The Pyramid: a typical Marlborough family farm revisited

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Abstract
The Pyramid, a family farm in Marlborough, illustrates how long-term adaptation can sustain pastoral production while responding to climate, environmental and market pressures. This paper revisits the farm 18 years after an earlier review, using farmer narratives, farm records, reports and greenhouse gas modelling to examine changes in production, tree planting and diversification. Since 2008, the farm has intensified and diversified through improved sheep performance, flexible cattle policies, indoor lambing, expanded forestry and native planting, and development of a vineyard enterprise. Production increased from 148.9 to 216.6 kg carcass weight per hectare by 2020, lambing percentage rose from 119% to 158%, and profitability improved from $306 to $457 EBITDA per hectare. Although biological greenhouse gas emissions increased with higher output, emission intensity declined by 12%, and forestry sequestration was estimated to exceed whole-farm emissions. Vineyard development added a complementary land use, supported succession, and retained integration with livestock grazing. The findings show that resilience at The Pyramid has come from matching land use to land capability, investing steadily in infrastructure and soil fertility, and maintaining enterprise flexibility. This case highlights practical pathways for combining productivity, environmental stewardship and family business continuity in dryland hill country farming.

Keywords: dryland resilience, farm diversification, greenhouse gas emissions, tree planting, viticulture

Background
The Pyramid is a highly adaptive Marlborough family farm shaped by climate, climate adaptation, policy support, long-term development, and close attention to matching land use to land capability. The family has been on the property for 72 of the 172 years it has been farmed. Settled in the 1850/60's, there was a pioneering stage of 30 years that led on to 40 years of sustained growth off the advent of refrigeration. Some stagnation occurred over a 15-year period with the Great Depression and WW2. After WW2 the Dawkins family arrived and embarked on a 40-year period of development off the back of aerial topdressing, the Korean wool boom, mechanisation, and electric fencing. The subsequent period until 2020 had a focus on production and intensification driven by new technology which, in some cases, resulted in "dirty dairying", welfare and water quality issues. The changes needed since Richard and Jess took over management in 2020 has again shifted direction as farming is much more visible with social media, hence the indoor lambing to achieve better lamb survival. Through associations with the local catchment group, Richard has undertaken water quality testing and environmental enhancement work with potential to add value in the marketplace. Accreditation programmes, such as FAP+ (the New Zealand Farm Assurance programme) is cost-neutral and sets a very high bar in terms of environmental stewardship and animal welfare.

Chris and Julia Dawkins took ownership in 1978 at age 23, purchasing the farm from his father at a government valuation of $186,000. This was after several years in partnership and practical training that included a short period at Massey University (Dawkins and Dawkins 2008). The farm itself comprised 415 ha at the confluence of the Avon and Waihopai Rivers, 30 km south-west of Blenheim and about 250 m above sea level. A further 30 ha was leased from 1995, giving 380 ha effective for pastoral farming. The physical character of the farm strongly influenced management. Approximately half of the effective area was heavy clay downs, one quarter stony river flats and terraces, and the remaining quarter steeper hill country. Rainfall averaged 760 mm annually with a six-month moisture deficit beginning in mid to late October, making drought planning central to the whole system. Average pasture production was estimated at around 7000 kg DM/ha/annum, made up of about 4.5 t DM/ha on the hill, 7 t DM/ha on the downs, and 10 t DM/ha from lucerne on the free-draining flats.

The key strategic approach was to use each land management unit for what it did best, then integrate the units into an integrated livestock and feed system. Lucerne was the cornerstone on the stony flats, occupying about 20% of the grazing area and being

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grazed *in situ* rather than conserved, especially by hoggets, their lambs, and ewes rearing triplets. The clay downs were used to provide flushing and tupping feed, to hold moisture later into spring and early summer, and to build a winter feed bank after autumn rain. The steeper country functioned more as run-off, though Chris Dawkins argued it still had untapped potential through greater subdivision and more sub clover.

