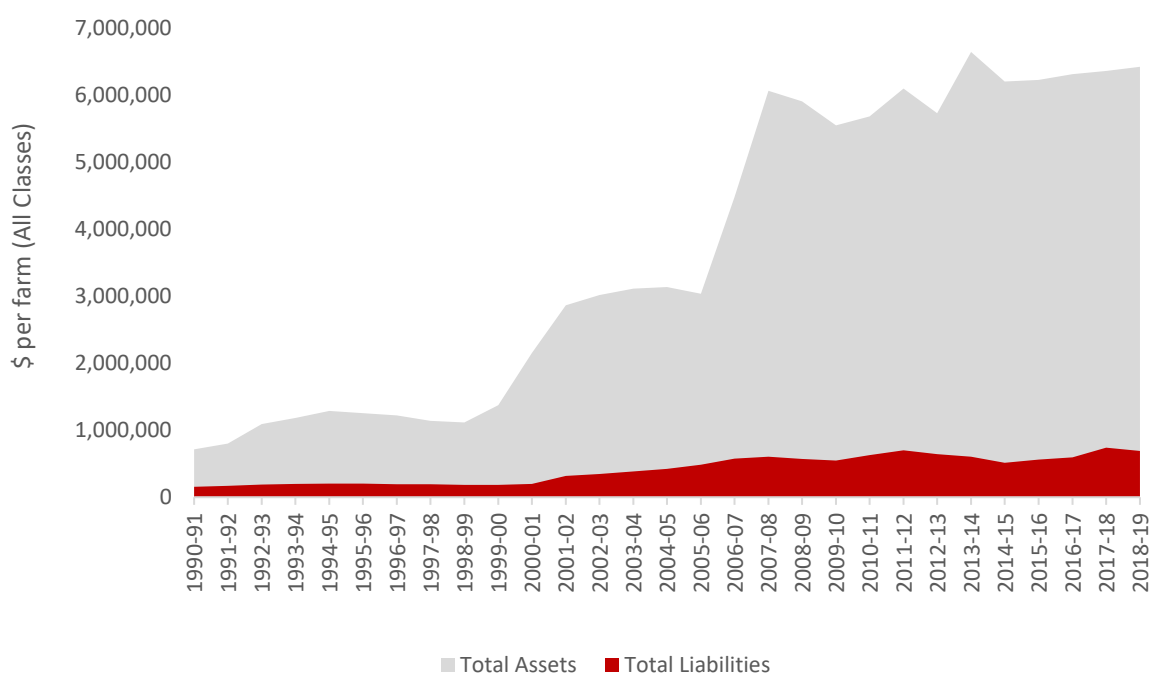


Figure 2: Trend in Total Assets and Total Liabilities per farm for Southland sheep and beef farms across all farm classes from 1990-91 to 2018-19.

Note - Total liabilities includes term debt and current liabilities.

When Total Assets and Total Liabilities are considered on a per hectare and per stock unit basis, it ‘smooths’ some of the movement in the past 8-10 years and repeats the large increases during the early 2000s. While average farm size (land area) has increased over the 30-year period since 1990, debt has increased at a greater rate. In 2018, Total Assets per hectare for all classes averaged \$18,882 and Total Liabilities were \$2,023.

Two factors that have driven the increase in debt are land values and succession or transition. Often younger farmers are more highly leveraged as they borrow to purchase a farm or as part of a gradual

⁸ There are fewer high country and hill country farms in Southland, so for confidentiality reasons this reporting is for Otago-Southland for Farm Classes 1 and 2.

succession plan with purchasing animals and plant while leasing the land. Stage of farming lifecycle is an important influence on debt and is highly variable across the sector.

On average, Southland sheep and beef farms carried less debt (in absolute or ‘per farm’ terms) in 2018-19 than the New Zealand average sheep and beef farm, reflecting the fact that the size of Southland sheep and beef farms is half the weighted average for the country. On a per hectare basis, debt is higher on Southland farms while on a per stock unit basis it is very similar to the rest of the country. The Debt-to-Asset Ratio in Southland has been relatively consistent over a long period, averaging 17.5 per cent across 30 years, and at 20 per cent in 2018-19. Figure 3 shows this relative stability of Debt-to-Asset over time.

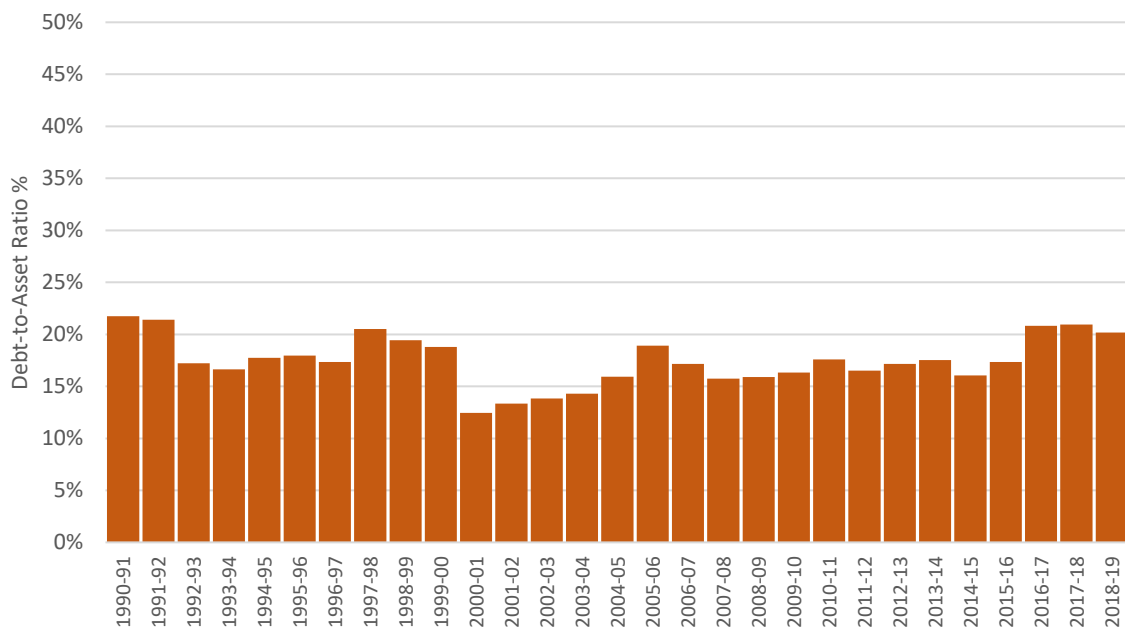


Figure 3: Average Debt-to-Asset Ratio for Otago-Southland sheep and beef farms 1990-91 to 2019-20.
 Note – The scale of the vertical (or y) axis goes from 0% to 50%, rather than to 100%.

