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Where does the future lie for the Arable Industry in Canterbury?

William Wright | Kellogg Rural Leadership Program | Course 48 2022

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Executive Summary

Arable farming in Canterbury is at a crossroads. The wettest harvest in the last 30 years, coupled with high inflation, low profitability, and a changing regulatory scene, has seen farmer morale at its lowest point in many years. Changes in land use to dairy or dairy support and more extensive family farming operations buying up smaller operations have caused the number of arable farming businesses to decrease significantly over the last 20 years. In the early 2000s there were over 1200's arable farms in Canterbury. This has now been reduced to less than 500 (Merrilees, 2021). Recent freshwater regulations now mean that converting to more intensive land uses is difficult. If profitability issues continue to worsen farmers now feel like they have few options.

This report aims to provide a broad overview of the arable industry in Canterbury with a key focus on understanding whether maintaining a business-as-usual approach to farming would be enough to maintain operations into the future. A literature review, informal indicative interviews and two proven models were used to answer the following questions:

- Why is it important to have a viable arable industry on the Canterbury Plains?
- Can arable farmers continue to operate business as usual?
- What factors determine the underlying cause of poor profitability in the industry?
- What are the potential solutions to improve the long-term viability of the industry?

Canterbury Arable Farmers are highly skilled and have access to some of New Zealand's best soils, irrigation, and research. Canterbury's climate, infrastructure and skilled grower group means that they are undeniable world leaders in grain and seed production and are critical to the success of our red meat and dairy industries as well as the security of New Zealand's domestic food supply.

However, Canterbury arable farmers are facing a number of challenges both domestically and internationally and the long-term viability of the arable industry as a whole is potentially under threat from high rates of attrition, low returns on investment and fragmentation of the growers.

Reliance on the traditional growth pathway of increasing production is unlikely to be sustainable in the long term, though current external forces driving high commodity values may enable the status quo to be maintained in the short-medium term.

Arable farms are flexible and agile in nature which means they are well poised to pivot into new opportunities as they arise. The key areas where the arable industry can improve its long-term viability are:

- Continue to build resilience into farm systems
- Cooperate
- Stop beating up the merchants
- Differentiate the offering
- Invest or partner in supply chains

If Canterbury arable farmers continue to sit back and expect a better future without taking any action the industry will likely continue to diminish. If farmers take the opportunity that a favourable short-term outlook provides them then the opportunities are endless.

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1 Introduction

Arable farming in Canterbury is at a crossroads. The wettest harvest in the last 30 years, coupled with high inflation and a changing regulatory scene, has seen farmer morale at its lowest point in many years (Federated Farmers, 2022) (Piddock, 2022) (Scott, 2022). Aging farm owners and high land values in comparison to return on capital value have made farm succession difficult and gaining farm ownership through anything but family ties almost impossible (Merrilees, 2021). High levels of attrition have caused the number of arable farming businesses to decrease significantly over the last 20 years (Merrilees, 2021). Farmers who remain in the industry are passionate, efficient and at the top of their game. High risk and low returns on capital land values have led many growers to question where the future lies for the arable industry in Canterbury. This report aims to provide an analysis of the arable industry in Canterbury with a key focus on understanding where the future lies for the industry.

2 Research Aim and Questions

Research Aim

This report aims to provide insight as to where the future lies for the arable industry in Canterbury.

Research Questions

Why is it important to have a viable arable industry on the plains?

Can arable farmers continue to operate business as usual?

What factors determine the underlying cause of poor profitability in the industry?

What are the potential solutions to improve the long-term viability of the industry?

3 Methodology

A literature review, informal indicative interviews and two proven models, PESTLE and Porter's five forces model, were used to complete this report.

A literature review was undertaken to provide an industry overview, using conference proceedings, reports, scientific publications and books. While compiling this report, several informal indicative interviews were undertaken with farmers and industry experts to gain deeper insight into ideas and experiences around the research topic.

