Grams on grass: Strategies to give lamb growers an edge

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Victoria

May 2025

Nuffield Australia project number 2204

Supported by

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Executive Summary

Maximising efficiency and profitability in lamb production requires a strategic focus on critical growth periods and the implementation of tailored management practices. By aligning resources with lambs' natural growth dynamics and environmental conditions, producers can optimise returns while promoting long-term farm sustainability.

Investing efforts and resources into the first five months of lamb growth is essential. During this period, lambs exhibit exceptional feed conversion efficiency and rapid weight gain. By prioritising nutrition and management during these formative months, producers can maximise growth potential and achieve significant economic returns with minimal input.

A successful operation is built on a system designed to suit the unique characteristics of the farm, including its climate, soil conditions, and seasonal variability. Tailoring management strategies to align with these factors ensures that lamb production remains resilient and adaptable to environmental changes, improving overall efficiency.

Incorporating diverse pasture mixes is another critical strategy. These mixes provide a variety of forages that complement lambs' selective grazing behaviour, allowing them to maximise nutrient intake while maintaining optimal growth. This approach also supports better pasture health, reducing the reliance on supplementary feeding and improving the sustainability of grazing systems.

Addressing mineral imbalances in soil and pastures is equally important. By conducting detailed soil tests and rectifying deficiencies with customised mineral licks, producers can provide lambs with the precise nutrients they require for optimal health and development. This targeted supplementation improves growth rates, reduces health issues, and enhances overall flock productivity.

Finally, utilising soil moisture probe data offers a powerful tool for proactive farm management. By forecasting the magnitude of the upcoming spring flush, producers can make informed decisions about grazing, weaning, and supplementary feeding well in advance. This predictive approach minimises resource wastage and ensures that feed availability aligns with lamb growth demands.

By integrating these strategies, producers can enhance lamb productivity, optimise resource use, and improve profitability while maintaining sustainable farming practices.

Keywords: prime lamb, grass-finishing, feed conversion efficiency, soil moisture probe

Table of Contents

Grams on grass: Strategies to give lamb growers an edge

Foreword

For years, my mum, Jo and I were passionate about growing lambs on grass. We loved the natural, pasture-based approach and truly believed it was the best way to raise our lambs. But every year, we faced the same issue: when the grass ran out, we were left with no choice but to finish most of our lambs on grain. This wasn't what we wanted. While some lambs were grass-finished as we'd hoped, the majority weren't. It left us stuck in a system that was part ideal and part compromise.

At the time of applying for my Nuffield Scholarship, I was strongly against finishing lambs on grain. I had plenty of reasons: concerns about animal welfare, higher costs and labour, a less healthy product for consumers, and the environmental impact. Yet, despite my stance, when the grass ran out, we always had to turn to grain finishing. Looking back, I realise I was focused too much on the short-term goal of getting each batch of lambs finished, rather than stepping back to think about our long-term goals and what we really wanted to achieve.

That perspective started to shift when I began travelling for my Nuffield Scholarship and meeting other producers—innovative, intelligent people who were doing incredible things in the industry. Those conversations opened my eyes. I came to see the importance of knowing your numbers—understanding exactly what's coming into your business, what's going out, and what you're trying to achieve. It became clear to me that, like it or not, our farm is in a comparatively dry area with unpredictable rainfall, and that isn't going to change. But by introducing a small amount of grain earlier in the lambs' growth cycle, we could finish far more lambs on predominantly pasture and at younger ages. This shift allowed us to move away from the split system and work towards a consistent approach that aligned with our goals.

Inspired by the farmers I met, I started paying closer attention to our seasons, growth cycles, and the points where we could make the biggest efficiencies. I learned to adapt to the rhythms of our farm and identify where the real gains could be made. The biggest takeaway from my Nuffield experience was a renewed mindset: to always aim higher and look for opportunities to improve. Being part of the Nuffield network also meant stepping up my game. Everyone in that community knows their businesses inside out, and their example pushed me to do the same.

When I was younger, farming felt like a separate part of my life. I didn't talk to people my age—especially women—about sheep farming. Joining Nuffield changed that entirely. It connected me to a network of people who share my passion for farming, and many of them have become lifelong friends. The Nuffield Sheep and Goat Whatsapp Chat is now one of my favourite things to read. It's filled with stories, ideas, and advice from sheep producers and friends around the world. I can't overstate how much I've benefitted from that chat.

What struck me most during my travels was how the most successful farms operated. They ran highly efficient systems, leaving nothing to chance. They knew exactly where they could make the biggest gains and made sure to capitalise on those opportunities. Seeing this inspired me to do better and find the biggest efficiency gains for our farm. That's what ultimately led me to write this report.

