KELLOGG
RURAL LEADERSHIP
PROGRAMME

How Can We Maximise Production In Our Decreasing Ewe Flock?

Kellogg Rural Leadership Programme

Course 53 2025

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I wish to thank the Kellogg Programme Investing Partners for their continued support.

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1 Executive Summary

New Zealand's sheep population has experienced a significant decline, decreasing by 21% over the past decade to reach 23.6 million as of June 2024. This trend is driven by a combination of environmental pressures, suboptimal wool returns, elevated input costs, and a transition towards a more beef-dominant system. However, the most influential factor has been the expansion of Carbon Forestry, facilitated by the Emissions Trading Scheme (ETS) policies, which has resulted in the conversion of 260,000 hectares of sheep and beef farmland into pine plantations. Since the inception of the ETS in 2007, the national sheep flock has shrunk by 40%. As lamb exports continue to generate $3.18 billion annually, optimising productivity from the remaining ewe flock is of utmost importance. This report focuses on the significance of terminal sires, particularly emphasising the utilisation of heterosis to improve lamb carcass weights and support the industry's sustainability in the future.

This report aims to investigate the current use and effectiveness of terminal sires within New Zealand's sheep farming systems, with an emphasis on enhancing productivity from the declining ewe flock. Acknowledging the industry's diversity in adaptability, this report is designed to influence the middle 60% of farmers, specifically those receptive to pragmatic, evidence-based transformations. Through the implementation of a relatable Mock Farm Model and accessible analysis, this research aspires to equip this group with the knowledge to make informed, production-optimising decisions regarding terminal sire usage.

The methodology employed in this research comprised a national farmer survey, semi-structured interviews, and the implementation of a Mock Farm Model. The survey collected regional and on-farm data from sheep farmers throughout New Zealand, with a particular emphasis on terminal sire usage, lamb slaughter performance, and the perceptions held by farmers. Comprehensive telephone interviews were conducted with a geneticist, a diverse group of sheep farmers, and a lamb trader to investigate the practical and commercial aspects of terminal sire application. Lastly, a Gross Margin analysis, based on a mock farm scenario, was utilised to evaluate the economic implications of heightened terminal sire adoption.

The survey findings indicate that farmers utilising higher rates of terminal sires exhibited a significantly higher percentage of lambs killed off mum at weaning. However, the insufficient availability of quality maternal ewe lambs for replacements continues to pose a primary barrier to the increased adoption of terminal sires. Apprehensions regarding lower lambing percentages and the limited integration of Breeding Values in the selection of terminal sires compound this issue.

Interviewees highlighted strategic flock selection, grouping ewes into 'A' and 'B' mobs, which enables the targeted utilisation of maternal rams for replacements and terminal rams for production enhancements. The lamb trader confirmed a premium for terminal lambs before Christmas, which contradicts certain perceptions held by some farmers. Furthermore, participants stressed the necessity to enhance the quality of terminal sires to maximise performance and improve industry outcomes.

The Mock Farm Model indicated that through increasing the utilisation of terminal sires from 10% to 50% resulted in a significant feed surplus in mid to late summer and advanced the average kill date by 13 days. This feed surplus may be allocated for baleage production,

enhancing the Body Condition Scores of ewes for improved scanning results, or for fattening lambs to heavier carcass weights. Scenario modelling proposed an enhancement in Gross Margin, thereby affirming the economic viability of the strategic use of terminal sires.

To optimise production within the declining population of ewes in New Zealand, this report presents the following recommendations:

- The flock on farm is to be segregated into two distinct groups:

    1. An 'A' flock comprised of high-performing or younger ewes intended for breeding replacements, limited according to actual replacement requirements
    2. A 'B' flock consisting of older or less productive ewes, which will be mated to terminal sires to leverage hybrid vigour for the production of heavier, more market-ready lambs at the time of weaning.

- Align sire selection with breeding goals, focusing more on rams with high genetic merit. Investing in quality terminal sires is a cost-effective decision due to their considerable effect on production.

2 Acknowledgements

Firstly, I'd like to acknowledge the team behind the Kellogg Rural Leadership Programme. Lisa, Scott, Craig, Annie, Lyndsey and Matt have done an outstanding job of organising and delivering a course that I feel very proud to have been a part of. I particularly want to thank Craig for helping me create a report that I'm proud of and teaching me basic computer literacy skills that I should have learnt a long time ago.

Cohort 53, it has been a delight to get to know each of you. The insights I've gained from this diverse group are truly invaluable to me. I look forward to keeping in touch with you all in the future.

I would like to thank Property Brokers Southland for nominating me and the Beef + Lamb Southern South Island Farmer Council for the scholarship that enabled my participation in the Kellogg program. Without this scholarship, I wouldn't have gained the confidence to pursue it.

Thank you to everyone who has contributed to this report in some way. Whether it's the participants in the survey, the interviewees, or Matt Hore from Rural Business Advisors for his assistance with the Mock Farm Model, all your efforts are appreciated.

And to my partner, daughter, and extended family, thank you for keeping everything ticking along while I've been away on the different phases of the programme or had my head buried in my laptop trying to finish this report. It hasn't gone unnoticed.

I would also like to acknowledge the use of artificial intelligence (AI) in this report.

- Otter as a tool for transcribing my interviews
- Microsoft CoPilot assisted me in analysing data from my survey and interviews.
- Grammarly, for doing the heavy lifting when it comes to spell check and making sure what I was writing made sense.

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5 Limitations of the Study

Survey - The scope of the survey was confined to my personal social media channels and word of mouth, ensuring a high calibre of participants.

Interviews – The interviews with sheep farmers were conducted only with those survey participants who expressed interest in a more comprehensive interview.

Limited Time – This study was conducted over the initial six months of 2025, within the limitations of the Kellogg course schedule and within the constraints of running my own Sheep and Beef property; however, a considerable amount of additional time could be required to investigate all concepts to their fullest extent.

Cross-bred Sheep Farmers - This study is exclusively focused on cross-bred sheep farmers. There has been no consideration given to the fine wool industry.

6 Introduction

Unless you've spent the initial half of 2025 living under a rock, you would have seen in the media that the population of sheep in New Zealand has been experiencing a significant decline. Statistics New Zealand has published figures indicating a continued decline in livestock numbers, with a 21% decrease in sheep populations over the past decade. As of June 2024, there were 23.6 million sheep in New Zealand, representing a decrease of 6.2 million since 2014 (StatsNZ, 2025).

The decline can be attributed to several factors, including recent severe drought conditions that have resulted in diminished lambing rates and the selling of capital maternal stock. Recent economic factors, such as inadequate returns on wool, elevated input costs, and overall low returns from sheep farming, have led an increasing number of farmers to transition to a beef-dominant system. This shift allows them to concentrate on lower workloads, reduced animal health expenses, and more stable beef markets (NZ B. +., Stock Number Survey, n.d.).

However, the single most significant factor contributing to our declining ewe flock is Carbon Forestry – the blanket planting of pine trees on productive farmland. Between 2017 and 2024 alone, 260,000 hectares of sheep and beef farmland have been planted with pine trees (Farmers, 2025). Not because forestry is a more productive use of the land, but because of our country's flawed Emissions Trading Scheme (ETS) settings. Since 2007, when the ETS was first introduced, our national flock has shrunk by 40% (Farmers, 2025). At the current rate of decline and without government intervention, our ewe flock could face further significant decline.

In the year ending June 2024, the export revenue derived from lamb production in New Zealand amounted to approximately 3.18 billion New Zealand dollars (L. Granwal, Jan 16, 2025). Considering the expected ongoing decline in the ewe flock, it is essential for us, as an industry, to pursue methods aimed at maximising production.

After the preliminary phases of the Literature Review presented below, the role of terminal sires becomes notably significant. Through the intervention of heterosis (hybrid vigour), the advantages in lamb carcass weight production attributed to terminal sires are estimated to be approximately 30%, particularly with the utilisation of sires such as Dorset and Suffolk (B+L Growing Great Lambs Workbook).

This is where this research report begins. It will centre on the utilisation of terminal sires and assess whether they are being utilised sufficiently in New Zealand sheep farming systems and how they can optimise production in the remaining ewe flock.

7 Aim

This research report aims to enhance the understanding of terminal sire usage within New Zealand sheep farming systems and to evaluate the extent of their impact on the production of our remaining ewe flock.

I believe that the New Zealand sheep industry can be categorised using the 20/60/20 rule (Figure 1).

- 20% - Top performers, who are highly innovative and adapt quickly to change.
- 60% - Average performers, who will change once they observe others doing so.
- 20% - Poor performers, who are unwilling to change.

I recognise that the top 20% of New Zealand sheep farmers are more than likely effectively using terminal sires to maximise their production benefits. Conversely, the bottom 20% show little interest and are unlikely to engage with this report regardless.

The primary objective of this report is to produce a research document that the middle 60% of sheep farmers like myself are likely to read and comprehend thoroughly, not only regarding the research itself but also concerning the data derived from the Mock Farm Model presented below.

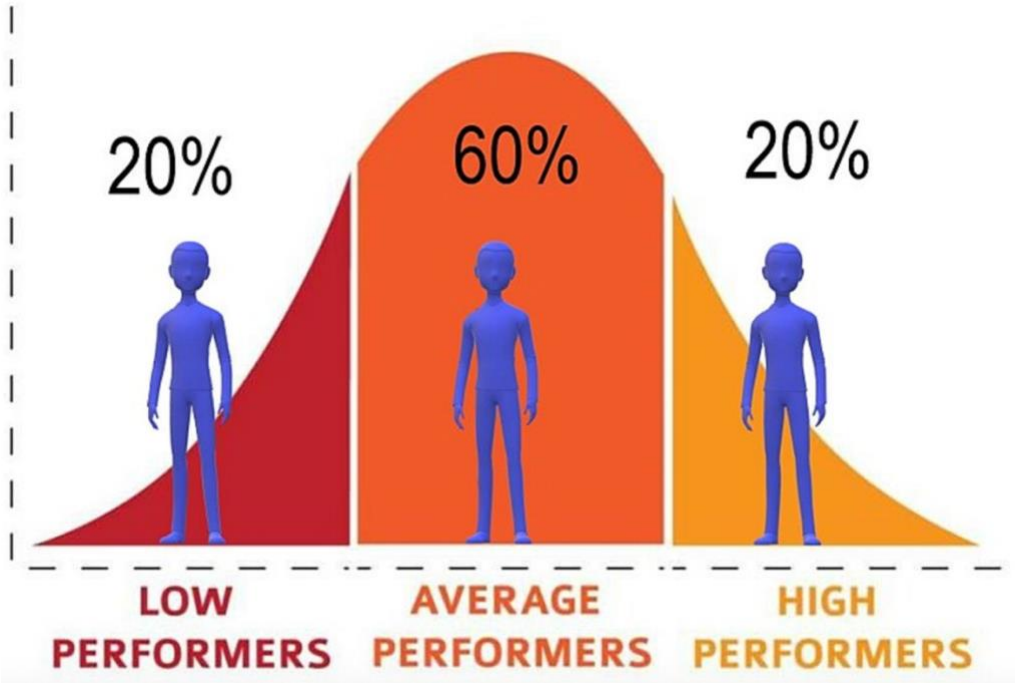


Figure 1 : 20-60-20 Theory

8 Literature Review

Through the literature review process, this research report has commenced an investigation into the utilisation of terminal sires and their potential efficiencies within New Zealand's sheep farming systems.

Initially, I examined the ewe flock in New Zealand, which has been experiencing a decline for an extended period (Figure 2). Evidence indicates that this trend is unlikely to reverse shortly. In the fiscal year ending June 2024, the export revenue generated from lamb production in New Zealand was approximately $3.18 billion (L. Granwal, 2025). Given the anticipated continuous decrease in the ewe flock, it is imperative that we, as an industry, seek methods to maximise production. In this context, production is defined as the kilograms of lamb produced per ewe.

This is where the implementation of terminal sires becomes significant. Through the intervention of heterosis (hybrid vigour), the advantages in lamb carcass weight production attributed to terminal sires have been estimated to be around 30%, particularly with the utilisation of sires such as Dorset and Suffolk (B+L Growing Great Lambs Workbook).