Debt is used in sheep and beef farming as a source of capital to invest in the farm business, for both growth and succession planning, as well as being a tool to manage cashflow. Farm expansion, improvements to infrastructure, meeting environmental compliance, or investing in new technology are some possibilities for increasing debt when farmers may choose to leverage their assets. Age and stage in farming career are often factors in borrowing to purchase livestock and/or land. High land values may be seen as a barrier to entry for some. In addition to debt, another way of ‘financing’ a farm, particularly to facilitate succession, is through leasing all or part of the farm or livestock or both.

Cashflow in sheep and beef farming is generally ‘lumpy’ during the season (more so than dairy farming). As well, the timing of surpluses and deficits varies between farms because of the different practices and activities both within and between farm classes. Farms could be breeding and selling, have breeding stock and buy in young stock, be rearing calves bought in from the dairy industry, or purchasing stock for finishing. This diversity impacts the need for overdraft facilities at different times of the year. A recent change in banking policy has resulted in a fee being charged for an overdraft

facility that may lead to changes in farmers' use of short-term overdrafts, and so current liabilities on their balance sheets.

3.3 The deer industry

There are an estimated 210 'majority deer' or 'specialist deer'⁹ properties¹⁰ in Southland, in addition to the deer included in other land uses. While most properties have an area of less than 500 hectares, and many are around 80 hectares, there are a handful that are extremely large (Moran et al., 2017). Deer gives an additional source of revenue for both farmers and the region, while diversifying the agricultural sector.

Whether 'majority' or 'specialist', deer farms are usually classified in terms of their production systems, which is a mix of: venison, velvet, and/or trophy antler. The main focus of the industry is on venison production, and although most farms are self-contained breeding and finishing units, there are specialist operations concentrating on either breeding or finishing. Deer farms, including those that specialist deer, usually have multiple revenue streams. Finishing properties also finish beef and/or lamb and can include arable crops. Velvet farms run other livestock species and some may have had a venison component. Even a farm that is purely deer may produce trophy, velvet, stud, semen sales, and be involved in tourism.

The different mix of age classes in each production system presents different environmental risks on-farm because of the size and seasonal, sex or age-related behaviours of the deer.

In 2017, the region's farmed deer herd was estimated to be around 200,000 head, which was roughly 23 per cent of the national deer herd (second only to Canterbury with 28%). The industry accounted for about 22 per cent of New Zealand's venison production, 35 per cent of its venison processing, and 20 per cent of the velvet antler production. The deer industry in Southland is generally more advanced than other regions (e.g. high quality genetics, animal specialist support services, stock transportation and processing) and there are also more specialist deer farms – although larger holdings are most likely to be mixed livestock operations.

3.3.1 Venison and velvet

The distinction between the venison producers and the velvet producers is marked, particularly within the smaller operations. Where deer are part of a larger mixed drystock farm they tend to be venison because it is a simpler system (in comparison with velvet) and so is easier for managing multiple mobs. Some deer farms are reasonably intense and have large areas of crop, although they are unlikely to have high nitrogen inputs. The system fits the pasture curve and they shift supplements and crops around on the shoulders of the season to carry a relatively high stocking rate, which is part of their advantage.

⁹ In the Southland Land Use Map (Pearson and Couldrey, 2016), Environment Southland (on advice from DINZ and the New Zealand Deer Farmers Association: Southland Branch) has classified deer properties in Southland into two main land uses: Specialist Deer and Majority Deer with Mixed Livestock. Operations where at least 80% of a farm's income is derived from deer activity. Deer are also present other land uses, particularly Mixed Livestock (sheep, beef, deer).

¹⁰ A farm business may consist of more than one property.

Many of the smaller deer farms are velvet-focused, although there are not huge numbers. One of the main reasons is because there is a physical limit to how many stags can have their velvet antlers removed in any one day, particularly if no extra labour is employed. In order to get the best grade of velvet, timing is critical – removing the antler too early or too late will significantly reduce the grading and price received. Although smaller, these farms are often on ‘good country’ (highly productive, flat land) because farmers want the best out of their stags, and the operations have the genetics that have given them good velvet herds. Most farms are well established and they can be highly profitable, so they are likely to be in a good cash position and fairly resilient. However, the next generation face a challenge to get into those operations with stock being a considerable investment.

In contrast, the small venison producers that are solely farming venison are coming under pressure. Although running hinds for 12-months to produce weaners for finishing can be done profitably, it is also a costly exercise. In comparison to mixed systems with lamb and/or beef finishing, the profitability of venison on good down country may not be sufficient to justify the expense of deer yards and fencing.

There appears to be a transition occurring in parts of the region from venison towards velvet production (and trophy) because of the way velvet has performed so consistently over the last decade. Velvet is seen as the real opportunity in terms of profitability, and market opportunities have been identified in functional foods and health foods, particularly if the industry gains access to China. A deer farmer requires confidence and different skills to successfully shift to a velvet operation. It tends to be a long transition period and takes sizeable investment because of the cost of velveting stags. When relatively cheap finance is available, the returns for making that investment are worthwhile.

In terms of debt, a velvet operation may tend to carry more debt than venison because they are able to support it. Deer farms are unlikely to be in a position to support higher levels of farm debt up without good sources of off-farm income.

3.3.2 Farm scale

Farm scale is closely linked to farm debt and may need to be considered on a similar footing. The well performing operators are quietly accumulating more and more land, and they take on debt to achieve it. If they can hold their debt at a sustainable level and still be profitable, then they are continuing to expand over time. However, it is the smaller operators who are really coming under pressure.

Typically, debt is measured on a per stock unit basis but there is a marked difference between having \$500 to \$600 of debt per stock unit on a 3,000 stock unit farm and a 8,000 to 10,000 stock unit farm. Usually, there is just one family running the business, but on a larger-scale operation they need roughly the same amount of gear and, although some labour is employed, many of the overheads are much easier to carry. While some inputs are more expensive (e.g. fertiliser and weed and pest control) most of the other 25-odd cost categories hold fairly consistently. On a return on capital basis, the farms in the hill country tend to use less inputs but are increasingly able to maintain reasonable levels of production.

