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PROGRAMME

Integrating Pasture Raised Egg Production into an Existing Farming Business

A Business Plan

Kellogg Rural Leadership Programme
Course 40, 2019
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I wish to thank the Kellogg Programme Investing Partners for their continued support:

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Executive Summary

With increased protein demand from the agriculture sector, ever increasing compliance costs and high land prices, adding more operational layers and diversity to an existing system is an option to some businesses.

This business plan focuses on integrating pasture raised egg production into an organic dairy farm but has relevance to any farming system.

The worldwide demand for eggs is increasing with most consumers in the EU already preferring to purchase free range eggs. Caged eggs are being phased out of New Zealand supermarkets by December 2022. The industry is expecting supply deficits due to the change in practice.

The initial idea was to have the birds following a dairy herd in a New Zealand grass based rotational system, but after talking with some of the interviewees this would have risks with smothering and animals becoming lost from the flock. The research shows better results could be gained through fertility transfer by focusing on poorer paddocks.

The low initial set up cost and payback modelled over 2.25 years makes it an attractive investment to be part of.

The pasture-based model has high social licence to operate characteristics which is being demanded more by consumers and the sector is expected to continue the growth its currently experiencing.

Acknowledgements

I would like to thank all the people who have taken time to answer my many questions or point me in the direction of where to find them. It was great to hear your experiences, ideas and thoughts on the industry.

The team at Aquila Sustainable Farming for supporting my journey through the Kellogg Program, keeping me focused, allowing time and guidance and proofing the finished project.

The three interviewees happy to talk about their business and give insight to the industry Glen Heslip, Michael Gardyne and Ann Eggert. I appreciate your openness as I realise the industry can be very secretive.

Patrick Aldwell for raining my big imagination in, giving guidance and honest feedback.

Aims and Objectives

- To assess the viability of incorporating pasture raised egg production following a dairy herd in a New Zealand rotational system
- Ensure there is a valid market for the product
- Understand the risks associated with pasture raised egg production

This project should give the reader enough confidence to make judgement and proceed to further investigation and finding suitable markets for their product

Methodology

There is no literature on the New Zealand poultry industry, so it was very hard to find relevant information. Overseas material was used which correlates with the sediment of producers here. Telephone and face to face interviews were conducted along with some resources provided by the Egg Federation of New Zealand.

Our Situation

In 2011, Aquila Capital, an investment firm based in Germany purchased six dairy units totalling 2400 hectares in Southland to conventionally milk 6000+ cows. Following the dairy downturn, the firm explored a more stable investment and made the decision to convert all farms to be certified organic to the EU standard. This was a two-year process commencing on 1st November 2016 and involved Aquila Capital forming their own asset management team in New Zealand. Aquila Sustainable Farming were tasked with writing and implementing policy and creating systems to ensure the operations functioned in unison both during and post the organic transition period.

Now fully EU certified to the AsureQuality Organic Standard and having gained other notable achievements along the way, such as ISO 9001:2015 Quality Management System accreditation, meeting pasture fed guidelines, leasing land to organic vegetable production, leasing a further 900 hectares of support land, a contract to supply Organic A2 milk, and move to regenerative cropping practices, Aquila Sustainable Farming are searching for the next step to increase profit and diversification on our land.

The Problem

Our current farming model

With growth in organic milk markets, we have diversified our product to attain a higher premium. We are now meeting pasture fed guidelines and transitioning five of the nine farms to produce organic A2 milk, but this is only the pinnacle of the market.

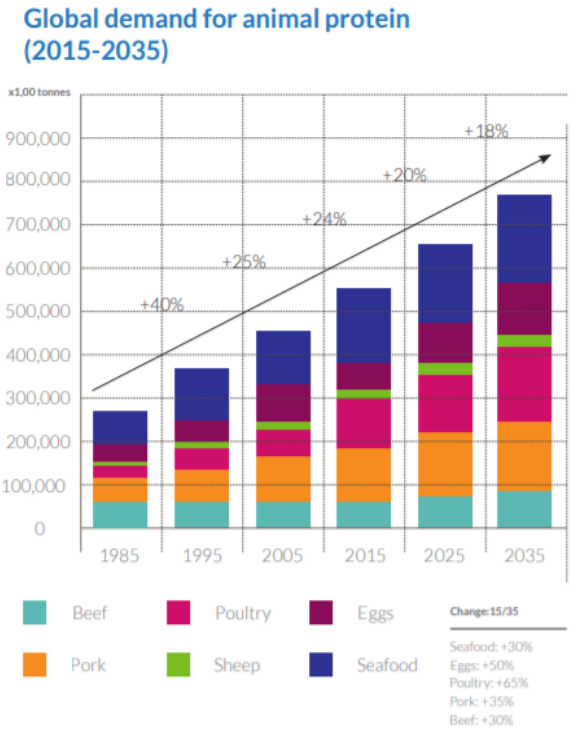
Current Government has ensured no foreign entities become majority investors of farmland, which will have the negative impact of lowering land prices and restricting further growth whilst in power.

