

Near-term Opportunities Feasibility Study

For Sustainable Land Use Options

10th January 2019



Mackenzie
CHARITABLE FOUNDATION

Leftfield
Innovation
Limited 

Contents

1.0	Executive Summary	4
2.0	Near-term opportunities for Value Work Programme	8
2.1	Situation Analysis.....	9
2.1.1	Milling Wheat	9
2.1.2	Breakfast Cereals	9
2.1.3	Grains & Pulses	9
2.2	Key Themes.....	11
2.3	Animal Food.....	11
2.4	2.4 Feed Grains	12
3.0	Market Players	13
3.1	Milling Grains - Key Players Description.....	14
3.2	Breakfast Cereal Grains – Key Players Description.....	17
3.3	Grain Pulses – Key Players Description	19
3.4	Pet Food, made with cereal grains - Market Players	21
4.0	Demand for NZ-Origin – Milling Wheat, Cereal Grains and Pulses	22
4.1	Consumer Demand.....	22
4.2	Raw Materials vs Ingredients	22
4.3	Capturing value - Telling their story.....	23
4.3.1	How they farm.....	23
4.3.2	Proven World-class quality.....	23
4.4	Eat New Zealand – Telling the NZ Food Story	24
5.0	Logistics	25
5.1	Regional Infrastructure Overview	25
5.2	Milling Wheat & Grains Bulk Supply	25
6.0	Price Point - Milling Wheat	27
6.1	Price Point - Breakfast Cereal Grains.....	27
6.2	Price Point - Grain Pulses	27
7.0	Ingredient Quality – Milling Wheat	28
7.1	Ingredient Quality - Breakfast Cereal Grains	28
7.2	7.2 Ingredient Quality - Grain Pulses.....	28
8.0	Evaluation of Market Potential	29
8.1	A shift to Value.....	29
8.2	Milling Wheat	29
8.3	Breakfast Cereal Grains	30
8.4	Pet Food	30

8.5	Grain Pulses	30
9.0	Recommendations – Milling Wheat, Cereal Grains & Pulses	31
9.1	Priority Project No. 1 Future Grains Project.....	31
9.2	Priority Project No. 2 - Crop Trials.....	31
9.3	Priority Project No. 3 -Substitution of Imported Pulses	31
9.4	Priority Project No. 4 –Processing Capability	31
10.0	Fresh + Processed Vegetables	32
10.1	Situation Analysis.....	32
10.2	Australian Market	32
10.3	Dubai	32
10.4	Japan.....	32
10.5	Price Point	33
10.6	The Demand for NZ Origin	33
10.7	Quarantine	33
10.8	Opportunity Summary	34
10.9	Recommendations	34
11.0	Plant-based Oil	35
11.1	Situation Analysis.....	35
11.2	Import Substitution – potential impact	35
11.3	Market Players	35
11.4	Opportunity Summary	36
11.5	Recommendations	36
11.6	Proposed next steps Oils.	36
12.0	Appendices: Questionnaires/Summaries (Confidential -Not provided in this copy).....	37

1.0 Executive Summary

Establishment of more hectares of sustainable land use is complex, with many factors influencing growers' ability to change what they farm. The purpose of this project is to identify sustainable land use opportunities that can be implemented in the near term, with an initial target date of establishing Grower Groups and refreshed grower/processor relationships in Q1 2019 that will enable growers to capture more value from existing crops. This is a key first step as we move toward transforming the raw materials into high value food products over the next 2-3 years.

Due to the new irrigation capability in the Selwyn District via the Central Plains Irrigation Scheme, our initial focus is central Canterbury. However, we have also included a target for some land use change in the North Island, likely the Wairarapa.

Why are we not seeing changes to a range of sustainable land use options triggered as a result of new irrigation? While there are several reasons, the key being the lack of high value options that enable farmers to 'make irrigation pay'. Traditionally, New Zealand agriculture has been a commodities-based sector. Growers are highly skilled and produce world class plant and animal raw materials for export. However, we typically don't transform these raw materials into high value food products. The value add is captured in-market after it leaves New Zealand. NZTE's figures illustrate this position well – the annual value of Agri food and beverage exports is \$36bn, which command an in-market value of \$200bn. New Zealand captures less than 15% of the value that we produce.

Moving from a volume-based industry to a value-based industry has long been identified as the position New Zealand agriculture needs to achieve. There are some examples of this transition – many of which are marketing based (Zespri, Rockit apples) rather than transformation of the raw materials into high value food products. However, these examples are not the norm, particularly in the arable sector.

This study reviewed 6 commodity categories – milling wheat, breakfast cereal grains, grain pulses, animal food, fresh vegetables for export and plant-based oils. We assessed the key players in each category, key barriers including logistics, quality, quantity, price point, ability to access seed and quarantine issues.

Historically New Zealand growers produced these 6 commodity raw materials for New Zealand processors and consumers. Challenges with quality and consistency; and the costs associated with transporting the raw materials from the South Island to the North Island resulted in processors opting for imported alternatives. The impact this has had on the range and quantity of grower contracts has been considerable. This position has been exacerbated through the increased competition for land use options as new irrigation has been developed; with many farmers converting to higher returning land uses such as dairy, to achieve economically viable businesses.

Our research has established that there is very low awareness by New Zealand consumers that the wheat in their bread (North Island), breakfast cereal grains and pulses are predominantly imported. We have established that the increasing biosecurity demands for imported grains and pulses are driving many food ingredient importers preference for New Zealand-grown options, particularly soybeans, chickpeas and lentils. Improvements to the grower/distributor relationship to achieve longer term supply partnerships has been established as a key opportunity to substitute some imported product with New Zealand grown. Further, securing the correct seed varieties that match consumer preferences regarding size, colour and cooking times is an essential part of securing higher value opportunities for farmers.

Processing capability is a theme that has also come through strongly across all the options we have evaluated. The lack of processing capability to transform our raw materials into high value ingredients and products is one factor limiting the ability for New Zealand growers to make the transition from volume to value.

Future Grains Project – Target September 2019 planting

We have examined milling wheat as an opportunity to increase hectares of wheat in the South Island initially, and ultimately both Islands, and improve the value for growers.

As a result of this study, we have developed the Future Grains Project with Champion Mills Ltd. Champion have significant milling infrastructure in Christchurch, and Tauranga. Japanese owned, Champion export some products globally and have a well-established supply chain and customer base. A key factor in the formation of this initiative is the shared values of sustainability and commitment to redesigning the way growers and Champion work together, moving away from an annual contracted basis to a long-term partnership with growers.

Capture Value

New Zealand growers produce some of the highest-quality milling grains in the world. However, this is not well known by New Zealand consumers. NZ grain growers farm to a very high standard compared with other countries with a wide range of farm practices measured and monitored daily. Our work has established that the lack of communicating the story around NZ grain is undervaluing the produce grown across all the segments we studied.

Milling wheat is not expected to be a 'game changer' land use in NZ. The Future Grains Project will be rolled out in three phases each forming the building blocks upon which a wider range of milling grains are developed into high value food products by Champion for global consumers.

Capturing additional value will involve the development of a Branded NZ Grains Mark that will be underpinned by sustainability benchmarks. Farm data will be authenticated through the transaction-based block chain technology to communicate the compelling provenance story from farm to plate.

Working with EatNZ, this project aims to raise the profile of NZ grown Grains, Pulses and Oils utilising top NZ chefs and restaurants who share the passion for locally grown food.

Grower Group

Capturing value for the growers is key. We have established that value for the growers includes not only the price for the crop, but also greater certainty for crops in future years. Greater certainty helps growers plan their business more effectively. Establishment of the Future Grains Grower Group will redesign the grower/processor relationship providing this much-needed longer-term certainty. The group will licence the Branded NZ Grain Mark to differentiate their produce from the market and benefit from an expanded grain crop offering by Champion as new products are developed and new value is created.

Options for the creation of new value could include premium cereal-based pet food, sprouted grains, coloured grains and a range of pasta and noodle-based food products for export.

Fresh & Processed Vegetables – Potential mid-term 2020/2021

We have established that there are 17 to 25 fresh vegetables within the Dubai market and Sydney markets that we can grow in New Zealand. These are not currently grown for export to these centres.

Research highlighted that Australia's demand for NZ grown vegetables was at times high, but this was typically short lived and related to drought conditions. There is a consensus that these conditions may become more prolonged and will present a more consistent supply opportunity for New Zealand in the future. The opportunity identified for export of fresh vegetables is focused on Dubai - the gateway to the Middle East. Initial findings are positive; with price points assessed showing significant potential \$45,000 - \$69,000/ha for some vegetable options such as green beans and bok choy. A trip is planned for February 2019 to investigate the market and this opportunity further.

Processed vegetables – juices and purees are an opportunity for potential expansion, however, this will require further engagement with processors in early 2019.

Plant based Oil

The two key opportunities for plant-based oils include the replacement of imported oils in food processing and the high-value oils market for food oils, dipping oils, cosmetics and aromatic oils.

A full NZ replacement for imported rape seed oil would result in 25,000ha of land use. A target of 50% replacement within a 3-year period would equate to 12,500ha by 2022.

