

Branching Out Blueprint

Sheep Dairy

THE OPPORTUNITY FOR TARANAKI, NEW ZEALAND



venture
TARANAKI
Te Puna Umanga

A blueprint for the future of food and fibre

Branching Out is a project that has been initiated and led by Venture Taranaki. It is underpinned by funding from the Ministry for Primary Industries' Sustainable Food and Fibre Futures fund (SFFF). It is supported by local sponsors as well as the region's three district councils – New Plymouth District Council, South Taranaki District Council and Stratford District Council. The project has identified a number of innovative, commercially viable food and fibre value chain opportunities for Taranaki. This work supports the region's strategy and long-term vision for a resilient, high-value, and low-emissions economy built on inclusivity and sustainability, as articulated by Tapae Roa and Taranaki 2050 – the guiding strategic documents for the region, co-created with the people of Taranaki.

Branching Out aims to strengthen and diversify the Taranaki economy and has taken input from a wide range of industry participants, from landowners to interested growers, manufacturers to food & fibre entrepreneurs and potential investors. Through a process of investigation, a shortlist of eleven feasible ventures have been selected. Crown Research Institutes and universities, including Massey and Lincoln, were engaged to provide robust research that underpins each venture selection. Work has also been undertaken with commercial partners to support the development of prototypes with significant market potential, and a core focus on sustainability and waste reduction.

The investigations, collaborations, and potential commercial pilot opportunities for the region that have been explored as part of this project are being presented

as Venture Blueprints. These blueprints aim to build investor confidence and serve as an informative and inspirational roadmap to kick-start complementary land-based activities and associated value chain enterprises in Taranaki.

The blueprints focus on traditional methods of assessing value, determined by comparing inputs (land, animals, machinery, time) and outputs (milk, meat, wool, other products). However, consumer expectations and an increased awareness of environmental degradation mean that thought should also be given to how the natural environment can be protected and what value this action can add to a developing sector.

TE TAIAO

In 2020, the Primary Sector Council released their Food and Fibre Strategy, Fit for a Better World. This strategy adopted the Te Taiao framework, acknowledging that Te Taiao is all of the natural world that contains and surrounds us (land, water, air, and biological life). It is a uniquely New Zealand perspective that is underpinned by three guiding principles:

- Our land, water, air, and biological life must be able to thrive without over-use
- Any use is a privilege, not a right
- If something is not healthy or well, we must fix it.

Developing or participating in a new value chain is an opportunity to consider your business's relationship with Te Taiao. It is a chance to farm, produce and engage in a way that safeguards the mana and integrity of the natural world. If the whenua (land), and the entities that are connected to it, are to be nourished and thrive, then it must be cared for and protected. Each blueprint opportunity should be considered with Te Taiao in mind.

DISCLAIMER

This document, produced by Venture Taranaki, provides an overview of opportunity for commercial sheep dairying in Taranaki, and an indication of potential returns. It does not constitute investment advice. Professional advice should be sought if you wish to explore this opportunity further. This blueprint is correct to our knowledge and based on the best information we could access as of June 2022. However, this work is ongoing, and we welcome new or emerging information about this opportunity. For more information or for input, please contact branchingout@venture.org.nz.

How to reference: Venture Taranaki – Branching Out, *Sheep Dairy: The opportunity for Taranaki*, June 2022



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Sheep dairy: A snapshot

UNTAPPED POTENTIAL

- Due to the strong and steady demand for sheep milk products there is less variability in milk prices compared to bovine milk.
- Recent conversion stories and financial modelling indicates the potential for much higher returns for sheep dairy farmers than bovine farmers.
- Sheep milk is frequently positioned in the market as a nutritionally superior alternative to bovine milk and generally contains higher levels of major nutrients such as proteins, fats, minerals and vitamins.
- Sheep have been found to have an up to 50% lower environmental impact than cows.

WHY NOW?

- The industry is in its infancy and strong industry growth is expected over the next 5 – 10 years due to demand for products from Asian markets.
- Existing producers are currently recruiting additional supplier farms to ensure demand for product is met.
- There are increasing regulatory pressures being applied to farmers to support the government's net zero ambitions.

SECTOR TURNOVER:

New Zealand exports of sheep milk products are valued at about \$20M¹.

GROWTH TARGETS:

Expanding the industry through the production of high value products has the potential to increase the sector's economic contribution to \$250M in 2024².

WHY TARANAKI?

The region is geographically close to one of the existing sheep dairy hubs (Waikato) and two industry leading producers (Maui Milk and Spring Sheep Co.).



Existing knowledge and expertise developed through generations of farming makes many farms ideally suited to transition to an adjacent market.



The region has a climate and pastures suitable to sheep farming.



Taranaki has a strong history of farming and food production which, over time, could be leveraged to create a unique provenance story and brand.



The existing industry is hubbed around three regions and development of sheep dairy operations in Taranaki would provide further resilience to the national industry.

WHO SHOULD BE INTERESTED?



Taranaki farmers and landowners looking to expand and diversify their income stream.



Investors considering future trends and growth markets in the food and fibre sector.



Bovine dairy farmers considering a change in lifestyle or farming operation.

