Principles of Dairy Sheep Farming in New Zealand

This document has been created as part of the Scale Up SFF Futures Programme

Published: 2025

SPRING SHEEP
— MILK CO. —
New Zealand

Ministry for Primary Industries
Manatū Ahu Matua

Ministry for Primary Industries
Manatū Ahu Matua

SPRING SHEEP
— MILK CO. —
New Zealand

Introduction

This guide has been prepared following extensive farm system analysis, using data collected from commercial sheep dairy operations in the Waikato and Taranaki regions of New Zealand.

The guide covers eleven core principles and is designed to capture the key farm system parameters and considerations in the successful establishment and operation of a commercial pastoral sheep milking operation.

The guide provides a high level summary of each principle, with further reference provided for where additional information can be sort.

Scale Up Research and Development Programme

Spring Sheep are the industry partner in a five-year research and development partnership with the Ministry for Primary Industries called 'Scale Up' through their Sustainable Food and Fibre Futures Programme. The programme of work is focused on scaling the New Zealand sheep milk industry with leading innovation while ensuring the sector has the tools required to operate efficiently and profitably. Scale Up is designed to support key innovation and development opportunities for the New Zealand dairy sheep sector as it moves from a piloting phase through to an established primary industry of significant value for New Zealand.

A key workstream of the Scale Up programme is the National On-farm R&D workstream. This workstream has been focused on capturing key production and performance data from active sheep dairy farms during 2023-2025 dairy seasons to better understand what drives success in the farming system.

For further information

info@springsheep.co.nz

11 Principles of Dairy Sheep Farming

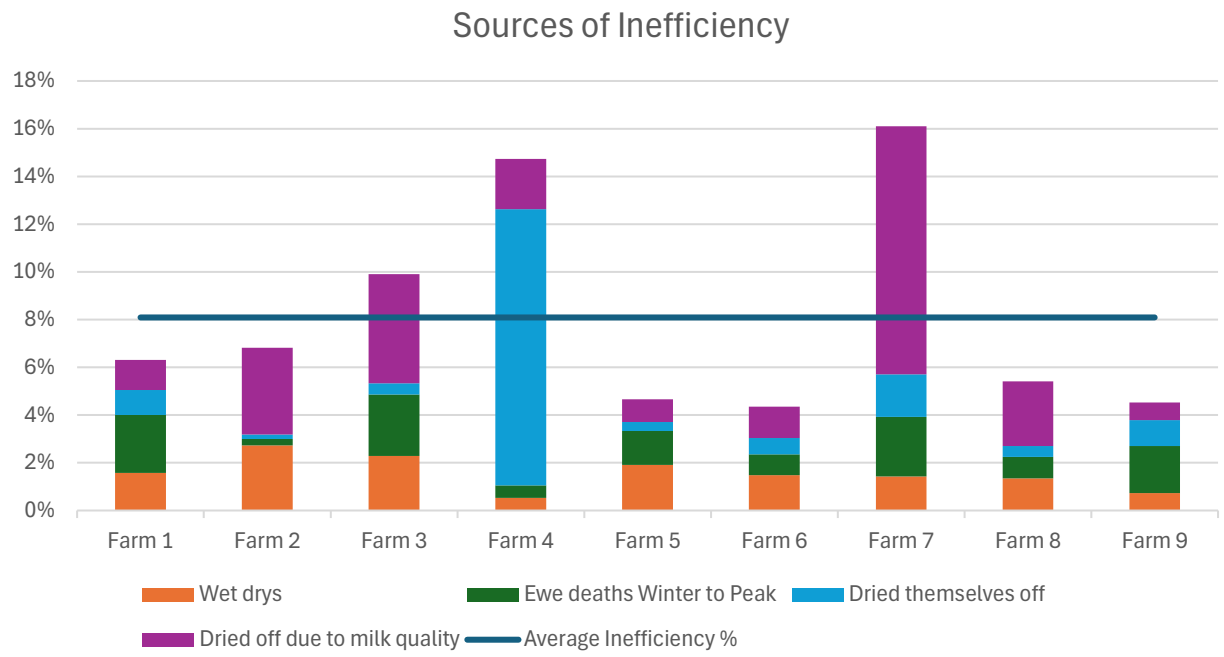
1 Flock Management: Key Flock Assumptions
2 Key Operating Assumptions for Dairy Flock Management
3 Milk Production
4 Key Inputs for Artificially Rearing Lambs
5 Body Condition Score (BCS) and Seasonal Management
6 Feed Budgeting and Grazing Management
7 Feet Trimming and Lameness Management
8 Shearing Management
9 Breeding Strategies for Genetic Gain
10 Principals for Good Milk Quality
11 Financial Considerations

Flock Management: Key Flock Assumptions for Managing Peak Milk

For managing a milking flock of ewes, the management of total wintered ewe to peak milking ewes is crucial for efficiency and economic sustainability. Key areas of inefficiency affecting the numbers milked at peak include the number of ewes scanned pregnant that then do not lamb (wet-dry), ewe deaths in the period from winter to peak milk (October), and the rate of ewes drying off either independently or due to milk quality reasons once they have lambed. Understanding these factors is essential for driving efficiency in the farm economic model, helping to minimise losses and maximise productive animals.

1. **Wet-Dry Ewes:** These ewes are the variation in the number of ewes scanned pregnant that then do not lamb (wet-dry) impacting peak milking numbers, with rates ranging from 0.53% to 2.73%. Higher percentages of dry ewes decrease efficiency by reducing the pool of potentially productive animals.
2. **Ewe Mortality (During the Lambing Period):** Reported losses from ewe deaths during the lambing season vary seasonally, with an average rate of 2.5%. Higher mortality naturally reduces the number of ewes reaching peak milk production. This results in the farm typically carrying the cost of these animals during an expensive time of the year on farm and not realising a return through milk.
3. **Drying Off Rates:**
    - **Self-dry Off:** Some ewes dry off independently (up to 11.5% in particularly bad cases), reducing the number reaching peak. Variations in this metric indicate farm management and seasonal environmental factors influence this behaviour.
    - **Milk Quality Dry Off:** Farmer initiated drying off due to poor milk quality ranges from 0.73% to 10.41%. High percentages suggest health or feed quality issues that need addressing to improve peak yield rates and maintaining high levels of animals in milk. Higher rates can also be a product of lower culling rates in previous seasons, where poor quality issues can be carried over from one season to another if ewes were not accurately culled (ie. For Somatic Cell Count).
4. **Overall Wintered Ewes-to-Peak Milk Ewes Efficiency:** Calculated wintered-to-peak milk percentages range from 83.89% to 95.65%, with total inefficiency reflecting the total reduction in animals reaching peak milking. Inefficiency can be as low as 4.35% for well-managed suppliers and up to 16.11% where issues are more pronounced.

Chart 1: Percentage of Ewes wintered that do not come into milk (inefficiency)



Key opportunities to increase efficiency:

- **Animal Selection:** Utilising data to focus on optimised opening flock, opting to cull poor milk quality animals and retain high quality animals, as opposed to focussing entirely on higher milk volume ewes.
- **Reduce Mortality and Dry-Off Rates:** Improving feed, health care, and management practices during winter may reduce mortality and drying-off rates, increasing the number of ewes reaching peak production. It is common practice for milking sheep to be fed concentrate feeds (approx. 300g of Maize Grain) in the month before lambing to support maintenance of energy, body condition and transition into lactation). This has been an effective tool to retain more ewes in milk to peak milk.
- **Monitor Milk Quality Closely:** Addressing milk quality issues with urgency can help prevent unnecessary drying-off, maintaining a larger pool of productive animals. Common practice includes regular use of RMT (Rapid mastitis testing).
- **Benchmarking Against Farmers with Best Practice** Farmers with low ewe loss percentages (around 4%) should serve as benchmarks for optimising practices across the flock.

In summary, reducing wintered-to-peak inefficiency through improved management, feed, and health interventions directly impacts the economic model by maximising the number of ewes in peak milk production and enhancing overall efficiency.