Pure Oil is the only domestic oil processor of scale. Pure Oil cold presses process oil seed rape for canola oil for domestic and industrial uses and currently have significant spare processing capacity. Pure Oil is currently examining sunflower oil as an opportunity for the New Zealand home kitchen trade.

Further engagement is required with industry experts to help determine if a viable opportunity exists for import substitution at scale for a range of imported oils.

Summary of Recommendations

1. Future Grains Project (Including Branding NZ Grains Mark)

Develop project scope of work and budget, secure farmer funding and co-funding.

2. Crop Field Trials

Plant trials of crops (Dec 2018/Jan 2019) relating to cereal grains and/or seeds that are of interest to Japanese customers. There is potential for 30,000ha to 50,000ha of crops that fit within existing farm systems and have a very short growing season.

3. Substitution of Imported Pulses

Engage with NZ food ingredient importers/distributors to secure grower contracts for soybean, chickpeas and lentils.

4. Manufacturing & Processing Capability Study

This study has highlighted that an effective strategy for supporting land use change is engagement with existing manufacturers and processors. Conversations have indicated there is a great deal of interest in expanding capability as a way of future-proofing businesses. Recommended actions include scoping a project to complete a wider evaluation of manufacturing and processing capability across NZ and to identify potential projects and opportunities for land use expansion.

5. Fresh Vegetables

There is a planned trip to Dubai in February 2019 to further investigate an opportunity to export fresh vegetables to Dubai. Additional work includes engaging with vegetable processors in January 2019 to investigate opportunities for expansion of juice and puree products.

6. Plant-based Oils

Engage with industry expert to evaluate canola oil substitution potential.

We would like to acknowledge the project sponsor, the Mackenzie Charitable Foundation, for making this work possible.

2.0 Near-term opportunities for Value Work Programme

The objective of this work programme is to unlock existing land use potential and provide short to long term opportunities for sustainable land use in Canterbury and other regions in New Zealand. LFI aims to deliver at least one sustainable crop option for Canterbury farmers and possibly some North Island farmers for Autumn 2019. LFI will deliver further land use options for New Zealand farmers in the future as the wider work programme progresses.

To achieve the objectives, this feasibility study will provide a high-level evaluation of the following 6 crop commodity options and determine which option(s) are worthy of further investigation.

1. Milling wheat
2. Cereal grains
3. Grain pulses
4. Grains for animal food
5. Fresh vegetables
6. Plant based oils

There are several participants in the existing value chains that relate to each of these crop options that LFI will engage with to determine the issues, challenges and opportunities. The first four categories will be evaluated together as they share some common participants and steps in the value chain. Where relevant, the following scope will be reviewed for options 1-6: -

- Key industry players.
- Potential customers.
- Potential barriers, including;
 - logistics.
 - quality.
 - quantity.
 - price point.
 - ability to access seed.
 - quarantine.

2.1 Situation Analysis

This section provides our analysis of the grain and pulse commodity to understand the current market, challenges and potential areas for further development in NZ.

2.1.1 Milling Wheat

Currently almost all baked goods produced in the North Island are produced using imported wheat mostly from Australia. NZ imports approximately 500,000 tonnes of wheat each year of which approximately 300,000 is milling wheat used by two of the three major flour mills and their associated bakeries.

The imported wheat can be delivered in large volumes to key ports in Auckland or Tauranga close to major flourmills. The wheat is one large (20 – 30,000t) consistent line so the large throughput mills do not need to alter the milling equipment to extract a consistent quality flour. Historically, it has not been possible to create a larger line of wheat that is consistent in quality from NZ as most wheat is stored on-farm in smaller batches.

North Island bakeries use flour milled from Australian wheat because it is supplied to them by the flour mills and they are given little choice. The flourmills have claimed they use Australian wheat based on flour quality. However, our research has indicated that the key drivers are more likely to be price, ease and consistency of supply of wheat.

To add to this, two of the four flourmills are Australian owned, and only one uses solely NZ wheat. Although the price of flour is obviously a driver, the farmgate cost of the wheat in a supermarket loaf of bread is very small (approximately \$0.20). If the increase in price of a loaf of bread only reflected the wheat price then an increase of \$50 per ton to the grower results in an increase in the bread price of \$0.02 /loaf.

To date there has been little or no demand for baked products to demonstrate NZ source, provenance, sustainability or traceability. From several discussions with consumers, part of this lack of demand may be due to lack of understanding that the wheat ingredients are not grown in New Zealand. Recently Champion and Countdown agreed to the supply and use of NZ flour in their instore bakery.

2.1.2 Breakfast Cereals

This category could include Weetbix, kibbled grains, oat-based foods, and possibly cornflakes. The major cereal manufacturers Sanitarium, Kellogg and Hubbards source cereals predominantly from imported grains.

Historically NZ produced grains were used in cereals with Weetbix made from NZ wheat and oats supplied from Bluebird for several cereals. Due to quality issues and consistency of supply the large cereal companies moved toward using imported cereal grains 10-15 years ago. It is now recognised that some of these historic issues were driven by the cereal crops being grown in the wrong regions.

Our research has indicated there are a range of emerging niche cereal brands that are made in NZ, mostly from imported ingredients (Blue Frog, Delish, Yum, Cathedral Cove, Clean Paleo). For each of these brands the NZ-made story could be important and has the potential to be further enhanced by including NZ grown cereal grains in their products.

For the smaller cereal brands, a key challenge relating to using NZ-grown cereals is obtaining a consistent supply of the cereal grains in the format they require. Importers/distributors have indicated that in addition to the challenges they have encountered with securing grower contracts there have also been issues with the lack of processing infrastructure to clean polish, colour sort, flake, puff, and pop smaller lines of the cereal grains into the desirable cereal ingredient format. These are a significant limiting factor to being able to supply customers with NZ grown cereal grains. While there is growing consumer demand for NZ-grown, many brands import to overcome these barriers.

2.1.3 Grains & Pulses

This category is the dried pulse products found in Bin Inn, high value health food stores and increasingly supermarket shelves. It could include split peas, a range of beans, (mung beans, adzuki beans, black bean, haricot bean Lima bean, brown beans, butter beans, kidney beans, pinto beans), chickpeas, soybean, lentils and linseed.

A snapshot of the domestic market for grains and pulses in 6 categories is reflected in the following table. Generally smaller amounts of product across each category are used across a range of end products.

Commodity (not for sowing)	Quantity	Value for Duty 2017 (excl insurances)	Price/ton	Estimated Hectares required to produce
Oats – rolled or flaked	6,141	7,204,847	\$1,173	980
Buckwheat	250t	\$433,760	\$1,735.04	60
Quinoa	400t	\$1,587,605	\$3,969	100
Lentils (shelled)	1,586t	\$2,751,726	\$1,735	400
Chickpeas	1,985t	\$4,109,335	\$2,070	490
Kidney beans (including white)	6,637t	\$8,044,990	\$1,212	1470

Table 1. StatsNZ Grain & Pulse Imports 2017

(a) Export

The UK exports faba beans to the Mediterranean. Australia exports 300,000 tonnes of faba beans primarily to Egypt. NZ has some exports of peas to India and other nations although tariffs and restrictions on volume apply to some countries.

(b) Import vs NZ grown

Our research established that most grains and pulses consumed in NZ are imported from the USA, France, China, Australia and Chile.

- Lentils – red, green, brown, black – France + some from NZ.
- Beans – Haricot, kidney, pinto, blackeye - USA.
- Green split peas – Canada.
- Chickpeas – Australia and USA.
- Buckwheat – China.
- Coriander & Cumin – India.

Additional commodities of interest:

- Mustard – yellow, brown – USA.
- Linseed – NZ.
- Pumpkin seed – China.
- Caraway seed – Germany.
- Sunflower – Argentina.
- Soybean.

2.2 Key Themes

A major importer and distributor of a wide range of food ingredient and commodity products confirmed that there was a growing demand in NZ for NZ-grown foods including grains and pulses. Key themes that emerged from this research are:

1. Biosecurity

The increasing biosecurity requirements that imported grains and pulses must meet are becoming very challenging, despite the products being for consumption and not for growing. Because of this, importers/distributors would prefer to source NZ-grown grains and pulses where possible. However, we identified that there were challenges associated with NZ-grown grains and pulses that made this option a less desirable solution.

2. Grower capability and contracts

Ideally distributors would prefer to secure long term contracts with growers – i.e. up to 5 years, to provide them certainty of supply. There are successful examples of these long-term relationships – i.e in 2017, NZ growers produced all of the lentils distributed by one company across NZ. However, the barriers to achieving long term contracts for the likes of soy and chickpeas have included the inability of growers to deliver on their contracts consistently, growers walking away from contracts, and in some cases, a lack of grower capability which has resulted in over promising and under delivering.

3. Cost focus

NZ-grown grains and pulses are competing with lower prices for imported product. The price and volume-based approach is challenging, particularly when some growers are 'chasing the highest prices' and moving from contract to contract, rather than taking a longer-term approach and building a longer-term relationship with the Distributor that will put them in a better position to ride the highs and the lows of price.