There is pressure is coming right across the deer industry. A 2,500 stock unit farm used to be seen as an economic unit but this measure has now shifted to at least 3,000 and possibly up to 4,000 stock units. On a farm with 3,000 stock units a family might make a margin per stock unit of \$50 or \$60 over and above their costs. With \$50,000 or \$60,000 taken out as a living expense, two-thirds of their margin (or net profit) is gone before they can cover any debt, and whatever is left is likely to be

'skinny'. It tends to be easier on a larger farm with a similar margin because there are a lot more stock to earn income from even if the task is bigger.

Farmers with between 4,000 and 4,500 stock units and who want to bring in the next generation are tending to buy small blocks of land to expand as their living expenses increase. This expansion is commonly financed with debt and so farm succession is challenging without strong profitability. The blocks of land are being created from smaller farms as they become less economic.

The larger deer farms in Southland are mostly family-owned. Some of these farms now almost have an element of a semi-corporate type structure to them as they pass through the generations but they are not operating formally as corporates. With different generations in the mix they often have an advisory board-type structure and are having to get better at managing communication, especially where there is higher debt.

The farmers that are static or struggling financially will not be as resilient, and are likely to exit their industry at some point in the near future. Under current circumstances, these farmers may be at least as likely to lease their land as they are to sell, particularly on the more highly productive land where there are more alternative land uses. Over time, the management of land may increasingly be separated from the ownership of it.

4 Debt position of pastoral farms in Southland

The debt position of different farm types varies both within and between the pastoral industries in Southland.

4.1 Dairy farms

For this section, DairyNZ used debt and profitability data for individual farms across a synthetic population of Southland dairy farms generated in R software (R Core Team, 2020). The population is generated to be statistically representative of the actual population, with a 5% margin of error allowed. The method uses data from real farms from a DairyNZ database, and closely follows the approach of Doole (2021, 2020, 2019) – more detail is included in Appendix 1.

Using this method, it was found that there is considerable variation between Southland dairy farms in terms of liabilities, leverage, and capacity to service debt. Figure 4 shows the distribution of Debt-to-Asset Ratios for the simulated population of dairy farms in 2018-19. Around eight per cent (or 78 farms) are above the red line that signifies whether a farm is at higher risk of foreclosure.

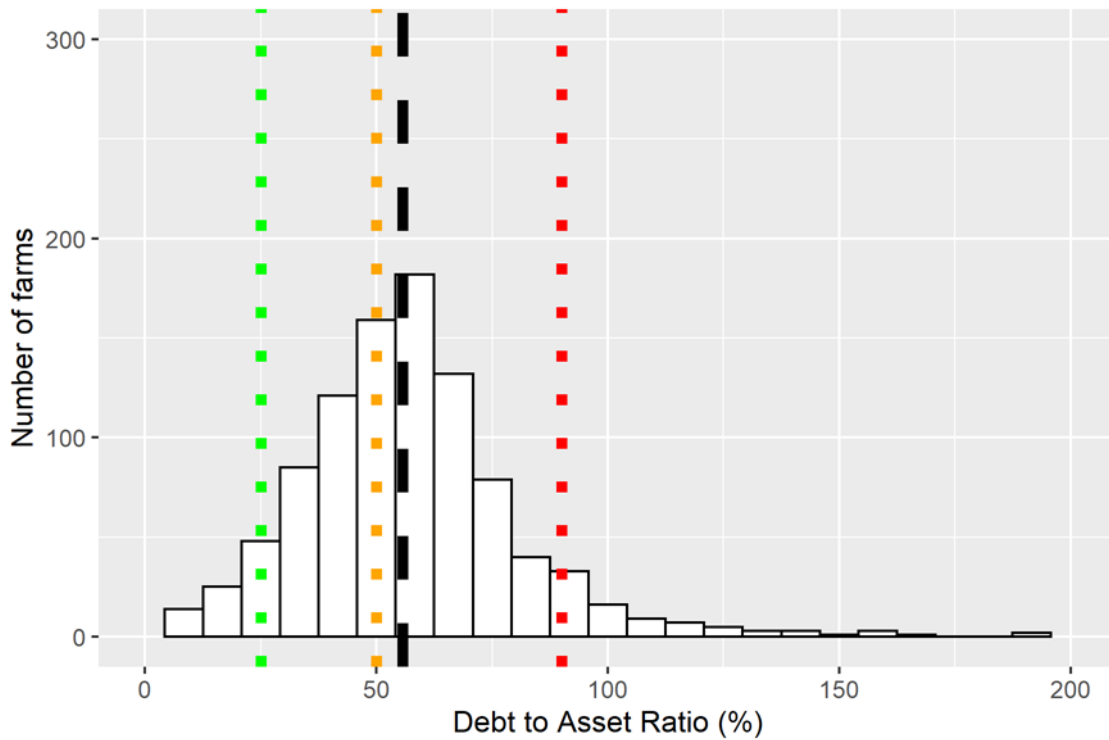


Figure 4: Distribution of Debt-to-Asset Ratio for Southland dairy farms 2018-19.
 Note – The black dashed line indicates the median for the sample. The green, orange, and red lines denote Debt-to-Asset Ratios of 25%, 50%, and 90%, respectively.

Three scenarios were modelled to estimate the distribution of debt payments per hectare across Southland’s dairy farms. The first was an ‘*Interest only*’ scenario, which involved the payment of interest only for all farms. The second was the ‘*Current*’ scenario that sought to replicate what is observed, with around 65 per cent of farmers continuing to pay interest only. The third was an ‘*Interest + Principal*’ where both interest and principal payments are made for all farms. In these scenarios the debt payments are based on a 20-year loan schedule with an interest rate of 5%).

Figure 5 shows the results of these scenarios using ‘violin plots’. For the *Current* scenario, 25 per cent of farmers are making payments less than or equal to \$1,093, another 25 per cent of farmers are making payments equal to or more than \$1,898, with the median payment being \$1,460. The *Interest only* scenario suggests a skew towards higher annual debt payments, while the *Current* scenario indicates less skew and a long (upward) tail. Overall, it appears that there is considerable variability in annual debt payments, but most farms are paying substantial amounts annually.