3.1 PESTLE AND PORTER'S FIVE FORCES ANALYSIS

Two models were used to analyse the industry as a whole to understand the future outlook for the arable sector in Canterbury. PESTLE and Porter's five forces techniques help to

provide a detailed picture of an organisation's situation. Just using one method may leave gaps in knowledge and understanding.

3.1.1 PESTLE

PESTLE analysis was developed in 1967 by Aguilar as an environmental scanning framework. It is a strategic tool for understanding market growth or decline, business position, potential and direction for operations. PESTLE provides an overview of the different macro-environmental factors (Political, Economic, Social, Technological, Legal and Environmental) factors that could influence an industry. PESTLE provides a summary of the major uncontrollable, external forces that industry have very little influence over. The goal of PESTLE analysis is to develop a profound understanding of the external environment where the organization operates. Understanding these external factors is important in understanding the direction an industry should be moving in.

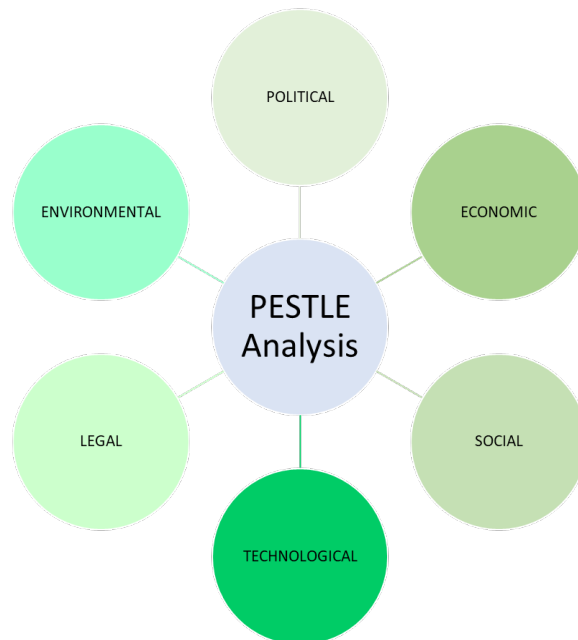


Figure 1- PESTLE Analysis, Adapted from Aguilar (1967)

3.1.2 Porter's Five Forces

Porter's *Five Competitive Forces that Drive Strategy* (Porter, 2008) draws a comparison between competition and the long-term profit potential of an industry. Porter's five forces was used to examine the root cause of poor profitability in the arable industry and how the sector could fight back to leverage more value from the crops they grow. Porter's five forces is an external analysis framework that falls within the task environment containing factors in direct contact with the industry. This means that industry can influence the environment as much as the environment can affect the industry; they interact with each other.

Porters Five Forces

- Rivalry Amongst Existing Competitors (High)
- Threat of New Entrants (Low)
- Threat of Substitutes (High)
- Bargaining Power of Suppliers, Arable Farmers (Low)
- Bargaining Power of Suppliers, Agricultural Service Providers (High)
- Bargaining Power of Buyers (High)

Figure 2 indicates the strength of each force in relation to Canterbury Arable Farmers. The larger the arrow the stronger the force.