4. Processing infrastructure

Grains and Pulses processing capability is well established within the feed grains industry. However, Distributors have not found there to be the equivalent capability for food grade grains and pulses. This includes screening; cleaning, colour selecting, metal detecting, polishing etc. We have established that this processing capability does exist across NZ within some of the larger food processors. A key barrier appears to be the availability of processing capabilities for the smaller volumes produced by NZ suppliers/growers. Colour sorting and cleaning are readily available in seed growing areas and polishing capability does exist.

5. Seed varieties

Seed stock is important for food grade soy and chickpeas. Being able to import the right variety is key. However, this is a costly and difficult process. Sources of a limited range of bean and pea seed varieties include:

- Heritage Food Crops Research Trust has collected a range of ancient beans and wheat varieties.
<https://heritagefoodcrops.org.nz> <david.hughes@laposte.net> or by phone on (06) 345 1302 or 021 081 30151.
- The Asian Seed Producers & Suppliers stocks a wide range of seeds including a range of pulses
https://www.asian-seed.co.nz/uploads/6/2/6/6/62666503/asain_seed_catalogue_427.pdf
- King Seeds have a range of pulses
<https://www.kingsseeds.co.nz/shop/Vegetables/Vegetable+Groups/Beans+%26+Peas.html> ;and
- Koanga Gardens : contact@koanga.org.nz appear to have wide range
http://www.koanga.org.nz/gardens/shop/?swoof=1&product_cat=bean

2.3 Animal Food

There are two distinct uses of grains in animal feeds, the use of grain to feed to animals for food production and the use of grains in diets for companion animals. These two markets are very different with feed grains generally

being commodities with lower value that are unprocessed or made in to a formulated feed and pet foods where the grain is a component of a high value feed primarily for dogs and cats.

2.4 2.4 Feed Grains

Although the feed grains will be a commodity there could be greater value to the farmer if the value chain was redesigned and the farmer was more closely linked to the customer. It is expected that some of the livestock industries will come under increased pressure to source NZ grain. The reliance on palm kernel by the dairy industry will not be tolerated by the major milk processors in future with Fonterra putting limits, and starting to enforce these limits, on animal intake. The potential change in consumer demands for chicken or pork fed NZ grain has not been assessed and the impact on the industry to supply has not been determined. The grains that may potentially be required by the livestock industry include wheat, barley and maize as well as faba beans for protein.

Between 2006 and 2016 the chicken consumption per person in NZ increased by 8kg per person per year and pork consumption by 2kg/ per person per year. The increase in chicken consumption in NZ is 3200 tonnes per year which, with a feed conversion ratio of 1.6:1, equates to an extra 5,120 tonnes of feed per year or 50,000 tonnes in the last decade. The price of feed grains is unlikely to change markedly but there could be an opportunity to return more to the farmer by setting up long-term contracts, by reducing the number of players in the value chain, or by identifying some attributes of grain for particular feed uses.

Pet Food: Targeting grain specifically to the high value pet food market could result in greater value to the farmers.

Nestle currently purchases 10,000t/year of NZ cereal grains for their Premium Pet food lines under the Purina brand. Consistency of supply and high quality will be essential for NZ-grown grains to retain Nestle as a customer.

This report will not consider feed grains for livestock any further as we cannot see much opportunity to add value. However, it will consider grains for pet food.

3.0 Market Players

Company	Milling Wheat/Flour	Breakfast Cereals	Grains & Pulses	Pet Food
Bakels	Yes			
Mauri	Yes			
Goodman Fielder	Yes			
Champion	Yes			Yes
Yarrows	Yes			
Foodstuffs	Yes			
Progressive (Countdown/Woolworths)	Yes			
NZ BioGrains (Ashburton)	Yes	Yes	Yes	
Nestle				Yes
Harraway & Sons		Yes		
Hubbards		Yes		
Kelloggs		Yes		
Lewis Road	Yes			
Sanitarium		Yes		
Taste Nature – wholefoods (Dunedin)	Yes	Yes	Yes	
Piko Wholefoods	Yes	Yes	Yes	
Davis Food Ingredients Ltd	Yes	Yes	Yes	

Table 2. Matrix of Key Market Players - Milling Wheat, Cereals, Grains & Pulses and Pet Food markets in New Zealand

3.1 Milling Grains - Key Players Description

The Baking Industry Association of New Zealand has approximately 500 members nationwide with many of these being smaller bakeries or smaller chains.

Major North Island bakers and suppliers of products for baking and some of the different or unique bakeries include:

Bakers, suppliers of baking products	Scope of business
<p>Bakels</p> <p>Awaiting reply from Brent Kersel, MD. Spoke to Kerry Hirst – very interested to engage with LFI. Likely to be the New Year.</p>	<p>Estab 1953, Bakels are a supplier of products to bakeries with over 220 product lines that contain flour. They have branches in both the North and South Island and are part of a large international business with Research and Development support.</p>
<p>Mauri</p>	<p>Mauri, a combination of 2 of Australia's most prominent baking ingredient business – Weston Milling and AB. Mauri are dedicated to the development of innovative bakery solutions which exceed customers' expectations on quality and performance. As a leading supplier of bakery ingredient solutions across Australia and New Zealand, Mauri offers a comprehensive portfolio of high-quality flours and pre-mixes under Weston Milling, Mauri and Cereform brands. Mauri aim to provide effective and successful solutions that add value to their customers' businesses and help them grow and established relationships ensure they are well positioned to create products and services that are innovative and unique.</p>
<p>Goodman Fielder</p>	<p>Goodman Fielder have a portfolio of brands that utilise milled flour including Quality Bakers, Vogel's, Mackenzie, Molenberg, Freya's, Natures Fresh and Ernest Adams as well as a range of flour and premix brands under the Edmonds brand.</p> <p>Sold Champion Milling Ltd to Japan's Nisshin Flour Milling in 2012.</p>
<p>Champion</p>	<p>Champion produce more than 40 varieties of flour for all kinds of baking and food processing; from high-performance baker's flour including Cake, Biscuit and Pastry flours, through to specialty-grain, ethnic and wholemeal flours. The Champion premix range has been developed as an ongoing commitment to improve the ease and quality of baking. Champion also supply a range of four different retail flours milled from premium quality wheat to precise specifications. Champion supply New Zealand flour to Countdown instore bakeries.</p> <p>Champion have extensive processing capability in Christchurch and Mt Maunganui, Tauranga.</p> <p>Supply cereals for premium pet foods.</p>
<p>Yarrows</p>	<p>State-of-the-art bakery is located in the small South Taranaki town of Manaia to produce an extensive range of breads, rolls, croissants, cookies and other quality baking products for leading supermarkets, retailers and food companies. All produced on highly specialised modern equipment. Yarrows have a site in Rotorua and recently commissioned their own flour mill in Tirau.</p>
<p>Stephen Anderson CEO 03 353 8601</p>	<p>100% NZ Owned cooperative buying group established in 1922; three separate, regionally based, retailer-owned co-operative companies and a federation body, Foodstuffs (NZ) based in Wellington.</p>

Bakers, suppliers of baking products	Scope of business
Progressive/ Countdown	<p>Progressive Enterprises changed its name to Woolworths NZ on June 25th 2018.</p> <p>Owns and operates 180 Countdown supermarkets in NZ.</p> <p>Support offices, processing plants and distribution centres.</p> <p>Serve 2.5m Kiwi's each week.</p> <p>Woolworths NZ is part of the Woolworths Group Ltd and is also the franchisor of the Super Value and Fresh Choice supermarkets which represents over 60 stores.</p> <p>July 2018 – Countdown announced that its in-store baked bread and rolls will now be made from more than 10,000 tons of Champion milled and Canterbury-grown NZ wheat each year.</p> <p>Available in 177 stores nationwide.</p> <p>Multi-year commitment to growers</p> <p>Countdown increasingly partners directly with growers and farmers – these relationships provide a better understanding of the challenge's growers face. Long term commitment sures up the whole supply chain, allowing growers to reinvest in their businesses and look at other opportunities to make the most of their land.</p> <p>Provenance and supporting local Kiwi producers are increasingly important considerations for customers.</p>
Gilmours	<p>Largest North Island food service wholesale provider for food and beverages. 7 Owner operated stores they offer 12,000 lines across a range of key categories. They have a Gilmores house brand.</p> <p>North Shore, Mt Roskil, Manukau, Tauranga, Hamilton, Central, Wellington.</p> <p>NZ Owned and operated for 100 Years.</p> <p>Sister Company – Trents Wholesale Limited (an independent operated subsidiary of Foodstuffs South Island).</p>
New Zealand BioGrains	<p>Located in Mid-Canterbury/Ashburton.</p> <p>Process organically grown grains, flours, pulses, nuts, stock food and other organic products to clients across NZ.</p> <p>Products are supplied in packets ranging from 500g bag to bulk purchases in 25kg bags.</p> <p>Certified by Bio-Gro, which is accredited by the international Federation of agriculture Movements (IFOAM), IFOAM represents the best in international organic standards.</p> <p>Shop on-line.</p> <p>Organic grains, flours, pulses, nuts, stock food.</p>
Lewis Road	<p>Lewis Road has recently added bread to their line of products and produce a kibbled grain loaf and a sourdough www.lewisroadcreamery.co.nz/products/pantry/bread</p>