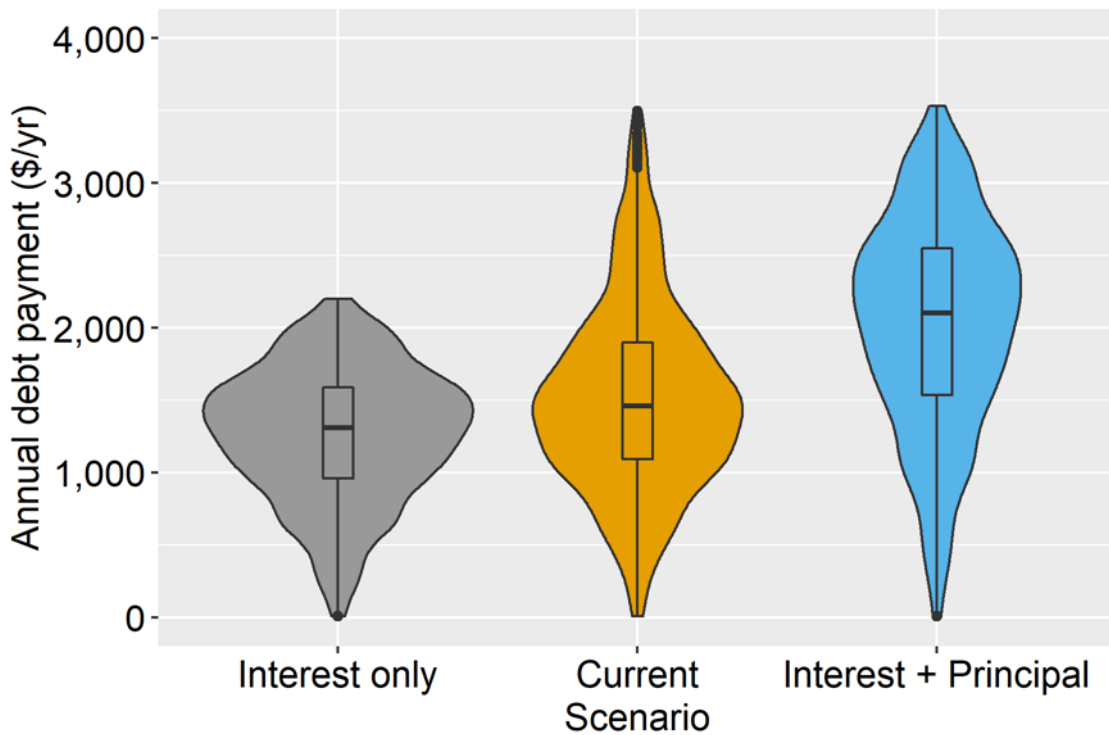


Figure 5 Distribution of payments *per hectare* (\$/ha/year) for Southland dairy farms across 3 scenarios in 2018-19. Note – The violin plots include a ‘box’ that identifies the median (50th percentile), the 25th and 75th percentiles, as well as ‘whiskers’ (top and bottom) that show the full range of results. The scenarios are based on a 20-year loan schedule with an interest rate of five per cent.

Figure 6 shows the distribution of the interest cover ratio for Southland dairy farms in 2018/19. The black dashed line in this figure indicates the median of the distribution. Around six per cent or 60 farms have an interest cover ratio below unity, indicating the high leveraging of some dairy businesses in this region.

Figure 7 presents the distribution of Economic Value Added[®] for Southland farms in 2018/19. An annual rate of capital gain of one per cent is assumed, while the (after-tax) opportunity cost of equity is set at 3.6 per cent. The assumed rate of capital gain is consistent with stable land prices with little speculation and a (conservative) rate of inflation. This aligns with observations that NZ dairy land prices have stabilised in recent years (DairyNZ, 2020). With these assumptions, around five per cent (or 49 farms) have an Economic Value Added[®] below zero, indicating their inability to cover their cost of capital. The minimum and maximum values for Economic Value Added[®] are -\$1,296 and \$3,559. The values for the 25th, 50th, and 75th percentile are \$621; \$1,076; and \$1,502, respectively.

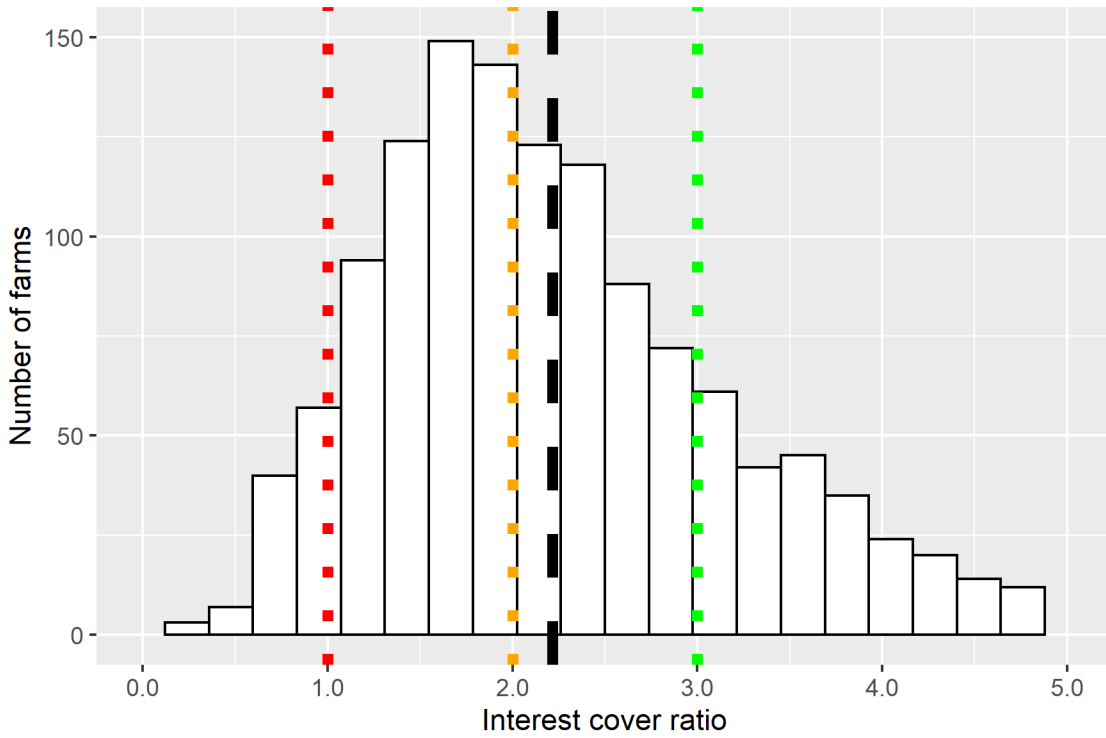


Figure 6: Distribution of Interest Cover Ratio for Southland dairy farms 2018-19.
 Note – The black dashed line indicates the median for the sample. The green, orange, and red lines denote interest cover ratios of 3.0, 2.0, and 1.0, respectively.