8.1 New Zealand's decreasing ewe flock

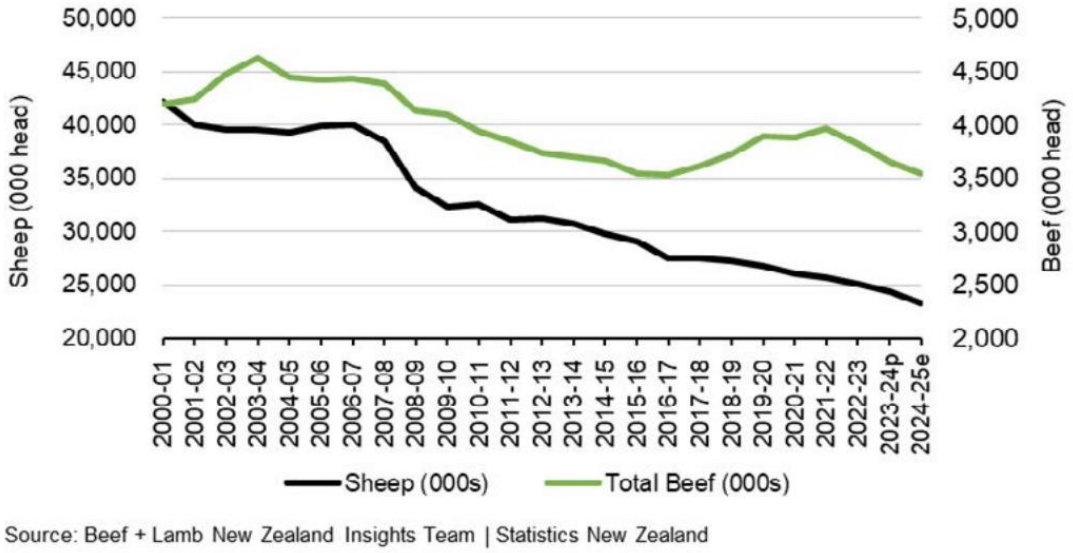


Figure 2 : B+LNZ Stock Number Survey, 30 June 2024

Over the past three years, sheep and beef stock numbers have decreased by 10%. This decline has primarily been due to many farms converting to forestry, driven by the Emissions Trading Scheme (ETS) and high carbon prices. Although sheep numbers had been gradually declining, the process of afforestation has significantly accelerated this trend and has also contributed to a decline in cattle numbers. (NZ B. +., Stock Number Survey, 2024)

Between 2019 and 2022, approximately 180,000 hectares of sheep and beef farms were sold for conversion to forestry. This trend began to decelerate in late 2022 following the Government's announcement regarding amendments to the ETS. It is important to note that there is a lag time between the sale of a farm and the initiation of planting; however, the

majority of farms sold during this period have now been transitioned into forestry. This assertion is supported by the planting statistics provided by the Ministry for Primary Industries (MPI). This alteration in land use has resulted in a decrease of approximately 1.4 million stock units. While the rate of farm sales has diminished, there were still instances of farms being converted to forestry over the past year. The transition of land use to forestry has complicated the forecasting of stock numbers due to the lag between the sale of the farm and the subsequent planting activities (NZ B. +., Stock Number Survey, 2024).

It must be acknowledged that on June 10, 2025, during the final stages of this report, Agriculture and Forestry Minister Todd McClay introduced long-anticipated legislation aimed at halting large-scale farm-to-forestry conversions. This initiative fulfils a significant election promise to safeguard the future of food production in New Zealand.

The Climate Change Response (Emissions Trading Scheme - Forestry Conversions) Amendment Bill will restrict the wholesale conversion of farmland into exotic forestry by prohibiting LUC 1-5 land from entering the ETS and by capping new ETS registrations on LUC 6 land (McClay, 2025)

8.2 New Zealand Sheep Breeds

Currently, there are more than thirty recognised sheep breeds in New Zealand (Figure 3), each with distinct characteristics. For instance, the Coopworth breed is noted for its high fertility and excellent maternal capabilities, the Merino is esteemed for its high-quality fine wool, and the Texel is acknowledged for its resilience and superior muscling.

8.2.1 Maternal Sheep Breeds

Maternal sheep breeds in New Zealand are selected primarily for their reproductive capabilities, mothering proficiency, fertility levels, and overall flock productivity. These breeds are esteemed for their capacity to produce robust, healthy lambs and nurture them effectively. Among the prominent maternal breeds in New Zealand are:

- Romney: One of the most prevalent maternal breeds, recognised for its adaptability, formidable mothering instincts, and commendable wool production.
- Coopworth: Developed for high fertility, robust mothering capabilities, and low-maintenance lambing.
- Perendale: A resilient breed well-suited for hill country farming, providing excellent lamb production and high-quality wool.

8.2.2 Terminal Sheep Breeds

Terminal sheep breeds in New Zealand are predominantly employed for the production of high-growth, high-yield lambs intended for meat production. The rams from these breeds are specifically selected for their capability to sire fast-growing lambs that possess desirable carcass characteristics, rather than for their maternal attributes. Several prevalent terminal sire breeds found in New Zealand include:

- Southdown – Renowned for its robust musculature and substantial meat yield.

- Suffolk – Noted for its rapid growth in lambs that achieve maturity at an early stage and attain significant weights efficiently.
- Poll Dorset – Appreciated for its elevated growth rate, muscular build, and reproductive capabilities.
- Dorset Down – A resilient breed that thrives under diverse environmental conditions.
- Texel – Acknowledged for its exceptional musculature and production of lean meat.

Figure 3 : B+LNZ Sheep Breeds Poster

8.3 Ewe Replacement Rate

Farmers utilising terminal sires must meticulously balance the retention of sufficient replacement lambs to sustain their ewe flock. Given that terminal sires produce offspring primarily intended for meat production rather than future breeding purposes, these lambs are generally not retained as replacements. This dependence on a smaller group of ewes mated to maternal sires is crucial for producing new breeding stock. Therefore, calculating the appropriate proportion of ewes in the maternal group is critical. Typically, the ewe replacement rate in New Zealand is approximately 25% annually (NZ B. +., Ewe Wasteage Numbers, 2022). An excessive proportion of ewes mated to terminal sires can temporarily increase lamb production but may jeopardise long-term flock sustainability by constraining

replacements. Conversely, insufficient numbers of ewes in the maternal group can diminish overall productivity and profitability. The objective is to breed the optimal number of ewes to ensure adequate ewe lamb replacements. For instance, in a flock consisting of 4000 ewes with a 25% replacement rate, 1000 ewe lambs are required each year. If 50 ewes, representing half the flock, are mated to a maternal ram, and the lambing rate is 135%, they would produce approximately 2700 lambs. Assuming half of these are ewe lambs, this yields 1350 ewe lambs, which surpasses the 1000 replacements needed.

8.4 Heterosis

Heterosis (hybrid vigour) is defined as the average performance of crossbred sheep relative to the average performance of the pure breeds that produce the cross. The effects of heterosis have a significant impact on the productivity of crossbred sheep. Each breed represents a unique package of genetic effects, resulting in characteristics that distinguish it from other breeds. Sheep with two copies of the same form of a particular gene are said to be homozygous for that gene, whereas sheep with two different forms of that gene are heterozygous. During evolution and development, each breed becomes homozygous for some genes and heterozygous for other genes, creating a unique set of genetic information. For each breed, the average degree of heterozygosity, considering all genes (sheep may have approximately 30,000 genes), reflects that breed's genetic history. When breeds are crossed, new combinations of gene forms are created in crossbred sheep. Therefore, crossbred sheep have increased heterozygosity relative to breeds that produced that crossbred. The increase in heterozygosity is the basis for heterosis (Leymaster, 2002).

8.5 Previous Studies

8.5.1 The Value Of Using Higher Yielding, Higher Growth Rate, Maternal And Terminal Sires

By McCorkindale & Byrne 2016

The report analyses the impact of utilising terminal sires on seasonal lamb supply and feed demand, emphasising the enhancement of lamb growth rates and survival through hybrid vigour and genetic selection. Additionally, it evaluates the effects of selecting maternal sires based on higher yield and growth rates, which further influence seasonal production, culminating in heavier ewes and lambs that exhibit increased growth rates.

The earlier slaughter of a greater number of lambs facilitates the availability of summer and autumn feed, allowing for the capitalisation on higher processing returns before Christmas, as there is traditionally a higher schedule price. Additionally, slaughtering heavier lambs on the same date enhances the overall value of the carcass.

With many New Zealand flocks achieving lambing percentages above 140%, the report suggests that more farms could increase terminal sire usage while still maintaining sufficient maternal ewe replacements.

The analysis examines the financial implications of increasing the proportion of ewes bred to high-performance terminal sires from 0% to 40% within a high-lambing flock. Furthermore, the

study investigates the impact of selecting maternal ewes based on higher yield and fast growth rates.

The findings are derived from an analysis of genetic trends and performance comparisons between the Wharetoa Stud flock and the broader industry, with a particular emphasis on a stabilised Texel x Coopworth maternal flock.

The analysis indicates that the utilisation of high-merit terminal sires significantly enhances farm profitability. In a flock of 3,000 ewes, mating 40% of the ewes to terminal sires results in an increase of $28,000 in the profit margin when compared to a baseline maternal flock. Furthermore, when the maternal flock is augmented with Wharetoa genetics that emphasises yield and growth rate, the profit margin escalates to between $63,000 and $66,000.

The enhancement of genetics facilitates the processing of heavier lambs without any delays in their slaughter dates. The same feed supply underpins this productivity, as earlier sales release feed for alternative applications. The increased processing of a higher proportion of lambs during the early season fortifies the flock's resilience against uncertain feed conditions in the summer, thereby providing farmers with the flexibility to either process lambs early at advantageous weights or retain them for an extended period to achieve greater slaughter weights. Consequently, farmers can augment profitability within their existing sheep enterprises, circumventing the need for financially burdensome transitions to alternative agricultural systems.

In summary, strategically utilising terminal sires along with enhanced maternal genetics provides a significant economic benefit, optimising the use of available farm resources.

8.5.2 Quantifying Sheep Enterprise Profitability With Varying Flock Replacement Rates, Lambing Rates, And Breeding Strategies In New Zealand

By L.J. Farrell, P.R. Kenton, P.R. Tozer, T. Ramilan, L.M. Cranston 2020

This study examines the economic implications of using terminal sires in sheep systems within New Zealand, with a particular focus on self-replacing flocks that require purebred ewe replacements. Utilising a bio-economic system-dynamics model based on industry survey data, the study simulated a North Island East Coast Hill Country sheep enterprise comprising 2,182 breeding ewes distributed across 549 hectares.

Key findings include:

Income derived from lamb sales exhibited an increase with the application of terminal sire usage, as lambs demonstrated accelerated growth and were marketed earlier at elevated prices.

The Cash Operating Surplus (COS) increased by $3 per hectare to reach a total of $101 per hectare, contingent upon the flock's lambing rate and the ewe replacement rate.

Enhanced lambing rates, coupled with reduced replacement rates, facilitated a more extensive integration of terminal sires, resulting in more substantial financial returns.

Up to 65% of the flock could be genetically enhanced with terminal sires while simultaneously producing an adequate number of purebred ewe lambs for replacements.

In an average enterprise, characterised by a 25% replacement rate and a 130% lambing rate, the COS experienced an increase of $15,021 when 45% of the ewes were bred using terminal sires.

Energy requirements rose by as much as 6%, with post-weaning increases substantially counterbalanced by reductions following crossbred lamb sales.

In conclusion, the strategic use of terminal sires has the potential to significantly enhance profitability within New Zealand sheep systems, particularly when flock composition and lambing rates are optimised to maximise benefits.

8.5.3 Lamb Production Performance Of 14 Sire Breeds Mated To New Zealand Romney Ewes

by A.H. Carter, A.H. Kirtan1975

This study analysed the performance of 14 sire breeds in lamb meat production, utilising data derived from trials involving 15,000 Romney ewes and 435 rams. The primary findings are as follows:

Progeny survival: The Southdown sires (terminal sires) demonstrated the highest survival rates, whereas the progeny of Romney (maternal sires) exhibited the lowest rates.

Wool production: Long-wool sires, notably Lincoln, yielded superior post-weaning wool clips when compared to Down breeds.

Lamb growth and carcass weight: The Suffolk, Hampshire, and Dorset breeds (terminal sires) produced the heaviest lambs, in contrast to Merino and Romney sires (maternal sires), which resulted in lighter progeny.

Efficiency per ewe mated: The Romney(maternal sire), Merino, Lincoln, Ryeland, Cheviot, and English Leicester sires exhibited lower efficiency than Southdown in terms of lamb live-weight and carcass production, while the Dorset, Suffolk, South Suffolk, and Dorset Down sires (terminal sires) outperformed.