Bakers, suppliers of baking products	Scope of business
Taste Nature Wholefoods	<p>Dunedin owned organic food store, eatery and kitchen. Organic produce is sourced from over 70 NZ suppliers. BioGro Certified. Extensive range of fill-your-own bulk products.</p> <p>Grains:</p> <p>Barley – Flakes/Pearl, Buckwheat – Bran/Flakes/Groats/Kasha/Semolina, Bulgur Wheat, Corn – Couscous/Popcorn/Polenta, Millet – Flakes/Hulled, Oats – Bran/Medium Rolled/Jumbo Rolled/Steel-Cut/Unsteamed/Whole Animal Feed, Quinoa – Black/Red/White/Flakes, Rice Flakes, Rye – Flakes/Kibbled/Whole, Spelt – Flakes/Hulled/Kibbled, Wheat – Bran/Kibbled/Konini/Whole/Semolina, Wheatgerm</p>
Piko Wholefoods 03 366 8116	<p>Wholefoods low-profit vegetarian wholefood co-operative estab 1979; specialising in certified organic and gluten free foods. Bulk purchases, self-packaging to keep prices down. Committed to – local produce & goods first; Fairtrade, providing information. Stockist list shows a range of imported and local organic products, including an extensive range of open sack, dry bulk ingredients (grains, pulses, seeds, nuts).</p>

Table 3. Major North Island bakers and suppliers of products for baking and some of the different or unique bakeries.

3.2 Breakfast Cereal Grains – Key Players Description

Cereal Processors	Scope of Business
<p>Nestle</p>	<p>Nestlé is the world's largest food and beverage company. They have more than 2000 brands ranging from global icons to local favourites and are present in 191 countries around the world.</p> <p>Their ambitions for 2030 that guide their work and support the achievement of the UN Sustainable Development Goals.</p> <ol style="list-style-type: none"> 1. For individuals and families – help 50 million children to lead healthier lives. 2. Strive for ZERO environmental impact in our operations. 3. Help to improve 30 MILLION livelihoods in communities directly connected to our business activities. <p>Brands</p> <p>Infant Nutrition; beverages; cereals; chocolate & confectionary; MAGGI; Medicated Remedies, Milks and Baking, Nestle Professional, Petcare, Tick Approved Products</p>
<p>Harraway & Sons</p>	<p>Est 1867, the Company still processes in the true Scottish tradition and style which gives Harraways oats a distinctive flavour and retaining the wholegrain “goodness of nature” in oat products. Harraway & Sons Ltd is a significant supplier of oat and grain cereals to the New Zealand retail and commercial markets and the Company specialises in both traditional and added value breakfast cereal products with a wide range of specialty grain products including oat, rye, barley and wheat flakes. The latter being used in both breakfast cereal, muesli and muesli bars.</p> <p>Sustainability Aspiration:</p> <ol style="list-style-type: none"> 1. Packaging – improving recyclable packaging over time – currently 50% is recyclable, non-single use plastics. 2. Utilising sustainable fuel sources and reducing waste- aspires to fully utilise its grain by-product in both fuelling aspects of its factory process, alongside introducing consumer concepts that are derived from factory created by product. – aspiration is to send less and less waste to landfill over time. 3. Supporting communities, trade customers and consumers. <p>Products</p> <p>Snack products – HARR-OS Indian Spice/Tai Sweet Chilli Pumpkin, Mexican Salsa (flavoured and baked oat ball);</p> <p>Oat-activ® Reduces Blood Cholesterol: flavours Original, Cranberry</p> <p>Harraways Breakfast – Rolled Oats, Scotch Oats, Fruit Harvest, traditional wholegrain, organic rolled oats, organic wholegrain oats.</p> <p>Oat Singles – various flavours</p> <p>Museli – Original, honey toasted, tropical fruit, Steel cut oats</p> <p>Commercial range:</p> <p>Toasted jumbo oats 20kg; Honey coated jumbo oats 20kg; honey coated and toasted barley flakes 20kg, Steel cut oats 20kg; Rolled oats 10kg; medium rolled oats 20kg; quick cook oats 20kg; jumbo oats 20kg; oatmeal 10kg; ground oaten flour 20kg.</p>

Cereal Processors	Scope of Business
Hubbards	<p>Established 1987 (Auckland based) – healthy, tasty nutritious food for New Zealanders everywhere. Oven baked, no added sugar options available.</p> <p>Products</p> <p>A range of natural and toasted muesli's/Granola; Porridge, Gluten free, corn flakes and rice pops, bran sultana & cranberry, Bran Berry.</p> <p>Yoghurt coated raisins added to muesli.</p> <p>A range of community outreach initiatives.</p>
Kellogg's	<p>90 years making cereals and snacks for NZ and Australia.</p> <p>Cereals – including 8 different grains: wheat, rye, triticale, brown rice, oats, barley, corn, quinoa. Does not state where the grains come from.</p> <p>Products</p> <p>All-bran; Coco Pops; Corn Flakes, Crispix, Crunch Nut; Fruit Loops Guardian, Just Right; LCM's, Breakfast Biscuits, Nutri Grain; Rice Bubbles; Special K and Sultana Bran (many of these cereals are Vegan).</p>
<p>Sanitarium health & wellbeing</p> <p>SG contacted Graeme Rayner, Commercial Manager (by email, awaiting response, likely to be in the New Year)</p>	<p>Sanitarium Health & Wellbeing New Zealand are one of several health-related companies owned by the Seventh-day Adventist Church (Vitality Works, Life Health Foods, Lifestyle Medicine Institute). It owns these companies as part of its vision to improve the health and wellbeing of communities in New Zealand, Australia and globally, with Sanitarium profits supporting these efforts.</p> <p>Charitable status, pays no income tax, reinvests profits into the community.</p> <p>Products</p> <p>Weet0Bix, Up&Go; So Good (non-dairy beverages – soy, almond and coconut milks).</p> <p>So Good – range of frozen desserts (soy, almond and coconut).</p> <p>Cereals – Toasted Muesli, Cluster Crisp; Light N Tasty.</p> <p>Spreads – Peanut Butter, Marmite.</p>

Table 4. Breakfast cereal grains – key players.

3.3 Grain Pulses – Key Players Description

Importers/ Wholesalers	Scope of Business
Gilmours	<p>Largest North Island food service wholesale provider for food and beverages. 7 Owner operated stores they offer 12,000 lines across a range of key categories. They have a Gilmours house brand.</p> <p>North Shore, Mt Roskill, Manukau, Tauranga, Hamilton, Central, Wellington.</p> <p>NZ Owned and operated for 100 Years.</p> <p>Sister Company – Trents Wholesale Limited (an independent operated subsidiary of Foodstuffs South Island).</p>
New Zealand BioGrains	<p>Located in Mid-Canterbury/Ashburton.</p> <p>Process organically grown grains, flours, pulses, nuts, stock food and other organic products to clients across NZ.</p> <p>Products are supplied in packets ranging from 500g bag to bulk purchases in 25kg bags.</p> <p>Certified by Bio-Gro, which is accredited by the international Federation of agriculture Movements (IFOAM), IFOAM represents the best in international organic standards.</p> <p>Shop on-line.</p> <p>Organic grains, flours, pulses, nuts, stock food.</p>
Taste Nature Wholefoods	<p>Dunedin owned organic food store, eatery and kitchen.</p> <p>Organic produce is sourced from over 70 NZ suppliers.</p> <p>BioGro Certified.</p> <p>Extensive range of fill-your-own bulk products.</p> <p>Beans & Pulses:</p> <p>Adzuki Beans, Black Turtle Beans, Blue Peas, Cannellini Beans, Chickpeas, Kidney Beans Red, Lentils – French Green/Laird/Red Split/Whole Brown, Mung Beans, Navy Beans White, Pinto/Borlotti Beans, Soup Mix – Ceres, Soya Beans, Split Green Peas, Whole Yellow Peas, Split Yellow Peas, Where Peas, Marrowfat Peas.</p>
Piko Wholefoods	<p>Wholefoods low-profit vegetarian wholefood co-operative estab 1979; specialising in certified organic and gluten free foods.</p> <p>Bulk purchases, self-packaging to keep prices down.</p> <p>Committed to – local produce & goods first; Fairtrade, providing information.</p> <p>Stockist list shows a range of imported and local organic products, including an extensive range of open sack, dry bulk ingredients (grains, pulses, seeds, nuts).</p> <p>Piko's have experienced difficulty sourcing NZ growing pulses recently. They typically only source organic. However, they do sell some non-organic that is spray free.</p> <p>Importing soy beans is difficult due to the GMO issues here. They would be very interested in NZ grown chick peas, non-organic whole soy beans; and lentils.</p> <p>Suggested that due to their small demand (100kg at a time), it would be best to sell through a national distributor as this would make it more worthwhile for the growers.</p> <p>Currently they source from Ceres Organics in Auckland and Chantal Organics in Napier.</p>