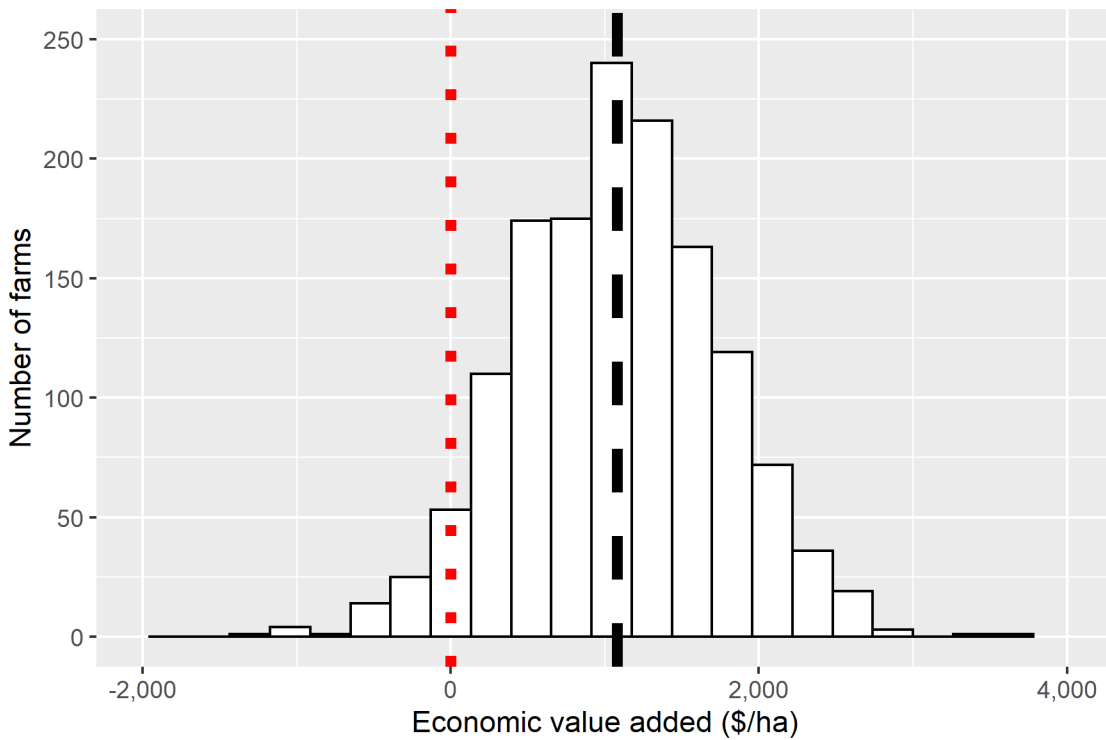


Figure 7: Distribution of Economic Value Added® for Southland dairy farms 2018-19.
 Note – The black dashed line indicates the median for the sample, and the red line an Economic Value Added® of zero.

Policies aimed at reducing the nutrient footprint of dairy businesses can decrease their profitability (Doole and Kingwell, 2015; Vibart et al., 2015). This can be expected to impact their viability in the future (Doole, 2019), thereby increasing the number of farms that may be considered vulnerable.

4.2 Sheep and beef farms

For this section, B+LNZ has used data from the Sheep and Beef Farm Survey, as described in section 3.2.

Two-thirds of sheep and beef farms in Otago-Southland¹¹ have a Debt-to-Asset Ratio of less than 25 per cent. It is estimated that a sizeable group of farms have Debt-to-Asset Ratios of less than ten per cent across the farm classes, while relatively few have a Debt-to-Asset Ratio of more than 50 per cent (Figure 8). For those farms with a Debt-to-Asset Ratio over 50 per cent, some will be profitable and able to service debt comfortably at current interest rates, while others may have insufficient cashflow or are constrained.

There are important differences between the farm classes. Figures 8 to 11 show that, on average, Farm Classes 1, 2 and 7 generally have a high level of equity, while Farm Class 6 appears to be more variable (87% have less than 50% Debt-to-Asset). For Farm Classes 1 and 2 (high country and hill country farms) it is estimated that 40 to 45 per cent of farms have a Debt-to-Equity Ratio of less than 10% and healthy balance sheets overall.

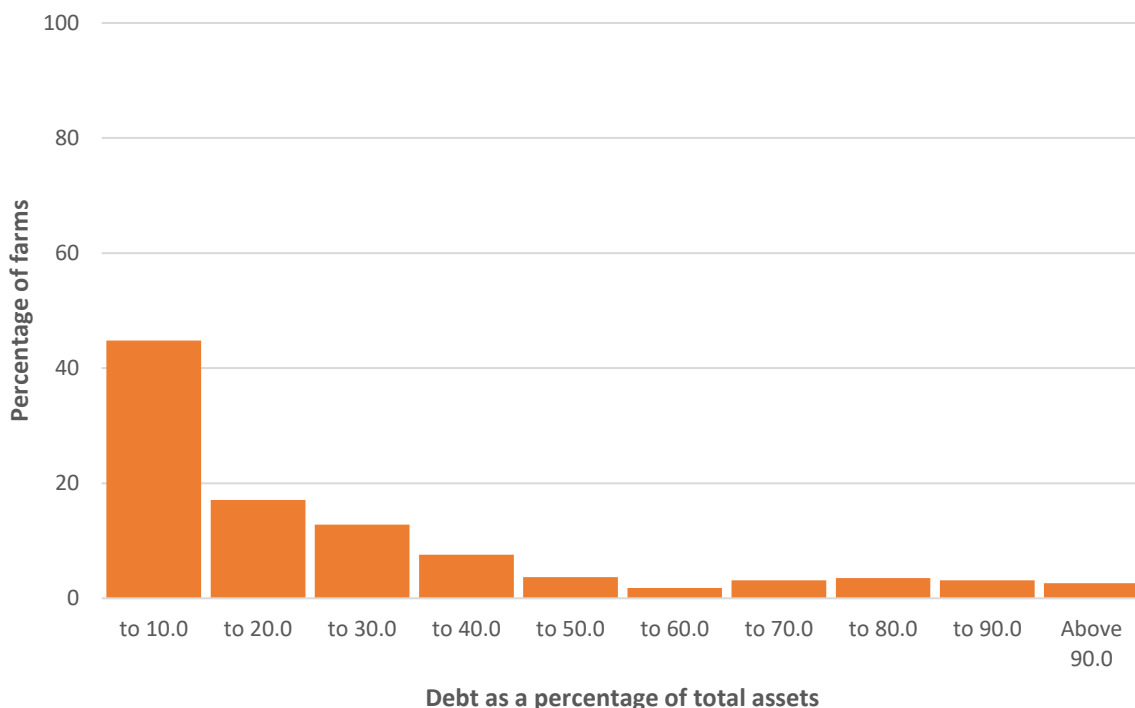


Figure 8: Distribution of Debt-to-Asset Ratio for Otago-Southland sheep and beef farms in 2018-19.