Key Operating Assumptions for Dairy Flock Management

Through farm management surveys across a number of seasons, key farming assumptions have been analysed for the New Zealand dairy sheep industry. These assumptions provide a structured approach to managing a dairy sheep flock, with a focus on high fertility rates, efficient lamb rearing, and reduced ewe losses. By maintaining these benchmarks farmers can operate a productive and sustainable farm, ensuring both the health and growth potential of the flock.

Lambing and Mortality Rates

- **Ewe Mortality**: Ewe death rates are anticipated to be low, with 2.5% during lambing and 2.0% through the milking season for a total of 4.5% of the opening flock
- **Non-Milkers and Dry Ewes**: At the end of lambing, an average of 6.5% of ewes that the farm opened with will be dry or non-milkers (refer previous topic for full breakdown of drivers of this).
- **Lambing Percentage**: A high lambing percentage of 165% is to be expected depending on the exact breed of sheep farmed. Hogget's typically lamb at 130-150% and Mixed Age ewes can lamb at 160-200%).
- **Lamb Sex Split**: An equal split of 50% for ewe and ram lambs is assumed.

Lamb Growth and Development Losses

- **Pre-Rearing Losses**: Losses of lambs in the lambing paddock are expected to be minimal, at 2%.
- **Rearing and Finishing Losses**: Loss rates are estimated at 7% during artificial rearing and up to 5% during lamb finishing, reflecting expected challenges in lamb development.
- **Mating Weight Achievement**: In a typical year, 85% of finishing lambs are projected to reach the necessary mating weight, supporting their future reproductive success (mating weights are typically 40kg and above).

Mating and Conception Rates

- **Hogget Conception Rates**: The overall hogget conception rate for mated ewe hoggets is 85%, spread across three cycles (30% cycle 1, 40% cycle 2, and 25% cycle 3).
- **Milking Flock Conception Rates**: A high conception rate of 97% is targeted for the milking flock, with rates diminishing across four cycles (60%, 30%, 5%, and 2%) to capture as many pregnancies as possible.

Carry-Over Ewes: For carry-over ewes, the conception rate is set at 85%.

Summary

These assumptions provide a structured approach to managing a dairy sheep flock. By maintaining these benchmarks, the farm aims to support a productive and sustainable operation, ensuring both the health and growth potential of the flock.

The tables below outline key assumptions learnt around flock maintenance. In this example milking flock numbers are static from one season to the next. To achieve this, at least 43% of Ewes need to be mated with rams of high merit dairy genetics as opposed to terminal genetics.

Terminal genetics (sheep meat breed) are used to ensure that breeding is as efficient as possible, only producing dairy lambs to cover a farms replacements and producing terminal cross lambs from the non-breeding milking ewes. Terminal lambs will typically finish quicker and are a better value proposition for the farmer.

Assumptions	
Ewe death through lambing	2.5%
Ewe death through milking season	2.0%
Dry ewes at end of lambing	6.5%
Lambing Percentage	165.0%
Lamb Sex Split (Ewe)	50.0%
Lambs lost pre rearing	2.0%
lambs lost during rearing	7.0%
Lambs lost during Finishing	5.0%
Hoggets Conception Rate	85.0%
Milking flock Cull to works	15.0%
Flock mated to dairy genetics	44.0%

Wintered Ewes	**1000**
Less: Deaths at 2.5%	25
Less: Drys at the end of lambing at 6.5%	65
Equals Ewes lambed for milking	**910**
Number of Lambs Born	1502
Ewe Lambs Born	*751*
Ram Lambs Born	*751*
Ewe Lambs for Rearing	324
Terminal Ewe lambs for giving away	412
Ewe Lambs for Finishing	301
Ewe Lambs at mating	286
Pregnant Ewe Lambs	243
Non-Pregnant Ewe lambs	43
Ram Lambs for rearing	736
Ram lambs for Finishing (Sale)	684
Deaths in Milking flock	18
Culls from Milking Flock (Works)	134
Transfers out of dairy sheep	0
Closing Milking Flock less culls and deaths	758
Add required Pregnant Ewe Lambs *	242
Ewe lamb balance	*1*
Equals Wintered following season	**1000**

Milk Production

The vast majority of dairy sheep lambing in New Zealand happens through early Spring. The lactation curve peaks quickly, with a similar milk curve to Spring calving cows.

Chart 2: Spring lambing Dairy Ewes - Percentage of seasonal milk

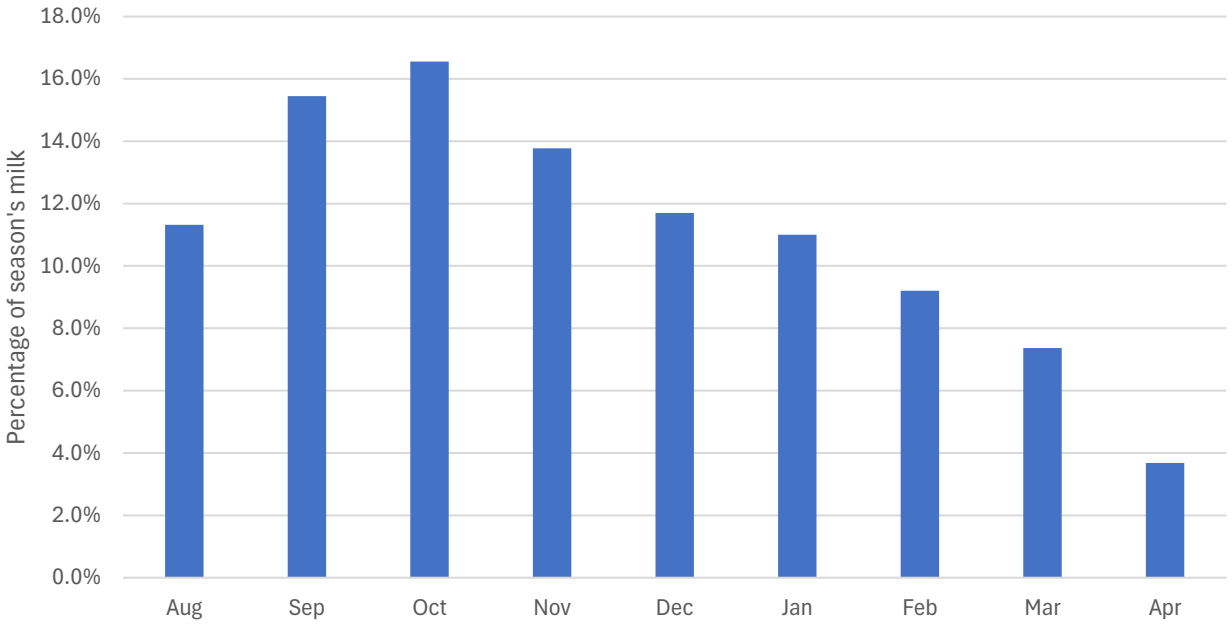
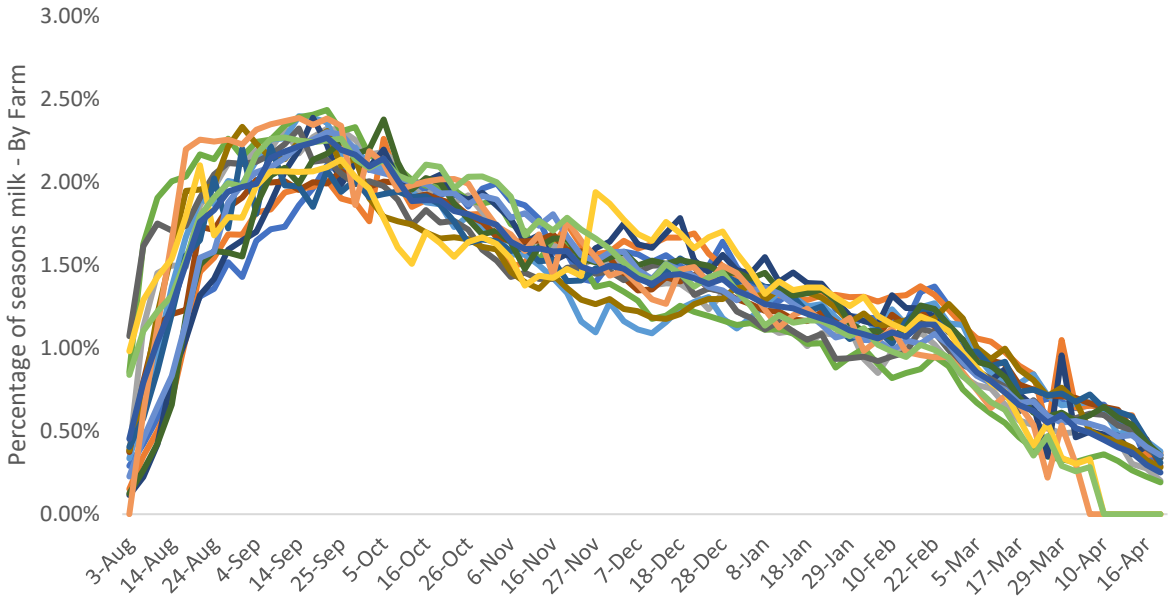