Importers/ Wholesalers	Scope of Business
Davis Food Ingredients Ltd	<p>One of NZ's largest food ingredient supply companies. 100% NZ owned, 85% owned by the people who work at Davis every day, and the balance is owned by those who have retired from Davis but have retained their shares.</p> <p>11 warehouses strategically located across NZ.</p> <p>Food processing capability.</p> <p>Branches – Auckland, Palmerston North, Wellington and Christchurch.</p> <p>Sales exceed \$300M.</p> <p>Commitment to the long-term view, invest in people, and logistics infrastructure.</p> <p>Extensive range of grains and pulses.</p> <p>Prefer to source NZ grown where this is possible.</p> <p>Works based on long term grower contracts (5 years).</p> <p>Supplies to many of the wholefood wholesale and retail outlets across NZ (Lindstrom Foods Christchurch).</p> <p>Very keen to source NZ grown soybeans, chickpeas and lentils. Has had challenges in the past with growers fulfilling their contractual obligations.</p> <p>Importing the right soybean and chickpea seed is key, but challenging.</p>

Table 5. Pulse grains- key players

3.4 Pet Food, made with cereal grains - Market Players

Processor	Scope of Business
Nestle	<p>Purina Pet Care; - one of the world's leading pet care companies (80 years of scientific advancement in pet nutrition).</p> <p>Biggest manufacturer and exporter of ped/dog food in NZ – Tux and Purina pet care.</p> <p>Currently Nestle imported most of the grains to produce their products but historically the Tux brand was made with New Zealand grain from a New Zealand breed wheat variety (Tribute) grown mostly in the Marlborough area.</p> <p>Price point is an issue, imported grains are cheaper and are of a consistent quality. There is a perception that it is difficult to control the consistency of quality for NZ-grown grains.</p> <p>Champion have an existing relationship with Nestle – supplying cereal grains for pet food. Further opportunity to expand on this relationship particularly by supplying quality grains.</p>

Table 6. Pet food – key player

4.0 Demand for NZ-Origin – Milling Wheat, Cereal Grains and Pulses

4.1 Consumer Demand

Until recently there has been very little consumer demand for flour from wheat grown in NZ. The Countdown initiative launched mid-2018 to use NZ wheat flour in their in-store bakery is a welcome step change and is working toward raising the profile of NZ grown wheat.

Farmers Mill tried to differentiate based on their flour being totally NZ in marketing to the bakery customer but have been faced with constraints in relation to price.

Amano Bakery in Brittomart www.amano.nz are the only bakery we are aware of that advertise the use of NZ wheat and clearly state *“It’s about staying true to our belief in provenance and sharing only seasonal, sustainable and local produce from New Zealand growers and farmers”* on their website and they source wheat (and spelt) from Canterbury. However, it is not clear in-store that they only source NZ wheat.

Similarly, there has historically been little demand for NZ-grown cereal grains. While there are specialist cereal grain companies such as Harraway & Sons; and Hubbards that use NZ-grown cereal grains, they are small players compared to the likes of Kelloggs and Nestle. Sanitarium used NZ cereal grains historically, but less so currently due to consistency of quality issues.

More recently however, there has been an increase in the niche market breakfast cereal companies producing NZ made products such as Blue Frog, Delish, Yum, Cathedral Cove, Clean Paleo. A closer look reveals that while many of these products are made in NZ, the ingredients are predominantly imported.

Through engagement with wholesalers, distributors and retailers we established that consumer preference for NZ-grown raw materials is increasing. However, 4 key themes emerged that help to understand some of the drivers for and against NZ grown raw materials:

1. Increasing biosecurity requirements is making importing grains and pulses more challenging, which is becoming a key driver toward a preference for NZ-grown raw ingredients.
2. The challenges with sourcing NZ-grown raw material that consistently meets the specifications required – some traders have found establishing relationships with growers difficult, and continuity of supply was challenging.
3. There is a significant lack of any NZ-branded raw materials that linked origin and quality to differentiate between NZ and imported raw ingredients. Without the origin and quality differentiation in place, it is very difficult for NZ growers to compete on a price basis.
4. Origin visibility displayed in the packaging of grains and pulses in retail outlets was very low. Deeper reading of the back label revealed that most were imported, very few pulses were grown in NZ. Those that were NZ-grown were not differentiated from others on display. We were surprised to learn that some consumers did not believe that many of the cereal grains and pulses could be grown in NZ. We were not able to establish how widely this view was held.

4.2 Raw Materials vs Ingredients

Our research was focused on NZ raw materials rather than processed ingredients made from those raw materials.

Plant based protein foods require the pulses to be processed and the protein extracted for use as an ingredient in these new and innovative foods. An example is NZ-made Sunfed Chicken, which is made from a range of plant-based ingredients including extracted protein from yellow marrowfat peas grown and processed in Canada. Sunfed chicken is attracting a great deal of national and international interest and investment; and is scaling up production. However, without the processing capability to transform the raw pea material into a high value ingredient there is no opportunity for NZ growers to participate in this innovative food opportunity that also could transform around 40,000ha of land use in NZ. We are also concerned that plant protein is already a commodity and it would be difficult for farmers to capture or create the value.

While lack of some specialist processing capability is currently a barrier preventing NZ growers from moving from volume to value, opportunities do exist within NZ’s processing landscape to extend uses for some existing NZ grown raw materials. Processors that have links to global markets, who have a future focused strategy that recognises the need to respond to changing consumers food preferences and demands are the ideal partners to explore value add, on a win-win basis.

4.3 Capturing value - Telling their story

We established that there is a link to the lack of telling the food story in the arable sector to the low demand for NZ grown grains and pulses. We need to acknowledge that there are other drivers such as price, quality and consistency of supply that have resulted in imported cereal grains and pulses dominating supply in NZ. Many of these issues have or can be overcome.

NZ consumers are demanding more locally grown food, thanks to the likes of Countdown's commitment to using only NZ wheat flour in their in-store bakery. However, there remains a great deal more that needs to be done if growers are to optimise the potential of what they can grow in NZ for local supply.

We have established that the first step is to capture the value that exists – the story of how they farm and the world class quality of what they produce. In this digital age, what does 'telling their story' entail?

We have established that the following are key elements to storytelling:

4.3.1 How they farm

1. Make it personal – telling the growers compelling story that is values-based.
2. Lead with 'their WHY', importance to their family, their community.
3. Lean on shared values - the food is grown sustainably – good for the environment, good for society.
4. Back up this story with on-farm data that is traceable – transparent transaction-based authenticated data at every step in the value chain.

4.3.2 Proven World-class quality

One processor we interviewed makes it their business to import cereal grains from around the world and test these grains for the quality attributes that make them recognised as world class. This ongoing check to establish how the NZ grown cereal grains compare enables this processor to validate that NZ cereal grains are some of the best in the world. This type of international quality benchmarking needs to become part of the story.

Farmers can provide origin traceability data to communicate that their products are NZ grown, sustainably with low agricultural input etc. The ability to provide these criteria in relation to wheat already exists and several farmers are already using software which can demonstrate this.

New Zealand cereal grains and pulses would benefit from branding or a 'Mark' based on sustainability benchmarks that would become the standard for growers to aspire to; processors to require, and for consumers to demand, and differentiate from other similar products.

4.4 Eat New Zealand – Telling the NZ Food Story

Eat New Zealand is a collective of New Zealand's chefs, producers, media, tourism and event operators, who have all been inspired to create a national platform to promote and champion our best food, drink, and culinary tourism opportunities. Their vision is for NZ to be the world's premium destination for food.

They are doing this by stimulating the development of sustainable food systems from source to the plate and beyond.

They are working on increasing our unique culinary credentials by showing NZ's food stories & people to the world.

Eat New Zealand was formerly called ConversatioNZ and was established in 2015 by owner of the 'Cuisine Magazine Restaurant of the Year', Giulio Sturla.

Eat New Zealand has confirmed they aspire to tell the NZ grains story to help raise the profile and therefore demand for NZ grains. Their research has indicated that there is an increasing demand for NZ-grown grains by mills, bakers and chefs that tell the provenance story, but have been unable to obtain a consistent supply.

Eat New Zealand's passion and commitment to telling the NZ food story is a significant opportunity to drive a revival of NZ cereal grains and pulses.

5.0 Logistics

5.1 Regional Infrastructure Overview

Canterbury is well appointed with key domestic and international transport infrastructure including Christchurch International Airport; South Island Main Trunk Railway Line; the Lyttelton Port and Lyttelton Port Company's new Rolleston facility, Inland Port.

The Inland Port has been set up to help service the increasing productivity from the Canterbury plains, primarily the anticipated export growth driven by increased irrigation.

Once fully operational, the Rolleston facility will provide better supply chain efficiency, particularly for central Canterbury importers and exporters, and will be able to receive and deliver import and export containers, provide container storage and repairs, and transfer containers between trucks and trains.