Variation within breeds: Notable disparities in progeny growth rates among individual rams highlight the importance of meticulous sire selection and comprehensive genetic sampling in breed comparisons.

This confirms the presence of hybrid vigour and how it can be used effectively. As shown above, where the terminal sire has been utilised, it has outperformed its maternal sire counterpart.

9 Methodology

9.1 Survey

In March 2025, a survey was distributed via social media platforms to attain a thorough understanding of the utilisation of Terminal Sires within sheep farming systems across New Zealand. Emphasis was placed on ensuring representation from all regions of New Zealand to mitigate any potential regional bias. The survey aimed to provide a comprehensive overview of practices from one farm to another and to identify key trends and constraints concerning the use of Terminal Sires.

The survey comprised 11 questions, starting with 'What region do you farm?', then going through how many ewes are mated and how many of these are mated to a Terminal sire. The central portion of the survey consisted of questions related to lamb slaughter, such as the average lamb carcass weight and the average lamb slaughter date. The end of the survey asked participants to add any additional comments on the utilisation of Terminal Sires within New Zealand's sheep farming systems. The final question inquired whether participants would be interested in a more in-depth interview, thereby offering a substantial pool of farmers from which to select for further interviews. A copy of the survey questions can be found in section 15.1 of the Appendix

9.2 Semi-Structured Interviews

In April 2025, a series of interviews were conducted to obtain a comprehensive understanding of the utilisation of Terminal Sires. These interviews followed a semi-structured format, incorporating a fundamental set of open-ended questions to guide discussions with each participant, while allowing for flexibility in follow-up inquiries based on the participants' responses. A copy of the interview questions can be found in Section 15.2 of the Appendix. This methodology facilitated an in-depth exploration of specific themes while maintaining a certain degree of control over the direction of the interview. All interviews were conducted via telephone and recorded with the participants' permission. The recordings were subsequently transcribed using AI software, 'Otter', from which the key themes were extracted. All participants completed the Kellogg Rural Leadership Programme interview consent form prior to the interviews taking place.

The first participant was an Animal Scientist and geneticist with over twenty years of experience in the industry, who also happened to be a stud ram breeder. The interview encompassed discussions regarding heterosis, as well as the extent to which sheep farmers are optimising its potential, along with the employment of breeding indexes and genetic testing to maximise the efficacy of the terminal sires being utilised.

The second group of interviews consisted of sheep farmers who were meticulously selected from those who expressed their willingness to participate in the survey and agreed to further interviews. Due diligence was exercised in the selection of these participants, ensuring representation from various sheep farming systems and different regions of New Zealand to capture a comprehensive range of perspectives on the utilisation of terminal sires. Questions

centred on the application of terminal sires within their flocks, the specific traits they consider when acquiring terminal sires, and the role the industry plays in this context.

The last interview was conducted with a lamb trader and finisher who engages in the purchase and sale of several hundred thousand lambs each season. This interview consisted of questions ranging from their strategies for acquiring lambs to preferences for specific breeds during the purchasing process, and a comparative analysis of the value of terminal-sired lambs versus maternal-bred lambs.

9.3 Mock Farm Model

A mock farm model was developed to assess the financial implications of increasing terminal sire usage on the farm. A Gross Margin (GM) spreadsheet, created by the esteemed farm advisor Pete Young, was utilised to analyse the data, with assistance from former farmer and banker, now farm advisor, Matt Hore of Rural Business Advisors, located in Central Otago. Every effort was made to ensure the accuracy of the content and information used in this Mock Farm Model.

10 Analysis

10.1 Analysis of Survey

During March 2025, a survey was distributed via social media to gain a comprehensive understanding of Terminal Sire utilisation in sheep farming systems across New Zealand.

10.1.1 Key Survey Questions & Answers:

Region of Farming

- The 37 respondents farmed across various regions, including Southland, Otago, Hawkes Bay, Canterbury, Gisborne, Waikato, Manawatu-Wanganui, Marlborough, Taranaki, and Wellington.

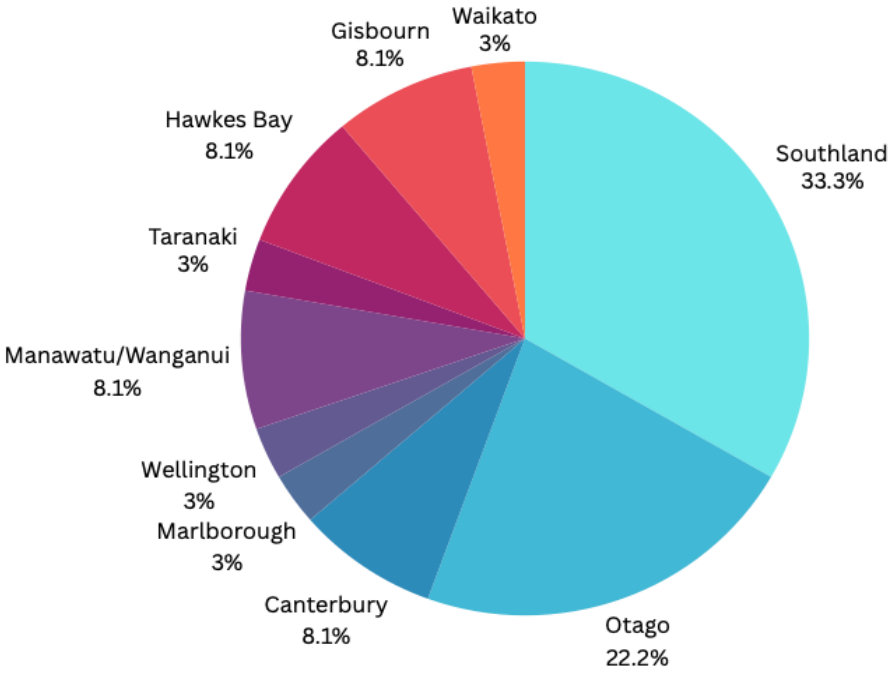


Figure 4 : Pie Graph Representing Survey Reach Throughout NZ

Stock Units & Sheep Proportion

- The number of stock units exhibited considerable variation, ranging from smaller operations, which encompass fewer than 1,500 stock units, to large-scale farms that exceed 10,000 stock units. Moreover, sheep constitute between 40% and 95% of the total stock units.

Total Ewes Mated

- Farmers reported mating between 1,000 and 8,000+ ewes, indicating considerable variation in flock sizes.

Terminal Sire Usage

- A majority of farmers retain between 25% and 60% of their flock for maternal objectives.
- 14% of respondents mated 100% of their flock to a terminal sire
- 11% of respondents mated less than 25% of their flock to a terminal sire.

Lamb Processing

- The proportion of lambs killed at weaning varies significantly, with percentages ranging from 1% to 96%.
- The average kill date fluctuates between November and April, depending on the farming system in use.
- Carcass weights mostly fall within the range of 17–21 kg.

Terminal Sire Breeds Used

- Common terminal sire breeds include Suffolk, South Suffolk, Poll Dorset, Suftex, Dorset Down, Hampshire, Texel, Beltex, and Charolais.
- Some farmers use a mix (e.g., Suftex & Beltex/Suffolk) for specific breeding strategies.

Challenges in Using Terminal Sires

- Many respondents noted that a significant reason for not utilising terminal sires more was due to the number of maternal ewe lambs that need to be bred each year for flock replacement purposes.
- Other concerns include low lambing percentage, weak constitution, survivability, eczema tolerance, selection pressure, and market demand for terminal lambs.
- Some farmers said terminals are underutilised and suggest a more strategic approach.

General Comments About Terminal Sire Use

- Some believed hybrid vigour is underutilised.
- Others felt that many farmers lack a structured breeding plan for the use of terminal sires.
- Some advocated for better selection of terminal rams to improve flock efficiency.
- A few noted the importance of balancing terminal sire usage with the needs of maternal stock.
- Comments highlighted the potential market gaps and the need for industry alignment.

10.2 Analysis of Semi-Structured Interview Responses

During April 2025, a total of seven interviews were conducted, focusing on three principal areas as detailed below:

1x Animal Scientist/Geneticist

5x Sheep Farmers

1x Lamb Trader/Finisher

All participants shall remain anonymous and have granted permission for the use of their findings in this report.

10.2.1 Animal Scientist/Geneticist Interview

Key Themes

Hybrid Vigour and Its Contribution to Productivity

- Hybrid vigour arises from the crossing of genetically distinct breeds, resulting in enhanced survival and accelerated growth.
- Maternal breeds are characterised by their emphasis on self-replacement, whereas terminal breeds prioritise growth, survival, and meat quality.
- The initial cross produces the most significant productivity gains; however, these benefits tend to diminish with subsequent crossbreeding due to genetic dilution.

Optimising Hybrid Vigour in the Industry

- The maximisation of genetic gain is not being fully achieved; farmers emphasise hybrid vigour but frequently overlook comprehensive genetic enhancement.
- Significant opportunities exist within maternal crosses, such as the Romney-Texel or Coopworth-Texel.
- Management, particularly in relation to nutrition, is of paramount importance in actualising genetic potential. However, numerous farmers encounter difficulties in aligning their feeding strategies with established best practices and genetic selection.

Breed Combinations for Hybrid Vigour

- The greater the genetic distance between breeds, the more pronounced the increase in productivity (e.g., Romney x Suffolk).
- The combination of two similar breeds, such as Romney and Coopworth, both selected for their maternal characteristics, would not yield the same results as crossing a Romney with a Suffolk. The Romney is developed primarily for its maternal traits, whereas the Suffolk is selectively bred more for its carcass qualities.

Genetic Testing and Breeding Indexes

- For commercial breeders, it is imperative to establish clear breeding objectives that emphasise either rapid growth for immediate returns or survivability to ensure long-term productivity.

- For stud breeders, monitoring lamb weight at birth, weaning, and differing growth stages, employing CT scanning for the assessment of muscle yield, and evaluating parasite resistance and tolerance to facial eczema.

Future of Terminal Sires in New Zealand Sheep Farming

- Terminal sires possess the capability to improve overall flock efficiency, enabling farmers to concentrate their replacement breeding efforts on their superior ewes while utilising terminal sires for the remainder of the flock.
- Insufficient lambing percentages present challenges in the complete adoption of this system.

Longevity in Ewe Flocks

- Older ewes that possess a demonstrated history of productivity continue to provide valuable genetic contributions to the flock. The absence of breeding values for longevity constitutes a limitation; however, genotyping has the potential to assess long-term genetic contributions more accurately.

10.2.2 Sheep Farmer Interviews

Sheep Farmer #1

- Farms on the Central Southland flats
- Mates over 3000 Ewes.
- 28% of their flock receives a Terminal Sire.

Key Themes

Strategic Terminal Sire Allocation

- Farmer #1 employs a "B flock" that is mated with terminal sires, thereby ensuring the culling of any undesirable traits, including poor dag score, inadequate mothering ability, or general underperformance from his maternal breeding pool. Furthermore, older ewes are mated with terminal sires to sustain flock numbers while promoting genetic advancement. The practice of identifying the 'B flock" with a black tag serves a pivotal role in monitoring undesirable traits, facilitating efficient selection for terminal matings.

Flexible Approach To Percentage Of Mob That Receives A Terminal Sire

- Farmer #1 does not adhere to strict percentages; instead, he operates within a replacement ewe threshold of approximately 800 ewe lambs to achieve a balance in genetic gain. He modifies the number of ewes based on available selection, removing high-performing older ewes when deemed necessary. With a total flock consisting of 3,200 ewes, he possesses the capacity to be selective with replacements.

Prioritising Genetic Progress

- They prioritise early genetic advancement by utilising Two-tooth rams on Two-tooth ewes to expedite improvements.
- Their hogget lambing strategy provides a preliminary advantage by culling underperformers before they can enter the breeding cycle.

Evolving Breed Preferences

- There is a preference for Suftex over pure Suffolk due to the perceived softness associated with the latter. Softness in this instance refers to the Suffolk's thinner skin, which leads to it not having as great a survival trait as a Texel does. Crossing the two breeds to produce a Suftex increases the survivability considerably.
- The focus is on hardiness and growth in terminal sires, favouring robustness in lambs.
- The selection of terminal sires also takes into account visual markers, specifically avoiding any lighter-faced Terminal Ewe lambs from entering the maternal mob.