There are countless ideas out there about how to finish lambs, but I wanted to create something practical and accessible. This report is designed to provide strategies that can work for anyone, regardless of their rainfall, stocking rates, or conditions. It's a

collection of approaches aimed at helping lamb producers achieve better results in their unique situations.

Finally, my Nuffield journey taught me to see the strengths of our own farm and stop comparing it to others. Yes, we face challenges like comparatively low rainfall, hot dry summers, and short springs. But we also have incredible opportunities: high growth rates, mild winters, easy access to cereal grains, several nearby abattoirs keeping our market prices competitive, and two growing seasons—cool and warm—that let us produce high-quality forages. I've come to appreciate how lucky we are, and now I wouldn't want to farm anywhere else.

Table 1. Travel itinerary

Travel date	Location	Visits/contacts
Week 1 February 11 – 16, 2022	Australia, Gulgong	Colin Seis
Week 2 March 2 – 6, 2022	United Kingdom: Somerset	Pre-CSC tour
Week 3 March 7 – 15, 2022	United Kingdom: Norwich	Norwich Research Park Anglia Producers Honingham Thorpe Farms Condimentum Ltd Greencoat Capital Tomatoes Houghton Hall Estate Holkham Hall Houses of Parliament (Robbie Moore)
Week 4 March 16 - 23, 2022	United Kingdom: London, Bath, Ross on Wye	Simon Cutters, Kitty Stainsby
Week 5 March 24 – 29, 2022	United Kingdom: Cornwall, Plymouth	Matt and Pippa Smith, Westcountry Premium Venison
Week 6 October 6 – 26, 2022	Zimbabwe: Victoria Falls, Harare, Lake Kariba	PCP piggery, Padenga crocodile farm, The Alan Savory Institute
Week 7 November 11 – 22, 2022	Australia: Castlemaine	Dick Richardson, Deane Belfield

Week 8 June 6 – 14, 2024	Australia: Northern NSW	Andrew Watson, Costa group, Michael Taylor, Agripath
Week 9 June 15 – 23, 2024	India: Delhi, Bengalore, Pune	Amul milk, Australian Wool Innovation, Fox in the Field, Abhay Kewadkar
Week 10 June 24 – 27, 2024	Qatar: Doha	Mathew Ipsen, Agrico, Baladna Dairy
Week 11 June 28 – July 6, 2024	Ireland: Dublin, Cork, Kilkenny	Niall Hurson, Mike Brady, Cork Rooftop Farm
Week 12 July 7 – 12, 2024	Mexico: Mexico City	CYMMIT wheat and corn research institute

Acknowledgments

Thank you firstly and most importantly to The William Buckland Foundation and Nuffield Australia. This opportunity has transformed my life, my farm and my way of thinking.

Thank you to my Mum, Jo, for encouraging me to apply and looking after the farm while I was travelling. I am so lucky to work alongside someone so open-minded who strives to put new ideas into immediate practice.

Thank you to my partner, John, for supporting me through thick and thin despite the terrible challenges of your own. I always know you will really listen.

Thank you to my wonderful 2022 CSC buddies and my 2024 GFP pals.

And a very special thank you to my 2022 Zimbabwe friends!

Abbreviations

FCE – Feed conversion efficiency

Objectives

This report aims to identify key strategies that producers can implement to optimise their lamb production systems, making them more efficient, sustainable, and profitable. It highlights the importance of tailoring management practices to suit the unique conditions of each farm, such as climate, soil type, and pasture growth patterns. With challenges like fluctuating market prices, rising input costs, and unpredictable weather, producers must focus on adapting their practices to leverage the natural advantages of their farm and livestock. By doing so, they can reduce costs, increase productivity, and ensure long-term success. The following objectives outline broad, adaptable goals that can be applied to any lamb production system, regardless of geographical location:

Investing in and leveraging the natural advantages of young lambs – Maximising feed conversion efficiency and carcass yield through early nutritional support.

Tailoring management practices to suit the farm's specific conditions – Customising pasture management and feeding strategies based on climate, soil type, rainfall, and pasture growth patterns.

Utilising soil moisture probes for informed decision-making – Monitoring soil moisture levels to guide early, proactive decisions that align with pasture growth and optimise lamb finishing outcomes.

Introduction

Lamb production in Australia is a highly complex undertaking, characterised by a range of challenges that demand innovative and tailored strategies for success. Australia's vast landscapes, diverse climates, and varied soil types, coupled with the fluctuating nature of both local and global markets, mean that a uniform approach to lamb production is not viable. While producers often find themselves at the mercy of unpredictable weather patterns and volatile market conditions, the real opportunity lies in refining production systems to leverage the unique characteristics of each individual farm. This report explores two critical strategies for improving lamb production: optimising the early growth stages of lambs and customising farm management practices to suit local conditions. Together, these strategies can significantly increase profitability, ensure sustainability, and enhance farm productivity.