Across the farm, the development story was tied closely to the policy environment of the Muldoon era. Subsidies, tax concessions, supplementary minimum prices, the Livestock Incentive Scheme, fertiliser subsidies, spreading bounties, transport subsidies, accelerated depreciation, investment allowances, concessional Rural Bank lending, and the Land Development Encouragement Loans all helped finance change. Chris Dawkins used these supports to transform 80 ha of unproductive stony native river flat into lucerne and, over eight years, borrowed more than the original purchase price of the farm to fund reticulated water, fertiliser, pasture improvement, yards, a wool shed, and house renovations. Although market interest rates approached 22%, development loans were capped at 7%, making large-scale capital improvement feasible. The livestock system was built around flexibility and climatic realism. Chris Dawkins says he always tried to farm within the climate rather than fight it. The original 140 breeding cows bought with the farm proved too demanding under prolonged dry summers, despite excellent calf weaning performance, so the system shifted toward flexible cattle trading, dairy support, carry-over cows, in-calf heifers, and breeding bulls grown out from weaners. Sheep remained the more stable core enterprise, with about 1500 Corriedale and Corriedale-cross ewes and 500 replacements. The breeding objective was fast lamb growth before summer feed quality declined, with most lambs needing to be sold by Christmas. About 40% of ewes were first-cross and mated to Suffolk and Poll Dorset terminal sires to exploit hybrid vigour. Monitor Farm data for 2006 and 2007 showed strong lamb growth rates of 325 g/day pre-weaning and 300 g/day post-weaning, with a 90-day weaning liveweight of 34 kg. Weaning percentage improved only modestly from 135% to 137%, but lamb loss declined from 28% in 2006 to 18% in 2007, and ewe losses fell dramatically from 7% in 2004, 6% in 2005 and 4.3% in 2006 to just 1.6% in 2007 after changes in the management of multiple-bearing ewes.

Economic signals meant a major shift away from wool and toward meat and cattle income. Wool, once more than half of sheep income in the late 1970s and 1980s, had fallen to around 20% of sheep income by 2006/07. At the same time, carcass weights and prices improved: average lamb carcass weight rose from 15.2 kg in the late 1990s to 17.2 kg from 2001/02 onward, while average lamb price increased from $34.50 per head in the 1990s to $69.47 between 2000/01 and 2007/08. Cattle income had become increasingly important, averaging $290/ha/year in 2006 and 2007. Supporting all of this was a strong commitment to soil fertility, technology, and measured management. Soil tests had risen from Olsen P 4, sulphate S 5 and pH 5.9 in 1978 to Olsen P 33, sulphate S at least 12, and pH no lower than 6.0 by 2008, supported by regular fertiliser use and more than 1600 t of lime since 1978.

Technology such as electric fencing, feed analysis, feed budgeting, direct drilling, weighing systems, faecal egg counts, pregnancy scanning, novel endophytes, and baleage made tighter control possible. Drought-proofing the property relied on early weaning systems, flexible stock policy, drought-tolerant species such as lucerne, cocksfoot and subterranean clover, and conserved supplements.

Indicators of potential future opportunities included greater use of legumes to capture biological nitrogen, reduced reliance on bag nitrogen, further gains in ewe efficiency, and a growing role for trees. By 2008 about 13% of the land had already been retired into timber trees, mainly radiata pine, both for erosion control and shelter, with 8 ha of regenerating natives protected by QEII covenant. These tree plantings were already enhancing carrying capacity and adding a new income stream, showing that the long-term resilience of the farm depended on more than one enterprise, combining productive, environmental, and financial adaptation over time.

Opportunities Identified in 2008

A clear set of opportunities were highlighted in 2008 (Dawkins and Dawkins 2008) for improving both performance and resilience at The Pyramid. The first set were directly related to improving the underlying animal enterprises on the farm, while reducing inputs such as nitrogen fertiliser.

- Using already high soil fertility more strategically, allowing some savings in fertiliser inputs while still maintaining productivity through careful long-term soil monitoring.
- Lifting ewe efficiency by weaning more lambs per ewe without sacrificing lamb growth rates, while holding ewe numbers at about 1500 and directing any extra feed produced into a larger and potentially more profitable cattle enterprise.
- Substantial pasture and feed opportunities through greater legume use, especially by increasing sub clover (Trifolium subterraneum) on the hill country, testing lucerne persistence on the better drained clay downs, and using late-flowering arrowleaf clover in dairy support forage rotations.