Barriers to Increased Terminal Usage

- There is a significant demand for maternal replacements due to stringent culling criteria.
- The sale of ewe lambs for breeding purposes is diminishing the available stock for internal selection.
- The previous overutilisation of terminal sires in the last production cycle resulted in a greater number of lambs than anticipated, necessitating adjustments to achieve a more optimal balance.

Market Perception of Terminal Lambs

- Farmer #1 concentrates exclusively on the finishing stage, rather than selling store lambs, thereby restricting their exposure to the direct market. They place significant value on Texel genetics when purchasing store lambs, indicating a preference for enhanced carcass characteristics during the finishing process.

Farmer #2

- Farms in the Gisborne Hill Country
- Mates over 5500 Ewes
- 60% of their flock receives a Terminal Sire

Key Themes

Main Influences on Terminal Sire Usage

- The growth rate and lamb output are essential factors to consider.
- The primary emphasis is on optimising terminal lambs while minimising the quantities of replacements.

Determining Terminal Sire Allocation

- Progressive modifications in sire allocation involve mating hoggets to maternal rams to sustain the replacement rate.

Sire Allocation Strategy

- Younger ewes are bred with maternal sires to enhance genetic gain. In contrast, older ewes are more inclined to produce heavier lambs for terminal production purposes. This strategy effectively balances genetic improvement with production efficiency.

Longevity Considerations in Terminal Sire Selection

- The structural integrity and hybrid vigour are key attributes.
- The influence of ram longevity on cost efficiency is noteworthy, as longer-lasting rams reduce the need for replacement.
- Furthermore, ram breeders play a pivotal role in genetic enhancement, particularly in terms of longevity and structural traits.

Tagging and Identification Practices

- Certain farms implement ear tagging for terminal ewes. In contrast, others categorise them according to age groups (e.g., two-tooths and four-tooths assigned to maternal sires, with older ewes designated for terminal sires).

Key Traits in Terminal Sire Selection

- The structural integrity is prioritised to attain the benefits associated with hybrid vigour.
- The impact on growth rate is significant, with hybrid vigour contributing an advantage of 15–18%, whereas genetic selection accounts for merely 1–2%.
- Furthermore, the longevity of rams plays a more crucial role in investment decisions than minor genetic enhancements.

Preferred Terminal Sires

- Poll Dorset breeds are favoured for their compact lambing and robust early-season growth, as well as their effective finishing rates compared to maternal lines.

Terminal Sires' Role in New Zealand Sheep Farming

- It is critical to maintain production levels despite the decline in national flock numbers.
- The potential of terminal sires is optimised within the constraints of replacement; future advancements will rely on continued improvements in lambing percentages.

Industry Support for Terminal Sire Usage

- A degree of resistance to change exists among some farmers who prefer traditional methods. Conversely, those who are more proactively adapting to terminal sire strategies are experiencing financial benefits.

Farmer #3

- Farms in the Central Otago High Country
- Mates 4000 Ewes
- 20% of their mob receives a Terminal

Key Themes

Decision Drivers for Terminal Sire Usage

- The primary motivation is to produce marketable lambs from a less productive B line of ewes. Maintaining flock balance and ensuring an adequate number of maternal replacements significantly influence the percentage of Terminal Sire usage.

Selection Criteria for Terminal Sires

- The survivability of lambs is of paramount importance due to the challenging conditions during lambing. Furthermore, enhancing the growth rate is a critical objective for improving lamb performance.

Balancing Terminal Sire Usage & Maternal Line Strength

- Restricting the number of ewes bred to terminal sires is essential to maintain an adequate supply of maternal replacements. Using terminal sires on less productive ewes helps improve the quality of their lambs.

Challenges & Barriers to Expanding Terminal Usage

- The lambing percentage, which ranges from 120% to 130%, necessitates the maintenance of maternal genetics for replacements. A potential strategy involves breeding two-toothed ewes to terminal sires to achieve improved weaning weights; however, this strategy may conflict with the objectives of genetic gain selection.

Breed Preferences & Considerations

- Preference is given to Suffolk terminals because of their clear marking, which effectively prevents unintended retention in maternal lines.
- Texel sires provide desirable characteristics in terms of meat quality and growth traits; however, they pose identification challenges within the system.
- Previously, Composite Terminal rams were utilised due to their favourable genetic indexes, although concerns regarding their structural soundness were noted.

Industry Demand for Terminal Lambs

- There is a perceived deficiency of robust demand from finishers, accompanied by the absence of distinctly established premium pricing for terminal lambs. The market consistently exhibits a high availability of cull ewe lambs; however, this does not necessarily imply higher returns.

Future Role of Terminal Sires in NZ Sheep Farming

- A discussion regarding the efficacy of terminal versus high-performing maternal rams indicated that certain well-bred maternal sires can outperform less robust terminal alternatives. There exists the potential for a reduced number of superior-quality terminal rams to enhance industry outcomes.

Industry Support & Future Innovations

- Historical discussions regarding the enhancement of breeder-finisher integration aim to align production with market demands.

- Furthermore, an exploration of sexed semen technology has the potential to be a transformative factor, as breeding all-male terminal lambs and all-female maternal replacements may facilitate a substantially increased utilisation of terminal sires.

Farmer #4

- Farms in Eastern Southland Hill Country
- Mates 4000 Ewes
- 55% of their Ewes receive a terminal sire

Key Themes

Decision Factors for Terminal Sire Usage

- Initially, Coopdale rams were utilised; however, a transition was made to Romney rams, resulting in the division of ewes into two distinct groups: Group A (Romney) and Group B (Terminal). The objective is to have 50% of the ewes bred with terminal sires, thereby concentrating replacement breeding efforts on the highest-performing ewes. Ewes that require assistance during lambing are tagged and subsequently relocated to Group B.

Selection and Traits of Terminal Sires

- There is currently no specific trait selection; however, consideration is being given to the terminal worth index. The preference is for Suftex due to its identifiable markers in terminal lambs, although exploration of white-face options is ongoing. In an optimal year, 40% of terminal lambs are finished off their mothers, thereby leaving excess feed for alternative uses.

Balancing Terminal Usage with Maternal Line Strength

- The prioritisation of genetic gain is facilitated through the implementation of an A/B mob structure.
- Additionally, black-tagging is used to identify problem ewes and prevent breeding with less desirable stock.

Breed Preferences and Practical Considerations

- They utilise Suftex to achieve black markings and use Texel to enhance the yield of carcasses.
- They refrain from shearing terminal lambs to maintain cost efficiency.

Market Demand and Industry Trends

- There exists a strong belief in the demand for terminal lambs.
- It is argued that premium pricing should be applied due to the superior growth rates attributed to hybrid vigour.
- Furthermore, it is noted that the current pricing structure fails to differentiate between quality terminal lambs and slower-growing maternal lambs.

Future Role of Terminal Sires in NZ Sheep Farming

- Essential for enhancing flock genetics, facilitating swift progress by producing replacements from the top 50% of ewes.

Industry Support and Potential Improvements

- Advocates for premium compensation contingent upon carcass yield and quality of meat.
- Urges the provision of enhanced resources that emphasise the benefits of hybrid vigour while challenging outdated agricultural mindsets.
- Proposes strategies to adapt to escalating farm expenses through the enhancement of ewe flock productivity.

Farmer #5

- Farms in the Wellington Hill Country
- Mates 1300 Ewes
- 100% of their Ewes receive a Terminal sire

Key Themes

Climate Constraints & Flock Management

- The dry summer climate presents challenges in breeding and nurturing replacements. Terminal sires facilitate flexibility, older ewes are introduced annually to receive terminal rams, and all lambs are fattened for slaughter at weaning. Maintaining a terminal flock serves as a management tool to adjust stock levels quickly in response to drought conditions.

Selection of Terminal Sires

- The selection priorities centre on growth rate, carcass yield percentage, and survivability.
- Hybrid vigour holds significant value; stocky and efficient hill sheep are preferred over larger-framed rams.

Breed Preference & Yield Efficiency

- Beltex is favoured for its superior efficiency in carcass yield.
- Terminal lambs present higher returns due to enhanced carcass yields, thereby improving financial efficiency.

Market Demand & Industry Utilisation

- The finishing industry demonstrates a demand for terminal lambs; however, numerous farmers do not fully optimise the utilisation of terminal sires.
- Terminal sires facilitate a more rapid turnover and provide flexibility to adapt livestock according to seasonal conditions.

- There is a marked preference for crossbred or hybrid vigour lambs, as buyers are prepared to pay a premium for superior quality.

Future Role of Terminal Sires in New Zealand Farming

- Terminal sires will significantly enhance agricultural efficiency by redirecting the focus towards carcass weight and feed conversion. These sires help manage animal health risks, such as worm resistance and facial eczema, as they are required to be removed from the farm at an earlier stage. Breeders, traders, and finishers experience increased flexibility within their production systems.

Industry Support & Changing Attitudes

- A deficiency exists in data regarding the business implications of terminal sires, thereby creating obstacles to their adoption. A cultural transformation is imperative; terminals should be perceived as instruments for enhancing efficiency rather than as a secondary alternative. Young farmers who are adopting terminal sires for financial optimisation encounter opposition from deeply rooted traditions. Enhanced industry data, breeding indexes, and educational initiatives are required to facilitate increased uptake.

10.2.3 Comparisons of the Sheep Farmer Interviews

Terminal Sire allocation and replacement strategy

- Farmer #5 represents an outlier, managing a full-terminal system influenced by climate limitations and adaptability requirements. Farmers #1 and #4 employ tagging systems to direct terminal allocation; however, Farmer #4's approach is more rigid and performance-oriented.

Genetic Strategy & Hybrid Vigour Prioritisation

- Farmers #4 and #1 converge on structured, performance-oriented genetic strategies. #5 emphasises system efficiency and adaptability to external conditions, utilising hybrid vigour as a means rather than a fundamental breeding principle.

Market Perception & Industry Trends

- Farmers #4 and #5 share a common frustration regarding market structures that undervalue terminal quality. The caution expressed by #3 originates from insufficient premium differentiation, whereas #2 perceives terminal adoption as a significant factor for profitability.

Industry Support & Adoption Barriers

- Farmers #4 and #5 are vocal advocates for systemic change, including indexing, education, and market signals. Conversely, Farmers #3 and #2 exhibit practical hesitation, primarily due to ambiguous return on investment and deeply rooted farming conventions.

10.2.4 Lamb Trader/Finisher Interview

- Buyer and seller of several hundred thousand lambs a season

Key Themes

Lamb Purchasing Strategy

- Consumer purchasing preferences fluctuate according to the season. For instance, pre-Christmas purchases emphasise terminal-sired lambs, generally weighing between 28 to 30 kilograms liveweight. Additionally, there is a marked preference for wethers and ewe lambs over ram lambs as the year progresses.

Breed Preferences

- The emphasis is placed on crossbred lambs. Romdale lambs and well-bred ewe lambs yield optimal performance in the winter trade. The winter trade concentrates on sexed lines; ewe lambs are processed at an earlier stage, while male lambs are allowed to grow to greater weights.

Value Comparison: Terminal vs. Maternal Breed Lambs

- Lambs sired by terminal sires command a price that is at least 10 cents per kilogram higher than those bred maternally before Christmas. Enhanced genetics indicate that certain maternally bred lambs now exhibit improved carcass quality compared to previous standards. Furthermore, lambs sired by terminal sires typically demonstrate greater weight at weaning, which contributes to their elevated market price.

Genetic Selection and Breeding Values

- Enhancing the genetic selection of terminal sires could significantly improve market efficiency. Numerous farmers tend to select terminal rams based on superficial traits, such as a black face, instead of relying on established breeding values. There is a pressing need to place greater emphasis on selective breeding by cultivating replacements from superior ewes and employing terminal sires for mature ewes to maximise the overall productivity of the flock's potential.

Yield & Processing Efficiency

- Lambs sired by terminal breeds yield a greater quantity of saleable meat compared to those sired by maternal breeds. Even when the carcass weights are equivalent, terminal-sired lambs produce a greater volume of usable product per lamb, attributable to their enhanced yield efficiency. Furthermore, processing costs are consistent across different breeds, thereby establishing yield efficiency as a pivotal economic consideration.

Future of Terminal Sires in New Zealand Sheep Farming

- Terminal sires have the potential to optimise meat production utilising a reduced number of sheep, thereby enhancing the overall efficiency of the industry.

- The appropriate selection of sires and their feeding practices can lead to a reduction in greenhouse gas emissions by enhancing production efficiency.
- There is a pressing need for the industry to transition toward data-driven genetic selection, rather than adhering to conventional practices.