Chart 3 highlights the milk curves of supplier farms across a dairy season. The different supplier milk curves are relatively uniform with peak milk day in September before a relatively straight volume decline through to the end of the season. New Zealand Spring lambing milk curves are very similar to those of the bovine industry.

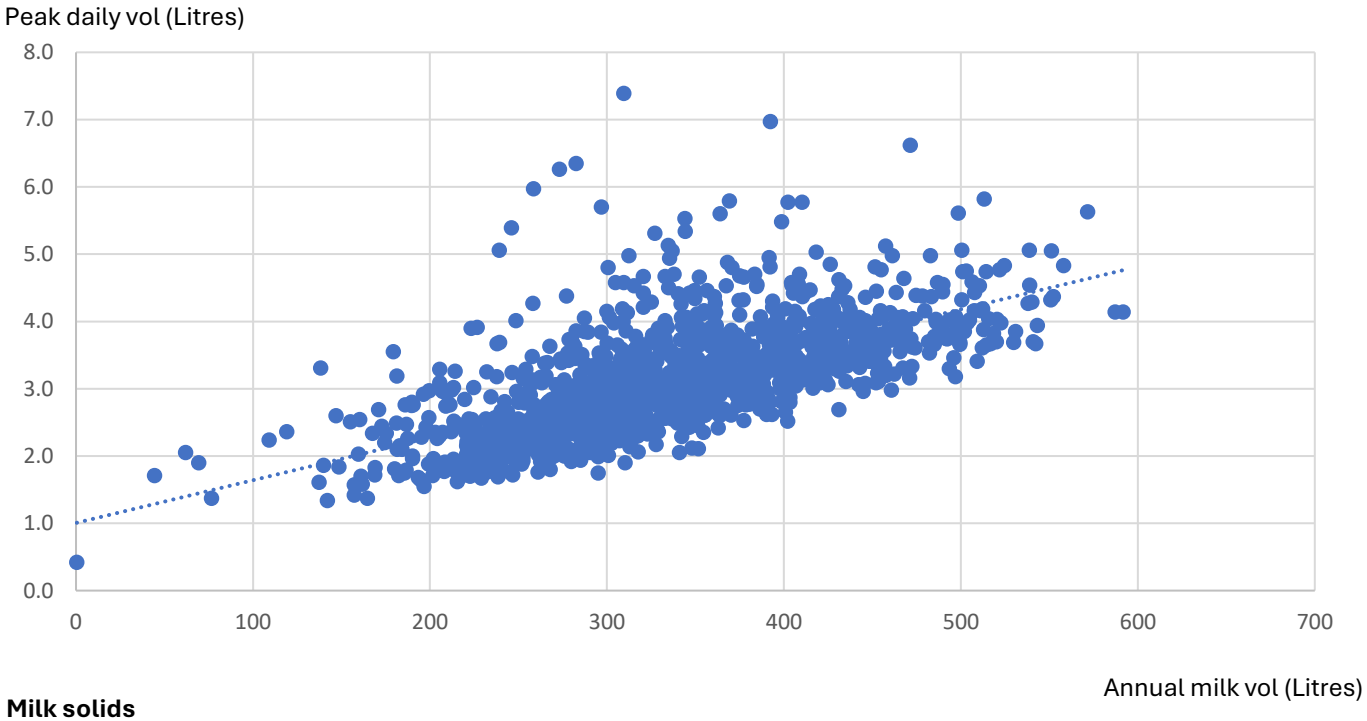
Chart 3: Normalised Supplier Farm Milk Curves



Individual Ewe performance

Utilising milk records highlights the relationship between daily maximum volumes expressed and full season total volumes. On average, to achieve 300 litres in a season, a Ewe needs to produce 3.4 litres in its peak day. Peak day performance is highly correlated to overall full season milking performance.

Chart 4: Maximum daily yield vs full season yield



Milk solids

Milk solids in New Zealand pasture-fed dairy sheep milk naturally trend upward through the season, with fat seeing the most notable increase. Monitoring the protein-to-fat (P:F) ratio is an important tool for assessing dietary changes and underlying animal health. The P:F ratio can indicate the overall energy balance, with a higher ratio generally being better for the ewe. An increase in fat percentage may indicate poor rumen health, often caused by inadequate fibre digestion, which can suppress milk production.

Table 1: Components through the dairy season

	Fat %	Protein %	Lactose %	Total solids %
Aug	5.90%	5.80%	5.90%	17.60%
Sep	5.50%	5.70%	5.80%	17.10%
Oct	5.60%	5.70%	5.80%	17.10%
Nov	5.90%	5.70%	5.80%	17.40%
Dec	6.10%	5.90%	5.60%	17.60%
Jan	6.40%	5.80%	5.50%	17.80%
Feb	7.10%	6.10%	5.40%	18.60%
Mar	8.00%	6.80%	5.20%	20.00%
Apr	8.60%	7.20%	4.90%	20.70%
Average	**6.20%**	**5.90%**	**5.70%**	**17.80%**

Ministry for Primary Industries
Manatū Ahu Matua

SPRING SHEEP
— MILK CO. —
New Zealand

Key Inputs for Artificially Rearing Lambs

Over several years of large-scale lamb rearing, we have refined and established the following model of standard inputs, their quantities, and associated costs per lamb. This is based on rearing a lamb for 6 weeks and weaning at 17kg live weight.

For a comprehensive guide to Lamb rearing see The Lamb Rearing Technical Manual, by Dr Sue McCoard.

1. Milk Powder

- **Average Quantity:** 17 kg per lamb
- **Historical cost per kg:** $4.80 (variable based on product and seasonal cost)
- **Total Cost:** $81.60

There are a range commercial milk powders for lambs on the market. These include proven and successfully trialled products such as Sprayfo and Anlamb. These milk products It is a common practice to transition lambs from a casein based powder to a whey-based milk powder.

A method that has been successfully used in maximising quality of lambs, while managing cost is to feed a casein based powder for the first 2–3 weeks of rearing, with an estimated consumption of 6 kg of powder per lamb. For the remainder of the rearing period, transitioning to a whey-based powder for the remaining (approximate) 11 kg of powder per lamb. Refer to The Lamb Rearing Technical Manual for further information.

2. Meal

- **Average Quantity:** 10 kg per lamb
- **Cost per kg:** $1.20
- **Total Cost:** $12.00

Meal is a crucial component of lamb rearing, supporting both growth and digestive development. It is recommended that meal is introduced after the first week of life. In a typical model, lambs are allocated 8–10 kg of meal throughout the rearing period. Meal also plays a vital role in facilitating the weaning transition, with lambs needing to consume at least 200 g/day before weaning. It is advisable to keep lambs on the same meal for at least two weeks post-rearing. If transitioning to a new concentrate, blending the old and new meals during the changeover period is recommended.