IN-REGION INFRASTRUCTURE OPPORTUNITIES

There is currently no storage or processing facilities for sheep milk in Taranaki. Over time and with enough demand there may be an opportunity to develop a processing facility, similar to the Spray Dryer at FoodWaikato. Prior to this, there could be demand for the construction of a 'staging post' facility – a storage facility capable of storing larger volumes from multiple suppliers for an extended period of time, allowing for more efficient management transportation.

VALUE-ADDED OPPORTUNITIES

There appears to be a limited market for fresh sheep milk in New Zealand. However, domestically and internationally there has been demand identified for value-added products such as cheese, yoghurt, infant formula and beauty products made using sheep milk.

FARM FINANCIALS

- Minimum land required: 50 hectares
- Minimum capital investment required (for conversion from bovine dairy farm): \$9,490 per hectare.
- Time to 100% yield: Approx 4 years.
- Expected per hectare return after 5 years: \$4,829 (based on minimum land and investment as outlined above).

POTENTIAL RETURNS FROM ONE SCENARIO OF SHEEP DAIRY IN TARANAKI

Modelling suggests that if 1000ha of bovine dairy farm in Taranaki was converted to sheep dairy land it could:

- Allow for approximately 16,000 sheep producing up to 320 litres of milk each per year (total 5.6 million litres)
- Provide employment for 40 – 50 FTE
- Produce a surplus of more than \$5 million per year.

This would provide significant opportunity for the region.

RISK AND SENSITIVITIES

- Early entrants in Taranaki may experience challenges accessing supporting services and inputs locally.
- A range of goods and skilled services required to convert, develop and operate sheep dairy farms may initially need to be sourced from other regions, such as Waikato.
- There are a small number of operators that manage most parts of the value chain, meaning there may be limited opportunity to make strategic decisions.
- Milk will initially be required to be transported out of region to be processed.
- As there are only a few types of sheep specifically for dairying, biosecurity breaches, or pest and disease issues have the potential to significantly impact the entire industry.
- Workforce and skills development will be required to fill important roles, such as farm managers.

TARANAKI BRANCHING OUT SCORECARD

Opportunity rating
1 = low, 5 = high.

This scorecard is intended to act as a quick comparison between blueprint opportunities. These scores are subjective and based on information available at the time of publishing. Further professional investment advice should still be sought.

Development Opportunity

Suitable farming conditions	4
Suitable land available at reasonable cost	4
Existing investment interest	4
Local development experience	4
Potential for circular economy opportunities	3
Established local, domestic, and international demand	4

Product Opportunity

Large and growing demand for high quality value-add sheep dairy products	4
New Zealand sheep dairy products differentiated in key markets	3
Contribution to health and wellness of the consumer	4
Established sustainable/ regenerative growing practices, including water usage	2-3
Reduced greenhouse gas emissions compared to existing land uses	3

Postharvest and Processing Opportunity

Processing facilities available now in Taranaki	1
Opportunities for development of added value products, particularly from waste products	3

Sheep dairying in New Zealand and internationally

BACKGROUND

Sheep farming has a long history in New Zealand, primarily focussed around meat and wool production. For more than 130 years sheep were the dominant pillar of the farming industry, but since the mid 1980's the strength and value of the bovine dairy industry has resulted in the number of sheep in New Zealand falling from 70 million to approximately 26 million in 2020³.

Globally, the sheep dairy industry has been operating for thousands of years, well before milking of cows began. However, sheep dairying only accounts for approximately 1.3% of the total worlds milk production. The majority of sheep milk is produced in Spain, Italy, Greece and France, with production also occurring in the United States and Australia.





Photo: Spring Sheep Milk Co.

CURRENT CONTEXT

Sheep dairying is in the embryonic stage in New Zealand having grown from only four operators in 2014 to just over thirty five in 2021. New Zealand's industry is comprised of a mix of small commercial farms (handling between 200 – 450 sheep) and large commercial operations (handling between 600 – 3,000 animals). These farms are currently hubbed around Waikato, Wairarapa and Canterbury. The sector has seen 12% annual growth since 2016, however it still accounts for just 0.1% of the current total world sheep milk market⁴.

Despite being an emerging sector in New Zealand, there is significant opportunity for attractive financial returns for farmers and investors based on the unique attributes of sheep milk and the value-added products they can create.

TARANAKI OPPORTUNITY: BOVINE DAIRY TO SHEEP DAIRY CONVERSION

Farming, in particular bovine dairy farming, has been at the core of the Taranaki economy since the late 1800's. Over that time, Taranaki has built a reputation for being a region that produces a range of high-quality primary products such as milk, cheese, meat and wool. Primary production remains a key aspect of the regional economy, sustaining nearly 6,000 jobs and providing over \$1 billion into the regional economy each year⁵.

There is an opportunity for existing bovine dairy farmers in the region to reconsider their farming operations and to extend into or even fully convert to sheep dairy. Existing knowledge and expertise developed through generations of farming makes many farms ideally suited to transition to an adjacent market.