Further medium-term opportunities were environmental

and strategic:
- expanding tree planting to move toward carbon neutral status and create benefits beyond livestock production alone.
- Determining a response to the external pressure of spread of vineyards up the Waihopai Valley

Taken together, the 2008 outlook framed the opportunities as a combination of biological improvement, lower input dependence, greater feed flexibility, stronger environmental positioning, and adaptation to changing regional land values and enterprise choices.

Approach

The return of the NZ Grassland Conference to the Marlborough region in 2026 provided the opportunity to review the changes that have been made to The Pyramid in the intervening years, 18 years after the original paper (Dawkins and Dawkins 2008).

Personal narratives, commissioned reports and the results of a Kellogg scholarship were used to develop insight into the changes which have occurred over the past 18 years. Three areas are highlighted in their contribution to change. These are production, tree planting, and diversification. Included in the production advances are the results of shifting to indoor lambing of triplets and changes to beef production. Included in tree planting is a summary of changes in Greenhouse Gas (GHG) Emissions. Diversification provides insight into the choice of viticulture and how it fits within the wider farm system.

Table 1 Long-term changes in The Pyramid farm livestock enterprises from 1980 to 2020

	1980	2020	D	2026
Effective Area (ha)	400	427	7%	308
Stocking Rate (SU/ha)	8.0	10.6	33%	9.5
Production (kg CW/ha)	148.9	216.6	45%	274
Lambing %	119	158	33%	194%[1]
Calving %	90			
Breeding Ewes (hd)	1,291	1,386	7%	1,070
Breeding Cows (hd)	90	47	-48%	0
Trading Cattle (hd)	0	211	100%	150
GHGs: kg CH_4/ha	80.0	101.8	27%	88.5
N_2O as t CO_2e/ha	0.5	0.66	32%	0.17[2]
Total Biological GHGs (T CO_2e/ha)	2.73	3.51	29%	2.65
Emission Intensity (kg CO_2e/kg product)	18.4	16.2	-12%	9.65
Profitability: EBITDA/ha	$306	$457	49%	
Whole farm emissions (T CO_2e)	1,092	1,499		816
Forest sequestration (T CO_2e)	0	1,700		
Net surplus (T CO_2e)	-1,092	201		

[1] Includes hogget lambs

[2] Changes in the calculation of N_2O emissions from soil (MPI 2026) has resulted in lower CO_2 equivalent emissions in recent calculations.

Production and Farm Development

The Pyramid has made substantial progress since its earlier sheep and beef base by becoming larger, more diversified, and more productive. The farm now totals 602 ha, plus 38 ha of leased land, with 308 ha in pasture compared with an earlier effective pastoral area of about 400 ha in 2020 (Table 1). The system has shifted from 1,291 breeding ewes and 90 breeding cows on browntop (*Agrostis capillaris*) pastures to a more specialised and flexible mix including about 1,100 ewes with a 158% lambing rate, no breeding cows (in 2026) and more trading cattle, lucerne-based grazing, improved subdivision, drainage, forage cropping, and extensive baleage use. Sheep breed has shifted from Corriedale to a Composite base. The stocking rate increased from 8.0 to 10.6 SU/ha, production rose from 148.9 to 216.6 kg carcass weight per hectare, and EBITDA improved from $306 to $457 per hectare.

Triplet lamb survival

The team at The Pyramid started indoor lambing in 2017, with their previous death rates of 30% of triplet lambs and 26% farm-wide being similar to industry averages. The Pyramid now achieves significantly higher than industry average survival rates in triplet-born lambs, overall lambs and triplet-bearing ewes. This is despite average scanning percentages of approximately 200% being greater than the industry average of 184% (Stevens 2026). While this lower death rate could be attributed to the indoor lambing system, it is paired with excellent pre-parturition management with lambing being treated “as the tip of the spear”.