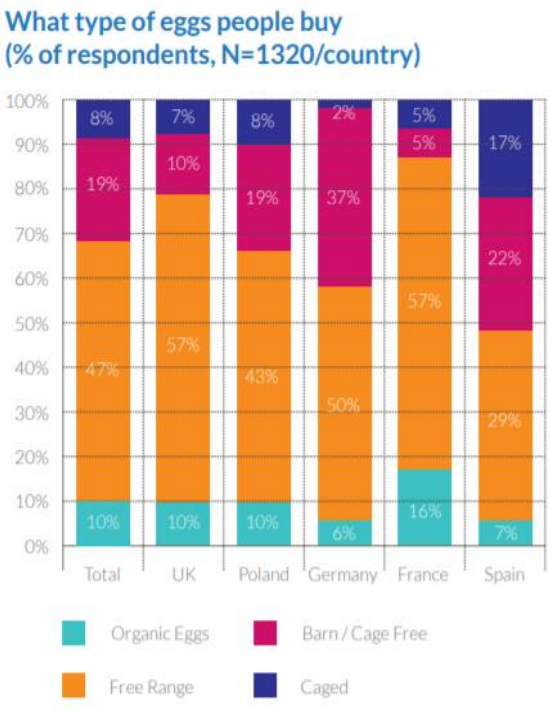
World Protein Demand

Consumer base is growing along with increased protein consumption per person creating more demand. The below tables show the egg and poultry industries will have the biggest increases in demand over the next 15 years and that free-range eggs are the most sort after product in the EU.

This is reinforced by an international study by Unilever revealing that 33% consumers are now choosing to buy from brands they believe are doing social or environmental good. Huhtamaki The World of Eggs *(2018).*

Supermarkets are already experiencing supply issues as they begin to phase out caged eggs and the demand for free range and pasture raised increases.





Source: Huhtamaki The World of Eggs (2018).

Potential Opportunities

Now certified organic, there are other opportunities to add to the current model whilst having minimal disruption on business efficiency and providing another income stream, such as:

- Organic sheep production
- Organic beef production
- Organic pasture raised egg production
- Organic pasture raised chicken production
- Organic pasture raised pork production
- Organic hemp production for seed or oil
- Organic honey production
- Organic grain production
- Rearing organic bobby calves to slaughter weight

These potential solutions add diversification and more security to Aquila Capital's current investment, spreading risk and utilizing the asset further. Most of these ideas would impact dairy production as the resource of land is needed. This project will focus on free range egg production, drilling down deeper into this opportunity and assessing all aspects.

Background to the egg industry

- Kiwis eat an estimated 227 eggs per person each year, making them one of the highest per capita consumers of eggs in the world
- Total number of eggs produced in NZ in 2016: 1,126,128,636 eggs
- Value of retail sales per annum in 2016: 286 million
- Number of commercial layer hens in NZ in 2016: approx. 4,348,397
    - Presently 3,900,000, a decrease of 11% *New rules on hen cages and rising feed costs lift egg prices (2019)*
- Number of layer farms in New Zealand: 166
- Percentage of eggs by production type in 2016:
    - Conventional and Colony cage: 77%
    - Free-range: 20%
        - Presently 27%, increase of 31% over 3 years
    - Barn: 3%
- Percentage of eggs that go into processed egg products: 9-10%
- Enquiries regarding free-range egg production are increasing exponentially
- Caged egg production to be phased out by December 2027 with supermarkets stopping selling by December 2022
- Number of fresh, preserved or cooked eggs exported in 2016: approx. 2,493,613