5.2 Milling Wheat & Grains Bulk Supply

A major constraint to supply of wheat, or bulk flour, to the North Island has been freight costs from the South Island. Historically freight rates across Cook Strait have made selling milling wheat competitively with imported wheat difficult. Further, the current trading model means individual merchants have been responsible for organising logistics and have taken a cut for their role in the transaction. Thus, there has been little incentive for a freight company to engage in the value chain. Bulk shipment of flour is difficult, as it is unstable and special vehicles are needed for safe transport. As such, any shipment is likely to be as wheat, which suits most flour milling enterprises as they aim to deliver 'just in time'.

Through engagement with industry we have identified that there are three key factors that impact on logistics, which have been particularly challenging for the cereal grains and pulses.

1. Consistent quality.
2. Moving quality/volumes.
3. Cost.

Other agricultural commodities regularly move by commercial freight between islands, and there are excellent success stories that the grain industry can learn from. Once such case study would be to look at the dairy industry in relation to feed grains. The dairy industry imports feed grains of 4million tonnes annually. Palm kernel imports are 3million tonnes annually. The dairy industry has developed a sophisticated network of supply chain partners to enable them to move these large volumes efficiently.

A key factor identified to be the cause of the often-prohibitive costs (compared to imported grains), is that each player in the logistics supply chain works in isolation. Failure to link the players and provide an end to end solution has an impact on cost.

Having the infrastructure in place to support each of the link/steps is critical. In NZ, that requires partnering to optimise existing infrastructure. In some cases, there may be a need for new infrastructure.

There are two key supply chain scenarios:

1. Grower direct to customer.
2. Grower to manufacturer to customer.

The addition of the manufacturer into the supply chain causes complexity. Typically, when a manufacturer is involved the volumes change, the raw materials become more diverse and value is added.

One of the biggest opportunities we have established is the role that the blenders (end to end service) play in the supply chain. They can move vast tonnages efficiently, have drying capability and quality bulk storage at key locations throughout NZ and can process, load and deliver 24/7, 365 days/year.

This end-to-end service minimises the changing of hands and thus added costs.

Any extension or new near-term opportunity needs to be able to look at all these steps to ensure that either one player can provide end to end services; or that partnerships/relationships are developed with key players to ensure that the end to end capability can be linked up. Our findings have indicated that the ability to achieve this efficiency of cost and time is a critical success factor.

5.3 Niche scale alternative

There are opportunities for smaller niche scale bakeries to mill on site and avoid shipping. Small-scale flourmills cost as little as \$4000US. Amano Bakery have their own stoneground flour mill instore. www.unitedmillingsystems.com/stone-grinding-mill/ . This scenario may fit well for the farmer to consumer scenario where smaller volumes of raw milling wheat can be efficiently transported direct to the bakeries. On-site milling becomes another thread to the food provenance story telling.

6.0 Price Point - Milling Wheat

Wheat price in New Zealand has historically been linked to the world wheat price. The value of wheat should be determined by the value of the retail or baked product, not the world price, and farmers should be rewarded relative to these values.

The current milling wheat price is just under \$450/tonne. If an increase to \$500 could be sustained, then farmers could potentially gross \$4000 - \$5000/ha. This increase in price of grain relates to an increase in the cost of a loaf of bread of around 2 cents.

A significant amount of work is required to change the thinking of the customer, including large retailers that the value of the wheat or flour is relative to the value of the end baked product not the world wheat price. If this were the case, then the customer can have confidence with regard to their margin relative to this input cost. This will require a major redesign of the value chain. Further, this could lead to the farmers toll processing flour, possibly through the major companies, for delivery to their customers. A significant amount of work is required to better understand North Island ownership, flour milling capacity and attitude to toll processing.

Historically it has been difficult to provide long term guarantees of supply as farmers have all been engaged in short term contracts and have moved production in relation to short term annual demands and price trends.

Supply of wheat with quality, provenance, sustainability traceability etc needs to be secure. Farmers that wish to be involved in supplying wheat need to commit for the long term irrespective of supply and demand opportunities and price. Work is needed to redesign this part of the value web so the right farmers are linked to the customer and are committed to producing wheat for these customers or consumers.

The right farmers are those that have a future focused mindset with a sustainability focus, are willing to work collaboratively, and seek value beyond just price.

6.1 Price Point - Breakfast Cereal Grains

The oat price to farmers is around \$400/tonne and at 6-7tonnes per ha thus a gross of \$2800/ha. The inputs to oats are relatively low cost. The difference in the cost of a cereal packet for an increase in oat price could be determined if this is seen as an area with potential.

In the Corilos report (Emerging Growth Opportunities in Food and beverage 2018) breakfast cereals indicate a CAGR of 20% for exports over the next 10 years from a base of \$16 million export to \$35 million.

NZ produces a purple wheat variety which is used as kibbled grain in a number of baked products. Some is exported. The total volume is currently small but there is potential for export growth.

6.2 Price Point - Grain Pulses

Chick peas retail on-line in NZ for \$6.10/kg (\$6100/tonne). Assuming a 30% return to the farmer this equates to \$2000/tonne, with a yield of 3-4 tonnes/ha = \$6-8000/ha.

7.0 Ingredient Quality – Milling Wheat

The milling industry generally has a belief that NZ wheat is inferior in quality to Australian wheat, possibly to justify using Australian wheat. When the question is asked of millers, they will generally say the NZ wheat is superior quality but because of small size lines there is variability. Not enough information is available on the differences in wheat quality between NZ and Australian wheat and the implications of this to the baker. Further research work is needed to understand if there are differences in quality between wheat from Australia and NZ, to understand what the quality constraints of NZ wheat are and to understand how quality varies throughout NZ.

7.1 Ingredient Quality - Breakfast Cereal Grains

Quality is important for oats with attributes of grain and colour. However, some of the grain size quality requirements relate to the ability of the processing equipment to create a quality product.

7.2 7.2 Ingredient Quality - Grain Pulses

There are clear quality requirements around grain size and cookability for chickpeas that will need to be met for any NZ produced grain. For soybean certain protein levels are required and clear hilum is a requirement for many food pulses such as soybean and faba bean.

8.0 Evaluation of Market Potential

8.1 A shift to Value

Determining market potential includes re-examining the volume-based approach NZ primary producers have traditionally operated within. Leftfield Innovation sees that a near-term opportunity is one that we know farmers can grow, that doesn't need any new processing capability to be in place; and there is an existing market that has potential to be expanded through several ways including:

- the re-design of the value chain (take out any unnecessary players that don't add any value).
- capturing value that already exists but is not currently recognised – i.e. provenance through authenticated data.
- Substantiating the quality of the raw material/grain/pulse against international quality benchmarks – NZ has some of the best wheat in the world.
- Willing partners – processors and growers, who are future focused and realise the grower/processor relationship needs to move away from an annual contracts-based arrangement to a longer-term relationship/partnership based on value not volume.

An opportunity that has these attributes may not necessarily result in a higher price for growers, but it will bring value through providing growers with certainty on a longer-term basis; and the kudos of being founding growers that are telling the NZ grains story. It is the first step in the journey of shifting the model from growing for volume, to growing for value.

8.2 Milling Wheat

Several opportunities exist for NZ-grown wheat. As a result of the industry capability assessment work undertaken as part of this Feasibility Study, LFI has identified an internationally owned, Canterbury based wheat processor that is committed to expanding wheat growing in New Zealand, with a focus on Canterbury in the near-term.

Champion Milling Ltd is owned by Japanese company Nisshin and have decades of NZ based expertise relating to milling wheat know-how across processing, wheat quality, industry relationships; grower relationships and export expertise. The most important factor that has resulted in LFI identifying a near term opportunity for milling wheat, is Champion's future focused strategy and willingness to 'do things differently'.

Champion is supplying NZ milling wheat to Countdown for use in their in-store bakery.

Champion have extensive processing capability in both the North and South Island; and can process a range of grains into different formats. This is one of several key benefits Champion will bring to this initiative; others include their established supply chain nationally and internationally; and links to global consumers.

The milling wheat opportunity forms Stage 1 of a 3 Staged Future Grains Project LFI has developed as part of the near-term opportunity programme with Champion.

This initiative includes the re-design of the grower/processor relationship through the establishment of a Grower Group and an improved longer-term working partnership that allows Champion to expand grains/cereals crop options to a full farm offering to growers - (commodity/ingredient) and the use of ingredients to produce high value food products for international markets.

Stage 1:	Stage 2	Stage 3
<p>High quality milling wheat to fulfil niche market segments (commodity).</p> <p>Spring 2019 = 500ha Spring 2022 = 2500ha</p>	<p>Champion to expand grains/cereals crop options to full farm offering to growers – (commodity).</p> <p>Spring 2020 = xxx ha Spring 2023 = xxx ha</p>	<p>Use of ingredients to produce high value food products for international markets.</p> <p>Spring 2021 = xx ha Spring 2024 = xx ha</p>

Table 7: Future Grains Project Phases

8.3 Breakfast Cereal Grains

The domestic market size is relatively small, and the effort required to source and supply small quantities of products mean this should be a lower priority.

Through the Future Grains Initiative, there is interest to expand the cereal grain crops grown to include the likes of Durum Wheat (semolina) for high grade pasta; and buckwheat for noodles. This opportunity is further out, in Stage 2 and 3 of the proposed plans.