¹¹ For confidentiality reasons in the Sheep and Beef Survey, the distribution includes the Otago region.

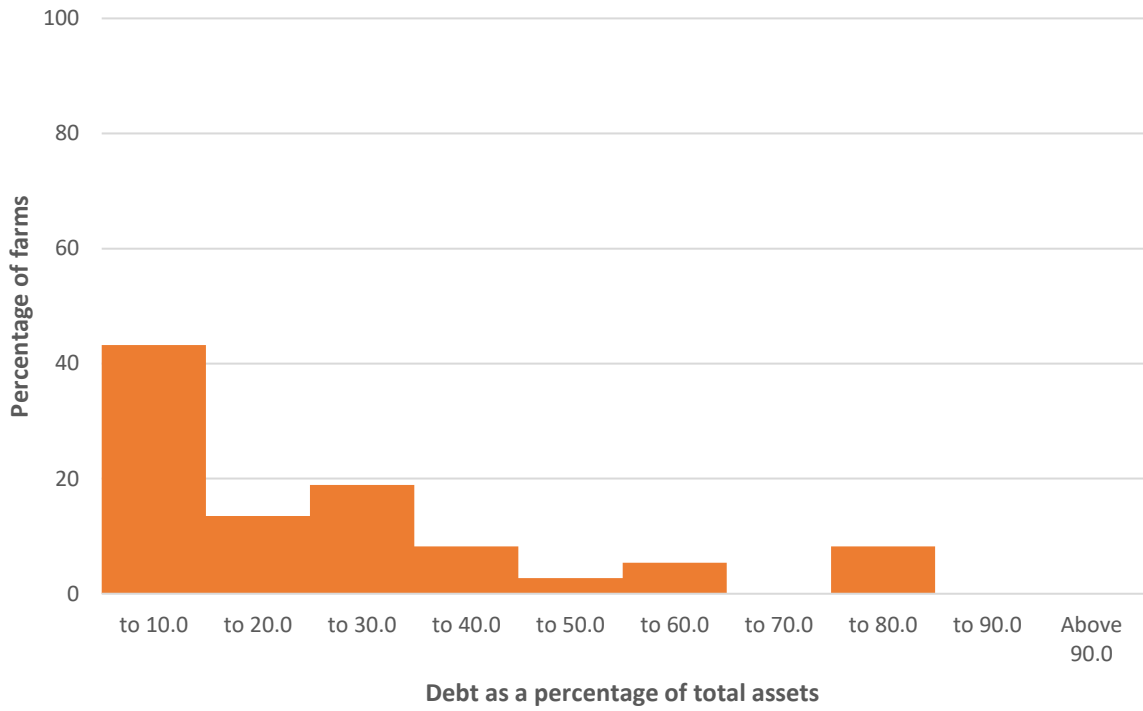


Figure 9: Distribution of Debt-to-Asset Ratio for Otago-Southland sheep and beef farms in Farm Classes 1 and 2 in 2018-19.

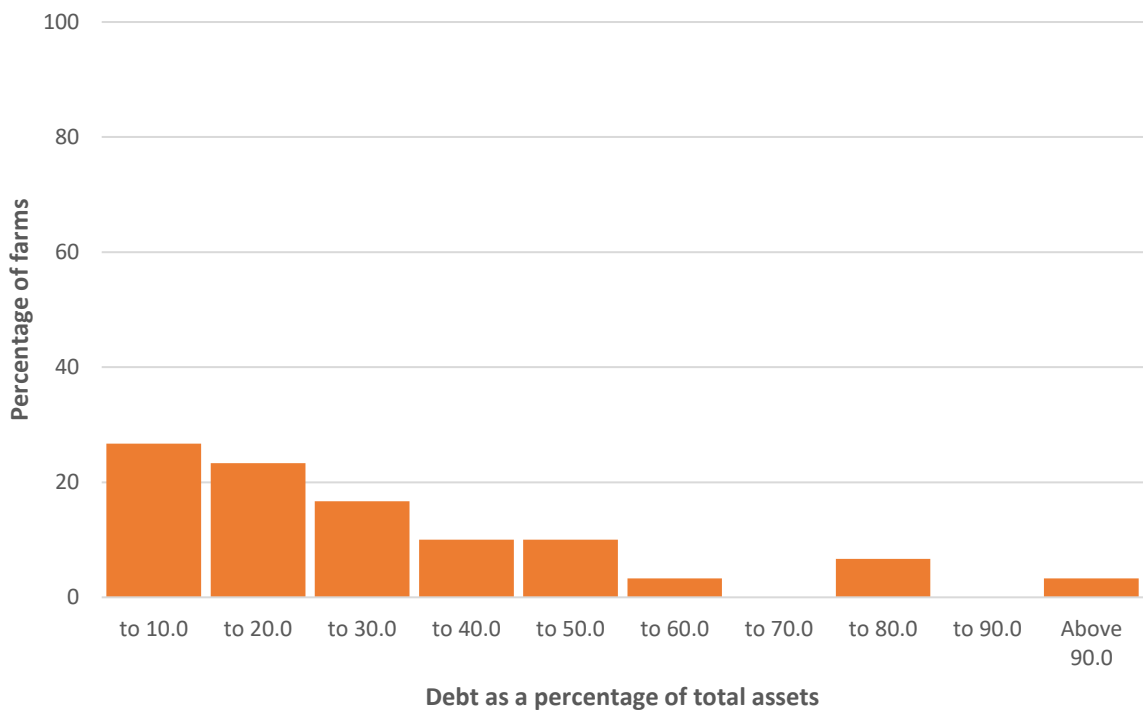


Figure 10: Distribution of Debt-to-Asset Ratio for Otago-Southland sheep and beef farms in Farm Class 6 in 2018-19.