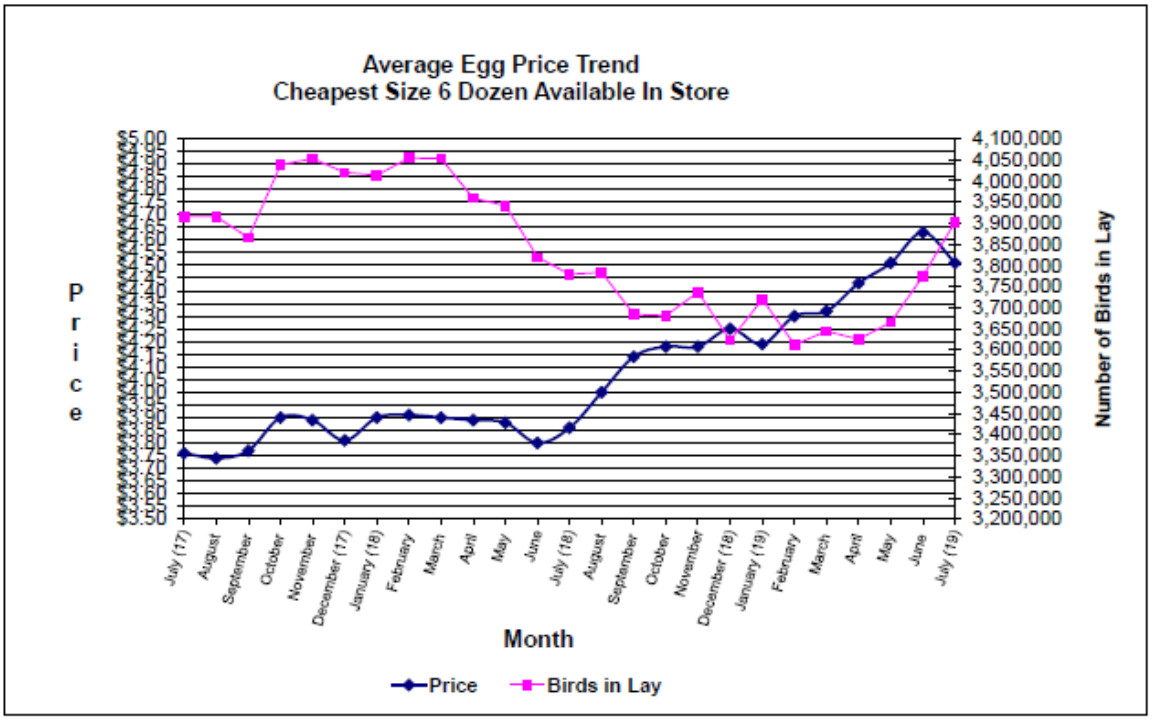


Figure 1: Average Egg Price Trend
Source: Egg Producers Federation of New Zealand (2019)

Current Producers and Their Pearls of Wisdom

Heslip's Hatcheries

FAIRLIE, NEW ZEALAN

Heslip's are a wholesaler of brown shaver from day old to point of lay and have seen a lot of change in the industry. Along with selling birds they also produce housing and feeders for pasture raised egg production and produce eggs for the market.

Glen explained about the high attention to detail needed to raise chicks to point of lay and the unexpected/unexplained mortality which can exist, as well as the need to ease your way into the business before scaling. Glen had a wealth of knowledge of the industry and is generally worried about supply. As caged and colony egg production is phased out, this is going to cause demand to exceed supply and will see egg prices rise further.

Glen talked about correct nutrition for the birds and the potential to produce 300 eggs/bird/year over their 72-week production lifespan and the options for humane dispatch at the end of this.

Main points from Glen's interview:

- Focus on having a strong social licence to operate
- Start small <2-3000 birds and find your way from there
- Rearing chicks can be satisfying, cost effective but there are risks involved
- Demand and prices will increase
- There is no clear definition yet what "Pasture Raised Eggs" are
- Optimal environment is contained within poly-fence and shifted multiple times a week
- Find consumers where you can sell by the box
- Only feed birds outside and water inside
- Feed no more than 120gms/day as they can get too big
- 72 weeks of egg production is maximum profitable age

Heslip's Hatcheries (2019).

Oxhill Organics Farm

NSW, AUSTRALIA

The original home of the chicken caravan, this team integrated pasture raised eggs onto their farm to support more family members on the property.

Unfortunately, when I talked to them, they were amid a severe drought and production was being scaled back to cut costs. The operation has been in business 10+ years and found demand for the eggs outstripped supply.

They talked about the initial capital cost of the caravans and the long payback time putting a strain on the business model.

Main points of interview with Ann:

- Dairy farming business that added pasture raised egg production as another income stream to enable more family members to remain on farm
- Break fed with mobile caravans through selected paddocks shifted 1-2 times per week
- Had been up to 1500 birds but currently scaling back due to drought
- Bring new birds to mob 4 times per year to try and ensure constant supply
- More demand that they could supply

- Strong focus on social licence to operate
- Labour required is one-person for 4hrs per day
- Feeding 130-150gms wheat/day

Oxhill Organics (2019).

Absolute Free-Range Eggs

GORE, NEW ZEALAND

Grain farming business Southland, that has added pasture raised egg production as another layer to their business, rearing them on ryegrass break crops with sheep. Their theory was a small circular economy, grow grain -> feed to chickens -> excrete high nutrient fertilizer -> grow more grain on this area, with eggs as an extra by-product.

Talked about growing markets and expanding their business to meet demand and the need for a clean uniform product.