Go hard early

The early months of a lamb's life are pivotal for maximising feed conversion efficiency, carcass yield, and overall health outcomes. During this phase, young lambs exhibit remarkable feed conversion efficiencies that diminish with age. As such, the early stages of growth represent the best time to invest in lambs, as every dollar allocated to nutrition and health during this period produces a far higher return than investments made later. By directing resources to lambs during this crucial phase, producers can achieve superior growth rates and foster healthier, more marketable animals. These early investments yield lambs with not only better growth but also enhanced nutritional profiles, which can appeal to consumers seeking healthier and more sustainable meat options (Snowder & Van Vleck, 2003). Additionally, early investment in lamb growth can reduce the environmental footprint by minimising the amount of feed required to reach market weights, thus contributing to a more sustainable production process.

Customise to the nth degree

The second strategy focuses on adapting farm management practices to the unique environmental conditions of each farm. Australian lamb producers are confronted with diverse climates, soil types, and pasture growth patterns that require a flexible and custom approach to management. It is no longer sufficient to rely on traditional practices or replicate the methods of neighbouring farms; success demands continuous evaluation and adaptation. A particularly effective practice is the use of multispecies pastures, where a variety of plant species suited to local conditions are integrated. These pastures are more resilient to seasonal changes, ensuring a steady supply of nutritious forage year-round for lambs. Studies show that multispecies pastures comprising cereals, grasses, legumes, and brassicas can significantly boost lamb growth rates by providing a more balanced diet, improving pasture resilience, and enhancing animal health (MLA, 2024).

Alongside pasture management, targeted mineral supplementation tailored to the specific needs of a farm’s soil and pasture composition is critical for ensuring optimal lamb growth. Customised mineral licks, developed based on regular soil testing, can help correct nutrient deficiencies, supporting the lambs' health, particularly during the most critical growth phases.

In addition to these strategies, the integration of soil moisture probes is crucial for informed decision-making. By providing real-time data on the moisture levels across

different soil depths, these probes allow producers to predict pasture growth potential and make adjustments to grazing, weaning, and supplementary feeding schedules accordingly. Soil moisture data helps producers understand when their pastures are likely to reach peak growth, enabling them to manage pasture resources more effectively and optimise lamb finishing. This technology empowers producers to make proactive decisions, reducing reliance on guesswork or uncertain rainfall forecasts, and ensuring that lambs are finished efficiently in alignment with pasture growth.

Chapter 1: Go hard early

In the pursuit of optimal lamb finishing, the first five months of a lamb's life represent a critical, golden window of opportunity for producers to maximise growth, feed conversion efficiency, and carcass yield. During this period, young lambs exhibit remarkable characteristics that can be leveraged to boost productivity and profitability. In particular, the early stage of life is marked by a high rate of lean muscle deposition, rapid growth, and superior feed conversion compared to older lambs. Properly managing these early months is essential for achieving the best possible outcomes in lamb production.

Investing early in lambs also leads to significant time and labour efficiencies. By proactively managing lambs during the first five months, producers establish a strong growth foundation, reducing the need for intensive interventions later in the production cycle. Ensuring optimal growth from the outset helps avoid costly measures like shearing, repeat-drenching, supplementary feeds, or addressing health issues caused by poor early nutrition such as slow growth, poor rumen development and reduced feed conversion.

A common mistake is the "wait and see" approach, where producers delay nutritional support or management until lambs show signs of slower growth or the pasture quality declines. While this may seem like a cost-saving tactic, it often leads to higher costs in the long run. Delayed interventions in any business are always less effective than management decisions made early.

The methods used to invest in younger lambs will vary from farm to farm. Regardless, the key point to remember is that, based on FCE and carcass yield alone, every dollar invested in a younger lamb can be worth double the value of a dollar invested in an older lamb.

1.1 Feed conversion efficiency in younger lambs

Feed conversion efficiency (FCE), the measure of a lamb's ability to convert feed into body weight, is a fundamental driver of profitability in lamb production. During the early months, lambs demonstrate exceptional FCE, requiring substantially less feed to achieve weight gain than older lambs. This makes the early growth periods critical for maximising returns on investment in feed and management strategies (Feedtek, 2018; Meat Promotion Wales, 2018).

Lambs in their first three months require as little as 3 kg of feed to gain 1 kg of body weight, highlighting their unparalleled efficiency during this phase (Meat Promotion Wales, 2018). By comparison, lambs aged six to eight months need more than double the feed (6–10 kg) to achieve the same weight gain (Meat Promotion Wales, 2018). This enormous difference is attributed to young lambs' ability to allocate most of their dietary energy toward lean muscle development, with minimal energy expended on maintenance (Jacob and Calnan, 2018).