The proximity of Taranaki to the main sheep dairy hub of Waikato also supports the development of sheep dairy in the region. It allows for sufficient support in the early stages of sector development, leaning on existing facilities, value-chains, and knowledge in Waikato. However, the distinct Taranaki climate and pastures (renowned for their free draining structure and phosphate retention) mean product differentiation can be enabled once the sector is more established. Over time this would also support the wider sheep milk industry in New Zealand, reducing dependency on various hubs.

Many value-added sheep milk products gain their value from their Product Denomination of Origin status, meaning that they are purchased for their provenance and distinct flavours, like the concept of Champagne. Taranaki too can leverage the region's strong history of dairy production, dating back to the butter export days of Chew Chong, to create a strong and valuable sheep dairy brand.

Despite being an emerging sector in New Zealand, there is significant opportunity for attractive financial returns for farmers and investors based on the unique attributes of sheep milk and the value-added products they can create.

³ *Sheep Farming, Te Ara - the Encyclopedia of New Zealand, Hugh Stringleman and Robert Peden, November 2008*

⁴ *Opportunities for New Zealand Sheep Milk Products, New Zealand Food Innovation Network, July 2020*

⁵ *Infometrics Industry profile data, Taranaki 2021*

Sheep dairy industry value chain

As the New Zealand sheep dairy industry is in its infancy, the value chain is still developing. However, there are a few key industry leading organisations that contribute to growth of the sector.

SUPPORT	CHANNEL TO MARKET	SERVICES AND PROCESSING
<p>MĀORI AGRIBUSINESS SHEEP MILK COLLECTIVE</p> <p>The Māori Agribusiness Sheep milk collective is an organisation that represents 20 members (Māori Land Trusts and Incorporations) that own primary sector assets with a combined area of 22,156 hectares between Lake Taupō and the Hauraki Plains. Their vision is to create an opportunity for their members to enter the industry with an ownership model that encompasses the full value chain and a Kaupapa Māori framework.</p> <p>The collective recently received a \$700,000 investment from Central Government to help them explore the potential of their whenua to sustainably produce sheep milk at scale, create jobs and further grow the emerging export market.¹²</p>	<p>MAUI MILK⁷</p> <p>In addition to Maui Milk's two privately owned sheep dairy farms, they have contracts with twelve independently owned supply farms based in the Waikato and Northern Taupō region. In 2020, Maui Milk announced it was embarking on a cautious growth strategy with the aim of having 60 farms milking by 2025⁸.</p> <p>Milk from their supply farms is processed at FoodWaikato and is supplied to Danone for their premium infant formula range.</p> <p>SPRING SHEEP MILK CO.</p> <p>Spring Sheep Milk Co. is a joint venture of Pāmu, a state-owned enterprise also known as Landcorp Farming limited, and SLC, a New Zealand based export-focussed sales and marketing company. Based in Waikato, Spring Sheep Milk comes from farms in the Central North Island and is also processed at FoodWaikato.</p> <p>In the 2022/23 season, Spring Sheep will have 16 farms milking over 15,000 of its Zealandia sheep, a sheep specifically bred for sheep dairying in New Zealand. They have plans to expand to 40,000 sheep by 2025⁹. Spring Sheep recently announced they are partnering with Parininihi ki Waitōtara (PKW) to expand its supply base into Taranaki, with the support from MPI.¹⁰</p> <p>SHEEP MILK NZ</p> <p>Sheep Milk New Zealand is a mid-Canterbury based sheep milking business owned and operated by Matt and Tracey Jones. As well as selling raw milk to other producers, they have developed their own fresh milk product range <i>Jones Family Farm</i> and a skin care range <i>Sabelle</i>.</p> <p>Currently Sheep Milk NZ has two other farm suppliers but have plans on taking on a further 22 over the next two years¹¹. From August 2022, they will begin sourcing milk from farms around the entire South Island.</p>	<p>FOODWAIKATO⁶</p> <p>FoodWaikato is part of the Waikato Food Innovation Network based at the Waikato Innovation Park just ten minutes from Hamilton. They offer specialised spray drying capability to support innovation in dairy products, as well as business support to food and beverage companies. Each day, the spray dryer can process up to 65,000 litres of milk into powder used to make infant formula.</p>

⁶ [Food Innovation Network, Food Waikato](#)

⁷ [Our Story, Maui Milk Limited website, 2021](#)

⁸ [Wool's worth nothing, how about sheep milk? Sudesh Kissin, Rural News, November 2020](#)

⁹ [Dairy's other export not sheepish about growth, Lawrence Gullery, Stuff NZ, October 2021](#)

¹⁰ <https://www.farmersweekly.co.nz/sheep-milking-expands-to-taranaki/>

¹¹ [Mid-Canterbury sheep milking business looks to expand, Maja Burry, RNZ, March 2021](#)

¹² [Government support for Māori landowners to invest in growing sheep milk industry, Hon Damien O'Connor, Beehive Press Release, February 2022](#)