Main points of interview with Michael:

- Raised in mobile sheds shifted daily in open pasture paddocks with sheep that are 3-year break crops from the grain at 150 birds/Ha
- Keep birds <18months to keep best quality eggs and supply
- Started with 600 birds in 2017, and have grown to 3000 birds at present
- Feed 130-140gms wheat/day
- Growing markets
- One employee working 5hrs per day (scalable up to approx. 4500 birds/person) plus 2 mornings packing
- Focus on the social licence of their business, and constantly thinking about the animals' welfare and perception of their market
- Loss of birds when tried transferring between paddocks (smothering), reinforced the need to stay in one paddock and move only length of the sheds per day

Absolute Free-Range Eggs (2019).

How it Works

- Birds are kept in purpose-built structures either wheeled or on skids that are shifted on a regular basis (> twice/week)
- Birds have access to fresh water and 120gms grain/bird/day
- Birds have access to roam in pastures. Some have access to the whole paddock but there appears to be benefits to using poly-fence and having a fresh small lot and will reduce disease and parasite burden
- Eggs are collected daily
- Eggs are processed and sold

Market Overview

New Zealanders eat on average 227 eggs per person per year, among the highest per capita consumers in the world.

As customers are becoming more focused on the quality of their food studies have shown possible nutritional benefits of pasture raised eggs compared to caged eggs (Sentry Hill, 2016).

Pasture raised egg nutritional benefits	
Saturated fat	-25%
Cholesterol	-33%
Vitamin A	66%
Omega-3	200%
Vitamin -E	300%
Beta Carotene	700%

Table 1: Nutritional Benefits Pasture Raised of Eggs compared to Caged

More consumers are preferentially buying foods with these properties after research released showed the nutrient density in our foods is ¼ what it was in 1940 compared to 1995 and will be lower in present times.

Market and Competitor Assessment

Threat of new entry

- Organic land takes 2-3 years to convert
- As part of a rotation we have large farms capable of sustaining birds without creating environmental issues

Threat of substitution

- Caged eggs are being phased out which will create a deficit in the market
- Barn and Colony Cage eggs will be available but struggle to meet evolving social licence to operate

Supplier power

- Lack of competition in organic grain market can lead to higher prices
- Can create economies of scale buying grain with the dairy farms

Buyer power

- Interest continues to grow for organic wholefoods
- People want to know a story about their food
- Willingness to pay for premium

Competitive rivalry

- Organic egg production in New Zealand is only 1% of total
- We have the land to scale as markets grow

Figure 2: Porters Five Forces Model (Dobbs, 2014)

Where do Hens Come From?

- Chickens will need to be purchased from a hatchery, such as Heslip's
- 16-week-old birds will cost around $20/bird and have time to adapt to their new environment before starting to lay, at around 20 weeks
- There can be considerable economic benefit in rearing day-old birds to point of lay. These chicks can be purchased for $4.90 and will consume approximately $7-10 in feed, but higher mortality rates can be experienced pushing costs up

Benefits to the Dairy Operation

Birds foraging in the fields will add to the dynamic of the ecosystem. Scratching through cow excrement and spreading it out will help it break down and running three days behind livestock will give them the opportunity to eat any parasites hatching in the excrement.

Chicken manure is high in nutrients, which going back into your pasture system, a layer bird will on average produce 59kg of wet manure per year. Appendix D shows the percentage of nutrients in the manure and the cost per unit of that nutrient if you were to buy it in the form of solid fertilizer. This works out at $39.02 worth of nutrients from each bird deposited back in your soil, with no shares or trucking costs.

Risks

	Risk	Mitigation
Pests	Large pests target chickens.	Little pest pressure in New Zealand. Foreign producers use guardian dogs and alpacas. Trapping for stoats and rats as a precaution would be advised.
External Parasites	Red mites living in the wood feed on the birds as they roost at night.	They have a short breeding cycle and can live without feed for 6-8months. Diatomaceous earth or silica-based products that are microscopically sharp pierce the outer, waxy coating of the mite causing them to dehydrate and die. The Ultimate Guide to Red Mite (2019).
Disease	Pathogens	Pathogens that effect chickens have a 60-day lifecycle, daily shifts using poly-fence will dramatically reduce the parasite risk.
Climatic	Varied climate in Southland puts pressure on the chickens	Ensuring layers have clean water, warm shelter winter and shade in summer is all that's required they are reasonably hardy to climatic conditions but can suffer from heat stroke.

Shifting, Feeding and Egg Collection

- Eggs need to be collected daily and housing needs to be shifted at least twice a week, but daily shifts are most beneficial
- The businesses talked to that are running a similar system to proposed find one person can comfortably manage 4-5000 birds
- Keeping your nesting boxes as clean as possible is important, ensuring birds are shut out at night so they don't nest in them
- Roll away nest boxes are preferred to keep eggs cleaner and reduce the risk of hens eating eggs
- Egg washing machines are expensive and manual washing is time consuming

Where Do Old Birds Go?