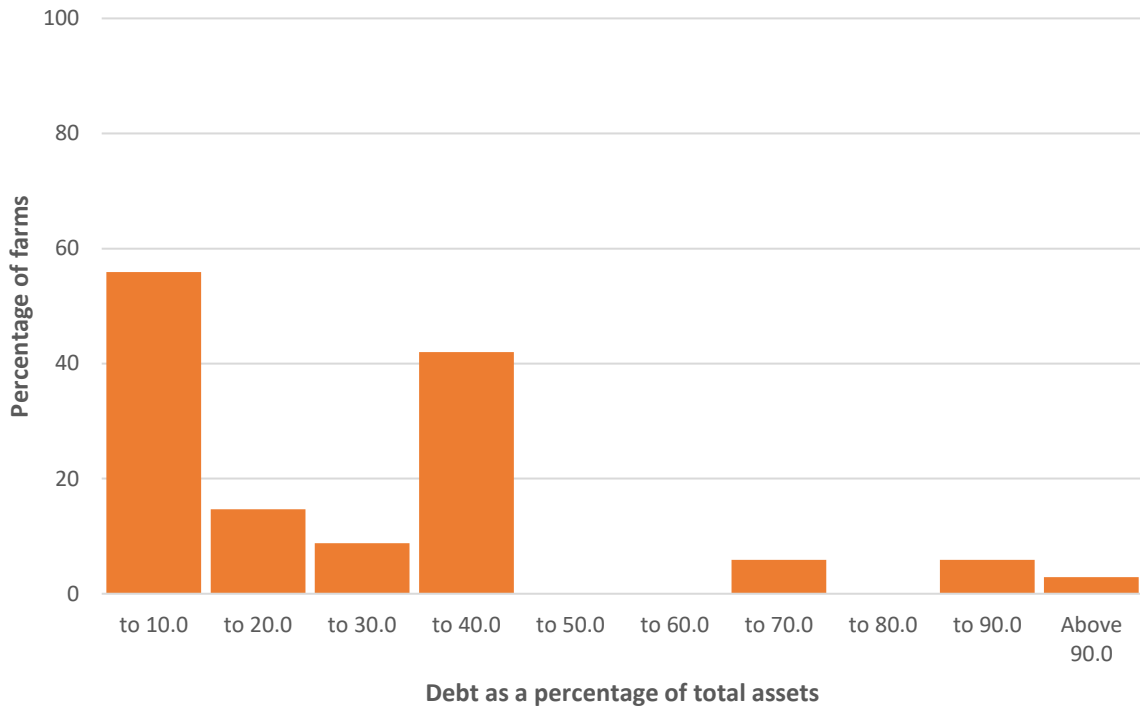


Figure 11: Distribution of Debt-to-Asset Ratio for Otago-Southland sheep and beef farms in Farm Class 7 in 2018-19.

A farmer's ability to service debt, pay down principal, and invest in the farming operation depends on generating cash surpluses. Average Farm Cash Surplus fluctuates over time (being influenced by climate, prices, expenditure and other factors) and is highly variable for individual farms (Figure 12).

In 2018-19 the average Farm Cash Surplus for Otago-Southland was \$199,172 per farm. Figure 13 shows four per cent of farms had a deficit, with the Farm Cash Surplus for the middle 50 per cent (i.e. 25% to 75%) of farms ranging from \$80,000 to \$240,000. Further analysis is required to understand if there is any relationship between Farm Cash Surplus and other variables, such as farm area, within and between Farm Classes.

Overall, the sheep and beef farms are relatively low-risk operations, with strong balance sheets and high levels of equity (or net worth).

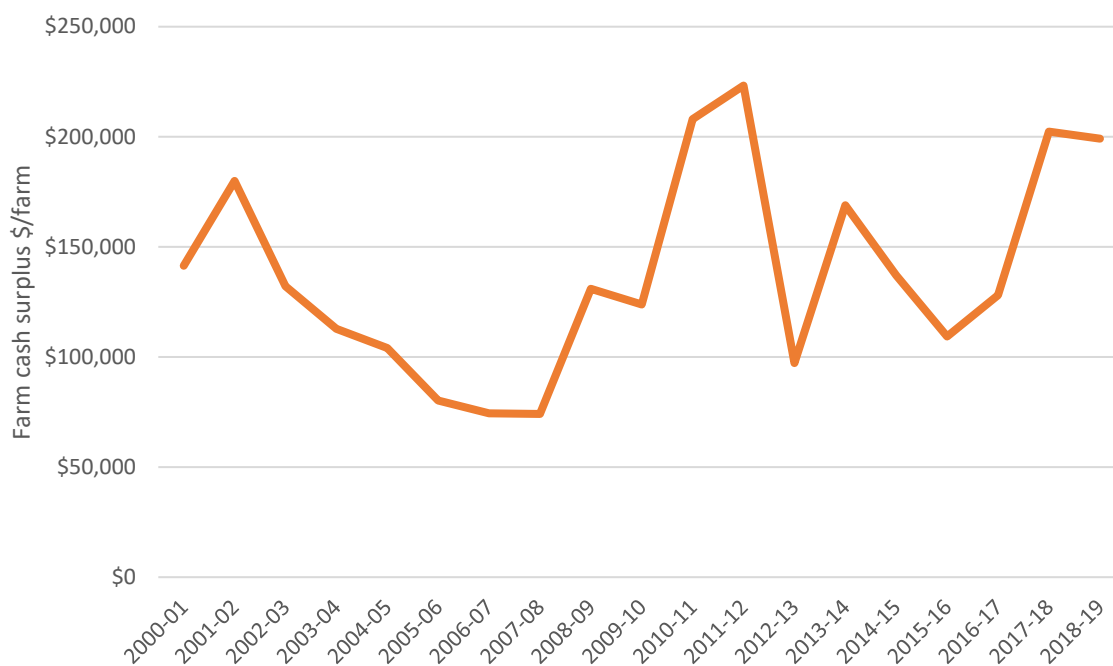


Figure 12: Average Farm Cash Surplus for Otago-Southland sheep and beef farms 2000-01 to 2018-19.