3. Labour

- **Average Time:** 1.4 hours per lamb
- **Cost per hour:** $27
- **Total Cost:** $37.80

Efficient labour management is essential for the success of artificial rearing programmes. The most labour-intensive period occurs during the first few days after lambs enter the barn, as they are trained to use artificial teats. However, ongoing labour is also required for essential tasks such as barn maintenance, bedding replacement, cleaning equipment, ensuring a clean water supply, and conducting regular health checks.

In our systems, we have found that employing a couple of casual staff throughout the day, with additional casual staff arriving in the afternoon specifically for lamb training and cleaning the days equipment, helps manage workloads efficiently while keeping overall labour costs down.

4. Bedding

- **Cost per lamb:** $7.00

Clean, dry bedding is vital for maintaining hygiene and promoting lamb health. Bedding should be replaced regularly, and surfaces sprayed with a disinfectant such as Virkon or Vetsan before adding fresh bedding. Effective bedding materials include miscanthus or wood chips.

5. Shed Expenses and Electricity

- **Cost per lamb:** $3.30

This covers the operational costs of maintaining a suitable rearing environment, including lighting, heating, and operating the automatic milk machines.

6. Animal Health

- **Cost per lamb:** $5.20

Includes preventative treatments (e.g., vaccinations such a clostridial vaccines and scabivax, coccidiostats) and any required veterinary care to ensure lambs remain healthy throughout the rearing period.

Total Standard Cost Per Lamb:

- **$146.90**

Table 2: Summarised lamb Rearing Cost

Item	Std Units	Std Unit Cost	Standard Cost
Milk Powder	17	$4.80	$81.60
Meal	10	$1.20	$12.00
Labour	1.4	$27	$37.80
Bedding			$7.00
Shed Expenses + electricity			$3.30
Animal Health			$5.20
Total cost per weaned ewe lamb			**$146.90**

Ministry for Primary Industries
Manatū Ahu Matua

SPRING SHEEP
— MILK CO. —
New Zealand

Body Condition Score (BCS) and Seasonal Management

Body Condition Score (BCS) is a critical measure of a dairy ewe's energy and nutrient reserves, influencing her ability to produce milk and maintain good health.

Managing BCS at different stages of the reproductive cycle ensures that ewes have the necessary reserves to meet nutritional demands, support milk production, and prepare for the next breeding season.

The table below outlines the target BCS ranges for two key periods: Post Peak (November–January) and Dry Off (April–May). Meeting these targets helps support milk production, successful reproduction, and long-term flock health.

Period	**BCS**
Post Peak (Nov – Dec)	3.5 - 4.5
Dry Off (Apr – May)	3.5 - 4.5

1. **Post Peak Lactation (Nov–Jan)**

During post-peak lactation, maintaining a BCS between 3.5 and 4.5 helps ewes sustain milk production and energy reserves. Ewes with BCS closer to 4.0 generally show better resilience and consistent milk output than those at lower scores, as they have more stored energy to support lactation demands. Ewes below 3.5 at this stage may struggle to maintain milk production levels and require additional nutritional support. Ewes with BCS above 4.5 may face metabolic challenges, making it harder to mobilize their reserves effectively. Maintaining a BCS close to 4.0 post-peak supports optimal milk production and prepares ewes for the following stages without the risk of metabolic issues associated with higher scores.

2. **Dry Off (April–May)**

At dry-off, a BCS between 3.5 and 4.5 is ideal, as milk production has ceased, allowing ewes to replenish body reserves in a timely manner for future reproductive and lactation cycles. Ewes at the upper end of this range (around 4.0) enter the breeding season with sufficient reserves to support pregnancy and lactation. Achieving this BCS target helps ensure ewes have ample energy to maintain their health through gestation and initiate lactation in the next season. Ewes below 3.5 may lack adequate reserves for a healthy pregnancy, while those above 4.5 risk complications during lambing and inefficient energy utilization. A BCS of around 4.0 at dry-off supports a smooth transition into the breeding season, reducing health risks and promoting better reproductive outcomes.

Seasonal BCS management enables dairy ewes to sustain high productivity and maintain good health across the reproductive cycle. By targeting a BCS of around 4.0 at post-peak lactation and dry-off, farmers can ensure their ewes have the necessary reserves to support milk production, reproduction, and overall flock productivity.

Improving Body Condition Score

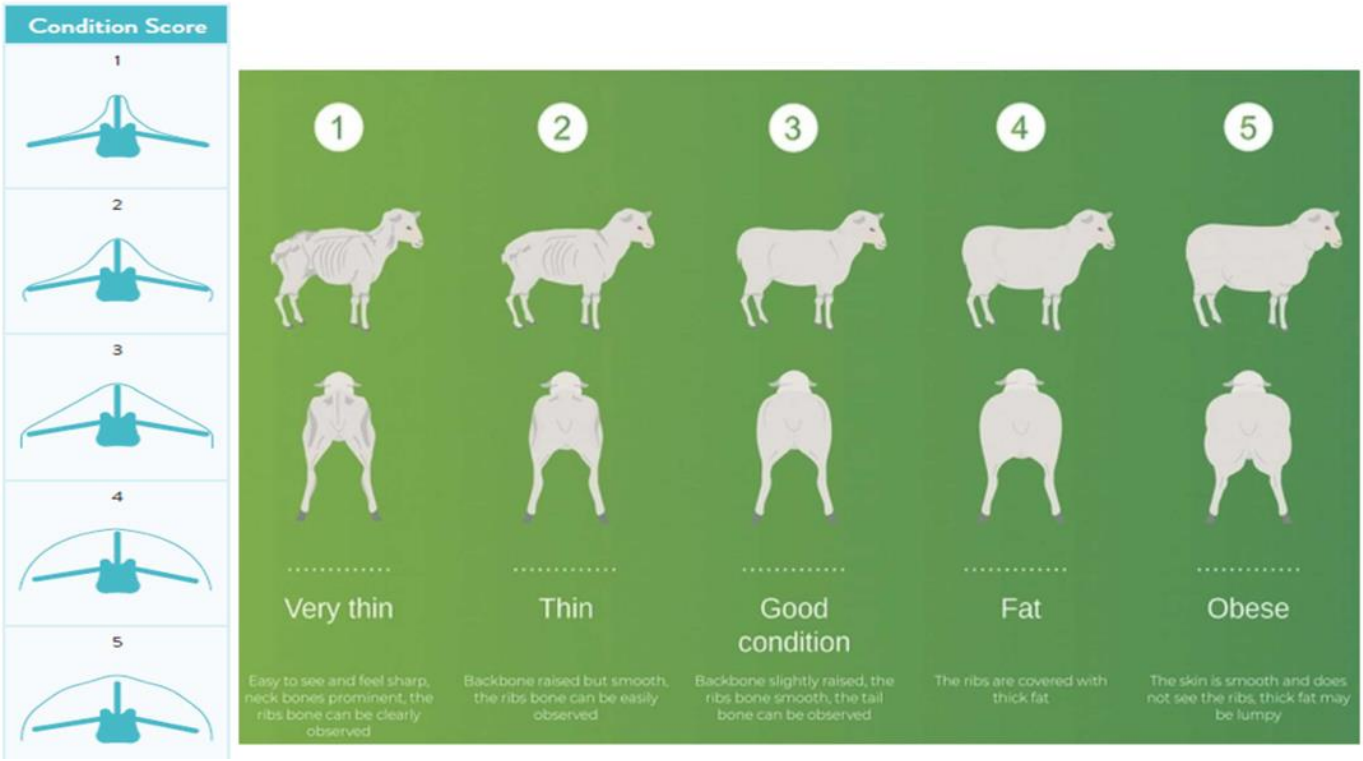
Improving Body Condition Score (BCS) in dairy sheep in New Zealand involves a strategic approach that combines nutrition, management, and monitoring. Here are some key steps:

Nutrition Management

- Increase Energy Intake by providing high-energy supplements especially in late lactation or early dry periods when sheep have higher nutritional demands. This can include concentrates like grain or high-quality pellets.
- Ensure access to high-quality pastures with sufficient metabolisable energy (ME). Aim for pre-grazing covers of 2,000–2,400 kg DM/ha with low fibre and high digestibility.