Birds have the highest laying potential in their first 72-78 weeks and reduce production significantly after this. To obtain optimal eggs/bird/year specific breeds mainly Brown Shaver are used, but the trade-off is a bird with little meat and no market.

The farmers I spoke with talked about ensuring their birds are dispatched in the most humane way possible, this to them was completing it on farm with no distressing travel.

Most old birds are used in pet food products such as dog roll but there is potential for composting to help boost nutrients on your property as part of a circular model, but this would be another possible project for someone.

Sorting and Packing

Currently we run higher staffing levels on farm so there could be the ability to utilise some of this time or it could suit a parent between school hours.

Smaller operations run mixed grade eggs rather than trying to separate the small percentage of outlier grades, which could be donated or fed to pigs etc.

Packing will need to be completed in a dedicated packhouse and the eggs kept between 7-12 degrees to ensure they keep optimum nutritional value.

All the producers talked about the need to clean a small proportion of their eggs and had varied ways of going about this, from kitchen sinks to automatic egg washers.

Regulatory Compliance

- A comprehensive Egg RMP needs to be completed and assessed by MPI before any sales are made and on an annual basis MPI (2019).
- If over 100 birds are to be farmed, resource consent needs to be attained. Environment Southland (2019).
- Change of scope to our current organic management plans and annual auditing.

Revenue Model

This project has been based on the same sale price as majority of the businesses interviewed and financials based on selling dozens (very similar per egg returns as tray) and 280 eggs/bird/year. Eggs will be sold within two weeks of production.

Dozen Price $6.50	Tray Price $15

There could be some upside to these prices as the New Zealand businesses interviewed weren't organic which will command a small premium. Using these prices will allow for smooth entry into the market if organic buyers can't be found at first.

Appendix C shows price points $2.70/dozen to meet expected returns and the payback period agreed.

Cost saving such as brooding our own day-old chicks can halve the cost of buying 16-week-old birds even with allowing for high mortality rates so this could be a way of lowering expenses and driving up profit.

Other revenue streams in the future could be realised with outlets for the retired birds or increases in production towards the 300+ eggs/year which is attainable.

Customer Acquisition

Organic production is currently only 1% of NZ eggs and being pasture raised may lure more consumers to our product. Queenstown Lakes District would be an ideal area to start marketing this product as it aligns well with the consumers in the area better than Southland based consumers. Queenstown Lakes area residents and tourists will be more focused on knowing they are eating wholesome food with strong movements towards organic and socially acceptable practices. The area is home to a large amount of dining establishments to service both the tourist sector and locals. These tend to be higher end and strong synergies between this product and their business could be formed.

Channel of supply and will differ greatly between the food producer and the wholesaler such as supermarket:

- Wholesalers such as Bidfood and Foodstuffs
- Relationships with food producers or ingredient-based users need to be developed and meet supply/demand of both parties. Due to the competition in the market these relationships need to be continually worked on ensuring consumers are happy and engaged
- Having a more niche product such as this will engage consumers more and create word of mouth marketing. Quality control will be important as this can aid a business's sales as fast as hamper them

Variations with each consumer could exist and be relevant to what is exerted in marketing and distributing of the product. A food producer with a large standing order compared to a supermarket consumer buying a dozen sporadically deserves to be receiving their egg product at a discounted rate

Tech advertising such as Facebook allows you to target marketing to specific demographics and population zones where you will best see returns on marketing spend. Having an up to date Facebook page with targeted, enticing, and educating content will help customers buy in to the product and ensure return custom. QR Codes could be used on packaging to help customers become more informed by leading you to our Facebook or website.

Distribution

- Eggs can be packed and couriered to consumers as standing orders or as needed.
- Eggs have a four-week lifespan and most markets don't wish to have fresh eggs as they do not perform as well in situations that require boiling or for baking, so this will require management.
- Bulk buyers prefer eggs in trays by the box (six trays of thirty in a box) according to the businesses interviewed
- Smaller consumers purchasing by the dozen would generally be health and environmentally focused. More sustainable focused packaging such as GreeNest boxes would be a good fit for this, made of 50% grass, and with a reduced water consumption of 50% and carbon footprint lowered by 10%. GreeNest (2019).

Social Proof

There is a big shift in the social license to operate for the egg industry with supermarkets already moving away from selling any caged eggs post December 2022. Colony cages will eventually follow as factory farming becomes more unacceptable.

Consumer buying habits are changing as well with health, wellbeing and traceability all considerations when buying foods. This alongside higher expendable income boads well for the pasture raised egg producers going into the future.

Partnerships

With many small producers coming on board and their ability to add this aspect to their farming business, undercutting will begin to drive down profits as businesses too small for the supermarkets compete for the same niche customers.