The nutrition programme is critical to the success of the enterprise. Ewes are kept in good body condition (>3), with most between 3.5 and 4.0, as they approach lambing. Ewes are assessed for readiness for parturition using a combination of ultrasound scanning birth date prediction and physical inspection. They are brought into the lambing facility within a day or two of lambing and fed with high quality lucerne hay and field peas. Once the ewes have lambed and they are milking well and the lambs are healthy they are moved to high quality pasture of 2000-3000 kg DM/ha within 48 hours. This minimises the time in the facility, reducing risk of disease spread. The use of lucerne hay has meant no exit transition diet management is required.

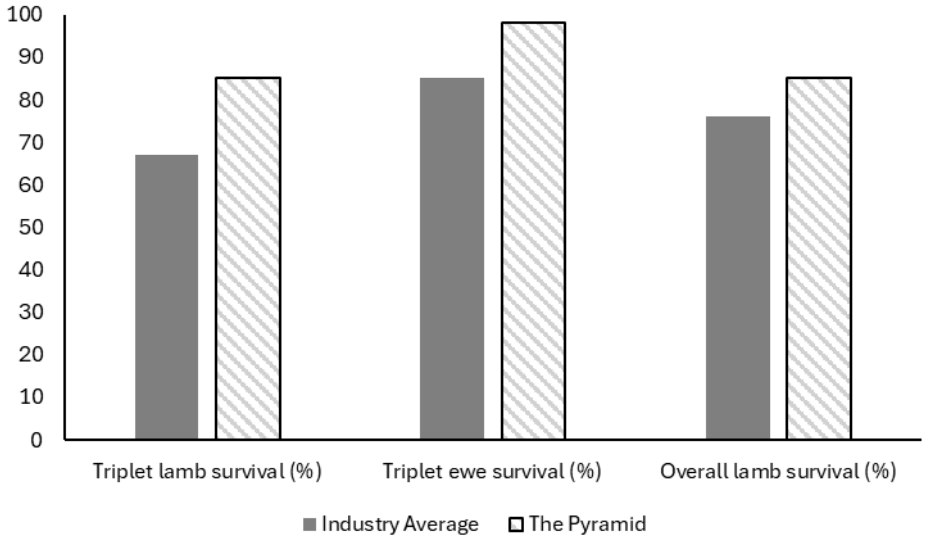


Figure 1 Survival of triplet lambs, triplet-bearing ewes and overall farm lamb survival at The Pyramid farm compared to NZ national average data (from Dawkins 2023).

Furthermore, Richard Dawkins notes that half of their 15% triplet lamb death rate is embryonic loss, abortion or stillbirth. Very few lambs perish that could be saved. This is both financially rewarding and morale boosting. Their shed is well-ventilated and receives sunshine from 7.30 am through the winter. The composite sheep are handled often and farmed intensively, making them comfortable being handled indoors during lambing.

Recent changes

In 2026 the actual farmed area is 270 ha effective plus a lease block of 38 ha. The vineyards are used during autumn and winter to support the ewe flock which averages approximately 155-165% lambing with 90-96% sold at weaning (105 days of age) at 41 to 44 kg liveweight. The hogget flock has a 95% lambing finishing 50-60% prime at weaning at 36-38 kg LW. Terminal Charollais sheep are the chosen terminal sire for all sheep classes. The beef system has been simplified with the replacement of Jersey bulls with finishing beef on dairy. Approximately 100 ha effective is available in the vineyard, producing an estimated 200 t DM/annum, adding approximately 650 kg DM/ha/annum to the effective farm area of 308 ha. As the area of available vineyard increased, stocking rate was adjusted to suit.

The indoor lambing systems has been further modified. All singles are now also lambed indoors. This allows dystocia birth to be attended to quickly, and orphan lambs mothered on to single-bearing ewes. Consequently, there are minimal single lamb deaths annually and only a small amount of artificial rearing of lambs.

Tree planting

In the 2008 paper the issues of GHG emissions and carbon neutrality were identified. The same changes that were targeted to lift production would also increase biological greenhouse gas emissions. Tree planting of various types was identified as a potential offset.