10.3 Analysis of Mock Farm Model

10.3.1 Base Farm

A base sheep and beef farm has been established, consisting of 650 hectares (ha) of summer-safe rolling hill country located in Eastern Southland. This property comprises 20% flat land, 40% easy, and 40% steep hill country. The property produces 40ha of winter crop, 40ha of new grass, and produces 250 bales of baleage per season. Fertiliser is applied at a rate of $15 per Stock Unit (S.U). The property consists of 4350 two-tooth and mixed-age Romney ewes, 1175 unmated hoggets, and a herd of 100 Angus cows. The ewe flock weighs an average of 67 kg, scans at 175%, and lambs at 135% with a self-replacing rate of 27%.

For the purpose of this investigation, the cow herd has been excluded from the financial figures to facilitate a greater focus on the sheep side of the operation. The ewe flock count of 4350 was derived from the average flock size of farmers who participated in the above survey. The monetary values for the lambs were derived from the average schedule price for the 2024-2025 season. Every effort was made to ensure that all details of the base farm remained consistent across both models that were produced.

10.3.2 Scenario One

In Scenario One, 4350 ewes were mated at a ratio of one ram to one hundred ewes (1:100). 90% of the ewe flock was mated with a maternal (Romney) ram, and 10% of the flock was mated with a terminal (Suffolk) ram. With a lambing rate of 135%, a total of 5,872 lambs were born, which included 1,175 replacement ewe lambs.

On January 7th (90-day weaning), **564 lambs**, representing **12%** of the saleable lambs, were sent to the freezing works. With a live weight of **36 kg** and a yield of **45%**, these lambs yielded a carcass weight of **16.2 kg**, achieving a sale price of **$127.38** per head. There are **2610 lambs** with an average weaning weight of 31 kg that are fattened on the farm. These lambs have an **average kill date of March 25th,** resulting in an average carcass weight of **18.4 kg** at a yield of 41%, with an average price of **$145.36** per head. Additionally, **350 lambs**, which were lighter at weaning with an average weight of 24 kg, were retained until the **14th of April** and subsequently sold as **store lambs** at a weight of **32 kg**, achieving a sale price of **$126.40**.

Feed demand is measured in Kilograms of Dry Matter (kgDM). In Scenario One, feed demand for all Ewes is 2,551,073 kgDM, Hoggets demand is 498,098 kgDM, Rams demand is 25,438 kgDM, with the lambs demand being 334,496 kgDM. The total feed demand for the year is **3,409,105 kgDM**.

The total gross farm income (GFI) for Scenario One amounts to **$645,789**, comprising $495,742 from the sale of lambs, $54,440 from wool sales, and $95,616 from the sale of dry/cull ewes. Direct expenses total **$263,798**, resulting in a gross margin (GM) of **$332,685** after deducting $49,590 attributed to stock capital. Consequently, the gross margin per kilogram of dry matter (**GM/kgDM**) is calculated to be $**9.76 cents/kgDM**, as highlighted in yellow in the image below.

Farm Topography 650ha

	Ewes M	Select One	Wethers M	Select One	Ewe Hgt M	Select One	Wthr Hgt M	Select One	A Lamb M	Select One	B Lamb M	Select One
Flat	1.94	0.2	1.00	1.0	7.58	0.5	7.14	1.0	7.03	1.0	7.31	1.0
Easy	4.32	0.4	-		0.27	0.5	-		-		-	
Steep	5.08	0.4	-		-		-		-		-	

Breeding Ewes
Maternal 90% & Terminal 10%

	Number	Weight	Lamb %	Scan %	% Dry	Death Rate	Kg DM/day	Liveweight Change (kg)	Shearing kg Feed	Lamb Birth Wght	Pregnancy kg Feed	Lactation & Lamb
Ewes	4,350	67	135	175	3.0	6.5	1.08	4.0	7	4.0	32.7	172.7
Wethers						6.0	0.09	5.0	7			
Ewe Hgts	1,175	44.0				2.0	1.15		5	4.0	-	-
Wthr Hgts	-	41.0				3.0	0.78		10			
Rams	44	120					1.60					31
Sale Lambs	4,698	Ewe/Hgt %	27%	Wthr/Hgt%	20%	-						29
Stock Units	5,216											

Ewe Hgt Growth Data

Wean Weight	28	
LW 15 months	60	
Av Feed ME	11.0	
Start Date	20/12/16	
End Date	20/12/17	
Total Days	365	
Av Gain	87.67	gm / day
Growth	4.79	

Lamb Data 90 day weaning

	Number	Wean Wght	Sell Weight	Wean Date	Av Kill Date	Sale Price	Yield %
A	564	36.0	16.2	7/01/18	7/01/18	127.98	45%
B	2,610	31.0	18.4	7/01/18	25/03/18	145.36	41%
C	350	24.0	32.0	7/01/18	14/04/18	126.40	100%

Lamb Feed Demand

	Days Wean-Sell	Required Gwth Rate	Feed Consumed	Average Weight	G=
A	-	-	-	36.0	-
B	77	180.23	115.34	37.9	9.17
C	97	82.47	95.70	28.0	3.54
		#DIV/0!			
		180.23			
		82.47			

Wthr Hgt Growth Data

Wean Weight	32	
Mature Wght	50	
Av Feed ME	10.5	
Wean Date	15/02/16	
Mature Date	20/12/17	
Total Days	674	
Av Gain	26.71	gm / day
Growth	1.23	

	Wool Wght	Wool Price	No. Shorn	Total kg	Total $
Ewes	4.0	2.80	4,350	17,400	48,720
Hoggets	1.5	3.00	1,175	1,762	5,285
Wethers				-	-
Rams	5.0	2.00	44	218	435
Lambs	1.0	3.00		-	-
		2.81	5,568	19,379	54,440

Sheep Sales	Number	Price
Dry Ewes	131	110.00
Cull Ewes	739	110.00
Cull Wthrs	(0)	

Lamb Growth Info

Maternal Ewe	0.9
Terminal Ewe/ Mat Wthr	0.1
Term Wthr / Mat Ram/Crypt	
Terminal Ram/Crypt	

Lamb Maintenance Info

	Ewe / Wthr	Ram / Crypt
A	0.4	0.6
B	0.4	0.6

Direct Expenses		**Cost**	**Units**	**Total**
Shearing	Per Head	6.50	5,525	35,909
Crutching	Per Head	1.20	4,350	5,220
A Health	Per SU	7.00	5,216	36,510
Freight	Per SU			-
Brassica	Per Ha	1,200.00	40.0	48,000
Regrass	Per Ha	1,100.00	40.0	44,000
Feed		40.00	250	10,000
Fertiliser		15.00	5,216	78,235
Rams Maternal		1,200.00	4	4,800
Rams Terminal		850.00	1	850
Total Direct Expenses				263,524

Lamb Income	495,742
Wool Income	54,440
Sheep Income	95,616
Total Gross Income	645,798
Total Direct Expenses	263,524
Gross Margin	382,275
Stock Capital Cost	49,590
Gross Margin after Stock Capital	332,685
Total Feed Consumed	3,409,105
Gross Margin / kgDM	9.76
PE Kg DM / Kg Product	71.23

Feed Demand (kgDM)

Ewes	2,551,073	586
Hoggets	498,098	424
Rams	25,438	
Lambs	334,496	
Wethers	0	
Total Feed Demand	3,409,105	

Stock Capital Interest 6.0%

Ewes	4,350	160.00	696,000	
Ewe Hgts	1,175	100.00	117,450	
Wethers	-		-	
Wthr Hgts	-		-	Months
Trade Hgts		85.00	-	8.0
Rams	44	300.00	13,050	
Total Stock Capital			826,500	

Kg Product Sold

Ewes	24,460
Lambs	4,018
Wool	19,379
Total Product	47,858
KgDM / kg product	71.23

Figure 5 : Scenario Two GM table

10.3.3 Scenario Two

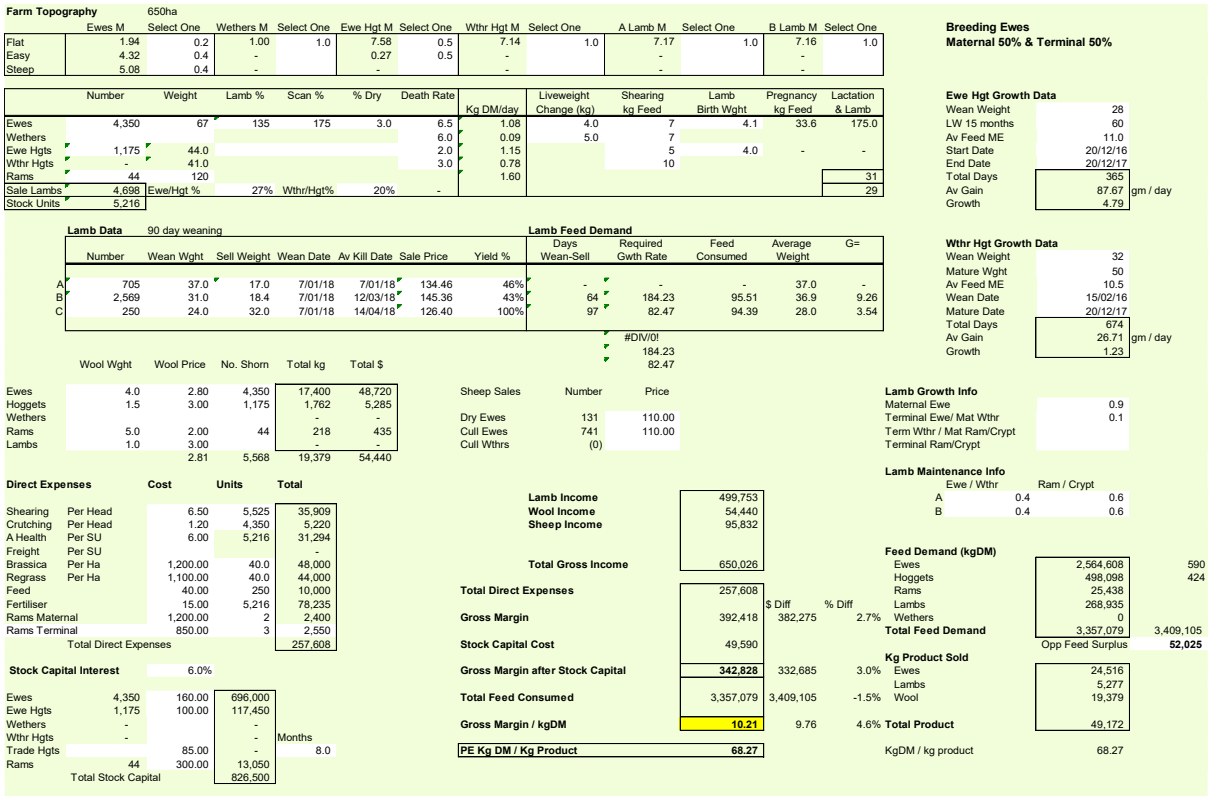
In Scenario Two, 4350 ewes were mated at a ratio of one ram to one hundred ewes (1:100). 50% of the ewe flock was mated with a maternal (Romney) ram, and 50% of the flock was mated with a terminal (Suffolk) ram. With a lambing rate of 135%, a total of 5,872 lambs were born, which included 1,175 replacement ewe lambs.

On January 7th (90-day weaning), **705 lambs**, representing **15%** of the saleable lambs, were sent to the freezing works. With a live weight of **37 kg** and a yield of **46%**, these lambs yielded

a carcass weight of **17 kg**, achieving a sale price of **$134.46** per head. There are **2569 lambs** with an average weaning weight of 31 kg that are fattened on the farm. These lambs have an **average kill date of March 12th,** resulting in an average carcass weight of **18.4 kg** at a yield of 43%, with an average price of **$145.36** per head. Additionally, **250 lambs**, which were lighter at weaning with an average weight of 24 kg, were retained until **April 14th** and subsequently sold as **store lambs** at a weight of **32 kg**, achieving a sale price of **$126.40**.

In Scenario Two, feed demand for all Ewes is 2,564,608 kgDM, Hoggets demand is 498,098 kgDM, Rams demand is 25,438 kgDM, with the lambs demand being 268,935 kgDM. The total feed demand for the year is **3,357,079 kgDM**.