When selling eggs wholesale to a business, joining forces with another producer that already has good market share and branding could have several benefits, including:

- Utilizing their cleaning and packing facilities
- Increased buyer power
- Increased supplier power
- Higher return on investment of marketing

Whilst teaming up with another producer may be a risk to their brand, reputation and business should they already be well established, with good codes of practice agreed it has great potential to gain larger market share and ability to service larger customers. Wholesaling eggs with another producer may also result in a significantly reduced rate e.g. $9 tray instead of $15.

Intellectual Property

Based on internet research and discussions with existing suppliers, there is enough information available to understand the requirements of a pasture raised eggs system, implement the systems needed and get the business underway. There doesn't appear to be a lot of IP in this industry, rather competitor secrecy. Individual producers seem very closed and mentioned of the secret nature of producers. A lot of businesses approached as part of this project declined to be interviewed.

Press Mentions of Aquila Sustainable Farming Limited

Whilst our farms were under the conversion period to organic, a conscious decision was made to abstain from the media and public eye. Now we have reached business as usual and the systems have been refined, we have put ourselves out for everyone to see. This has included articles in rural and tertiary institute publications, field days, farm tours with interested parties and being finalists in three categories at the Southland Westpac Business Awards 2019.

Management Team

The highly motivated Aquila Sustainable Farming senior management team is made up of three individuals from varying backgrounds and qualifications. General Manager Shaun has studied an MBA and has background in dairy farming, seed sales and corporate business leadership. Shaun focuses on analytical thinking, financial planning and industry networking. Policy and Planning Manager Jessica came into the business from the Criminal Justice sector in the UK and has great knowledge of policy development and implementation, auditing and human resource requirements. Operations Manager Luke uses his skills and knowledge developed in the dairy and rural contracting sector to support the teams on farm in good decision making and corporate farm management. This team would be responsible for developing relationships, finding markets, ensuring supply and financial management.

Each dairy farm currently under the management of Aquila Sustainable Farming has a farm manager responsible for the day to day running of the business and the team they form around them. It is at this farm level where the care of birds, harvesting and packing of the eggs will happen. Some casual staffing will be required, up to 2-3 times per week to assist with prepping and packing.

It is expected that this labour use would mirror the other businesses interviewed that have added egg production as another layer in their system.

Funding

Each unit can house 250 birds and the following figures are worked out based on purchasing two units each quarter over the first year, buying 16 week old bird that will commence laying at 20 weeks, producing 280 eggs/bird/year and then every fifth quarter replacing the birds to ensure the best production.

Capital Requirement Per 250 Bird Shed	
Shed / Drinker / Two Grain Feeders	$17,800
Poly-fence	$1,800
Solar Fence Unit	$600
Total	**$20,200**

Table 2: Capital Requirement

Source: Heslip's Hatcheries (2019).

Funding goal

During the setup phase, an overdraft of $40,000 ($22,000 needed in first quarter, the remainder as contingency) will be needed to get through the first two quarters. This will cover any late debtors, compliance and initial feed and bird purchase costs. Post quarter two it is expected there will be no need for any overdraft.

A business loan will also be required for the capital purchases during the first year. In each quarter $40,400 will be needed to establish the business totalling $161,600, and there will be the ability to have this fully paid down by end of quarter nine (2.25 years).

No marketing has been allowed for at this stage as the plan for this relatively small amount of eggs should be to direct sale. If the business was to be scaled in future, there may be a need for marketing.

This is a quick payback, cash rich business showing strong return on investment aimed at a niche market to start with and with potential to scale. All income has been worked on conventional prices with organic expenses allowing for a good buffer.

Financials

Appendix A demonstrates:

- Cashflow with a return on investment of 197% by year 5
- Average 39% return on investment per year for a single shed with 250 birds.
- Year 1 has a lower expenses due to discount on first batch of chicks and year 5 due to not needing to purchase chicks

Appendix B demonstrates:

- Growing to 2000 birds the forecast shows a 26% reduction in the 5-year average cost of production per dozen.
- The economies of scale result in an average of 69% annual return on investment.

Appendix C demonstrates:

- Profit margin/dozen and how sale price would need to be adjusted to meet any increases in cost of production, or increased profits available if markets allow.

Conclusion

The egg industry is in a great space to accept new entries such as this. Pasture raised eggs have a high social licence to operate and will replace the void of caged eggs as they are mandated out. Along with this is an increased population and a generation that wants to know they are eating sustainably produced, nutrient rich foods and have the expendable income to do it.

The business model has a strong return on investment and short payback time of 2.25 years, but economies of scale pay a large part in increasing returns. It allows us to better utilise some of our on-farm teams whilst providing another income stream using the existing available land. There is both a good financial and holistic payback, with quality nutrients returned to the soil, dung spread, and parasites removed.