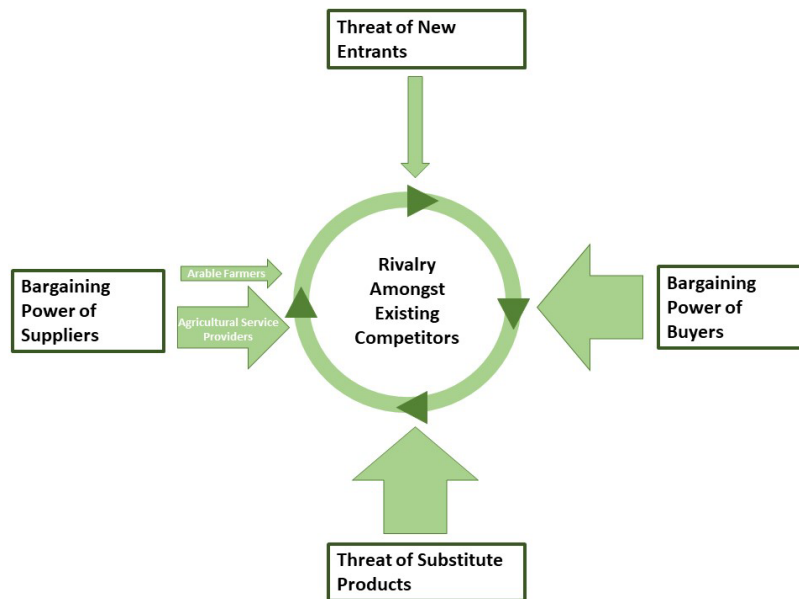


Figure 2, Porter's 5 Forces Analysis of the Arable Industry in Canterbury, Power of Different Forces Adapted from Porter (2008)

Indicative findings from informal interviews and the literature review were then combined with the models to summarise findings.

4 Literature Review

4.1 OVERVIEW OF THE CANTERBURY ARABLE INDUSTRY

Arable production in New Zealand includes everything grown as a crop and harvested by a combine harvester (Federated Farmers, 2022). The bulk of the arable output in New Zealand is located in the Canterbury region (Millner, 2012). However, substantial

production occurs in Southland and the North Island in Wairarapa, Manawatu, Wanganui, Hawkes Bay, Gisborne, and Waikato (Millner, 2012).

4.1.1 Geography

The Canterbury Plains stretch from the foot of the Hundalee Hills in the Hurunui District and merge into North Otago beyond the Waitaki River. The Plains are bound by the Southern Alps to the west and the Pacific Ocean and the Banks Peninsula to the east. Multiple large, braided river systems flow across the plains draining the Southern Alps. The Canterbury Plains were formed during the last glacial period by overlapping fans of glacial-fed rivers. This process formed extensive flat, fertile, free-draining plains (Wilson, 2022).

4.1.2 Climate

Canterbury's latitude, geology, and the surrounding ocean give it a Mediterranean climate ideal for growing temperate crops (Moot, 2010). The mountains give Canterbury greater weather extremes than most other parts of the country, with North Westerly winds hitting the southern alps reducing annual rainfall between the mountains to the coast. Strong North Westerly winds can produce temperatures exceeding 40 degrees in summer, providing the ideal conditions for harvesting arable crops. Conversely, the braided river systems that drain the southern alps and flow through the plains generally flood during these events due to the moisture-laden westerly air cooling it and forming precipitation as it rises over the Southern Alps (Sturman, 2005). These rivers provide a natural freshwater pipeline from high rainfall to lower rainfall areas. Irrigation schemes harvest and store water when the braided rivers are in high flow. This water can stave off the high evapotranspiration caused by the North Westerly Winds in summer (Wilson, 2022).

4.1.3 Humans on the Plains

4.1.3.1 *The Early Years*

Before European arrival, Canterbury supported a significant Māori population (Ngāi Tahu, 2022). Māori lived mainly by the coast, where staple foods were abundant. They would travel inland to the plains and foothills to seasonal settlements where different foods specific to those areas were gathered (Wilson, 2022). Europeans first settled Canterbury en masse in the mid-1800s.

Farms in Canterbury were initially made up of vast sheep runs, often exceeding 10,000 ha (Acland, 1946). The wheat boom of the 1880s, along with the development of infrastructures such as railways, roading, shelter belts, and stock-water races, facilitated land use change to more intensive mixed systems and made the smaller family-run farming operation more viable. By the time of the first World War (1914-1918), a mixed arable farm system of between 130- 260ha was the norm on the plains. Following the Second World War (1939-1945), the green revolution took off with mechanisation, agrichemical and fertilisers increasing farm productivity significantly but more importantly plant breeding and multiplication techniques also greatly increased yields (Dynes, 2010).