The total GFI for Scenario Two amounts to **$650,026**, comprising $499,753 from the sale of lambs, $54,440 from wool sales, and $95,832 from the sale of dry/cull ewes. Direct expenses total **$257,608,** resulting in a GM of **$342,828** after deducting $49,590 attributed to stock capital. Consequently, the **GM/kgDM** is calculated to be $**10.21cents/kgDM**, as highlighted in yellow in the image below.



Farm Topography 650ha

	Ewes M	Select One	Wethers M	Select One	Ewe Hgt M	Select One	Wthr Hgt M	Select One	A Lamb M	Select One	B Lamb M	Select One
Flat	1.94	0.2	1.00	1.0	7.58	0.5	7.14	1.0	7.17	1.0	7.16	1.0
Easy	4.32	0.4	-		0.27	0.5	-		-		-	
Steep	5.08	0.4	-		-		-		-		-	

Breeding Ewes
Maternal 50% & Terminal 50%

	Number	Weight	Lamb %	Scan %	% Dry	Death Rate	Kg DM/day	Liveweight Change (kg)	Shearing kg Feed	Lamb Birth Wght	Pregnancy kg Feed	Lactation & Lamb
Ewes	4,350	67	135	175	3.0	6.5	1.08	4.0	7	4.1	33.6	175.0
Wethers						6.0	0.09	5.0	7			
Ewe Hgts	1,175	44.0				2.0	1.15		5	4.0	-	-
Wthr Hgts	-	41.0				3.0	0.78		10			
Rams	44	120					1.60					31
Sale Lambs	4,698	Ewe/Hgt %	27%	Wthr/Hgt%	20%	-						29
Stock Units	5,216											

Ewe Hgt Growth Data

Wean Weight	28
LW 15 months	60
Av Feed ME	11.0
Start Date	20/12/16
End Date	20/12/17
Total Days	365
Av Gain	87.67 gm / day
Growth	4.79

Lamb Data 90 day weaning

	Number	Wean Wght	Sell Weight	Wean Date	Av Kill Date	Sale Price	Yield %
A	705	37.0	17.0	7/01/18	7/01/18	134.46	46%
B	2,569	31.0	18.4	7/01/18	12/03/18	145.36	43%
C	250	24.0	32.0	7/01/18	14/04/18	126.40	100%

Lamb Feed Demand

Days Wean-Sell	Required Gwth Rate	Feed Consumed	Average Weight	G=
-	-	-	37.0	-
64	184.23	95.51	36.9	9.26
97	82.47	94.39	28.0	3.54
	#DIV/0!			
	184.23			
	82.47			

Wthr Hgt Growth Data

Wean Weight	32
Mature Wght	50
Av Feed ME	10.5
Wean Date	15/02/16
Mature Date	20/12/17
Total Days	674
Av Gain	26.71 gm / day
Growth	1.23

	Wool Wght	Wool Price	No. Shorn	Total kg	Total $
Ewes	4.0	2.80	4,350	17,400	48,720
Hoggets	1.5	3.00	1,175	1,762	5,285
Wethers				-	-
Rams	5.0	2.00	44	218	435
Lambs	1.0	3.00		-	-
	2.81		5,568	19,379	54,440

Sheep Sales	Number	Price
Dry Ewes	131	110.00
Cull Ewes	741	110.00
Cull Wthrs	(0)	

Lamb Growth Info

Maternal Ewe	0.9
Terminal Ewe/ Mat Wthr	0.1
Term Wthr / Mat Ram/Crypt	
Terminal Ram/Crypt	

Direct Expenses

		Cost	Units	Total
Shearing	Per Head	6.50	5,525	35,909
Crutching	Per Head	1.20	4,350	5,220
A Health	Per SU	6.00	5,216	31,294
Freight	Per SU			-
Brassica	Per Ha	1,200.00	40.0	48,000
Regrass	Per Ha	1,100.00	40.0	44,000
Feed		40.00	250	10,000
Fertiliser		15.00	5,216	78,235
Rams Maternal		1,200.00	2	2,400
Rams Terminal		850.00	3	2,550
	Total Direct Expenses			257,608

Stock Capital Interest 6.0%

Ewes	4,350	160.00	696,000
Ewe Hgts	1,175	100.00	117,450
Wethers	-		-
Wthr Hgts	-		-
Trade Hgts		85.00	-
Rams	44	300.00	13,050
	Total Stock Capital		826,500

Months 8.0

Lamb Income	499,753			
Wool Income	54,440			
Sheep Income	95,832			
Total Gross Income	650,026			
Total Direct Expenses	257,608			
		$ Diff	% Diff	
Gross Margin	392,418	382,275	2.7%	
Stock Capital Cost	49,590			
Gross Margin after Stock Capital	**342,828**	332,685	3.0%	
Total Feed Consumed	3,357,079	3,409,105	-1.5%	
Gross Margin / kgDM	**10.21**	9.76	4.6%	
PE Kg DM / Kg Product	**68.27**			

Lamb Maintenance Info

	Ewe / Wthr	Ram / Crypt
A	0.4	0.6
B	0.4	0.6

Feed Demand (kgDM)

Ewes	2,564,608	590
Hoggets	498,098	424
Rams	25,438	
Lambs	268,935	
Wethers	0	
Total Feed Demand	3,357,079	3,409,105
	Opp Feed Surplus	**52,025**

Kg Product Sold

Ewes	24,516
Lambs	5,277
Wool	19,379
Total Product	49,172
KgDM / kg product	68.27

Figure 6 : Scenario Two GM Table

10.3.4 Comparison of Scenario One and Scenario Two

All possible efforts were undertaken to ensure that all variables remained consistent between Scenario One and Scenario Two, except the percentage of the flock that received a terminal sire. Consequently, any discrepancies between Scenario One and Scenario Two, as outlined below, can be attributed to the increased utilisation of terminal sires.

Below is a table showing the difference between Scenario One and Scenario Two.

Table 1 : Difference Between Scenario One And Scenario Two

	Scenario One	Scenario Two	Difference
Ewes Mated	4350	4350	0
Scanning Percentage	175%	175%	0
Lambing Percentage	135%	135%	0
Replacements Kept	1175	1175	0
Lambs Killed At Weaning	564	705	+141
Percentage of Saleable Lambs	12%	15%	+3%
Liveweight	36 kg	37kg	+1kg
Carcass Weight	16.2 kg	17 kg	+0.8 kg
Carcass Yield	45%	46%	+1%
Price Per Head	$127.30	$134.46	+$7.16
Lambs Left To Fatten	2610	2569	-41
Average Kill Date	25/03/2025	12/03/2025	-13 Days
Average Carcass Weight	18.4 kg	18.4kg	0
Average Price	$145.36	$145.36	0
Store Lambs Sold	350	250	-100
Store Lamb Weight	32 kg	32 kg	0
Store Lamb Price	$126.40	$126.40	0
Total Feed Demand	3,409,105 kgDM	3,357,079 kgDM	+52,026 kgDM
Gross Farm Income	$645,789	$650,026	+$4237
Farm Expenses	$263,798	$257,608	-$6190
Gross Margin	$332,685	$342,828	+$10,143
Gross Margin/kgDM	9.76	10.21	+0.45

As illustrated in Table 1 above, distinctions exist between Scenario One and Scenario Two. A greater number of lambs are slaughtered at weaning at a heavier carcass weight, resulting in increased earnings per head. Fewer lambs are required to be retained on the farm for fattening, and the average slaughter date is decreasing, resulting in fewer lambs needing to be sold as stores. Higher GFI and a decrease in farm expenses culminate in a GM of **$10,143**.

All positive indicators suggest that Scenario Two is the superior option; however, the significant distinction lies in the **52,026 kgDM** produced by culling additional lambs at an earlier stage. This excess of feed provides the farmer in Scenario Two with various options, including:

- Producing additional baleage.
- Allocating surplus feed to ewes to enhance their Body Condition Score (BCS), which may result in an increased scanning percentage.
- Utilising the surplus feed for personal lamb production to achieve higher slaughter weights.

10.3.5 Scenario Three

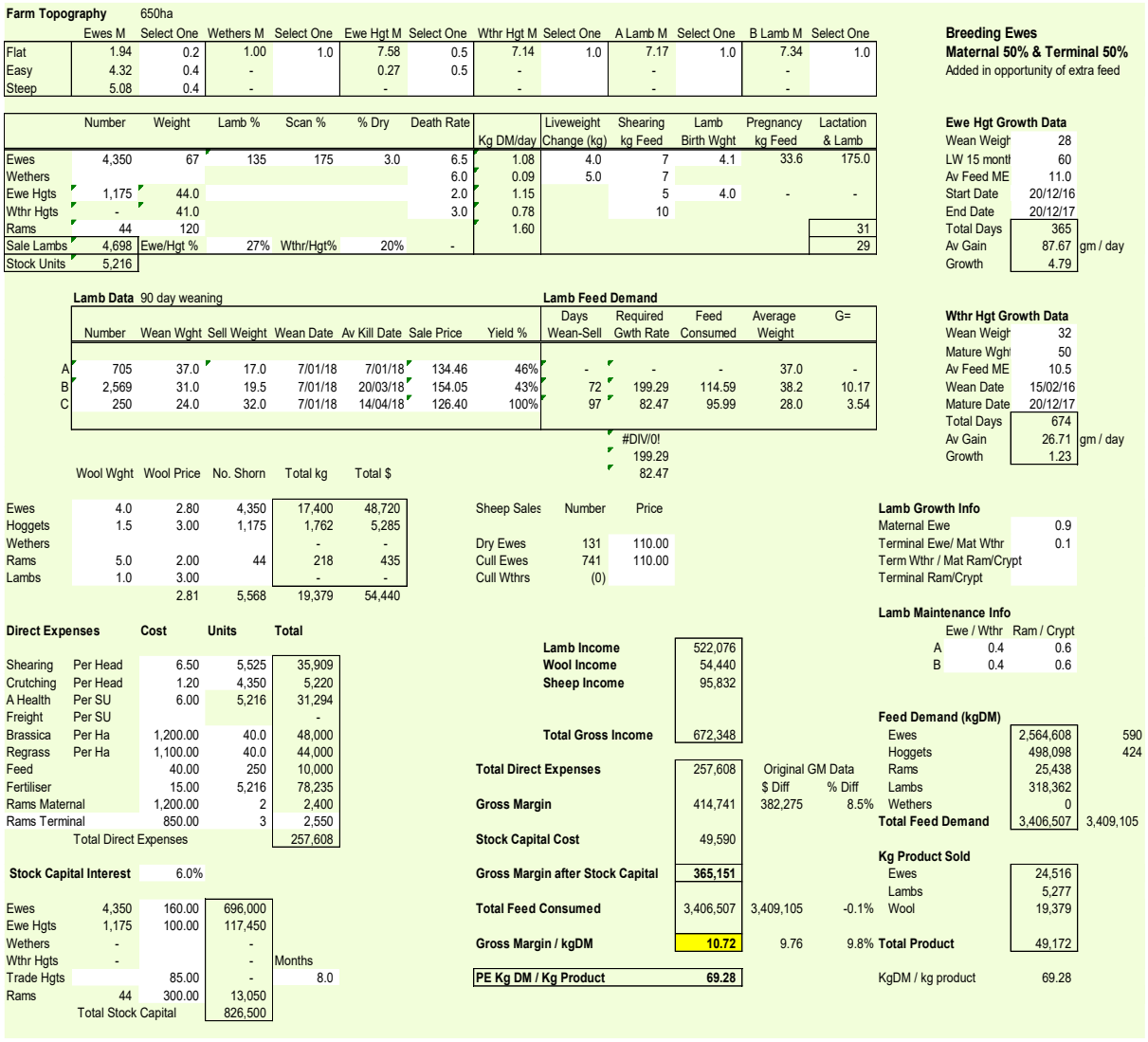
Scenario Three constitutes a module that involves utilising the excess feed generated in Scenario Two to add extra weight to the lambs remaining on the farm.

In Scenario Three, 4350 ewes were mated at a ratio of one ram to one hundred ewes (1:100). 50% of the ewe flock was mated with a maternal (Romney) ram, and 50% of the flock was mated with a terminal (Suffolk) ram. With a lambing rate of 135%, a total of 5,872 lambs were born, which included 1,175 replacement ewe lambs.

On January 7th (90-day weaning), **705 lambs**, representing **15%** of the saleable lambs, were sent to the freezing works. With a live weight of **37 kg** and a yield of **46%**, these lambs yielded a carcass weight of **17 kg**, achieving a sale price of **$134.46** per head. There are **2569 lambs** with an average weaning weight of 31 kg that are fattened on the farm. These lambs have an **average kill date of March 20th,** resulting in an average carcass weight of **19.5 kg** at a yield of 43%, with an average price of **$154.05** per head. Additionally, **250 lambs**, which were lighter at weaning with an average weight of 24 kg, were retained until **April 14th** and subsequently sold as **store lambs** at a weight of **32 kg**, achieving a sale price of **$126.40**.