EXISTING PRODUCTS, PRODUCERS AND SUPPLIERS¹³

INFANT FORMULA AND POWDER PRODUCTS		
Producer	Supplier	Product
Danone	Maui Milk	Infant formula – Stage 1, 2 and 3
Spring Sheep Milk Co.	Spring Sheep Milk Co.	Growing Up Formula - Stage 4
		Milke powder pouches
		Milk powder cans
		Min Seniors Formula
		Family Probiotic Formula
MILK		
Producer	Supplier	Product
Ferglen		Whole milk, plain (1 litre)
		Prebiotic flavoured, three flavours (450ml)
Charing Cross		Whole milk, plain (1 litre, seasonal supply only)
Jones Family Farm		Whole milk, plain (450ml)
CHEESE		
Producer	Supplier	Product
Waimata		Camembert (125g), Feta (130g), Blue (100g), Manchego (110g)
Craggy Range		Blue, Pecorino, Feta
Kingsmead		Akitio Robiolino (100g), Feta, Cumin Gouda, Robust, Havarti, Brie, Manchego, Pecorino, Blue (2 variations)
Charing Cross		Feta, Halloumi, Labneh
Over the Moon Dairy	Maui Milk	The Black Sheep (100g)
Thorvald	Sheep Milk New Zealand Ltd	Camembert, Blue Vein, White Vein, Feta, Curado, Devotion
Viavio	Canterbury Milk Supply Group	Pecorino
Whitestone Cheese		Monte Cristo (100g or 1.9kg)
Kaikoura Cheese		Mahi
Barry's Bay Cheese		Pecorino (110g or 1kg)
Meyer Cheese	Spring Sheep Milk Co.	Gouda (200g or 1kg)
Mercer Cheese		Gouda (50/50 sheep and cow milk)
YOGHURT		
Producer	Supplier	Product
Thorvald	Sheep Milk New Zealand Ltd	Yoghurt, plain (500g)
		Yoghurt, Honey flavoured (500g)
Viaivo	Canterbury Milk Supply Group	Yoghurt, plain (200g)
Charing Cross		Yoghurt, plain (365ml)
GELATO (ICE CREAM)		
Producer	Supplier	Product
Charing Cross		Gelato, various flavours available at Christchurch Riverside Market
SOAP AND COSMETICS		
Producer	Supplier	Product
Sabelle	Jones Family Farm	Soap, fragrance free (120g)
		Hand Cream (200ml)
		Body Wash (500ml)
		Body Lotion (250ml)
		Body Butter (230g)
Lonsdale Sheep Dairy	Canterbury Milk Supply Group	Novelty soaps, various scents and sizes

¹³ Information provided by Craig Prichard (SheepMilkNZ) in report commissioned by Venture Taranaki, March 2022

Drivers of growth

The sheep dairy industry is based around value-added products, such as infant formula, cheese, and yoghurt. The export industry in New Zealand of sheep milk products is currently valued at \$20 million, however, this is expected to increase to approximately \$250 million in 2024 based on current modelling¹⁴.

The growth of New Zealand's sheep milk industry is deeply connected to the changing concerns, desires, tastes, and behaviours of consumers both domestically and internationally. The key drivers of the growth of this sector are:



¹⁴ Opportunities for New Zealand Sheep Milk Products, New Zealand Food Innovation Network, July 2020



Photo: Spring Sheep Milk Co.

Benefits of sheep milk compared to bovine milk

FINANCIAL BENEFITS

The below table compares the operating inputs and profit of traditional bovine dairy farms and sheep dairy farms. Information is sourced from the financial analysis of a Waikato sheep dairy unit, DairyNZ's 2019/20 Dairybase benchmark data¹⁵ and Fonterra's 2019/20 farmgate milk prices¹⁶. The assessment shows a clear increase in operating profit per hectare for sheep dairy farms compared to cow dairy farms.

	Bovine dairy farm - national average (2019/20)	Bovine dairy farm - Taranaki average (2019/20)	Sheep dairy farm - Taranaki model (Year 1)	Sheep dairy farm - Taranaki model (Year 5) ¹⁷
Animals per hectare	2.9	2.8	16	16
Average total animal per farm	377	300	800	800
Farm size (hectares)	130	100	50	50
Average yearly milk production per animal (litres)	420	425	260	320
Approx percentage of milk volume as solids	15%	15%	18%	18%
Farm expenses per kg milk solids	\$4.46	\$4.17	\$10.68	\$8.68
Farm gate price per kg milk solids	\$7.19 (incl. dividend)	\$7.19 (incl. dividend)	\$13.80 (incl. transport costs)	\$13.80 (incl. transport costs)
Gross profit per hectare (excludes tax interest, depreciation etc)	\$2,816	\$2,905	\$2,333	\$4,718

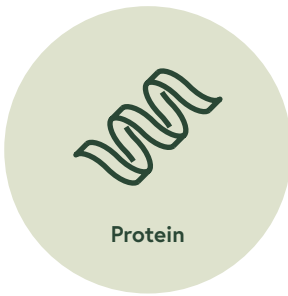
¹⁵ DairyBase Benchmarks, DairyNZ, 2022

¹⁶ Farmgate milk price, Fonterra New Zealand, 2022

¹⁷ Details taken from year three of financial model #2 which can be found on page 16 of this report