4.1.3.2 *Rogernomics (The 1980's)*

In the 1980s, the deregulation of agriculture and the abolishment of subsidies and import restrictions led to extreme financial challenges for New Zealand farmers (Wallace, 2014).

Before the reforms, subsidies made up a large portion of farmers' income and kept many otherwise unviable operations afloat. Many farmers were forced off their land, and morale in farming was at an all-time low (Cushnie, 2015).

The other side of deregulation was free enterprise. Free markets allowed farmers to be dynamic and responsive, letting them consider markets and allowing market forces to drive decision-making. Innovative farmers developed efficient new farm systems to get the most out of their land. By lifting the veil of subsidies, farmers were free to find ways to maintain profitability without the government's support (Wallace, 2014).

4.1.3.3 Modern Times (2000- Present)

4.1.3.3.1 An Unrivalled Level of Efficiency

The free market thinking of New Zealand Governments and an innovative and skilled grower group has enabled arable farmers to forge a pathway of operational excellence that has led Canterbury farmers to be recognised as some of the most efficient operators in the world. Today Canterbury arable farmers are undeniable world leaders in grain and seed production (Federated Farmers , 2022).

Canterbury Arable Farm Key Statistics

- Approximately 2800 arable growers in NZ are growing crops on 180,000 hectares of land of which approximately 75,000 hectares are irrigated.
- NZ produces about 1,000,000 tonnes of grain each year. Grain production is made up of 400,000t Wheat (300,000t feed wheat, 100,000t milling wheat), 400,000t Barley and 200,000t Maise grain.
- Of the total amount of New Zealand's arable production 88% of wheat, 66% of barley and 90% of herbage and vegetable seed is grown in Canterbury.
- NZ holds the Guinness world record yield for wheat (17.4t/ha) and barley (13.8t/ha). Both of these records were achieved on Canterbury Farms.
- Canterbury produces 40% of the world's carrot seed, 60% of the world's radish seed, and 50% of the world's white clover seed (Federated Farmers , 2022)

4.1.3.3.2 FAR (The Levy Group)

The unique nature of New Zealand's arable systems requires local research and development to maximise productivity, value, sustainability, and resilience. Growers set up the Foundation for Arable Research (FAR) in 1995, which operates under the Commodity Levy Legislation. FAR's strategy is to undertake research to provide new tools, share knowledge and technology to support responsible and profitable farming (Foundation for Arable Research , 2022). FAR's research has been one of the significant factors that have enabled New Zealand farmers to become some of the most productive growers in the world.

4.1.4 Modern Arable Farm Systems in Canterbury

The modern arable farm system in Canterbury produces a wide variety of crops, including herbage seed, cereals, and vegetable seed. Farms are complex, often with upwards of 20 crops grown at any one time. Cropping rotations are tailored to utilise residual nutrients, minimise disease issues and maintain soil health (New Zealand Fertiliser Manufacturers' Research Association Inc, 2009). An important point to mention is monoculture cropping common in Australia and United States, is not a viable option. The key to the success of the New Zealand system is in the rotation and incorporation of animals.

4.1.4.1 *Incorporating Animals Into the system*

New Zealand's arable system is one of the few countries incorporating livestock into their systems. Grazing helps control weeds and encourages the tillering of ryegrass, meaning the use of herbicides and growth regulators can be reduced. Incorporating animals also improves soil structure and nutrient cycling leading to less reliance on synthetic fertilisers. Incorporating animals into our farm systems provide an added revenue stream and allows us to farm with a lighter touch.

4.1.4.2 *Plant Variety Rights*

The Plant Varieties Rights (PVR) Act was passed in 1989 to bring New Zealand into line with international standards (Ministry of Business, Innovation and Employment, 2022). PVRs grant a limited monopoly to the breeders in exchange for instructing the public on how the new variety was created. Without PVR the development of new and improved seed varieties would be significantly less or eliminated, limiting the possibility of technical advancement and breakthroughs. PVRs are currently under review to update to UPOV 1995 standards.