Oats is an opportunity particularly for the growing range of niche NZ made breakfast cereals. LFI will engage with the likes of Harraways to establish interest in processing oats for other cereal brands. A key challenge here is the small scale and geographically dispersed nature of the niche cereals market. Linking up a cost-effective supply chain will be a determinant of this opportunity's success.

Imported Commodity (not for sowing)	Quantity	Value for Duty 2017 (excl insurances)	Price/ton
Oats – rolled or flaked	6,141	\$7,204,847	\$1,173
Buckwheat	250t	\$433,760	\$1,735
Quinoa	400t	\$1,587,605	\$3,969

Table 8. StatsNZ data 2017 – Breakfast cereal grains

8.4 Pet Food

The potential to supply a high-quality consistent supply of cereal grains for pet food presents a real opportunity. Initial engagement with key market players indicates this is an opportunity with very good potential; but unlikely to be an immediate near-term opportunity (i.e September 2019).

8.5 Grain Pulses

Although this is a relatively small market there could be opportunity for a few farmers to produce a range of crops that are targeted at this market. We have established that increasingly restrictive biosecurity requirements for importing grain pulses is driving importers/distributors toward a preference for NZ grown options.

Engagement is continuing with a leading NZ importer of food ingredients to develop grower relationships in the North Island to grow a range of pulses including soy, chickpeas and lentils. At the time of writing discussions are on-going with no specific targets for Autumn 2019, however, this remains an opportunity LFI will continue to pursue.

Imported Commodity (not for sowing)	Quantity	Value for Duty 2017 (excl insurances)	Price/ton
Lentils (shelled)	1,586t	\$2,751,726	\$1,735
Chickpeas	1,985t	\$4,109,335	\$2,070
Kidney beans (including white)	6,637t	\$8,044,990	\$1,212

Table 9: StatsNZ Data 2017 – Imported grain pulses

9.0 Recommendations – Milling Wheat, Cereal Grains & Pulses

There are several opportunities that have emerged as a result of this Study. Some more robust than others.

There is one lead opportunity, which we have established as Priority Project No.1. Priority projects No. 2 and 3 are less developed but worthy of a continued focus.

9.1 Priority Project No. 1 Future Grains Project

The scope of Future Grains Project has been developed in parallel with this Study. Key next steps include:

Develop a project plan outlining the scope of work and deliverables required to ensure plants are in the ground for Spring 2019.

Key headline tasks include:

1. Establishment of a Canterbury based Future Grains Grower Group (FGGG).
2. Develop FGGG Terms of Reference, including quality standards.
3. FGGG Kick off meeting and Induction.
4. Develop Champion/FGGG Partnership/relationship document.
5. Outline Champion supply chain.
6. Identify key customers and secure contracts for 2019.
7. Branding – NZ Grains Mark; develop logo and secure trademark.
8. Develop Sustainability bench marks associated with NZ Grains Mark (sustainability, quality, traceability, social, food safety, health benefits etc).
9. Data Capture – on farm transaction based via blockchain – create an exemplar.
10. Tell the NZ Grains Story through partnering with EatNZ.

LFI to develop a budget; and secure funding.

Founding members of the Grower Group meeting December; full Grower Group (12 members) early January 2019.

9.2 Priority Project No. 2 - Crop Trials

Plant trials of crops relating to cereal grains and/or seeds that are of interest to a Japanese customer (plant December 2018/Jan 2019). If successful, there is a potential for 30,000 – 50,000ha of a crop that fits within a mixed farm system and has a very short growing season (harvest 70 days from sowing).

9.3 Priority Project No. 3 -Substitution of Imported Pulses

Continue to engage with NZ Food Ingredients Importer/Distributor to secure grower contract opportunities for soybean, chickpea and lentils.

Once secured, develop a project plan and apply tasks 1,2,7,8,9 and 10 listed in Project No. 1.

9.4 Priority Project No. 4 –Processing Capability

Processing capability is a theme that has come through strongly across all the options we have evaluated. The lack of processing capability to transform our raw materials into high value ingredients and products is one factor limiting the ability for NZ growers to make the transition from volume to value. This project would undertake a stock take of processing capability across NZ to establish scope, scale, future plans alignment of values, and the degree of willingness to 'do things differently' to achieve the goal of more hectares of sustainable land use.

10.0 Fresh + Processed Vegetables

10.1 Situation Analysis

This category is based on the supply of high-water demand, durable fresh and/or processed vegetables to water scarce countries such as Dubai and Australia; or countries that do not have the ability to grow their own produce, i.e. Japan, Singapore and, Hong Kong.

10.2 Australian Market

Initially a small amount of work was done in relation to the Sydney market, the second largest fresh food market in the Southern Hemisphere. There is relatively easy plane and ship access to Sydney. Some possible fresh vegetable options that meet the criteria with regard to sustainability and durability are sweetcorn, a range of beans, peas, bok choy, leeks and possibly some brassicas. The challenges identified in relation to supplying fresh NZ grown vegetables into Australia is the sporadic demand, which is generated by periodic drought conditions. During times of drought, Australia take 'all NZ can supply', however, this is discontinued as soon as the drought breaks and growing conditions prevail. Price is a key driver for the Australian market, and it is difficult for NZ to define a point of difference with the quality and environmental standards between Australia and NZ being so similar.

There is a general consensus that the frequency and duration of droughts in Australia will become more regular and prolonged in the future. When this does occur, fresh vegetable exporters agree that more secure and consistent contracts to supply are likely to be achieved.

Further challenges highlighted relate to freight and quarantine. While shipping is a lower cost, it takes too long, and produce is not fresh enough by the time it reaches the consumer. Airfreight is faster; however, it costs more.

Freight also impacts on the form of the product being exported. Fresh bagged greens for example are light, but they are bulky, therefore the exporter is paying for a great deal of air.

New Zealand has battled for a number of years to export pipfruit, potatoes and grains to Australia with quarantine issues, such as plant diseases, making access to these markets impossible or extremely difficult.

Breaking into new markets has been identified as the biggest challenge. Building relationships and supply arrangements that endure is a key theme emerging from this Study across all raw material categories. There are examples where long-term relationships are in play between NZ growers and the Australian market. A Dunedin grower exports fresh carrots to a Perth fresh vegetable retail chain and has done so for many years.

10.3 Dubai

Dubai is the dynamic, pro-business gateway to the Middle East, a market of 350 million consumers. The Middle East, which provides ready access to Asia, Europe, India and Africa, provides a great deal of potential for NZ producers. However, this has been under-utilised by New Zealand producers to date.

Carrfields opened a base in Dubai to open up Middle Eastern markets for Kiwi food producers. They have identified the Middle East as holding extremely high potential for NZ food producers looking for new export markets.

Carrfields have established their office deliberately to provide a marketing and trading hub to facilitate sales, and a point of contact for NZ producers to access the UAE with a team of well-connected experts focused on bringing NZ produce to the Middle East.

10.4 Japan

The exported fresh vegetables we have researched were all unprocessed, except for some minor processing that included cutting and packaging into portion sizes. However, one company, Japanese-owned, Washdyke based Juice Products NZ (JPNZ), is a leading processor of raw carrots into high quality carrot juice concentrate, which is exported to Japan, Singapore, Malaysia, Vietnam, Thailand, Taiwan, China, USA and Australia.

JPNZ's juice concentrate is used at 65% of the mixture in the popular Japanese Kagome fruit and vegetable juices, which is 80% owned by Sumitomo Corporation.

The total grower area supplying mainly carrot and beetroot to JPNZ is 650ha.

An annual export value of \$20M from its current juice concentrates, JPNZ have plans to expand in the next 2-3 years to move into other lines including:

- Vegetable purees – particularly green vegetables for inclusion in soups, ice creams and baby food.
- Fresh carrot exports.
- premier pet food.

JPNZ demonstrates the value uplift as a result of value-add processing. However, further value is added in-market which could be captured in NZ if processing capability was established to create the blended juice product; vegetable puree-based products or pet food.

10.5 Price Point

To develop an understanding of the potential opportunity for fresh vegetable exports to Dubai, we looked at three prominent on-line vegetable stores; Aweermart, Kibsons and Luluwebstore, where consumers buy direct. Of the three, Kibsons also have retail outlets.

Kibsons source vegetable products from 18 nations including Australia but nothing from NZ. Approximately 15 vegetable products fulfil the criteria of being sustainable and being able to be grown in NZ. For example; Green beans in Dubai retail on line for \$15NZ/kg, assume 30% is in retail, 50% in transport and logistics and 20% to the grower then at a yield of 15t/ha = \$45,000/ha. Bok choy making the same assumptions retails at \$17.25/kg with a yield of 20t/ha = \$69,000/ha.

The following are a range of vegetables available at the market which have a significant water demand, are durable and may command a sufficient value proposition to New Zealand and could be grown under New Zealand conditions; Beans, Beetroot, Bok Choy, Brussels sprouts, Carrots, Celeriac, Celery, Fennel, Jerusalem artichokes, Kohlrabi, Leeks, Parsnips, Radicchio, Radish, Sweetcorn, Swiss chard, Sweet potato, zucchini.