As lambs age, their dietary energy becomes increasingly consumed by maintenance and non-productive growth activities such as fat deposition (Jacob and Calnan, 2018). This metabolic shift results in diminishing returns on feed investment, with greater resources required to achieve smaller weight gains. For producers, this underscores

the importance of focusing feed and management resources during the early growth stages, when lambs naturally exhibit higher FCE.

Figure 1. Lambs finished at 129 days, averaging 56kg. Assuming an average birthweight of 5kg, these lambs averaged growth rates of 395g per day. This was achieved through high quality mixed pastures, coupled with judicious use of lucerne hay and barley from birth. Annual rainfall to date was 400mm (1st January – 1st November 2024). (Source: author)

1.2 Carcass yield: maximising marketable meat

Alongside FCE, carcass yield, the proportion of live weight transformed into saleable meat, is another critical determinant of efficiency and profitability in lamb production. Younger lambs consistently achieve higher carcass yields, typically exceeding 48–50%, compared to older lambs, whose yields are closer to 45–47%. This disparity is deeply rooted in the physiological shift from muscle development to fat accumulation as lambs mature, making the timing of slaughter a crucial consideration (Jacob and Calnan, 2018).

Fast-growing lambs, reaching their target weight early in life, exhibit lean, muscle-dense carcasses that are inherently more efficient. This performance is largely driven by the consumption of nutrient-rich colostrum and milk in the early weeks of life, which optimises muscle deposition and minimises fat accumulation. During this early growth phase, lambs also prioritise muscle development, converting dietary energy into lean tissue with remarkable efficiency (Prache, 2022). Bone, muscle, and fat all follow distinct growth trajectories: bone forms a significant portion of carcass weight early in life but declines as lambs grow, while muscle development aligns with overall carcass growth until maturity (Jacob and Calnan, 2018). Fat, initially a minor component,

becomes increasingly significant as lambs age, shifting energy dynamics unfavourably.

By five - six months of age, lambs begin a metabolic transition where dietary energy is diverted toward fat deposition rather than muscle growth. This shift occurs as muscle growth naturally slows while fat accumulation accelerates, particularly in subcutaneous regions (Prache, 2022; AMPC, 2015). While some fat contributes to flavour and texture, it detracts from carcass yield, as it provides less marketable meat than muscle. Consequently, older lambs experience reduced dressing percentages and lower saleable yields compared to their younger counterparts (Jacob and Calnan, 2018).

These changes highlight the importance of aligning slaughter timing with the biological growth patterns of lambs. Early slaughter, during peak muscle development, ensures higher carcass yields and more efficient production. As fat begins to dominate the body composition of older lambs, the opportunity for optimising carcass efficiency diminishes. The interplay between bone, muscle, and fat underscores the necessity of understanding growth dynamics to make informed management decisions (Jacob and Calnan, 2018).

For producers, targeting resources towards the early stages of lamb growth not only enhances carcass yield but also meets consumer demand for lean, high-quality meat. This approach leverages the natural growth curve of lambs, delivering both economic and market-driven benefits (Jacob and Calnan, 2018; Prache, 2022).

1.3 The unique and time-limited ability to digest fat

Another one of the distinct advantages of lambs in their early months is their ability to efficiently process fat. As a feed source, pasture is typically low in fat, consisting primarily of carbohydrates, protein and fibre. Indeed, ruminants generally handle dietary fat poorly due to its interference with the microbial fermentation process (Palmquist, 1994). However, in young lambs, the digestive system is specifically adapted to efficiently absorb and utilise the energy from milk fat. Fat is a remarkably rich calorie source (Elliot, 2022), providing approximately 9 kcal per gram, which is nearly double the energy content of protein or carbohydrates (around 4 kcal per gram). This makes it a highly concentrated form of energy; ideal for supporting the rapid growth and development of young lambs. Clearly, maximising milk intake during a lamb’s early life is key to capitilising on the superior growth ability during this period.

It is therefore important for producers to recognise that lactating ewes experience a substantial increase in energy demands due to the high energy costs associated with milk production, and that those needs need to be met to fulfill the maximum lactation potential. During early lactation, while the ewe's nutrient requirements surge, her feed intake often fails to rise at the same rate. This creates a significant challenge, as the ewe’s ability to consume and digest large quantities of feed is limited by physical constraints from pregnancy and early lactation (Elliot, 2022). Consequently, lactating ewes are at risk of entering a negative energy balance, where the energy used for milk production exceeds what they can consume. This is especially pronounced in the first month of lactation, when milk production peaks, often resulting in visible weight loss in ewes.

Thus, the importance of providing high-quality feed during early lactation cannot be overstated (Galvani et al. 2014). If the ewe's energy intake falls even slightly below her needs, she will not be able to meet her full lactation potential, and the golden window of lamb growth potential will be lost.