- Focus on improving BCS during the dry period by feeding silage, hay, or other conserved forages with balanced minerals.
- Dry off ewes with low BCS earlier to allow them to recover condition without the metabolic demand of lactation.
- Regular drenching and parasite monitoring are critical, as a parasite burden can reduce nutrient absorption and overall condition.
- Avoid stressors such as frequent handling, poor weather conditions, or overcrowding. Stress can lead to reduced feed intake and lower condition.
- Identify and separate lower-condition sheep for preferential feeding.
- Ensure the diet includes adequate levels of key minerals like calcium, magnesium, selenium, and zinc. These play a role in metabolic health and overall condition.

Body Condition Score Guide



Feed Budgeting and Grazing Management

The Principles of a Sheep Dairy Feed Budget

The typical characteristics of a sheep dairy feed budget is that the pasture demand is consistently around 2kgDM/ewe/day regardless of whether they are lactating or dry. The total diet during lactation increases to a demand of 2.8kgDM-3kgDM. The balance of the diet above 2kgs is typically supplemented with grain during the lactation season. This is due to the relatively smaller rumen capacity and consumption power of sheep vs. dairy cows. Supplementing the diet with grain allows the sheep to have its nutritional requirements met, within the rumen capacity.

The graph below illustrates the pasture demand and supply on a farm wintering 1,000 ewes to peak milk 900 in central Waikato.

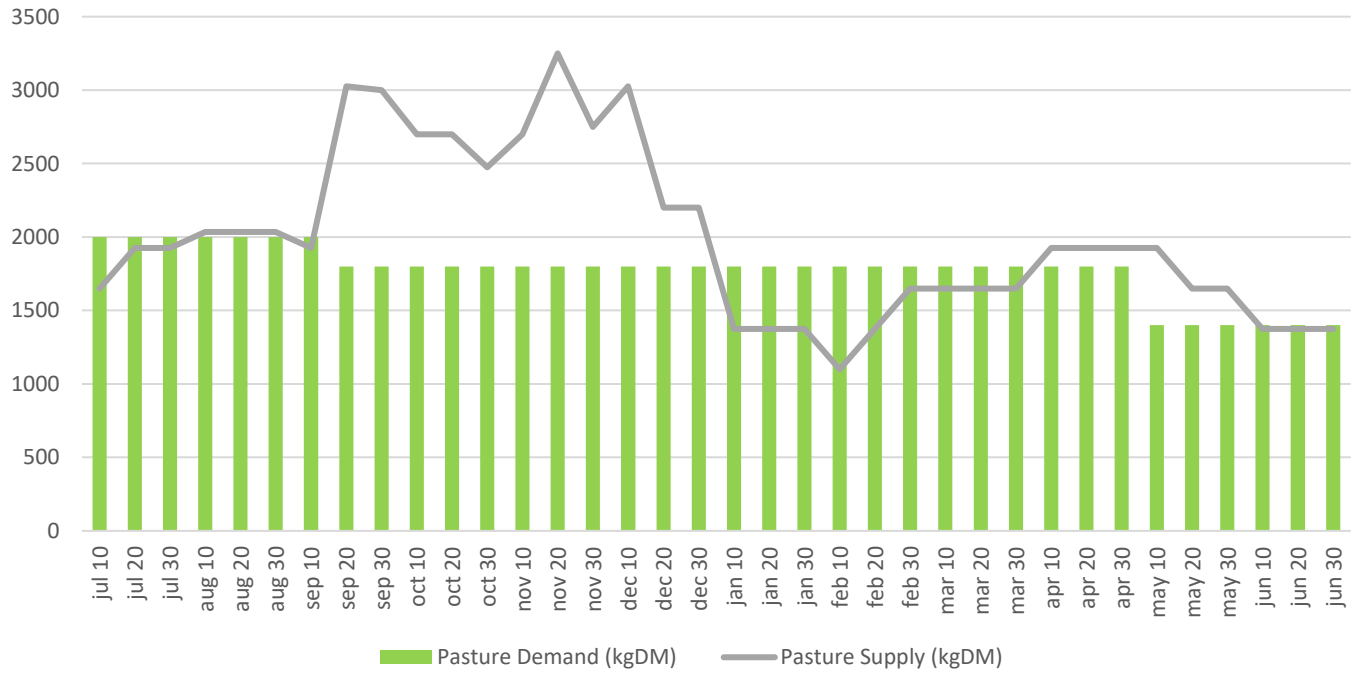
The pasture supply or growth rate follows a typical Waikato pasture supply curve, with the slowest growth rates in winter and summer (season dependant), and highest growth rates in Spring.

As illustrated, a typical sheep dairy farm in the Waikato is in a surplus grass position for large portions of the season. This highlights the critical importance of managing this surplus grass to maintain pasture quality and optimise milking performance.

There are several factors that need to be balanced to optimise milking and animal performance. These are:

- Achieving optimal pre-grazing covers
- Maximising grass quality
- Precision in feed allocation per ewe
- Achieving optimal grazing residuals
- Managing surplus grass efficiently to:
    - supplement the farm in times of deficit
    - preserve grass quality

Chart 4: Pasture growth rate vs demand



Optimal Pre-Grazing Covers

- **Target Pre-Grazing Covers**: Research and practical experience have shown that the best pre-grazing covers for dairy sheep range from 2,200 to 2,400 kg DM (dry matter) per hectare.
    - **Grass Quality and Palatability**: Grass within this range is nutritious and palatable, encouraging higher intake. High-quality grass is more digestible, which is critical for sheep as their grazing intake is smaller per bite compared to dairy cows.
    - **Sheep-Specific Intake**: Sheep typically consume around 700-800 kg DM/ha per grazing session, which is lower than dairy cows. This requires careful management to prevent pasture waste and to maintain quality for regrowth.

Importance of Grass Quality and Allocation

- Effective grass management is crucial for dairy sheep productivity, as grass is the primary feed source. High-quality grass supports milk production, ewe health, and overall flock performance.

- **Precision in Allocation**: Dairy sheep have distinct grazing behaviours and intake capacities compared to dairy cows. Allocating the right amount of grass is essential to meet their nutritional needs without over- or under-grazing, which helps maintain pasture quality and flock health.

- **The impact of getting pasture management and grazing right cannot be understated. The data has shown that this is the key variable across farm systems that varies from farm to farm and is the major driver of yield per ewe variability across supply farms of up to 50%.**

Residuals, Post-Grazing Targets, and Use of Crops

Ideal Grazing Residuals: Residuals should be around 1,500-1,600 kg DM/ha after grazing. This helps support healthy pasture regrowth while ensuring the remaining grass remains of high quality for the next grazing round.

There are several tools used to ensure residuals are being met. If the sheep do not graze to a satisfactory level, it is encouraged to use an alternative means to reach this residual and not force the sheep to graze harder. Typically, if the sheep are made to graze harder, intake drops and this impacts milk production.

There are additional tools to manage residuals are:

- Using dry cows to graze behind the sheep to ensure the residual is optimal
- Pre-topping the paddock
- Post-topping the paddock (but ensuring there is limited wastage to reduce the risk of this wastage breaking down and the dead matter encouraging the growth of Facial Eczema spores

Maintaining appropriate residuals avoids overgrazing, protects root systems, and reduces weed pressure and ultimately preserves grass quality. However, there are key considerations to be made around round length and growth rates, as well as facial eczema risk in summer when determining optimal residuals.

Supplementary Crops

Crops are an essential supplement in the dairy sheep diet, particularly during periods when grass protein levels fluctuate. As grass protein levels naturally decrease post-Spring flush, crops provide a consistent source of high-quality protein and energy, helping to balance the diet and sustain milk production. This supplementary feeding is especially valuable during late lactation or early spring when grass may not meet the nutritional needs of Ewes.

The typical crops used in a sheep dairy system are chicory and lucerne. The percentage of the milking platform dedicated to crops can vary significantly depending on the season and farm objectives, typically ranging from 10% to 32%. This flexibility allows farmers to adjust crop allocation to align with changing nutritional requirements, ensuring the flock receives optimal support when grass quality declines.