Unfortunately, the original idea of having the birds following the dairy cows around the system would not work due to the risk of smothering, so focus on specific poorer preforming paddocks may have better results through nutrients deposited.

Recommendations

The egg industry is a viable investment, but it will not fit seamlessly into any business, consider these areas for future research or analysis

1. Determine if it is a good fit for your business it is a 365 day a year commitment
    a. Complete a SWAT analysis relevant to your business
    b. Labour availability
    c. Talk with affected business partners
    d. Does the land requirement fit into current system?
    e. How big do you wish to grow, best returns are from economies of scale
2. Assess finances, talk with bank manager
    a. Start-up costs of $20,200 per 250 bird shed
    b. Working capital requirements
    c. Payback modelling
3. Check local and regional authorities regarding commercial farming of birds
    a. Council restrictions
    b. Assure Quality Risk Management Plan requirements
4. Assessing your local market
    a. Size of local market and buying habits
    b. Bets prices will be received direct to consumer
    c. Approaching potential customers with proposal to supply

All of these will vary between businesses looking at entering the industry and time taken to assess them is invaluable.

References

Absolute Free-Range Eggs (2019). Personal Interview (L Futter, Interviewer)

Dobbs, M. E. (2014). Guidelines for applying Porter's five forces framework: a set of industry analysis templates. Emerald, 32-45.

Egg Producers Federation of New Zealand (2019). Personal Interview (L Futter, Interviewer) and data provided.

Environment Southland (2019). Retrieved from https://www.es.govt.nz/environment/consents

GreeNest Egg Cartons. https://www2.huhtamaki.com/web/moldedfiber/contact/oceania/new-zealand

Heslip's Hatcheries (2019). Personal Interview (L Futter, Interviewer)

Huhtamaki The World of Eggs (2018). https://www.huhtamaki.com/globalassets/global/highlights/trends/huhtamaki_focus_report_the_world_of_eggs.pdf

MPI (2002). Retrieved from https://www.mpi.govt.nz/dmsdocument/9830-egg-producers-federation-of-new-zealand-inc-code-of-practice-appendix-c-technical-annex

MPI (2019). Retrieved from https://www.mpi.govt.nz/processing/poultry-and-eggs/egg-production-and-processing/risk-management-programmes-rmps-for-eggs/

New rules on hen cages and rising feed costs lift egg prices (2019). Retrieved from https://www.stuff.co.nz/business/farming/109969799/new-rules-on-hen-cages-and-rising-feed-costs-lift-egg-prices

NZ Nutrition Foundation (2014). The role of eggs in the diet of New Zealanders

Oxhill Organics Farms (2019). Personal Interview (L Futter, Interviewer)

Ravensdown Price List (2019). Retrieved from https://www.ravensdown.co.nz/media/4601/fertiliser-prices-19-08-2019.pdf

Sentry Hill Organics (2016). Sentry Hill Organics. Retrieved from http://sentryhillorganics.co.nz/pasture-poultry-products/

The Ultimate Guide to Red Mite (2019). Retrieved from https://poultrykeeper.com/external-problems/red-mite/

Wade W. McCall (1980). Hawaii Cooperative Extension Service. *General Home Gardening Series 2, Chicken Manure.*

Wheat Futures Live Prices Chart (2019). Retrieved from https://www.ifcmarkets.co.nz/market-data/commodities-prices/wheat

Appendix A

SINGLE SHED WITH 250 BIRDS 5 YEAR CASHFLOW

One 250 Bird Shed Egg Production 5 Year Cashflow and Return Profile							
Year		**1**	**2**	**3**	**4**	**5**	**Total Five Year**
Income							
Annual Egg Production @	280	61250	61250	61250	61250	70000	315000
Sales Quantity							
Dozen @	**$ 6.50**	**$33,177.08**	**$33,177.08**	**$33,177.08**	**$33,177.08**	**$37,916.67**	**170625**
Expenses							
Compliance							
Enviroment Southland		$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	10000
MPI		$ 1,600	$ 1,600	$ 1,600	$ 1,600	$ 1,600	8000
Assure Quality		$ 300	$ 300	$ 300	$ 300	$ 300	1500
Wages							
Casual wages for packing		$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	25000
Feed							
120gms/day @ tonne	750	$ 8,100	$ 8,100	$ 8,100	$ 8,100	$ 8,100	40500
Grit		2160	2160	2161	2161	2161	10803
Replacement Birds		4000	$ 5,000	$ 5,000	$ 5,000		19000
Packaging							
Dozen @	$ 0.61	$ 3,114	$ 3,114	$ 3,114	$ 3,114	$ 3,558	16013
Total Expenses							
Dozen @	**$ 6.50**	**$ 26,274**	**$ 27,274**	**$ 27,275**	**$ 27,275**	**$ 22,719**	**130816**
Surplus/Deficit							
Dozen @	$ 6.50	$ 6,904	$ 5,904	$ 5,903	$ 5,903	$ 15,197	$ 39,810
Dozen Sales Zero Budget							
Opening		0	$ 6,904	$ 12,807	$ 18,710	$ 24,612	
Closing		$ 6,904	$ 12,807	$ 18,710	$ 24,612	$ 39,810	
Average Cost Production							
Dozen	$ 5.01	$ 5.15	$ 5.34	$ 5.34	$ 5.34	$ 3.89	
Annual ROI on Capital	$ 20,200						
Dozen		34%	29%	29%	29%	75%	