As part of a nation-wide GHG adaptation programme, Farmax modelling compared 1980 with 2020. Methane rose from 80.0 to 101.8 kg CH_4/ha, nitrous oxide increased from 0.5 to 0.66 t CO_2e/ha, and total biological GHG emissions increased from 2.73 to 3.51 t CO_2e/ha, a rise of 29% (Table 1). This increase was associated with both a higher stocking rate and greater output per hectare. However, emission intensity fell from 18.4 to 16.2 kg CO_2e per kg of product, a 12% reduction, which indicates that the farm became more efficient in emissions terms as production increased. More recent calculations (Table 1) have highlighted further improvements in emissions intensity (now 9.6 kg CO_2e per kg of product), and reductions in total emissions (-25%), though some of the methodology for calculation has changed since the 2020 calculations (MPI 2025). However, the improvements in eco-efficiency remain a feature of progress at The Pyramid.

Tree planting materially changed the whole-farm picture. The farm established a significant forestry estate, including about 82 ha of pines and 6 ha of poplars, alongside 39 ha of wider planting for erosion control, biodiversity, shelter, and landscape restoration. Under the averaging approach, forest sequestration was estimated at about 1,700 t CO_2e per year, compared with whole-farm emissions of about 1,499 and 816 t CO_2e per year in 2020 and 2026 respectively, leaving

a surplus of roughly 201 or 900 t CO_2e (Table 1). Tree planting has been used as a strategic response that offsets part or all of the increase in livestock emissions. Additionally, it has also delivered erosion control and shelter benefits. It must be noted that this carbon advantage is not permanent in a simple sense, because pine sequestration under the averaging scheme is available for about 16 years and poplar sequestration for about 22 years, meaning future offsetting or mitigation measures may still be needed.

A 15 ha wetland and hillside of native trees has been established to increase biodiversity and provide a longer-term carbon offset.

Diversification

Why viticulture became an option

In the early 2000s, farmers in Marlborough were advised to secure water rights, as irrigation water from the three main rivers was being rapidly allocated with the expansion of viticulture further up the valleys. A water consent could add considerable value to the farm, though not necessarily to the sheep and beef business. Marlborough District Council's "use it or lose it" policy for irrigation water meant a decision had to be made about how to use what was a very favourable water right. Activating that water right would clearly require a change in land use.

Why dairying was not pursued

Dairy farming was an option for changing land use. However, the Dawkins long-standing land use philosophy was to work with what occurs naturally rather than modify the environment to force a system that did not fit. On that basis, cows were considered too damaging for the heavy clay downs, which are prone to waterlogging even in a normal year. With a passion for animals and trees, and no firm succession plans in place the development of a vineyard was considered.

Vineyard development

- An offer from a winery to lease a vineyard was taken with the proviso that the Dawkins funded the development.
- In 2016, 48 ha was developed.
- The lessee provided project management and developed the vineyard to a high standard and to their specifications.
- The project manager was employed to become vineyard manager, and the block is managed by the Dawkins team on behalf of the lessee.
- On-going consultancy and advisory from the Project manager remain an integral part of the business delivery.

By 2020, succession planning became integral to the future of The Pyramid. At the suggestion of family a further 43 ha of vineyard was developed, reflecting both growing confidence in the industry and the proven ability of the project manager. The eldest son returned to the farm in 2022 after 20 years away and now manages Pyramid Farm Vineyards. A further 45 ha was planted in 2024, bringing the total planted area to 136 ha.

How the vineyard fits the wider farm system

The vineyard provides an alternative but compatible land use alongside livestock. Strategic grazing is still possible through most of the year, and the enterprise has also created employment opportunities within the extended family, who now all live in the valley.

Grapes perform well in this environment because the farm offers:

- a sheltered microclimate with relatively low wind run
- around 2,600 hours of annual sunshine
- dry summers
- a warm north-facing aspect
- secure irrigation water
- high soil fertility built from 60 years of intensive sheep and cattle farming

As summer dry conditions set in and pasture quantity and quality decline for the livestock operation, the grapes are just reaching their main phase of fruit development. The risks, including the need for development, lack of summer soil moisture, and out-of-season frosts, are manageable, although they do come at a cost. Viticulture is simply another crop in which the returns justify the investment, and the risks are no greater than those of any other biological industry, albeit at greater infrastructure cost.