1.4 Meeting consumer demands

Finishing lambs at a younger age aligns with consumer demands for healthier meat and contributes to a reduced environmental footprint. Younger lambs produce leaner meat with a higher protein-to-fat ratio, offering a more favourable nutritional profile compared to older lambs. Notably, younger lambs finished on green pastures exhibit increased levels of omega-3 fatty acids (Le et al. 2010), which are known for their cardiovascular benefits and anti-inflammatory properties. Studies indicate that grass-fed lambs can contain omega-3 levels up to five times higher than their grain-finished counterparts, making them particularly appealing to health-conscious consumers (Daley et al., 2010).

Additionally, reducing the finishing period of lambs contributes to lower resource consumption, including feed, water, and land use. Research suggests that shortening the finishing period to market weight by one month can decrease the carbon footprint associated with lamb production by 33% (BCG, 2014). This reduction also mitigates the reliance on high-emission feedlot systems that depend on grain-based feeds, which are resource-intensive and contribute to greenhouse gas emissions (Daley et al., 2010).

1.5 Strategies to capitalise on the early months

Producers can begin to invest in their younger lambs by redirecting some of the budget typically allocated to finishing lambs beyond five months towards boosting early growth. How much is normally spent on shearing, supplementary feeding, repeat drenching, and the time and labour associated with feed lotting? How can some of that budget be invested earlier in the growing period to capiltise on the natural attributes of young lambs?

Increased fertiliser: Investing in fertilisers to improve pasture quality can have a significant impact on early lamb growth. Well-maintained, high-quality pasture provides the essential nutrients lambs need for optimal growth, reducing the need for supplementary feeding. This investment not only supports early growth but also reduces feed costs in the later stages, leading to more consistent and efficient lamb development. Indeed, some farmers consider top-dressing pastures as a cost to be attributed to the annual fodder budget, rather than the sowing budget, due to the increased feed created.

Increased sowing: Sowing high-quality pastures or forage crops can provide excellent grazing for lambs during their early months, boosting their nutrition and supporting leaner growth. While the upfront cost of sowing may appear high, it's a one-time

expense that yields long-term benefits, reducing the reliance on supplementary feeds and improving overall growth rates.

Early supplementary feeding: Rather than spending heavily on expensive concentrate feeds on older lambs, reallocating some of that budget towards early supplementary feeding can increase ewe lactation and accelerate early lamb growth. High-quality hay or grains supplemented in the early months when the lambs' feed conversion efficiency is better, even if pasture quantity and quality is high, can significantly improve growth rates. While some producers prefer to save their best feed for post-weaning to avoid competition with the ewe, the higher nutritional value of milk fat and the superior FCE during early lamb growth can actually make this investment more efficient and cost-effective (Galvani et al. 2014).

Chapter 2: Customised to the nth degree

To achieve optimal lamb growth and finishing, producers must adapt their management strategies to suit the unique conditions of their farm. Factors such as climate, rainfall patterns, pasture species, and the overall pasture growth curve play a pivotal role in shaping lamb productivity and feed efficiency. A thorough understanding of these environmental factors is essential for maximising farm profitability and achieving the best outcomes for lamb growth.

For example, in regions like North Central Victoria, Australia, where the annual rainfall averages around 450mm, producers face a distinct set of challenges and opportunities. The area is known for its short, dry springs, which result in ‘hard’, nutrient-dense feed. This type of feed promotes rapid lamb growth, with some lambs achieving impressive growth rates of 400g+ per day. The high nutrient density of spring pasture is ideal for finishing lambs and achieving market weights quickly. However, to fully capitalise on this high-quality spring feed, lambs need to reach key growth milestones during the challenging winter months, where frosts and water-logging can inhibit pasture growth. This often necessitates supplementary feeding, fertiliser top-dressing or other management strategies to ensure that lambs are adequately nourished through the cooler months, setting them up for success during the spring flush.

Reflecting on my own experiences, I used to envy producers in higher rainfall regions, wishing for the ability to grow more feed and carry larger stock numbers. However, after travelling through the UK and Ireland, I gained a new perspective. While higher rainfall areas support lush pastures, these regions also face unique challenges. In contrast to the nutrient-dense, compact feed in Northern Victoria, pastures in wetter, colder regions had higher water content and lower nutrient density, which slowed growth rates and extended finishing times. This shift in perspective helped me realise that higher rainfall regions, while capable of growing more feed, do not necessarily provide the same advantages in terms of growth efficiency.

This experience reinforced the importance of understanding the specific strengths and weaknesses of our own farm. Instead of comparing it to other regions, I learned to appreciate the unique advantages of our shorter, drier spring. While it may seem challenging, this climate produces nutrient-dense feed, allowing us to achieve rapid lamb growth during that time. The lesson I learned is that every farm system has its own distinct set of conditions, and the key to success lies in understanding these factors intimately and adapting management practices to them.