Appendix B

EIGHT 250 BIRD SHEDS EGG PRODUCTION 5 YEAR CASHFLOW AND RETURN PROFILE

Eight 250 Bird Sheds Egg Production 5 Year Cashflow and Return Profile							
Year		**1**	**2**	**3**	**4**	**5**	**Total Five Year**
Income							
Annual Egg Production @	280	490000	490000	490000	490000	490000	2450000
Sales Quantity							
Dozen @	**$ 6.50**	**265417**	**265417**	**265417**	**265417**	**265417**	**1327083**
Expenses							
Compliance							
Enviroment Southland		2000	2000	2000	2000	2000	10000
MPI		1600	1600	1600	1600	1600	8000
Assure Quality		300	300	300	300	300	1500
Wages							
Casual wages for packing		15000	15000	15000	15000	15000	75000
Feed							
120gms/day @ tonne	750	64800	64800	64800	64800	64800	324000
Grit		17280	17280	17280	17280	17280	86400
Replacement Birds		32000	32000	32000	32000	16000	144000
Packaging							
Dozen @	$ 0.61	24908	24908	24908	24908	24908	124542
Total Expenses							
Dozen @	**$ 6.50**	**157888**	**157888**	**157888**	**157888**	**141888**	**773442**
Surplus/Deficit							
Dozen @	$ 6.50	107528	107528	107528	107528	123528	553642
Dozen Sales Zero Budget							
Opening		0	107528	215057	322585	430113	
Closing		107528	215057	322585	430113	553642	
Average Cost Production							
Dozen	$ 3.79	$ 3.87	$ 3.87	$ 3.87	$ 3.87	$ 3.47	
Annual ROI on Capital	$ 161,600						
Dozen		67%	67%	67%	67%	76%	

Appendix C

PROFIT MARGIN PER DOZEN WITH 8 SHEDS

	Cost of Production/Dozen								
		$ 3.4	$ 3.6	$ 3.8	$ 4.0	$ 4.2	$ 4.4	$ 4.6
	$ 6.0	$ 2.6	$ 2.4	$ 2.2	$ 2.0	$ 1.8	$ 1.6	$ 1.4
	$ 6.3	$ 2.9	$ 2.7	$ 2.5	$ 2.3	$ 2.1	$ 1.9	$ 1.7
	$ 6.5	$ 3.1	$ 2.9	$ 2.7	$ 2.5	$ 2.3	$ 2.1	$ 1.9
	$ 6.8	$ 3.4	$ 3.2	$ 3.0	$ 2.8	$ 2.6	$ 2.4	$ 2.2
Sale Price/Dozen	$ 7.0	$ 3.6	$ 3.4	$ 3.2	$ 3.0	$ 2.8	$ 2.6	$ 2.4
	$ 7.3	$ 3.9	$ 3.7	$ 3.5	$ 3.3	$ 3.1	$ 2.9	$ 2.7
	$ 7.5	$ 4.1	$ 3.9	$ 3.7	$ 3.5	$ 3.3	$ 3.1	$ 2.9
	$ 7.8	$ 4.4	$ 4.2	$ 4.0	$ 3.8	$ 3.6	$ 3.4	$ 3.2
	$ 8.0	$ 4.6	$ 4.4	$ 4.2	$ 4.0	$ 3.8	$ 3.6	$ 3.4

Appendix D

NUTRIENT REQUIREMENTS

	N	P	K
Percentage	1.6%	1.1%	0.5%
Kg/Bird @59kg Manure/year	0.943	0.649	0.295
	(Urea @ $616/t)	*(Triple Super Phosphate @ $689/t)*	*(Potassium Chloride @ 685/t)*
$ Value Per kg of Nutrient	$13.39	$34.45	$13.70
$ Returned to soil Nutrient/Bird	**$12.63**	**$22.35**	**$4.04**
Total $ Nutrent returned to soil/Bird/Year		**$39.02**	

This table was produced with information from the following:

Ravensdown Price List (2019).

Wade W. McCall (1980).