Using crops is also a key tool for maintaining pasture quality on the milking platform in the Spring flush when paddocks are sprayed out, allowing their removal from the effective milking area and speeding up the round length. On the contrary, when the growth rates are decreasing in summer, crops play a vital role in extending the round length on the grass area.

Typically, crops are allocated in the same capacity as grass i.e. the 2kgDM of pasture demand is made up of approximately 50% pasture and 50% crops, once crops are introduced after a brief transition period to optimise health and digestion.

Seasonal Round Lengths

- **Adapted Grazing Rounds**: The optimum round length varies by season, influenced by stocking rate and grass growth rates. Multiple seasons worth of data collection offers key insights for adjusting round lengths across the year:
    - **June**: Typical round length is around 80 days, allowing for slow grass growth during winter months. This longer round length provides sufficient recovery time for pastures.
    - **October**: As growth rates peak in spring, typical round lengths shorten to 11-14 days. Faster rotations take advantage of rapid pasture growth and help maintain grass quality and palatability.

Foot Trimming and Lameness Management

Foot health is crucial in dairy sheep management, directly affecting milk production, mobility, and overall welfare. Foot problems, especially lameness, can lead to decreased milk yield, reduced feed intake, and compromised reproductive performance.

Routine foot trimming and proactive lameness management are essential for optimizing dairy sheep productivity and welfare. Feet trimming is a preventative maintenance practice to keep sheep hooves in optimal shape, preventing overgrowth and issues like foot rot and abscesses. Overgrown hooves make sheep more susceptible to infections, deformities, and reduced locomotion, which negatively impacts feed intake, body condition, and ultimately milk yield.

For dairy sheep, trimming is particularly important since lameness can prevent them from efficiently accessing feed and water, directly affecting milk production.

1. **Frequency**: Generally, dairy sheep require feet trimming 2–4 times per year, depending on environmental conditions. Sheep kept in moist, muddy areas may require more frequent trimming as softer ground can lead to faster hoof overgrowth and increased risk of infection.
2. **Technique:** Proper trimming techniques focus on balancing hoof length and removing any damaged or diseased material. Care must be taken not to over-trim, which could expose sensitive tissue and lead to pain, lameness and developing cherries.

Lameness in Dairy Sheep

Lameness is one of the most common welfare and productivity issues in dairy sheep, often caused by foot rot, infections, injuries, or improper hoof maintenance. Lameness leads to reduced grazing and feeding time, weight loss, and a decrease in milk yield due to limited mobility and stress. Furthermore, lame sheep may suffer from chronic pain, negatively impacting their welfare and immune system, making them more vulnerable to other diseases.

3. **Causes of Lameness**: The primary causes of lameness include bacterial infections like foot rot and foot scald, as well as stone injuries and overgrown hooves. Environmental factors, such as wet and muddy conditions, increase the risk of bacterial infections and should be managed to reduce lameness incidents.
4. **Prevention and Management:** Effective lameness prevention includes regular foot trimming, maintaining clean and dry living conditions, and early treatment of infections. Additionally, foot baths with antibacterial solutions can help prevent bacterial buildup and minimize infection risks, especially in larger flocks.

Impact on Dairy Sheep Welfare and Productivity

Foot health directly impacts dairy sheep welfare. Sheep with healthy hooves are more mobile, experience less pain, and exhibit normal grazing and social behaviour, leading to better overall well-being. From a productivity standpoint, preventing lameness ensures that sheep can maintain consistent feeding habits, supporting milk production and the overall efficiency of dairy operations.

Foot trimming and lameness management are essential aspects of dairy sheep husbandry, critical for both productivity and welfare. Regular trimming, vigilant monitoring for signs of lameness, and maintaining a clean environment all contribute to healthy hooves and prevent conditions that could impair milk yield. Through proactive foot care and early intervention, dairy sheep farmers can sustain higher productivity levels while ensuring that animal welfare standards are met. If we use the relative size of a farm's 'lame' mob as a proxy for foot health, we can see a correlation between foot health and yield per Ewe performance.

Shearing Management

Shearing Optimisation for Dairy Sheep

Shearing is a critical management practice for dairy sheep, directly impacting milk production, animal welfare, and overall farm efficiency. Optimising shearing frequency, timing, and techniques can maximize milk yield, improve sheep comfort, and reduce health risks associated with fleece management.

Shearing in dairy sheep has unique considerations compared to wool-focused sheep breeds, as the primary goal is milk production rather than wool yield. Properly timed shearing enhances dairy sheep's ability to dissipate body heat, especially during warm seasons, which is crucial for maintaining consistent milk production. Excess wool can trap heat and lead to heat stress, adversely affecting lactation and leading to decreased milk output.

Optimal Shearing Frequency and Timing

1. **Frequency**: Most dairy sheep benefit from being shorn twice per year. This approach balances the benefits of heat dissipation with the need to maintain a protective fleece layer during colder months.
2. **Timing**: Shearing before lambing can improve hygiene during the birthing process, reducing the risk of udder infections such as mastitis. Additionally, shearing in late winter or early spring prepares sheep for warmer temperatures, preventing heat stress in the early stages of lactation. However, if sheep are exposed to cold conditions, sufficient shelter must be provided post-shearing to protect against hypothermia.

Key Welfare Considerations

- Ewes should be at least 50 days in lamb before being shorn
- Pre-lamb shearing should take place approximately 6 weeks pre lambing
- A compulsory cover-comb is to be used to leave appropriate wool cover

Ewe management at Shearing

In order to maximise milk production and animal wellbeing around shearing time, it is important to ensure that feed allocation is increased by 15-20% for 2-4 weeks post-shearing. Increasing the feed allocation helps reduce stress by giving ewes more room to graze, as well as giving them more access to feed to ensure they are not restricted.

It is also important that ewes are not off feed for too long awaiting shearing. Milk production was least impacted when ewes were taking to shearing in small groups, minimising the time off feed.

Shearing's Role in Health and Welfare

Regular shearing contributes to improved animal health by reducing the incidence of fly strike that thrive in long wool and cause skin irritation or infections. Shearing also facilitates routine health inspections, enabling farmers to monitor for any early signs of disease. Implementing best practices in shearing can enhance overall sheep welfare, which is crucial for ethical dairy farming and for meeting consumer expectations on animal care standards.

Optimising shearing for dairy sheep is essential for maximizing milk production, enhancing animal welfare, and improving farm efficiency. Twice-yearly shearing, with timing adjusted to support lambing and seasonal conditions, provides the best balance for health and productivity. Attention to shearing techniques and equipment, along with post-shearing care, will support the long-term productivity and well-being of dairy sheep, making shearing optimization a valuable component of dairy sheep management.

Breeding Strategies for Genetic Gain

Achieving greater genetic gain in dairy sheep involves careful selection and breeding strategies focused on improving traits like milk yield, milk composition, health, and overall productivity. Selecting the best ewes (ewe side selection) and utilizing structured mating strategies like A and B flock mating can enhance desirable traits across generations.

Ewe Side Selection

Ewe side selection is a breeding practice focused on selecting high-performing ewes with desirable traits to serve as the foundation of the flock. By identifying and breeding only the best ewes, farmers can ensure that future generations inherit favourable genetics.

- **Milk Production Records**: Collecting accurate milk production records for each ewe helps identify those with high milk yield and good milk composition. These top-performing ewes are selected as breeding candidates to pass on their genetic traits. The simplest and cheapest way to get individual ewe milk records is through Herd testing, with three per year providing optimal coverage.
- **Conformation Records:** Recording ewes with undesirable traits such as poor feet, temperament, udder conformation and mating these in the B flock or culling them ensures that the ewes you keep offspring from are going to have daughters with more desirable traits.
- **Health and Longevity**: Selecting ewes with a strong history of health and longevity ensures genetic gains not just in productivity but also in resilience, leading to lower veterinary costs and improved herd stability over time.