NUTRITIONAL BENEFITS

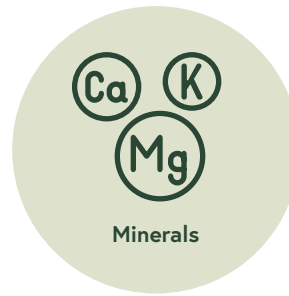
Sheep milk is frequently positioned as a nutritionally superior alternative to bovine milk¹⁸. Compared to bovine milk, sheep milk generally contains higher levels of major nutrients including:



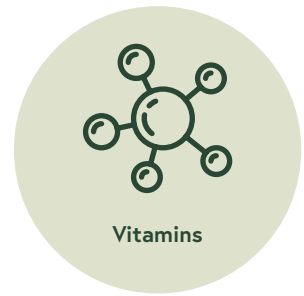
such as casein and whey which are a useful energy source and can assist muscle repair and development



various fats and lipids such as medium chain triacylglycerols (MCTs) which are useful for supporting natural resistance to infections, gut health and cognitive function



in particular calcium, potassium, and magnesium which are key for healthy metabolism and bone development and strength



in particular B2, B5 (supports the body to convert food into energy) and B3 (helps to lower cholesterol)

A full assessment of NZ sheep milk compared to bovine milk, completed by AgResearch, is available at **Appendix B**.

PRICE STABILITY

Due to the exceeding demand for sheep milk, there has been less variability on prices for milk solids, compared to that of the bovine dairy industry.

Year	Sheep milk pay-out (per kgMS) ¹⁹	Fonterra Bovine farmgate Milk price (per kgMS)
2017-18	\$14.40 - \$17.00	\$6.69
2018-19	\$14.40 - \$17.00	\$6.35
2019-20	\$14.40 - \$17.00	\$7.14
2020-21	\$14.40 - \$17.00	\$7.54
2021-22	\$14.60 - \$15.00	\$9.30 - \$9.90

¹⁸ *New Zealand Sheep Milk nutritional composition, AgResearch, 2017*

¹⁹ *Transport costs not included*



ENVIRONMENTAL BENEFITS

New Zealand Crown Research Institute, AgResearch, has supported Sheep Milk NZ to determine the environmental footprint of sheep dairy with a specific focus on nitrogen leaching and greenhouse gas emissions (GHG). Overall, they found that environmental impact of sheep dairying was between 10 – 50 percent lower than bovine dairying.

Nitrogen (N) leaching

N Leaching is the loss of nitrate as water drains through the soil profile, moving out of the range of plant rooting systems. It is recognised worldwide as an environmental and economic concern. In New Zealand, agricultural systems have been identified as a significant contaminant source to underlying groundwater and surface water bodies.

Studies in 2017 and 2018 looked at N leaching on farms near Tāupo in the North Island and Telford in the South Island. There was 50 percent more pasture growth and N cycling in the sheep treatment compared to cow farms. They attributed this to less compaction of the soil and more even spread of urine. Urinary N extraction (kg/ha) was 50 percent less for sheep than cows as well.

Greenhouse gas emissions (GHG)

Greenhouse gases, particularly methane and nitrous oxide, make up the majority of emissions that come from farmed livestock, such as sheep and cows. These animals naturally produce methane as a by-product of their digestive process and release it into the air. Nitrous oxide is produced when nitrogen compounds in urine, manure and fertilisers are broken down by microbes in the soil and released into the atmosphere.

Between 1990 and 2017, methane and nitrous oxide emissions from dairy cows made up more than 22% of New Zealand's total greenhouse gas emissions²⁰.

AgResearch completed a modelling exercise that compared two cow farming operations with five sheep dairy operations. This model showed that sheep dairy farms have a much lower GHG emissions level of 8 tonnes per hectare per year, compared to cow dairy levels of 12 tonnes per hectare per year²¹.

²⁰ NZ Greenhouse gas inventory 1990 – 2017, NIWA, published 2019

²¹ Information provided by Craig Prichard (SheepMilkNZ) in report commissioned by Venture Taranaki, March 2022

What's the bottom line?

Financials for farm conversion

Financial modelling has been completed for three different conversion options in Taranaki²². These models make a number of assumptions, as described in the first table below. Surplus and reared stock sales are not included in this modelling as this income would be offset by lamb rearing costs. These models describe a range of conversion options and five year flock performance forecasts.

Model assumptions²³

Farm gate price per kg milk solids (minus transport costs)	\$13.80				
Year	1	2	3	4	5
Average per ewe milk volume per year (litres)	260	270	280	300	320
Average per ewe milk solid volume per year (kgs)*	46.8	48.6	50.4	54	57.6
Lactation length (days per year)	180	190	200	210	220
Gross return per ewe	\$646	\$671	\$696	\$745	\$795
Total farm costs per ewe (expenses, labour, overheads etc)	\$500				
Cash surplus per ewe	\$146	\$671	\$696	\$745	\$795

Model 1 – small swing over 600 ewe on 40 hectares

Existing infrastructure	Yes				
Farm size (hectares)	40				
Number of dairy sheep	600				
Expected shed design	20 bale swing or 30 bale rotary				
Expected capital cost	\$200k - \$400k				
FTE staff	1 - 1.5				
Year	1	2	3	4	5
Total milk solid production (kgs)	28080	29160	30240	32400	34560
Total gross profit	\$387,504	\$402,408	\$417,312	\$447,120	\$476,928
Cash surplus after expenses	\$87,504	\$102,408	\$117,312	\$147,120	\$176,928
Cash surplus per hectare	\$2,188	\$2,560	\$2,933	\$3,678	\$4,423

²² Based on information provided by Craig Prichard (SheepMilkNZ) in a report commissioned by Venture Taranaki, March 2022. Note, total farm costs per ewe can vary significantly based on a range of factors and \$500 is an estimate based consideration of known industry figures

²³ Calculated at 18% of total milk volume.