4.1.4.3 *Key Canterbury Crops*

4.1.4.3.1 *Cereals*

Wheat and barley are two of the staple crops that Canterbury arable growers produce. These grains generally fall into two categories: Grains grown for human consumption (milling wheat and malting barley) and grains grown for animal feed (feed wheat and barley). Cereals grown for animal feed make up over 75% of the wheat and barley grown in Canterbury (Federated Farmers, 2022). Feed cereals tend to dominate due to the higher specifications milling wheat and malting barley require for a similar reward.

The price of New Zealand-grown cereals is heavily linked to the New Zealand dairy pay-out. Dairy farmers can increase milk production through supplementary feeding. When the milk solid pay-out increases the benefit of in-shed feeding out-ways the cost, increasing demand of purchased feed and increasing the value of the feed crops.

New Zealand does not produce enough milling wheat to satisfy domestic requirements. For this reason, large quantities of grain are imported from Australia and, to a lesser extent, the United States. Significant economies of scale and lower land values mean that international growers can produce grain at a lower cost. The cost of transporting grain from Canterbury to Auckland has traditionally been higher than transporting grain from Sydney to Auckland, therefore the price of New Zealand cereal is connected to international markets (Millner, 2012).

4.1.4.3.2 Herbage Seed

Herbage seed production in Canterbury is dominated by annual ryegrass, perennial ryegrass and white clover. Herbage seed production falls into two categories, proprietary varieties, and non-proprietary varieties.

4.1.4.3.2.1.1 Proprietary Herbage Varieties

Proprietary herbage seed varieties are owned by private companies who contract arable farmers directly or grain and seed merchants acting as intermediaries to multiply seed lines.

4.1.4.3.2.1.1.1 Domestic PVR Varieties

The proliferation of the New Zealand dairy industry has led to demand for quality, genetically improved ryegrass varieties. Local plant breeding companies such as Agriseeds (now Barenberg), PGG Wrightsons and Agricom have successfully developed grass varieties to meet this demand (Rolston, 2006). Local companies that have developed intellectual property and marketed these varieties have carved out a powerful reputation for adding value to New Zealand's pastoral farm systems.

The delivery of novel endophytes able to provide biological controls to ryegrass pests has further strengthened the value that locally bred varieties can offer (Millner, 2012).

Creating a new variety requires significant time and investment. Grass varieties take 15 years to develop to market and require niche facilities and plant breeding experts. Time, money, brand presence and risk contribute to competitors' entry barriers. The seed companies who own the PVRs set the price that arable farmers receive for multiplication. These companies own the supply from development to market, meaning that this industry is quite valuable to the PVR breeding companies.

4.1.4.3.2.1.1.2 International PVR Varieties

Canterbury provides a counter-season multiplication service for northern hemisphere seed companies. Grain and seed merchants act as intermediaries between international companies and farmers (Rowarth, 1998). High levels of competition mean the overall value in global counter-season multiplication is less than the more lucrative domestic seed markets.

Competition between New Zealand merchants can lead to weak buyers eroding overall margins. Merchants take on significant risks in guaranteeing volumes, meaning that weather events can be very costly and even lead to loss of business.

4.1.4.3.2.1.2 Non-Proprietary Herbage Varieties

New Zealand growers also produce non-proprietary herbage seed varieties. Non-proprietary varieties are in the public domain, and anyone can produce and distribute them. An example of this is Nui. Nui is a ryegrass variety that is used as a turf grass primarily in America and China (Rolston, 2006). The price for Nui is directly linked to international grass seed markets. Common varieties such as Nui have played a vital role in keeping the price for PVR varieties honest. Because the price of Nui is linked to global markets, if demand is high, companies vying for the area will have to lift the prices to compete.