A and B Flock Mating System

The A and B flock mating system is a structured breeding strategy that divides the flock into two groups (A and B) based on genetic quality. This approach increases genetic gain by focusing resources on a high-quality core group while maintaining a second group to support production without compromising the top genetics.

- **A Flock (Elite Flock)**: The A flock consists of the highest genetic merit ewes and rams with top traits, such as high milk production and optimal body conformation. Only the best ewes and rams are mated within this flock to produce the next generation of high-quality replacements. Over time, this selective breeding amplifies genetic progress.
- **B Flock (Commercial Flock)**: The B flock includes ewes that are productive but do not meet the elite criteria. Ewes in the B flock may be bred with a terminal ram where you do not keep the offspring as a replacement. This group maintains flock productivity and genetic diversity without affecting the elite group's genetic purity.
- **Benefits of A and B Flock System**: This two-tier approach allows farmers to focus their best genetics in the A flock while using the B flock to support production needs. It accelerates genetic gains in the A flock while still enabling herd expansion and operational flexibility in the B flock.

Controlled Mating and Culling

To maximize genetic gains, it is also important to implement controlled mating and rigorous culling practices.

- **Controlled Mating**: Managing the mating process within each flock ensures that only selected animals breed, preserving and enhancing the best traits.
- **Culling**: Regularly culling ewes that do not meet productivity or health standards ensures that only the best genetics remain in the flock. This practice improves the average genetic quality over time, leading to a more productive and resilient flock.

Implementing ewe side selection and an A and B flock mating system, can significantly increase genetic gain in dairy sheep and improve overall productivity and profitability.

Genomic Selection and Parentage

Genomic selection allows farmers to make more informed breeding decisions by identifying superior animals early.

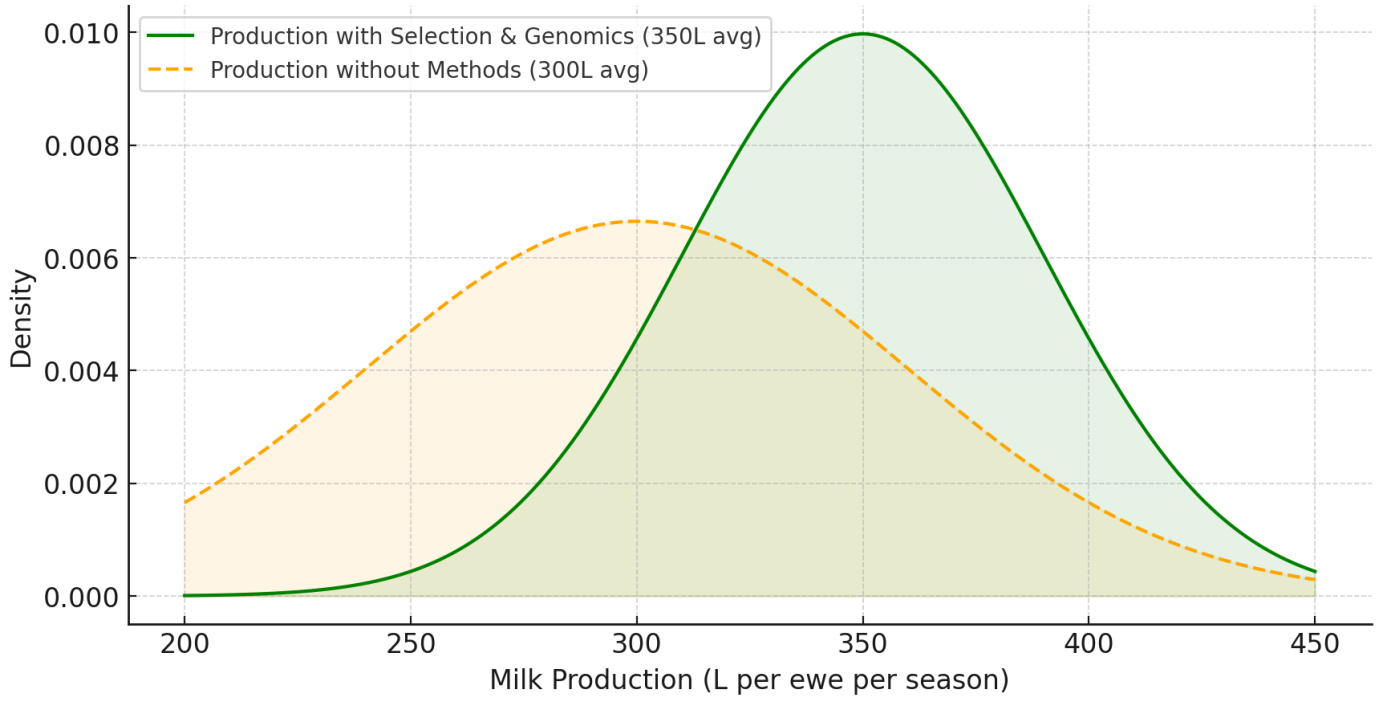
Key Requirements:

- Comprehensive parentage records for all ewes, lambs, and rams are essential.
- Tracking parentage ensures accurate identification of genetic lines and optimises breeding outcomes.
- Genomic testing reveals valuable traits, supporting faster and more precise genetic gains.

Example: In a 1,000-ewe flock, combining parentage recording and genomic selection could improve milk yields by 5-10% annually. Without these tools, yields may remain static. Though genomic testing costs approximately $27 per ewe, the long-term productivity benefits far outweigh the initial investment.

By integrating ewe side selection, structured flock management, and genomic technologies, farmers can significantly increase productivity and secure a competitive, sustainable future in dairy sheep farming.

Chart 6: Milk production distribution: with vs without breeding strategies



This graph compares milk production between supplier and nucleus farms. The orange curve represents supplier farms averaging 300L per ewe per season, showing a broader spread and greater variability. In contrast, the green curve represents nucleus farms averaging 350L, with a narrower spread indicating more consistent production. The difference highlights the genetic gains achieved at the nucleus level through structured breeding and genomic selection, demonstrating the potential benefits for wider implementation across supplier farms.

When evaluating a 1,000-ewe flock for potential revenue, it is important to consider both milk production levels and the age structure of the flock. Here's how different production levels impact the flock's revenue:

Without Breeding Strategies (300L Average per ewe)

- **Average milk solids per ewe**: 300L x 0.175 = 52.5 kgMS
- **Total milk solids for 1,000 ewes**: 52,500 kgMS
- **Indicative milk price**: $15.75 per kgMS
- **Total revenue**: 52,500 kgMS x $15.75 = **$826,875**

With Breeding Strategies (350L Average per ewe)

- **Average milk solids per ewe**: 350L x 0.175 = 61.25 kgMS
- **Total milk solids for 1,000 ewes**: 61,250 kgMS
- **Indicative milk price**: $15.75 per kgMS
- **Total revenue**: 61,250 kgMS x $15.75 = **$964,688**

Revenue Difference

- The implementation of breeding strategies results in an increase of 8.75 kgMS per ewe.
- This leads to an **additional $138,000** in revenue for the season, as the flock produces an extra 8,750 kgMS overall.

By focusing on improving milk production through breeding strategies, the flock can significantly increase its total revenue, demonstrating the value of efficient breeding and management practices in maximising profitability.

Principles for Good Milk Quality

Producing high-quality milk requires a combination of genetic selection, strict hygiene, careful monitoring, and effective management practices. Below are the key principles to ensure excellent milk quality on-farm.

As stated in the Flock Management section of this report, drying off animals due to poor milk quality ranges from <1% to >10%. This indicates the commercial implications of milk quality issues can be hugely material to any farm.

1. Breeding & Selection

- Regularly test the flock to identify and select ewes with superior milk traits.
- Prioritize breeding from animals with proven milk quality and production records.

2. In-Shed Hygiene

- Maintain rigorous milking hygiene practices, including proper equipment washing and sanitisation.
- Ensure staff wear gloves and follow clean milking procedures at all times.
- Keep the milking area clean and well-organised to prevent contamination.
- Milk Storage & Handling: Maintain the cold chain from milking to storage to prevent bacterial growth. Milk should be cooled to ≤3°C immediately and held below this temperature.