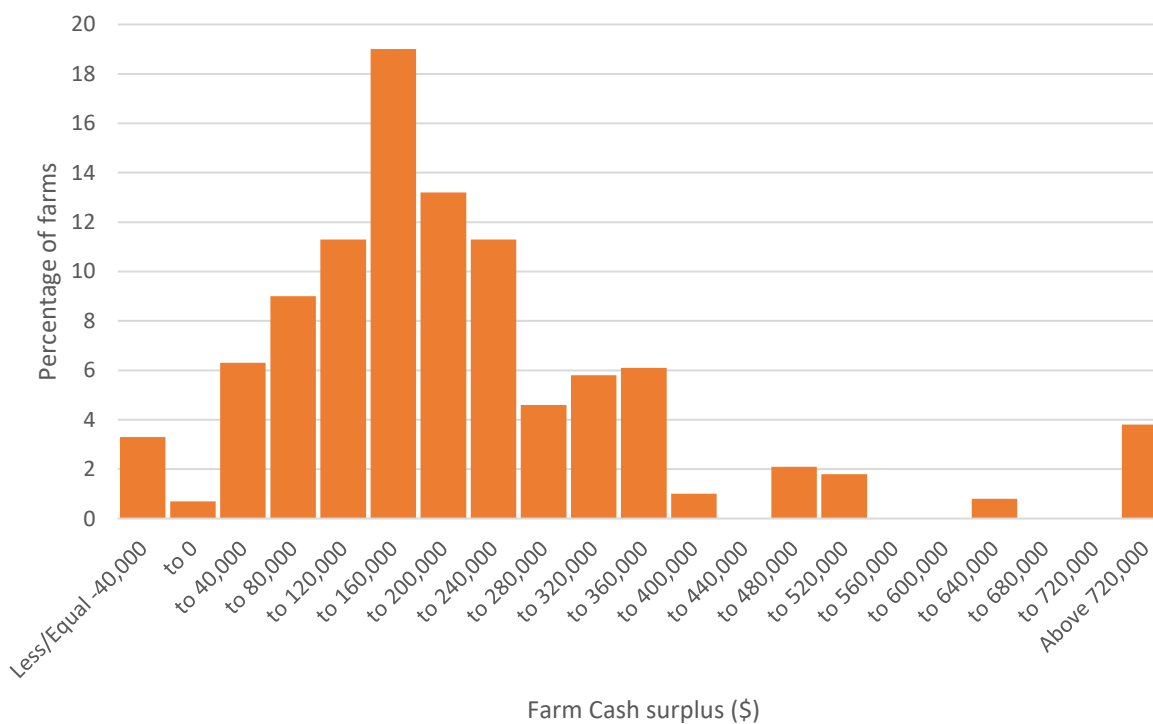


Figure 13: Distribution of Farm Cash Surplus for Otago-Southland sheep and beef farms in 2018-19.

4.3 Deer farms

After an early period of flux, the deer industry is steady as it moves through a second generation of deer farmers. There are a core group of farmers who are passionate about deer, although the knowledge base for the industry is relatively narrow and many farmers will reach the end of their careers over the next 10 or 15 years.

Within the deer industry, it is anticipated that there are few deer farm businesses that are carrying over a 50 per cent Debt-to-Equity Ratio but quantitative data is not available to be certain. This said, it is understood that some deer farm businesses in Southland can operate successfully at around 50 per cent. These farms tend to be stud breeders, good velvet operations, and may have trophy hunting arms to their business. The farmers are living reasonably comfortable off those higher debt levels and have grown and expanded, but they are specialists. If 50 per cent debt was put against a standard venison operation then it may be far more vulnerable.

The outlook for the deer industry is positive and the advances in production and quality are promising. However, more often than not banks appear to be lending to existing deer farmers who are looking to buy more land to expand their business rather than to new entrants. In general, it is difficult for young farmers to get bank loans without a 'track record' or something 'solid' standing behind them.

Research note

This paper is the starting point for the Farm Debt Working Group to use at its first workshop in June 2021 so specific findings are not included in this paper. Any findings will be included at the end of this workstream in the formal technical report of farm debt, which is to be developed in 2022.

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Appendix 1 – Method used by DairyNZ to generate baseline population

A set of primary performance metrics is generated for each Southland farm in 2018/19 in a statistically-consistent manner to represent realistic levels of inter-farm heterogeneity. This season is the most recent for which detailed data is available. Plus, the milk price in that year (\$6.44/kg MS) is around the historical mean, helping to ensure that the estimated cost is not biased either upward or downward by an abnormal milk price (DairyNZ, 2020).

A sample of data for 2014-2019 containing only dairy farms in Southland is extracted from other regional records in the DairyBase system. This sample consisted of around 360 individual farm records. DairyBase records, standardises, and reports physical and financial information from New Zealand dairy farms using an online platform (DairyBase, 2016). The DairyBase data was filtered to include only owner-operator farms. A focus on owner-operators simplifies the analysis, while sharpening insight on the most common farm type. It is unlikely to introduce bias given that share and contract milking affects more the allocation of debt among parties, rather than the absolute level.

Farms that record outliers for farm size, milk production per hectare, and/or stocking rate are then removed.¹² The inclusion/exclusion of farms within the sample is then adjusted until the average farm size, milksolids per cow, and stocking rate for the sample closely matches the regional averages for these variables published in LIC/DairyNZ (2019). This matching procedure is automated using binary optimisation to solve a multiple-objective minimisation problem (Doole and Kingwell, 2010).

The regional distribution of the key performance metrics is then estimated from the sample data. The distributions are generated for farm size (ha), milk production per cow (milksolids (MS)/cow), stocking rate (cows/ha), gross farm revenue (\$/kg MS), operating expenses (\$/kg MS), asset value per hectare (\$/ha), closing liabilities per hectare (\$/ha), and nitrogen-fertiliser application (kg N/ha).

Individual values for each of these elements is then generated for each farm present in the region. The total number of farms located in Southland is taken from LIC/DairyNZ (2019). Each random variable for each individual farm is generated in an integrated manner using the method of Fleishman (1978). This procedure accounts for the respective means, variances, covariances, skewness, kurtosis, minima, and maxima identified in the earlier estimation stage.

A non-parametric Kolmogorov-Smirnov test (R Core Team, 2020) confirms that the distributions generated for each variable are consistent with the base data.

¹² An outlier is defined using the standard statistical rule that an extreme observation is one that sits 1.5 times the interquartile range below the first quartile or above the third quartile (Verbeek, 2017).