Model 2 – medium 40 aside swing over 800 ewe on 50 hectares

Existing infrastructure	Yes				
Farm size (hectares)	50				
Number of dairy sheep	800				
Expected shed design	40 aside bale swing over				
Expected capital cost	\$500k				
FTE staff	2 - 2.5				
Year	1	2	3	4	5
Total milk solid production (kgs)	37440	38880	40320	43200	46080
Total gross profit	\$516,672	\$536,544	\$556,416	\$596,160	\$635,904
Cash surplus after expenses	\$116,672	\$136,544	\$156,416	\$196,160	\$235,904
Cash surplus per hectare	\$2,333	\$2,731	\$3,128	\$3,923	\$4,718

Model 3 - large rotary 1,600 ewe on 90 hectares

Existing infrastructure	Not necessary				
Farm size (hectares)	90				
Number of dairy sheep	1,600				
Expected shed design	60 - 72 bale rotary				
Expected capital cost	\$1m - \$5m				
FTE staff	4 - 5				
Year	1	2	3	4	5
Total milk solid production (kgs)	74880	77760	80640	86400	92160
Total gross profit	\$1,033,344	\$1,073,088	\$1,112,832	\$1,192,320	\$1,271,808
Cash surplus after expenses	\$233,344	\$273,088	\$312,832	\$392,320	\$471,808
Cash surplus per hectare	\$2,593	\$3,034	\$3,476	\$4,359	\$5,242

FARM CONVERSION DECISION: MILKING SHED TYPE

When converting from a bovine to sheep milk system, one of the decisions is the type of milking shed. This process requires consideration of a number of factors:

- Similar to bovine dairy, both rotary and herringbone options are available for sheep dairy.
- A large scale rotary with related barns, platform and covered yards will be more than \$5 million, where as a retrofitted herringbone shed should cost less than \$1 million.
- A 40 aside herringbone with two staff using a swing over system has become the standard set up for most of the smaller scale new entrant sheep dairy operators.
- It can be easier to train staff using rotary systems. Visibility advantages mean it is also easier to check sheep health and welfare using rotary systems.
- However, efficient and fast sheep milking comes down to animal selection based on behaviour, speed of milk let-down and 'milking out' rates. Systems that are able to identify high performing ewes to help a breeding scheme are the most valuable.

Other conversion considerations²⁴

There are many considerations beyond infrastructure and costs for farmers to think about when planning to convert from bovine to dairy farming. These are detailed below. A number of these considerations are dependent on the assumption that Taranaki farmers will initially rely heavily on the sheep milk sector in Waikato for supply contracts, value-added production and initial flock purchases.

CONTRACTS

Negotiation of a suitable supply contract is a key factor when considering farm conversion. Particular consideration should be given to various contractual commitments and supplier exclusivity.

TRAINING AND EDUCATION

The key to successful sheep dairying is not only in the capital infrastructure or quality of the sheep, but the farm manager and staff focussed on improving farm practices and outputs. However, as the sector is still in its infancy, the opportunity to recruit experienced and successful sheep dairy farm managers and staff from the outset can be limited. Consideration should be given to introductory courses in sheep physiology, behaviour, nutrition, and health and welfare, along with exposure to a full season of routines on an established farm.

FLOCK SELECTION AND STARTER FLOCKS

One of the fundamental aspects of a successful sheep dairy operation is a sufficiently large flock of high producing ewes. New-entrant farms could benefit by checking the in-shed behaviour of ewes prior to their purchase. Poorly behaved ewes can be a problem for many new sheep dairy farms and can create extra work for milking staff.

REARING UNITS

While it is possible to rear lambs using existing infrastructure on a farm (various sheds and buildings on the property), there are certainly benefits from a dedicated, organised rearing unit. However, these benefits should be compared against the construction costs which can be considerable.

MILK TRANSPORT

Taranaki farmers initially are likely to incur transport costs for milk to be collected by Waikato processors. These costs are expected to be between 12 – 25 cents per litre, or between \$1,800 - \$3,750 per \$15,000 tanker load. These charges may be unavoidable for Taranaki farmers in the first few years and consideration should be given to pre-milk transport systems.

MIXED FARM OPERATION MODELS

This blueprint primarily discusses the opportunity for the full conversion of bovine dairy farms to sheep dairy farms. However, a common question that is asked relates to whether a mixed operation (i.e, farming sheep dairy and other livestock) is possible.

It is possible to farm sheep dairy as well as dry stock. Many sheep dairy operators run a small herd of beef cattle with the purpose of cleaning pastures after the flock has moved on and managing the parasite burden. Some operators also run ewe lambs on their properties once the lambs are fully weaned. These options can also assist to diversify income and manage risk.