Clearly, a one-size-fits-all approach is ineffective in lamb production; instead, management strategies should be tailored to align with the unique conditions of each farm. By timing lambing, managing pastures, and implementing targeted supplementary feeding practices based on local conditions, producers can optimise lamb growth, improve feed conversion efficiency, and reduce finishing times.

2.1 Multispecies pasture systems

Multispecies pastures offer an effective way to design grazing systems tailored to a farm's specific conditions, enabling producers to optimise lamb growth and health. Unlike traditional systems that rely on a single species thought to be ideal for lamb production, multispecies pastures incorporate plants suited to the unique climate, soil, and seasonal characteristics of a farm. This adaptability increases pasture resilience

and ensures that lambs have a consistent supply of nutritious and palatable forage, even under challenging environmental conditions (Watershed Landcare, 2024; MLA, 2024). Additionally, such systems contribute to soil health and carbon sequestration, further enhancing farm sustainability (Francis, 2023).

Incorporating a variety of plant species, including grasses, cereals, legumes, and brassicas, creates a diverse pasture environment. This diversity ensures that at least one plant species is available for grazing at any time, regardless of the season. Each species contributes different growth patterns and nutrient profiles, allowing lambs to graze selectively and meet their nutritional needs. For example, trials conducted by Watershed Landcare demonstrated that lambs grazing on multispecies pastures achieved significantly higher average daily gains compared to those on monoculture pastures, underscoring the value of forage diversity in improving animal performance (Watershed Landcare, 2024). This principle aligns with broader goals of creating customised, environmentally harmonious farming systems (MLA, 2017).

A recent study in East Gippsland on multispecies pasture mixes reinforced these findings, showing that lambs grazing on diverse pasture blends achieved 25% higher growth rates compared to those on monoculture ryegrass pastures. The inclusion of legumes, such as clovers, and brassicas contributed to this increase by providing high-protein, highly digestible forage, particularly valuable during early finishing stages (MLA, 2024). These systems also improved forage use efficiency, reduced the need for supplementary feeding, and promoted sustainable lamb production by maximising available resources and reducing input costs (Francis, 2023).

Additionally, the study found that lambs grazing on multispecies pastures exhibited improved overall health and reduced digestive issues compared to those grazing on monoculture pastures. This improvement was attributed to the dietary balance provided by diverse forage options, which minimised the risk of overgrazing specific plants (Watershed Landcare, 2024). Lambs in these systems also reached market weights faster, shortening the finishing period and further reducing production costs.

Figure 2. Example of a multispecies pasture incorporating grasses, cereals, brassicas and legumes. (Source: author)

The studies concluded that multispecies pastures not only enhance growth and health outcomes for lambs but also represent a more sustainable and cost-effective approach to lamb finishing. By improving the resilience of the pasture system, producers can maintain forage availability throughout the season and reduce reliance on supplementary feeds. These benefits are particularly important for adapting to seasonal and environmental variability, ensuring long-term farm productivity and profitability (Watershed Landcare, 2024; Francis, 2023).

In contrast, monoculture pastures tend to lack the variety and nutritional quality needed to sustain lambs throughout the season. As these pastures mature, they often decline in quality, limiting the lambs' ability to graze selectively and necessitating greater reliance on supplementary feeding later on (MLA, 2017).

2.2 Customised mineral licks

Customised mineral licks represent an advanced and adaptive strategy for improving lamb productivity by targeting the specific mineral needs of individual farms. These licks are designed based on detailed soil and pasture analyses, addressing nutrient deficiencies or excesses that may hinder lamb growth. This farm-specific supplementation ensures that lambs receive the right balance of macronutrients and trace minerals, which are critical for supporting growth rates, feed conversion efficiency, and overall health (Colby 2006, Dickson 2016).

Customisation in mineral supplementation allows producers to bypass the inefficiencies of commercially available, one-size-fits-all solutions. Soil and pasture

testing provide an accurate profile of the mineral availability on a farm, enabling adjustments to meet livestock needs. For example, deficiencies in phosphorus, calcium, and magnesium can limit growth, while imbalances in trace elements such as zinc and copper can impair immune function and metabolic efficiency (Dickson 2016; Colby 2006). Tailored licks not only help promote optimal mineral balance but also reduce wastage and costs associated with over-supplementation of unnecessary nutrients.

A critical example is copper, an essential trace element for enzyme function, immune response, and tissue growth. Copper deficiency remains a significant challenge in southern Australia, with widespread economic consequences due to stunted growth, increased disease susceptibility, and reduced wool quality (Dickson 2016). A review by Meat and Livestock Australia noted that inadequate copper levels are common in soils across the region, exacerbated by interactions with antagonistic elements like molybdenum and sulfur that can reduce copper availability to sheep. However, since excess copper is highly toxic to sheep, this mineral is often lacking in commercial formulations, meaning that deficiencies go untreated (Dickson 2016). By identifying a copper deficiency through soil and pasture tests, producers can ensure this critical nutrient is provided.