In Scenario Three, feed demand for all ewes is 2,564,608 kgDM, hoggets demand is 498,098 kgDM, rams demand is 25,438 kgDM, and the lambs demand is 318,362 kgDM. The total feed demand for the year is **3,406,507 kgDM**.

The total GFI for Scenario Three amounts to **$672,348**, comprising $522,076 from the sale of lambs, $54,440 from wool sales, and $95,832 from the sale of dry/cull ewes. Direct expenses total **$257,608,** resulting in a gross margin (GM) of **$365,151** after deducting $49,590 attributed to stock capital. Consequently, the **GM/kgDM** is calculated to be **10.72**, as highlighted in yellow in the image below.



Farm Topography 650ha

	Ewes M	Select One	Wethers M	Select One	Ewe Hgt M	Select One	Wthr Hgt M	Select One	A Lamb M	Select One	B Lamb M	Select One
Flat	1.94	0.2	1.00	1.0	7.58	0.5	7.14	1.0	7.17	1.0	7.34	1.0
Easy	4.32	0.4	-		0.27	0.5	-		-		-	
Steep	5.08	0.4	-		-		-		-		-	

Breeding Ewes
Maternal 50% & Terminal 50%
Added in opportunity of extra feed

	Number	Weight	Lamb %	Scan %	% Dry	Death Rate	Kg DM/day	Liveweight Change (kg)	Shearing kg Feed	Lamb Birth Wght	Pregnancy kg Feed	Lactation & Lamb
Ewes	4,350	67	135	175	3.0	6.5	1.08	4.0	7	4.1	33.6	175.0
Wethers						6.0	0.09	5.0	7			
Ewe Hgts	1,175	44.0				2.0	1.15		5	4.0	-	-
Wthr Hgts	-	41.0				3.0	0.78		10			
Rams	44	120					1.60					31
Sale Lambs	4,698	Ewe/Hgt %	27%	Wthr/Hgt%	20%	-						29
Stock Units	5,216											

Ewe Hgt Growth Data

Wean Weigh	28	
LW 15 montl	60	
Av Feed ME	11.0	
Start Date	20/12/16	
End Date	20/12/17	
Total Days	365	
Av Gain	87.67	gm / day
Growth	4.79	

Lamb Data 90 day weaning

	Number	Wean Wght	Sell Weight	Wean Date	Av Kill Date	Sale Price	Yield %
A	705	37.0	17.0	7/01/18	7/01/18	134.46	46%
B	2,569	31.0	19.5	7/01/18	20/03/18	154.05	43%
C	250	24.0	32.0	7/01/18	14/04/18	126.40	100%

Lamb Feed Demand

	Days Wean-Sell	Required Gwth Rate	Feed Consumed	Average Weight	G=
A	-	-	-	37.0	-
B	72	199.29	114.59	38.2	10.17
C	97	82.47	95.99	28.0	3.54
		#DIV/0!			
		199.29			
		82.47			

Wthr Hgt Growth Data

Wean Weigh	32	
Mature Wght	50	
Av Feed ME	10.5	
Wean Date	15/02/16	
Mature Date	20/12/17	
Total Days	674	
Av Gain	26.71	gm / day
Growth	1.23	

	Wool Wght	Wool Price	No. Shorn	Total kg	Total $
Ewes	4.0	2.80	4,350	17,400	48,720
Hoggets	1.5	3.00	1,175	1,762	5,285
Wethers				-	-
Rams	5.0	2.00	44	218	435
Lambs	1.0	3.00		-	-
		2.81	5,568	19,379	54,440

Sheep Sales	Number	Price
Dry Ewes	131	110.00
Cull Ewes	741	110.00
Cull Wthrs	(0)	

Lamb Growth Info

Maternal Ewe	0.9
Terminal Ewe/ Mat Wthr	0.1
Term Wthr / Mat Ram/Crypt	
Terminal Ram/Crypt	

Lamb Maintenance Info

	Ewe / Wthr	Ram / Crypt
A	0.4	0.6
B	0.4	0.6

Direct Expenses		**Cost**	**Units**	**Total**
Shearing	Per Head	6.50	5,525	35,909
Crutching	Per Head	1.20	4,350	5,220
A Health	Per SU	6.00	5,216	31,294
Freight	Per SU			-
Brassica	Per Ha	1,200.00	40.0	48,000
Regrass	Per Ha	1,100.00	40.0	44,000
Feed		40.00	250	10,000
Fertiliser		15.00	5,216	78,235
Rams Maternal		1,200.00	2	2,400
Rams Terminal		850.00	3	2,550
Total Direct Expenses				257,608

Lamb Income	522,076	
Wool Income	54,440	
Sheep Income	95,832	
Total Gross Income	672,348	
Total Direct Expenses	257,608	
Gross Margin	414,741	
Stock Capital Cost	49,590	
Gross Margin after Stock Capital	**365,151**	
Total Feed Consumed	3,406,507	
Gross Margin / kgDM	**10.72**	
PE Kg DM / Kg Product	**69.28**	

	Original GM Data	$ Diff	% Diff
	382,275		8.5%
	3,409,105		-0.1%
	9.76		9.8%

Feed Demand (kgDM)

Ewes	2,564,608	590
Hoggets	498,098	424
Rams	25,438	
Lambs	318,362	
Wethers	0	
Total Feed Demand	3,406,507	3,409,105

Kg Product Sold

Ewes	24,516
Lambs	5,277
Wool	19,379
Total Product	49,172
KgDM / kg product	69.28

Stock Capital Interest 6.0%

Ewes	4,350	160.00	696,000	
Ewe Hgts	1,175	100.00	117,450	
Wethers	-		-	
Wthr Hgts	-		-	Months
Trade Hgts		85.00	-	8.0
Rams	44	300.00	13,050	
Total Stock Capital			826,500	

Figure 7 : Scenario Three GM Table

10.3.6 Comparison of Scenario One and Scenario Three

All possible efforts were undertaken to ensure that all variables remained consistent between Scenario One and Scenario Three, except the percentage of the flock that received a terminal sire and the use of the surplus feed gained in Scenario Two. Consequently, any discrepancies between Scenario One and Scenario Three, as outlined below, can be attributed to the increased utilisation of terminal sires.

Below is a table showing the difference between Scenario One and Scenario Three.

Table 2 : Difference Between Scenario One And Scenario Three

	Scenario One	Scenario Three	Difference
Ewes Mated	4350	4350	0
Scanning Percentage	175%	175%	0
Lambing Percentage	135%	135%	0
Replacements Kept	1175	1175	0
Lambs Killed At Weaning	564	705	+141
Percentage of Saleable Lambs	12%	15%	+3%
Liveweight	36 kg	37kg	+1kg
Carcass Weight	16.2 kg	17 kg	+0.8 kg
Carcass Yield	45%	46%	+1%
Price Per Head	$127.30	$134.46	+$7.16
Lambs Left To Fatten	2610	2569	-41
Average Kill Date	25/03/2025	20/03/2025	-5 Days
Average Carcass Weight	18.4 kg	19.5kg	+1.5 kg
Average Price	$145.36	$154.05	+$8.69
Store Lambs Sold	350	250	-100
Store Lamb Weight	32 kg	32 kg	0
Store Lamb Price	$126.40	$126.40	0
Total Feed Demand	3,409,105 kgDM	3,406,507 kgDM	+2,598 kgDM
Gross Farm Income	$645,789	$672,348	+$26,559
Farm Expenses	$263,798	$257,608	-$6190
Gross Margin	$332,685	$365,151	+$32,466
Gross Margin/kgDM	9.76	10.72	+0.96

As illustrated in Table 2 above, utilising the feed surplus generated from Scenario Two to increase the weight of the remaining 2569 fattening lambs incrementally results in an additional production of **1.5 kg** of lamb carcass in Scenario Three, thereby yielding an extra **$8.69** per head. The Gross Farm Income (GFI) increases by **$26,559**, and with a decrease in farm expenses, Scenario Three presents a Gross Margin of **$32,466**. This effectively results in a GM/kgDM of **10.72**, compared to 9.76 GM/kgDM in Scenario One.

11 Findings and Discussion

11.1 Survey Findings

The key findings derived from the survey indicate that participants utilising a higher rate of terminal sire had an increased weaning slaughter rate. Participants with systems in which 100% of their ewe flock was mated to a terminal sire exhibited the highest weaning slaughter rates. These individuals either managed flocks comprising older ewes that were subsequently slaughtered after weaning or used a terminal sire across all mixed-age ewes while procuring replacement ewe lambs or two-tooths to ensure a continuous influx of young sheep into their system.

Participants employing a mixed strategy of maternal and terminal sire usage, accounting for 40-60%, exhibited a slaughter rate at weaning that ranged from 25% to 45%. Furthermore, it was observed that their average kill date and average carcass weight demonstrated a significant improvement compared to participants utilising maternal sire dominant mating. Additionally, these participants maintained replacement ewe lambs bred by ewes that had mated with a maternal sire.

Participants employing a predominantly maternal sire approach had the lowest weaning lamb slaughter rate. Additionally, their average carcass weight and kill date lagged behind those of participants using a more terminal sire approach.

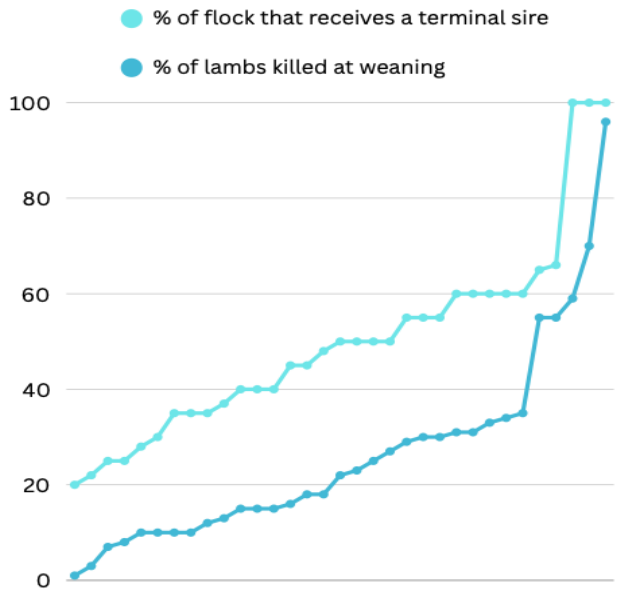


Figure 8 : Correlation Between Use of Terminal Sires And Lambs Killed At Weaning Derived From Survey Data

The survey revealed several key factors. The most frequently mentioned restriction by participants regarding their hesitance to utilise additional terminal sires centred on the insufficient availability of maternal ewe lambs suitable for selection as replacements. A considerable number of participants contend that an increased proportion of terminal sires diminishes the pool of quality ewe lambs available for selection. These individuals assert that a substantial pool of ewe lambs is necessary for effective replacement selection.

Several participants expressed concerns regarding the low lambing percentage, indicating that this may be a primary reason for their reluctance to utilise additional terminal sires. Some participants commented that they believe terminal sires possess a lower lambing percentage due to diminished survivability, particularly under adverse environmental conditions. These farmers are actively seeking more robust genetics for their breeding systems. Additionally, some participants noted that due to their suboptimal overall lambing percentage, they face challenges in breeding a sufficient number of ewe lambs from which to select replacements.

Several participants commented on the utilisation of Breeding Values (BVs) in the context of purchasing terminal sires from stud breeders. Observations were made regarding the extent of BVs employed in Maternal sire selection in comparison to Terminal sire selection. Furthermore, participants expressed concerns regarding the lack of tolerance to Facial Eczema in the North Island and the tolerance to Worm Burden exhibited by Terminal stud breeders, as compared to their Maternal stud breeder counterparts. One participant raised a concern regarding Facial Eczema tolerance, asserting that the procurement of Terminal Sires without such tolerance inhibited their capacity to retain Terminal Sired lambs during the Autumn season, when Facial Eczema is prevalent. Additionally, this participant noted that those Terminal sires were also susceptible to the disease.

Lastly, there were remarks regarding the perceived market favourability towards maternal-bred lambs compared to their terminally bred counterparts when marketing lambs for sale in the store market. Their objective was to align their breeding system with what they believed were the buyers' expectations, in accordance with processing timelines.