It is not recommended to farm both sheep and bovine dairy on the same property. Sheep dairy and bovine dairy are two different operations requiring different equipment, and it is much more efficient to focus on just one. Previously, one Canterbury farmer considered the cost of converting a rotary milking shed to be able to service both bovine and sheep but found the cost prohibitively expensive.

²⁴ Information provided by Craig Prichard (SheepMilkNZ) in report commissioned by Venture Taranaki, March 2022

Farm conversion case study²⁵

ONUKU MĀORI LANDS TRUST

Onuku Māori Lands Trust is a progressive, award winning, multi-enterprise and multi-discipline farming and food product business based at Rerewhakaaitu, south of Rotorua. In 2020 the trust converted one of its four bovine dairy farms and part of a sheep and beef farm to sheep dairying. It became Spring Sheep Milk Company's fifth milk supplier, and just the second external farm supplier in addition to the company's own three farms.

The 112ha property milked just under 1,500 ewes across the 2020-21 season from late August to April 2021 on a 72 bail GEA rotary. The trustees and managers would admit that there was a steep learning curve in the first season and would warn new sheep dairy farmers not to underestimate the challenges of the first season, particularly rearing lambs at scale.

The trust's decision to switch to sheep dairying was not taken lightly nor quickly. Onuku general manager Angela Wharekura and trustees Tina Ngatai and chair Barnett Vercoe gathered contacts and information over a three-year period before working with AgFirst consultant, Pete Livingstone, to submit a business case to the Trust board for consideration. Among the changes required on the 112-hectare property was a new rotary milking parlour and two covered barns, together with changes to fencing and significant lucerne planting. The scale was such that the many millions of dollars' worth of investment was required to convert. The trust employed former goat farmers Rudolph and Marijke Van Zuydam as farm managers in addition to three milking staff and casual staff involved in lamb rearing.

In 2018 Onuku won the Ahuwhenua Trophy dairy award. After years of work on improving farm returns, addressing environmental challenges, and increasing grants and dividends to the trust's more than 4,000 shareholders, the award gave the trustees the confidence to take the next diversification steps. Trustee Tina Ngatai told the 2021 Sheep milk conference:

'Like many Māori landowners the absolute priority is to leave the land in better condition than we got it. That means our key drivers are to stay in business, create a return for our people and to look after our whenua. We regard our land as *Taongo tuku ihu*, something that is sacred to be passed on from generation to generation.'

The trust's farm consultant, Pete Livingstone, said the trust was keen at looking at the long-term strategy and given that it is in a very sensitive area regarding water quality, lakes and rivers, the decision was not to just have a diversified portfolio but to look at the long-term environmental footprint.

In 2019 the trust's operations were the subject of a comparative greenhouse gas reduction project sponsored by the NZ Agricultural Greenhouse Gas Research Centre. The project showed that with relatively minor changes, including a 10 percent reduction in stocking rate, growing maize on site and not buying palm kernel, alongside some increase in forestry and mānuka planting, the overall operation could be carbon neutral or even in carbon surplus. The report noted that sheep dairying's GHG emissions (8 tonnes of GHG emissions per animal) and nitrogen loss (21kg of leached nitrogen per animal) was lower than that of the trust's bovine operations (9.3 – 10.3 tonnes of emissions and 44kg of nitrogen leaching per animal), however, the advantage of sheep dairying was the increased profitability per hectare.

Like many Māori landowners the absolute priority is to leave the land in better condition than we got it. That means our key drivers are to stay in business, create a return for our people and to look after our whenua.

25 Information provided by Craig Prichard (SheepMilkNZ) in report commissioned by Venture Taranaki, March 2022

Next steps

YOUR SUPPORT TEAM

Converting to and operating a sheep dairy farm can be challenging and will require a range of supporting services. Initial contact should be made with:

- Financial advisors to support and/or package development projects.
- Existing sheep dairy companies, such as [Spring Sheep Milk co](#), [Maui Milk](#) or [Sheep Milk NZ](#).
- If the farm is owned or operated by a Māori land trust or Incorporation then contact could be made with the Māori Agribusiness Sheep Milk Collective.

Many of these services will initially be provided from other regions, such as Waikato, but as the industry grows so too with the supporting services in Taranaki.

FUNDING OPPORTUNITIES

The source or sources of funding for development of a sheep dairy farm will depend on the circumstances of the party or parties carrying out the development and the structure of the proposed investment.

- Sheep dairy developments may be part-funded by the landowner – perhaps using equity and cashflow from an existing farming or other business operation that continues in conjunction with the forestry development.
- New Zealand banks will have personnel with experience in assessing farm conversion opportunities and providing loans for development.
- There are also developments funded by syndicators where equity is provided from multiple investors.
- Other sources of funding may also be available for specific activities such as R&D. Venture Taranaki can advise on whether there are other such funding opportunities.

CHECKLIST AND ACTION GUIDE FOR INTERESTED INVESTORS

If you are a/an:

- Taranaki farmer or landowner looking to expand and diversify your income stream.
- Investor considering future trends and growth markets in the food and fibre sector.
- Bovine dairy farmer considering a change in lifestyle or farming operation.
- Register your interest with Venture Taranaki.