3. Attention to Detail

- Inspect udders daily for swelling, shrinkage, heat, or lesions.
- Monitor milk quality visually, watching for discoloration or clots that may indicate infection.

4. Colostrum Management

- Clean teats before milking and trim tails to reduce contamination.
- Follow a consistent teat-spraying routine to promote udder health and milk quality
- Use a colostrum marking system to track and manage ewes in their first milkings effectively.

5. Sampling & Testing

- Test suspect ewes by sampling their milk and submitting it for Standard Plate Count (SPC) and coliform testing.
- Use test results to make informed culling or treatment decisions.

6. Leveraging On-Farm Technology

- Invest in on-farm testing tools (e.g., incubators) for faster bacterial testing and better decision-making.
- Use technology for early detection of milk quality issues and proactive management.

Improving Milk Quality: Best Practices

A typical Sheep Dairy farm experiences the following milk quality trends:

	July/Aug/Sep	Oct/Nov/Dec	Jan/Feb/March/
APC Trend	Highest Point	Low (with sporadic high results)	Low (with sporadic peaks)
SCC Trend	Lowest point	Highest Point	Low (provided pre-mating culling decisions are accurate)
Coliform Trend	Lowest point	Sporadic	Highest Point
Thermoduric Trend	Lowest point	Low (with sporadic high results)	Highest Point

Colostrum Marking System for Easy Identification of Ewes causing quality issues

- **Day 1:** Mark ewes with a dot on the rump after their first colostrum milking (AM or PM).
- **Day 2-4:** Add daily marks until **four marks are made (eight milkings complete)**.
- **Clearance Process:**
  - Perform an **RMT (Rapid Mastitis Test)**—if passed, mark the ewe with a **specific colour (e.g., green)** on the tail to indicate she can join the vat milking mob.
  - Change **confirmation mark colour** for each **tanker pickup** (e.g., green → yellow) to trace any grade issues.
- **Pro Tip:** Use **4-5 clearing colours** to track multiple collections.

Understanding Key Milk Quality Tests and Best Practice Management

Test	Purpose	Best Practices
Aerobic Plate Count (APC) (also known as SPCs)	Measures bacteria from milking machine hygiene and animal related bacteria (e.g. subclinical mastitis)	• Clean and sanitise milking machines twice daily, with a recommended acid and alkali combination and be sure to check doses of chemical on a regular basis • Ensure water recycling temperature is sufficient during every wash • Cool milk to ≤3°C immediately and maintain at or below this temperature • Strict RMT entry checks—only healthy ewes enter the vat. • Test individual animals if RMT fails and withhold milk until cleared. • Monitor cluster bowls and milk lines for watery or clotty milk. • Use leg bands and bright red paint to mark one-titters. • Reinforce cupping procedures daily with all staff, including casual staff (diagrams in the shed of procedures are helpful) • Submit vat samples for Day 1 and Day 2 milk to track potential issues and access information faster • Implement a systemic individual animal sampling routine to identify suspect ewes (see colostrum marking system above) • Cup only clean teats • Inspect flock consistently for lopsided udders or halves that are drying off and shrinking and complete individual animal sampling on these
Somatic Cell Count (SCC)	Indicates mastitis (high SCC = infection).	• Use the RMT (Rapid Mastitis Test) to identify SCC risks • Complete Herd Testing at least 3 x per year (or more if you are experiencing issues) • Incorporate SCC in your breeding flock selection criteria to ensure progeny are not pre-disposed to high somatic cell count
Sediment Test	Detects physical contaminants (faeces, wool, dust).	• Improve sheep preparation & hygiene (keep some approved teat wipes to use on dirty teats)

		• Ensure filters are of sufficient size and are not compromised in any way • Use new filters every milking
Thermoduric Plate Count (Thermo)	Identifies heat-resistant bacteria from dirty equipment.	• Regularly inspect & clean milking plant. • Regularly inspect all rubberware for signs of perishing and replace if necessary • Monitor airlines for traces of milk residue • Ensure all drainage points are opened during the wash cycle to ensure a flush of hot cleaning chemical to all milk contact surfaces
Coliform Plate Count (Coli)	Detects hygiene failures (faecal or water contamination).	• Ensure udders are clean prior to cupping • Keep the milking parlour rows free of effluent • Ensure slipped cups are not touching the ground or milking row where they could vacuum up contaminants (i.e. effluent) • Inspect flock consistently for lopsided udders or halves that are drying off and shrinking and complete individual animal sampling on these
Inhibitory Substance Test (Inhib)	Identifies antibiotic residues.	• Follow strict withholding periods for treatments. • Keep good records • Follow a Mark, Record, Segregate, Treat procedure (MRST) • Ensure staff understand the process and significance
Freezing Point	Detects water contamination in milk.	• Prevent wash water or detergent contamination • High vigilance during milk plant purge process • Consider an infrastructure change so water is not used to purge milk from the plant

Ministry for Primary Industries
Manatū Ahu Matua

SPRING SHEEP
— MILK CO. —
New Zealand

Financial Considerations

This farm budget template provides key considerations when assessing commercial outcomes and viability of dairy sheep farming. It is important to note all farms and farm systems are different, but these observed key assumptions are a useful reference guide.

	Commentary
Income	
From Milk	
Milk Production	Paid on component prices for Fat, Protein and Lactose. Typically paid out over 1 - 6 month period post collection
From Operating Activities	
1450 - Wool Income	Assume dairy ewes are shorn twice a year (November and June) and lambs (rising hoggets) are typically shorn once per year
From Livestock	
Culls	Assume that discretionary culls are approx 15% of the peak flock numbers
Expenses	
Farm Working Expenses	
Animal Health - Vet	Medication, vaccinations, drenches (oral and pour on)
Dairy Shed Expenses	Typical expenses include all dairy shed consumables and chemicals
Livestock Recording	Replacement Tags, electronic EID equipment
Wool Expenses	Shearing at a per ewe rate
Feed - Grain	In-shed grain and mineral mixes. A typical benchmark figure to use 0.6kgs/ewe/day for 270 days of lactation
Feed - Hay & Silage (made on farm)	Mowing & baleing
Bedding & Mucking Out	Bedding materials for the barn and disposal of bedding post use
Freight & Cartage - Livestock	Carting of ewes and lambs to grazing. Cartage of rams for mating period
Farm working - General	All other farm consumables (excluding dairy shed consumables)
Pasture And Land based expenses	
Pasture renewal & Cropping	Spraying out paddocks, crop seed, weed sprays, post-emerge sprays. Chicory is most commonly used, and assume 1 hectare of chicory per 100 milking ewes
Fertiliser	Maintenanceand capital fertiliser applications and spreading costs
Salaries	
Wages & Salaries	Assume approximately 1 x full time equivalent for 350milking ewes
Wages to Casual employees	Casual relief milkers to cover milking shifts on permanent staff's rostered days off
Staff Expenses	Personal Protective Equipment, Staff room supplies
Staff Training	Industry relevant courses, Heavy machinery training, Health & Safety Training etc
Lamb Rearing	
Lamb rearing - Shed Expenses	See The Lamb Rearing Section for a breakdown of key costs
Lamb Rearing - External Rearers Ewes	
Lamb Rearing - Wages & Salaries	
Lamb Finishing	
3133 - Lamb Finishing - Animal Health	See The Lamb Rearing Section for a breakdown of key costs
3134 - Lamb Finishing Feed	
3136 - Lamb Finishing - External Graziers (Ewes)	
Repairs and Maintenance	Repairs and routine maintenance to tractors, feed out wagons, bale feeders, milking plant, refrigeration system, effluent system etc
Services and Supplies	
Electricity - Farm	Electricity for dairy shed, water reticulation, fences and houses
Fuel & Oil - Vehicles	For any staff vehicles, tractors, motorbikes etc
Telephone & Internet	
Insurance	Insurance of plant and machinery, stock
Office Expense	Farm Maps, whiteboards, subscriptions to pasture monitoring applications etc