Mineral requirements are particularly acute during critical growth stages such as pre-weaning and finishing. Lambs in these phases experience rapid tissue development, making efficient nutrient metabolism crucial. Research highlights that targeted mineral supplementation during these periods can improve average daily gains and enhance feed conversion efficiency (Colby 2006). Phosphorus, for instance, is a key driver of energy metabolism, while calcium supports skeletal development. A lack of these minerals during early growth stages can have cascading effects on lamb productivity.

Moreover, addressing deficiencies in trace elements like zinc improves skin integrity and wool growth, while selenium plays a role in antioxidant defense mechanisms that protect against cellular damage (Suttle 2010). Customised licks tailored to these needs ensure that lambs maximise their genetic growth potential while minimising susceptibility to health issues such as white muscle disease, often linked to selenium deficiency (Suttle 2010).

Figure 3. Lambs inspecting home-made mineral lick, customised to suit local soil and pasture analyses. (Source: author)

Beyond addressing immediate deficiencies, customised mineral licks encourage a broader focus on soil health. Pat Colby emphasises that long-term soil amendment practices are vital for restoring natural mineral balance, reducing reliance on external supplementation (Colby 2006). Improving soil fertility through techniques such as rotational grazing, strategic fertilization, and the addition of organic matter can enhance the availability of essential nutrients in the pasture.

Producers adopting this holistic approach can gradually transition toward a more sustainable system, where soil health supports consistent lamb performance without the need for frequent corrective supplementation. However, in areas where mineral imbalances are deeply entrenched, regular testing and tailored supplementation remain indispensable for maintaining lamb productivity and health (Colby 2006; Dickson 2016).

2.3 Soil moisture probes: a crystal ball into the spring flush

Understanding soil moisture and temperature dynamics is a particularly useful tool in effective farm management, especially during the critical periods of winter and early spring. Research consistently supports the assertion that accumulated winter moisture, rather than the often-unpredictable spring rainfall, is the key factor determining the strength of the spring pasture flush. A soil profile adequately replenished with moisture during the winter months, in tandem with soil temperatures reaching optimal levels in later winter/early spring (above 10-12°C for cool-season pasture species), significantly influences the success of spring pasture growth

(Agriculture Victoria, 2022; Pasture.io, 2024). In contrast, insufficient moisture reserves can create a cascading effect, where producers are forced to intervene through practices such as weaning or supplementary feeding to mitigate the lack of pasture growth.

Winter rainfall plays a crucial role in replenishing soil moisture levels, as the cooler temperatures and slower growth rates during this period help minimise evaporation. This accumulation of moisture throughout the winter months provides a valuable reservoir for pasture growth in spring, often reducing the dependency on spring rainfall, which can be highly variable both in timing and quantity. The ability to accurately assess the moisture available in the soil allows producers to better forecast pasture potential and make necessary adjustments in management practices, such as deciding when to implement supplementary feeding or adjust stocking rates (Pasture.io, 2024; Cullen et al., 2021; Wall et al., 2020). This insight provides a strategic advantage by reducing uncertainty around the timing and volume of rainfall during the spring months, thus optimising resource use and maintaining steady lamb growth rates.

Real-time data obtained from soil moisture probes and temperature sensors equip producers with powerful tools to make more informed decisions, based on accurate, on-the-ground insights. These instruments not only provide current conditions but also offer invaluable trend data, allowing producers to observe long-term patterns specific to their farm's unique climate and soil conditions.

For example, tracking trends in soil moisture levels throughout winter can help producers predict the strength and timing of the spring flush. In cases where soil moisture is low, producers can prepare by adjusting management practices early on, such as implementing early weaning to alleviate the pressure on pastures or initiating supplementary feeding programs to anticipate the upcoming feed gap before lamb growth rates begin to decline (Cullen et al., 2021; Agriculture Victoria, 2024). Conversely, when moisture reserves are high, paired with favourable temperatures, the conditions are ideal for strong pasture growth. Strategies like larger mob sizes and maintaining pastures in a vegetative state—rather than allowing them to mature and flower prematurely—can be implemented to preserve the nutritional quality of the forage, thus supporting better growth rates in lambs (Pasture.io, 2024; Wall et al., 2020). Indeed, armed with the knowledge of a full soil moisture profile at the end of winter, producers can confidently increase their stocking rates just prior to the spring flush, taking advantage of cheaper store lamb prices.