For example; Green beans in Sydney retail for \$6.40 NZ/kg, assume 30% is in retail, 50% in transport and logistics and 20% to the grower then at a yield of 15t/ha = \$19,200/ha. Bok choy making the same assumptions retails at \$10/kg with a yield of 20t/ha = \$40,000/ha return to the grower.

10.6 The Demand for NZ Origin

Dubai is well-established as a key global trading hub for agricultural products, enabling entry into affluent markets where consumers are keen to access food from trustworthy sources.

The appetite for NZ food among affluent locals and expatriates in the Middle East presents a huge opportunity for Kiwi producers. This is owing to the high demand among consumers in the Middle East for food products which carry high standards of quality, provenance and safety.

NZ's reputation for quality is a key advantage, global consumers also believe NZ products to be trustworthy, safe and high quality, which is an even bigger requirement emerging from the global food industry.

10.7 Quarantine

Australia and NZ collaborate on food safety and food regulation standards at a Ministerial level, which sets policy about food; and have established a Food Standards Code through the government body, Food Standards Australia New Zealand (FSANZ)

VegetablesNZ confirm that NZ Growers are very capable and have to date demonstrated a high level of responsibility in meeting export standards to various global markets. These standards are generally much higher than the standards for domestic markets.

Dubai requires a number of certificates for fresh vegetables including an Animal & Plant Health Inspection Service Phytosanitary Certificate; a Country of Origin Certificate; and a Health Certificate – to attest that the goods have been prepared and shipped under sanitary conditions and are fit for human consumption. As mentioned above quarantine can be a significant issue if exporting to Australia.

10.8 Opportunity Summary

From a near-term opportunity perspective, we did not identify any immediate opportunities that could be activated for Spring 2019. However, it is recognised that fresh and processed vegetable exports are a significant opportunity for Canterbury, and NZ growers.

There is potential to assist JPNZ with product line expansion (including provenance and traceability) to increase production area and benefit more growers in Canterbury.

10.9 Recommendations

LFI will continue to work on the Dubai opportunity with Nick Pyke travelling to Dubai in February 2019 to meet with CEO Carrfields Middle East, Graeme Wilkins to discuss opportunities for fresh vegetable exports. Graeme has scheduled meetings with key contacts for this visit.

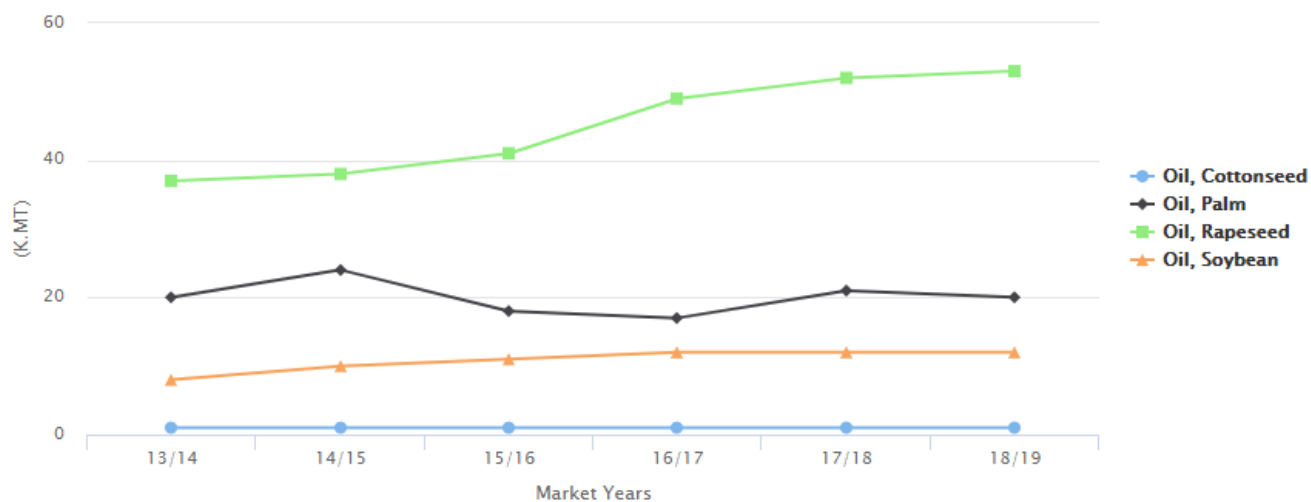
Further, LFI has agreed to meet with JPNZ's Agricultural Manager in the New Year to discuss opportunities to expand opportunities for growers.

11.0 Plant-based Oil

11.1 Situation Analysis

There are two key market opportunities for oils; to replace other imported oils in food processing and the high value oils market for food oils, dipping oils, cosmetics and aromatic oils.

Currently NZ imports a number of oils including approximately, 53,000T of rapeseed oil, 20,000T of palm oil and 12,000T of soybean oil.



Source: FAS USDA

Figure 1: Oilseeds – Oil Imports for New Zealand (forecast for last 5 years: Reported on 10/2018)

The growth in rapeseed oil is likely driven by the use by the major milk powder processors in producing infant formulas.

11.2 Import Substitution – potential impact

It may be possible to replace some of the imported oil used in food manufacture with NZ plant-based oils. For example, to achieve this would require approximately 100,000 tonnes of oil seed rape at 4t/ha is a further 25,000ha of oil seed rape. If a target was 10% in year one, increasing to 50% in year 3 would equate to 12500ha. A price of around \$550/ tonne to the grower is the world price with prices peaking around \$750/ tonne a few years ago. Crude canola oil is commanding around \$990/tonne while in retail in NZ it is around \$3.00/litre (approx. \$3000/tonne) with an extraction rate of 44%.

11.3 Market Players

For Rapeseed oil, there is only one domestic oil processor of scale, Pure Oil, who are only cold pressing processing oil seed rape for canola oil for domestic and industrial uses. It is understood they are operating at well below maximum capacity but have a modern cold press oil extraction plant based in Rolleston and are using the by-products as animal feed. They have, following some initial discussions with FAR, imported several sunflower hybrids and are now cold pressing sunflower oil for the NZ home kitchen trade. There could be potential for the home oils industry to expand to other species.

Midlands Nutritional Oils was established in 2002 with a primary focus to develop, produce, and supply high quality specialty oils to the global food, skincare and health product sectors. Midlands specialize in natural nutritional oils and food ingredients rich in essential fatty acids such as Alpha-linolenic acid (ALA, Omega 3) and Gamma-linolenic acid (GLA). Oils are extracted from linseed, borage, hemp, evening primrose and blackcurrant.

Other processors of olive oil, avocado oil and a hemp oil processor in Hawkes Bay are also producing plant-based oils. These are all likely to be relatively small quantities of high value oils.

11.4 Opportunity Summary

There are a wide range of oil raw material sources including Rape (Canola), Sunflower, Hemp, Flax, Olive, Linseed, Borage, Pumpkin, Safflower, Meadowfoam and Wheat germ, Corn and many others. Some native species such as manuka (New Zealand Manuka Group) and kawakawa have potential.

LFI would need to trace supply chains for each of the edible oils imported. NZ grown, and processed oils generally occupy high price, low volume niches for example Olive, Avocado, Hemp and Rapeseed (Canola).

LFI have undertaken some preliminary interviews to understand market structure and potential. The result is that we have some confidence that there are opportunities. These include:

- An apparent capability gap in NZ to refine/deoderise smaller runs of oil.
- There seems to be potential to work backwards from the infant formula to create a NZ grown offering in partnership with one or more NZ infant formula processors.

We have determined that this is a future project as the low oil prices make growing unattractive without some level of market restructure in the near term.

11.5 Recommendations

To progress this opportunity, we would need to open a more comprehensive discussion with Dr Laurence Eyres (preliminary discussion outlined below). His expertise will help us determine if a viable opportunity exists for import substitution at scale.

11.6 Proposed next steps Oils.

1. Map the NZ edible oil supply chain and market landscape with the assistance of Dr Laurence Eyres an acknowledged expert in the subject.
2. Drawing on Dr Eyres' knowledge, identify the most promising import substitute opportunities eg Canola oil into infant formula and investigate other markets opportunities for oils, particularly high-grade oils.
3. Further discussions with key infant formula processors eg Fonterra, Westland (see below), Synlait etc, on the potential to change to NZ produced oils.
4. Explore other oil niches suggested by Dr Ayres.
5. Confirm the quality, specifications and price points of oils that can meet specific needs.
6. Further discussions with Pure Oil (see below) the opportunity for them to extend their business to process for a range of other applications.
7. Investigate the opportunity for smaller scale processing through existing or new plant.
8. Assess the validity of the various raw material sources for viability – can we grow it, regional reality, necessary species and cultivars. Do we need to conduct trials?
9. Forecast a change scenario and investigate logistics.
10. Engage with preferred farmer suppliers.
11. Develop a NZ story around processed food products or high-grade oils.

12.0 Appendices: Questionnaires/Summaries

(confidential, not provided)