11.2 Interview Findings

The principal finding derived from the interview process, as articulated by multiple participants, pertains to the optimisation of an ‘A’ and ‘B’ ewe flock. The selection of superior ewes for the ‘A’ flock is based on criteria such as type, structure, longevity, and overall performance, which will receive a maternal ram to breed the highest quality replacement ewe lambs. Consequently, all remaining ewes will be allocated to the ‘B’ flock, characterised by undesirable maternal breeding attributes, including inadequate mothering ability and subpar type. This system allowed the participant to select the percentage of the flock that was subsequently to receive a terminal sire.

Comments were also made regarding the ‘A’ flock, which consists entirely of younger ewes. This ‘A’ mob would include all of the best two-tooth, four-tooth, and six-tooth ewes and will be provided with a maternal ram. This process, implemented by some interviewees, is perceived as an effective method for accelerating genetic gain within the overall flock. This

implies that the remainder of the flock, which includes all of the older ewes and the less desirable younger ewes, will constitute the 'B' flock. This mob would then receive a terminal ram. The interviewees remarked that they have observed older ewes producing larger terminal lambs due to the increased milk supply available from older ewes compared to their younger counterparts.

These interview findings directly correspond with the prior work documented in section 8.5.2 of the Literature Review, titled "Quantifying Sheep Enterprise Profitability With Varying Flock Replacement Rates, Lambing Rates, And Breeding Strategies In New Zealand," authored by L.J. Farrell, P.R. Kenton, P.R. Tozer, T. Ramilan, and L.M. Cranston. The referenced study concluded that up to 65% of the flock could be mated with a terminal sire while still ensuring an adequate number of replacement ewe lambs by selectively breeding the superior ewes with a maternal ram for replacement, and directing all other ewes to a terminal sire. In the context of this study, 65% of the flock is assigned to a terminal ram, with the remaining 35% allocated to a maternal ram.

Another significant finding derived from the interview process was the commentary provided by the lamb trader regarding the 10-cent-per-kilogram premium for terminal sire lambs in the lead-up to Christmas. It was also noted that these terminal sired lambs were observed to be heavier than their maternal counterparts. Therefore, this indicates that terminal lambs, which are heavier, are valued at 10 cents more per kilogram, resulting in a higher overall worth per head. These observations are noteworthy, particularly in light of remarks made by several participants in the above survey, who expressed scepticism regarding the existence of an increased demand for terminal lambs compared to maternal lambs.

Comments were also made by some of the interviewees concerning the quality of terminal sires, whether offered by stud breeders or procured from other farmers. It is perceived that some farmers continue to purchase poorly bred terminal rams due to their low cost, utilising them primarily as markers rather than optimising the potential of well-bred alternatives. Consequently, this practice results in lambs that are not bred to their full potential. Remarks indicated that placing greater emphasis on breeding superior terminal sires and preventing the sale of inferior rams would significantly improve the industry's overall impact.

11.3 Mock Farm Model Findings

The key finding derived from the Mock Farm Modelling illustrating the difference between 10% of the ewe flock receiving a terminal sire compared to 50% was the surplus of feed (52,026 kgDM) generated from more lambs being sent to the freezing works at weaning time and the average kill date from the remaining lambs being brought forward 13 days.

This surplus of feed can provide significant value for any farmer, as it offers numerous options for utilisation, including:

- Producing additional baleage.
- Allocating surplus feed to ewes to enhance their Body Condition Score (BCS), which will result in an increased scanning percentage.

- Utilising the surplus feed for personal lamb production to achieve higher slaughter weights for works lambs or growing out replacement ewe lambs, with the potential of mating them as a hogget if grown out well enough.

Making a feed surplus into additional baleage provides the farmer with an opportunity to reserve feed for future utilisation. This baleage can serve as a supplementary resource during winter months or can be utilised in the event of droughts to ensure livestock are adequately fed. It is always advantageous to have a stockpile of feed set aside for future needs. Furthermore, this approach presents the farmer with the option to market any surplus baleage. Using back of the envelope figures, 52,026 kgDM translates to over 200 bales of excess baleage. As of May 2025 in Southland, the market price for a bale of baleage is approximately $100 per bale, depending on quality, resulting in a gross margin (GM) exceeding $20,000.

The surplus of feed produced in Scenario Two would be observed during late summer and autumn. This period is critical for ewes to be presented to the ram in their optimal condition. The most effective and straightforward method to assess a ewe's condition is through Body Condition Scoring (BCS). BCS serves as a quick and cost-effective management tool designed to enhance ewe productivity and flock profitability. This scoring system evaluates the quantity of body fat or condition by feeling the vertical spine and horizontal processes along the loin region. It operates on a scale from 1 to 5, where 1 signifies extreme leanness and 5 indicates excessive fatness. The objective is to maintain the majority of the flock at a BCS of 3 or higher.

"Your biggest percentage jump in scanning percentage will come from reducing the number of poor condition ewes at mating." - Paul Kenyon, Massey University. (NZ B. a.)

Should the farmer conduct Body Condition Scoring (BCS) of their flock and identify the ewes with a BCS of less than 3, it is advisable to preferentially allocate them the surplus feed generated from Scenario 2 to elevate their condition to a score of 3 or higher. This strategic intervention is expected to enhance their scanning percentage.

	Status Quo: 15% flock BCS 1 & 2	**Use BCS:** 5% flock BCS 1 & 2
Scanning %	160%	175%
Lamb survival	78.4%	81%
Weaning weight	26.5 kg	**27.4 kg**
Increase in Gross Margin/ha		**+14%**

CR = Conception rate
Analysis and table prepared by Trevor Cook

Figure 9 : The benefit of reducing the number of tail-end ewes at mating (NZ B. a.)

Another way to utilise the surplus feed could be for personal lamb production to achieve higher slaughter weights, as shown in Scenario Three of the Mock Farm Model. As illustrated above in Table 2, utilising the feed surplus generated from Scenario Two to increase the weight of the remaining 2569 fattening lambs incrementally results in an additional production of 1.5 kg of lamb carcass in Scenario Three, thereby yielding an extra $8.69 per head. The Gross Farm Income (GFI) increases by $26,559, and with a decrease in farm expenses, Scenario Three presents a Gross Margin of $32,466. This effectively results in a GM/kgDM of 10.72, compared to the 9.76 GM/kgDM depicted in Scenario One.

12 Conclusion

This research report aimed to enhance the understanding of terminal sire usage within New Zealand sheep farming systems and evaluate the extent of their impact on the production of our remaining ewe flock. It was also noted that the New Zealand sheep industry can be categorised using the 20/60/20 rule (Figure 1).

- 20% - Top performers, who are highly innovative and adapt quickly to change.
- 60% - Average performers, who will change once they observe others doing so.
- 20% - Poor performers, who are unwilling to change.

Based on the survey findings and interview process, the New Zealand sheep industry adheres to the 20-60-20 rule.

The survey findings indicate that the top 20% of participants, who use a high proportion of terminal sires, are producing more lambs that are killed at weaning, achieving higher average carcass weights, and having earlier average kill dates, whilst also maintaining adequate replacement rates.

The middle 60% of participants are using a smaller proportion of terminal sires, focusing more on breeding sufficient replacements to introduce into the flock. This group, along with the bottom 20% also raised concerns that lower lambing percentages were a reason for their reluctance to use more terminal sires, and some mentioned that they didn't perceive as much demand for a terminal-sired lamb. It is recommended that the bottom 20% focus on improving their overall lambing percentage before considering the effective utilisation of terminal sires.

Based on the interview findings, it is evident that the farmers identified as the top 20% performers maintain an 'A' and 'B' flock of ewes. The animal scientist/geneticist, when interviewed, concurred that this practice is optimal. The 'A' flock comprises either superior ewes selected for type, structure, and performance or entirely younger ewes aimed at promoting genetic gain. All these ewes are mated to a maternal ram. A crucial point is that the number of ewes in the 'A' flock is restricted to the number of replacements needed. For instance, in a flock of 4000 ewes with a 25% replacement rate, 1000 replacement ewe lambs are necessary annually. If 50% of the flock (2000 ewes) is mated to a maternal ram and lambs at a rate of 135%, they would produce 2700 lambs. Theoretically, half of those lambs will be ewe lambs, providing 1350 ewe lambs to select from for the required 1000 replacements.

This leaves a 'B' flock of ewes that are all the least desired ewes for breeding replacements, either being of a poorer type and underperforming or all of the older ewes. It is these ewes that receive a terminal sire to produce a good saleable lamb come weaning time. It is these lambs that, through hybrid vigour, have increased weaning weights over their maternally bred counterparts.

The interview findings also revealed that the lowest-performing 20% of farmers were buying terminal sires solely for their marking ability, such as Suffolk rams, which are known for producing lambs with distinctive black faces. These farmers, however, paid little attention to the genetics of the rams. If greater emphasis were placed on genetics, it is thought that these rams would yield superior lambs.

The results from the Mock Farm Model for Scenario 2, which produced a feed surplus of 52,026 kgDM with a 50:50 flock, support the conclusions drawn from the survey and interviews regarding the practices of the top 20% of farmers. This group demonstrates that a simple adjustment in their systems can generate a feed surplus that can be used to create additional baleage, enhance the condition of lighter ewes to boost scanning outcomes, or increase the weight of fattening lambs by 1.5 kg of carcass weight, as shown in Scenario 3.

13 Recommendations

To maximise production in our declining ewe flock, findings from this report recommend:

- Implement a superior 'A' flock of ewes based on type, structure, and performance, or based on age, to ensure that replacement ewe lambs are bred from the very best ewes, making the most out of the genetic gain that can be offered. Ensure the number of ewes in the 'A' flock is capped at the number of replacements needed, depending on lambing percentage. Ideally, this should be 50% of the flock.

- Implement a less desirable 'B' flock of ewes based on inferior type, structure, and performance, which could also include all of the older M/A ewes. These ewes would receive a terminal sire, and through the natural effects of hybrid vigour, they would produce a heavier, more sought-after lamb at weaning. Ideally, this would comprise 50% of the mob as well.

- Ensure that emphasis is placed on purchasing sires with the very best genetics that align with your breeding plan. Rams are cheap investments compared to the number of lambs they can produce.

14 References

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15 Appendix

15.1 Survey Questions

1. What region do you farm in?
2. How many stock units is your current operation?
3. What percentage of those stock units is made up of sheep?
4. What is your total number of ewes mated?
5. What percentage of your flock receives a terminal sire?
6. What percentage of your lambs are killed at weaning?
7. What is your average kill date?
8. What is your average lamb carcass weight?
9. What breed of terminal sire do you use?
10. What reason (if any) stops you from using more terminal sires in your flock?
11. Do you have any comments in regard to terminal sire use in New Zealand sheep farm systems?

15.2 Interview Questions

Geneticist questions

- How does hybrid vigour contribute to productivity in terminal sire crosses?
- Do you think the sheep industry is optimising the use of hybrid vigour enough? Why/why not?
- What breed combinations tend to maximise hybrid vigour in lamb production?
- What advancements in genetic testing or breeding indexes could improve terminal sire selection?
- What advances in genetic testing are shaping the future of sheep breeding?
- What role do you think terminal sires play in the future of New Zealand sheep farming systems?

Farmer questions

- What factors influence your decision to use terminal sires in your flock?
- How do you determine the percentage of your flock that receives a terminal sire?
- Are there specific traits you prioritise when selecting terminal sires (e.g., growth rate, carcass quality, survivability)?
- How do you manage the balance between terminal sire usage and maintaining a strong maternal line?
- What are the main barriers preventing you from increasing terminal sire usage in your system?
- Why do you prefer certain terminal sire breeds over others?
- Do you think there is sufficient demand from the finishing industry for terminal lambs? Why or why not?
- What role do you think terminal sires play in the future of New Zealand sheep farming systems?
- How do you think the industry could better support farmers in utilising terminal sires more effectively?

Lamb buyer questions

- What is your strategy when it comes to purchasing lambs?
- Do you have specific breed preferences, or are you mainly focused on getting lambs in the gate?
- How do terminal sire-bred lambs compare in value to maternal-bred lambs in your purchasing decisions?
- Would better genetic selection of terminal sires make a difference in meeting buyer demands?
- How does the yield and processing efficiency of terminal sire lambs compare to maternally bred lambs?
- What role do you think terminal sires play in the future of New Zealand sheep farming systems?