Monitoring the depth of soil moisture penetration is also a highly valuable strategy for forecasting the longevity of the spring flush. In early spring, the shallow soil layers are the first to supply moisture for plant growth, but these reserves are quickly depleted as the growing season progresses. If moisture was unable to penetrate deeply into the soil over winter, or if soil temperatures remain too low to stimulate rapid root growth, pastures will struggle to access deeper reserves. Under these conditions, pastures may transition prematurely into their reproductive phases, shifting energy and nutrients away from leaf and stem growth, which directly impacts the quality of feed available for livestock. As a result, lamb growth rates may suffer due to reduced nutrient intake and compromised forage quality (Wall et al., 2020). This underlines the critical need for effective soil management, including practices that enhance moisture retention and promote deeper penetration of water into the soil profile, such as diverse, deep-rooted pastures.

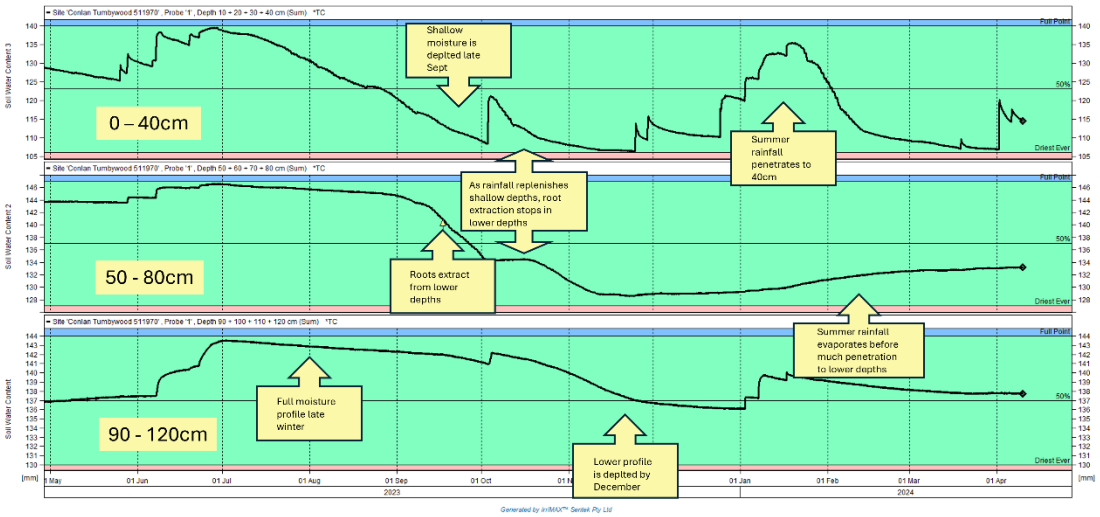

Figure 4. Soil moisture probe read-out showing significant changes in moisture availability and root activity over a single season. (Source: author)

By leveraging soil moisture probes and temperature sensors, producers can access an in-depth understanding of their farm's soil conditions, allowing them to manage pasture performance with precision. With this wealth of information at their disposal, producers are able to reduce the risk of underperformance by making timely interventions that are based on solid data. Proactive soil management, coupled with accurate temperature and moisture monitoring, enables producers to optimise pasture growth, maintain high lamb productivity, and sustain farm operations in a more resilient and resource-efficient manner, all while navigating the inherent challenges posed by unpredictable weather patterns (*Agriculture Victoria*, 2024; *Pasture.io*, 2024).

Conclusions

This report is about seizing the opportunity early. If there's one thing to take away, it's this: don't leave anything on the table in those crucial early months. This is the time to go hard—every dollar spent on nutrition and management during the early phase pays off. Young lambs have incredible feed conversion efficiencies, and by investing early on, lambs are well set up for superior growth, better health, and a more marketable product down the line. It's not just about boosting growth rates; it's about setting the stage for healthier lambs with a healthier, more sustainable and more desirable product for consumers.

But every farm is different, and every season throws up new challenges. So, it's time to throw away the 'one-size-fits-all' approach and tailor management practices to the nth degree. Customise, adapt, and keep refining strategies with every new season. Whether it's multispecies pastures that are tailored to specific climate and rainfall patterns, targeted mineral supplementation based on a farm's unique needs, or monitoring soil moisture profiles closely to anticipate key management opportunities, there are strategies for every operation and gains to be made.

Recommendations

- Redirect investment normally allocated to finishing lambs towards the earlier months, where the greatest gains can be made
- Understand the value of milk and the high nutritional requirements of ewes to fulfill their maximum lactation potential
- Incorporate diverse pasture mixes that capiltise on lambs' selective grazing instincts
- Identify soil and pasture mineral imbalances and rectify with tailor-made mineral licks in the short term, and pasture and fertiliser programs in the long term
- Utilise soil moisture probe data to forecast the magnitude of the upcoming spring flush and make key management decisions early

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