It has also added another option for succession planning and provides diversification into an industry beyond livestock.

Conclusions

The present situation shows how earlier principles have been extended. Total area is now 602 ha plus a 38 ha lease, with about 308 ha in pasture. Land use is spread across pastoral farming, vineyards, production forestry, native planting and leased land. Performance data show a more productive system in 2020. Stocking rate has increased from 8.0 to 10.6 SU/ha, production from 148.9 to 216.6 kg carcass weight/ha, lambing from 119% to 158%, and EBITDA from $306 to $457/ha (in 2020 $ terms). Although total biological emissions per hectare rose 29% to 3.51 t CO_2e/ha, emission intensity fell 12% to 16.2 kg CO_2e/kg product, indicating greater efficiency. Tree cover has become a major strategic asset, with around 82 ha of pines and 6 ha of poplars in the GHG analysis, enough to sequester about 1,700 t CO_2e/year versus farm emissions of 1,499 t CO_2e/year, leaving a carbon surplus. Further systems change since 2020 has led to overall greenhouse gas emissions reduced, while productivity has been maintained.

The progress was not limited to pasture and livestock.

The farm diversified into viticulture, expanded tree planting for erosion control and shelter, and built a more flexible business model better able to manage dry weather, variable rainfall, and market change. Overall, the progress is characterised by intensification combined with diversification, where higher output and profitability were achieved by redesigning the system to fit land classes, climate risk, and new enterprise opportunities. As progress has been made, succession for future generations has also been achieved.

The Dawkins family have been successful in changing their farming systems because they have consistently adapted the farm to its environment rather than forcing the environment to suit a fixed system. A key strength has been their ability to match enterprises to land classes. This includes lucerne on the dry river flats, productive pastures on the heavier downs, trees on erosion-prone land, and vineyards where water, climate and returns justified development.

This practical philosophy has been supported by long-term thinking and adaptation supported by steady capital development, and a willingness to invest in infrastructure, soil fertility, subdivision, drainage, water, and new enterprises. This investment has had climate adaptation in mind, from extensive farm tracks to 'over-sized' culverts to combat increased frequency of high intensity rainfall events. The approach to capital stock with large, high performing ewes weaning 96% lambs prime is an enterprise tried and tested for goodness of fit in this region under the current pasture supply context. Their success has also come from maintaining flexibility. As markets changed and wool declined, they shifted toward meat, cattle trading, forestry, and viticulture, creating several income streams and reducing reliance on any one commodity.

Just as importantly, they measure and manage carefully, using tools such as feed budgeting, pregnancy scanning, weighing and modelling to guide decisions. They have also embraced innovation while keeping a strong biological focus on animal performance, pasture resilience, and drought management. Finally, family continuity and succession have helped sustain this change, allowing each generation to build on the previous one rather than starting again.

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AI Use

AI (Copilot) has been used to both summarise the previous paper (Dawkins and Dawkins 2008) and the notes provided by authors to generate a concise narrative for the paper.

REFERENCES

Dawkins C, Dawkins J. 2008. The Pyramid: a typical Marlborough family farm. *Proceedings of the New Zealand Grasslands Association 70*: 45-50 https://doi.org/10.33584/jnzg.2008.70.2723

Dawkins R. 2023. Addressing mortality in New Zealand Lambing Systems. Report to Kellogg Rural Leadership Programme (Course 49). Retrieved 25 May 2026 from: https://ruralleaders.co.nz/report/addressing-mortality-in-new-zealand-lambing-systems/

MPI 2025. Methodology for calculation of New Zealand's agricultural greenhouse gas emissions. Version 11. MPI Technical Paper. Prepared for the Ministry for Primary Industries by Andrea Pickering, Joel Gibbs, Simon Wear, James Fick and Hazelle Tomlin. 221 pp. Retrieved on 2 June 2025 from Primary Industries website at http://www.mpi.govt.nz/news-and-resources/publications/.

Stevens DR. 2026. Impacts of ewe death and failure to rear a lamb on national production, profitability and greenhouse gas emissions in New Zealand. *Animal Production Science in press*.