REVIEW FURTHER INFORMATION

- Plant & Food Research's [Taranaki Land and Climate Assessment](#) report
- New Zealand Food Innovation [Opportunities for New Zealand Sheep Milk Products](#) report.

Get in touch, email branchingout@venture.org.nz

Appendices

APPENDIX A: HISTORY OF SHEEP DAIRY IN NEW ZEALAND

Possibility of sheep dairy industry first mentioned in *The Clutha Leader*, New Zealand's biggest newspaper at the time. Farmers decided to farm sheep for wool and meat instead.



Eight small scale sheep milking operations started with the support of the Ministry of Agriculture and Fisheries who imported East Friesian sheep dairy genetics from Sweden. Kingsmeade Artisan Cheese is the only business still in operation.



Ministry of Agriculture and Fisheries investigated various sheep milking projects in response to Britain's entry into the EU. There was some farmer interest but projects were abandoned when government financial support ended.



FoodWaikato Spray Dryer²⁶ operational (first in New Zealand). Specialising in converting sheep, goat and cow milk into powders that can be used to make infant formula, the spray dryer is capable of processing 65,000 litres of milk per day.



Waituhi Kuratau Trust (WKT) built an 80 bale external rotary sheep dairy shed on land near Tūrangi. MPI export regulations resulted in the business closure in 2014.



Only four sheep dairy farms operational.

WKT formed Maui Milk with international investors. Spring Sheep Milk Company was formed in partnership with Pāmu (Government owned Landcorp New Zealand) and SLC (marketing company)²⁷.



Maui Milk signed supply agreement with French multinational Danone, producers of the infant formula *Karicare*.

More than 36 sheep dairy operations exist, primarily based in Waikato, Wairarapa and Canterbury.



²⁶ Food Innovation Network, Food Waikato

²⁷ The Spring Sheep Story, Spring Sheep New Zealand website, 2022

APPENDIX B: NUTRITIONAL COMPARISON BETWEEN SHEEP AND BOVINE MILK

In 2017 AgResearch completed an assessment of NZ sheep milk compared to NZ bovine milk. Full details of the research are displayed below²⁸.

Component	NZ Sheep Milk *		Cow milk **
	Range	Average	
Water (% by difference)	78.3 – 84.7	81.9	86.4 – 87.8
Total protein (%)	4.1 – 11.2	6.2	3.3 – 3.9
Casein	3.3 – 8.9	4.7	2.6 – 2.8
Whey	0.82 – 2.24	1.24	0.55 – 0.70
Non-protein nitrogen	0.04 – 0.05	0.046	0.03 – 0.04
Fat/Lipids (%)	3.8 – 16.8	6.7	4.6 – 5.3
Phospholipids (% total)	0.03 – 0.12	0.053	0.03 – 0.04
Phospholipids (mg/100mL)	29.6 – 120.1	55.1	20.3
MCT (<36 carbons % total)	26 – 59	43	16 – 28
Saturated FA (mol % total)	63 – 79	72	75 – 79
Medium chain FA (mol % total)	7.9 – 23	15.4	9.6 – 10.9
Total PUFA (mol% total)	2.5 – 6.6	4.4	2.2 – 2.5
Lactose	3.4 – 5.6	4.8	4.6 – 5.2
Ash	0.89 – 0.93	0.91	0.7 – 0.8
Total solids	12.4 – 32.4	18.1	11.8 – 13.0
Mineral (mg/100mL)			
Ca	70 – 285	193	114
P	57 – 232	157	87
K	72– 203	126	106 – 163
Mg	7 – 45	20	7 – 12
Fe	0.02 – 0.18	0.05	0.03 – 0.1
Na	20 – 137	52	58
Vitamin (µg/100mL milk)			
A – Retinol	38 – 158	83	84
B1 – Thiamine	26 – 64	52	100
B2 – Riboflavin	260 – 530	406	200
B3 – Niacin	250 – 370	300	110
B5 – Pantothenic acid	383 – 554	462	260 – 490
B6 - Pyridoxine	15 – 20	18	30 – 70
B12	0.29 – 1.33	0.68	0.27 – 0.7
K	0.22 – 0.8	0.43	1.1 – 3.2
C	1000 – 3600	2100	2000

* NZ sheep milk experimentally derived from vat and individual milk samples (>400) collected Lactation seasons 2014-2017.

** Adapted from NZ and international data.

MCT Medium chain triglycerides

FA Fatty acids

PUFA Polyunsaturated fatty acids

ABOUT VENTURE TARANAKI

Venture Taranaki is the regional development agency for Taranaki. The organisation is responsible for regional development strategy, enterprise and sector development, investment and people attraction, and major project initiatives which contribute to the inclusive and sustainable growth of the region. Venture Taranaki is a registered charitable trust and a New Plymouth District Council Controlled Organisation, supported by the three District Councils of the Taranaki region.

venture
TARANAKI
Te Puna Umanga

Taranaki's Regional Development Agency

25 Dawson Street, PO Box 670
New Plymouth 4340, New Zealand

T+64 6 759 5150

E info@venture.org.nz

venture.org.nz