4.1.4.3.3 Vegetable Seed

Canterbury's climate, skilled grower base and infrastructure make it one of the few areas in the southern hemisphere suitable for vegetable seed production (McKay, 2008), which are mainly exported to Asia and Europe (Millner, 2012). The foundation of the Canterbury vegetable seed industry is providing counter-season multiplication services to large European vegetable seed companies. Seeds include baby leaf vegetables, Asian leafy vegetables, field peas and brassica.

Vegetable seeds are considered higher risk and reward than other crops. Pests, disease, and adverse growing conditions all affect the quality and quantity of production. The speciality nature and risk associated with vegetable seed production mean they are generally allocated a small portion in an arable rotation. As with proprietary ryegrass varieties, seed companies own the PVR for vegetable seed production and therefore set the price that farmers get for growing them. Like PVR herbage seed, high competition between New Zealand merchants vying for multiplication contracts can lead to weak buyers eroding the overall margin.

4.1.4.3.4 Other Crops

Canterbury arable systems are heavily aligned with processed and fresh vegetable production with potatoes, peas, sweetcorn and onions supplying Watties, Talleys and McCain occupying significant areas (Millner, 2012). Recently a burgeoning oil seed rape and sunflower industry has been started through the efforts of Pure Oil New Zealand, based out of Rolleston.

4.2 WHY HAVE A VIABLE ARABLE INDUSTRY?

Although the arable industry has not been as profitable as other land uses, the industry still significantly contributes to the New Zealand economy. The arable industry's value also lies in its ability to support New Zealand's other key primary industries, red meat and dairy, by producing the seed for pasture establishment and renewal, grain and silage for supplementary animal feed and providing land for winter grazing and finishing. If import restrictions on alternative animal forages such as Palm Kernel come to light, the

The Value of Arable

- The arable industry produced 2.29 million tons of grains, pulses, and seeds for sowing in 2021
- Directly produced crops worth \$1 billion
- Total upstream sales of all goods and services \$2.2 billion
- Contribution of 0.34% of the Gross Domestic Product
- 7,687 full-time equivalent employees (FTEs) (Hurren, 2022)

importance of the industry as a feed source for livestock will be particularly prevalent. New Zealand's livestock industry would be significantly affected without a viable arable sector.

4.2.1 Domestic Food Security

New Zealand is a net food producer with agriculture being a key component of our economy (Greenhalgh, 2020). There are several products that New Zealanders consume in large quantities that we either cannot produce here (coffee, sugar, rice) or of which we do not produce enough to meet domestic demand (wheat, barley, maize). Many of these products are imported from a small number of markets. Disruptions in supply chains and production has the potential to greatly effect New Zealand's food security (Greenhalgh, 2020). The changing climate, COVID 19, geopolitical instability, and continued loss of versatile soils through urban sprawl and degradation all combine to put great pressure on the global food system and mean a sound domestic food production system is as important as ever (Te Puna Whakaaronui, 2022).

The arable industry produces many staple food products that New Zealanders consume daily, highlighting the importance the industry may have on New Zealand's ability to be food secure in the future.

4.2.2 Lighter Footprint

The arable industry provides a sustainable land use option on the Canterbury Plains (Foundation for Arable Research , 2022). Arable farming contributes less than one percent of New Zealand's greenhouse gas emissions (Foundation for Arable Research , 2022). Arable growers are generally very good at converting synthetic inputs such as agricultural and fertiliser into crops, minimising the risk of leaching nutrients and chemicals into waterways.

Pesticides are only applied, when necessary, under strict international guidelines. For example, neonicotinoids are used as a seed treatment, not as a foliar spray meaning the beneficial bugs, such as bees and ladybugs, are not affected by this treatment. The development and implementation of integrated pest management (IPM) have allowed growers to be more targeted with spray treatments using nature to achieve more with less (Foundation for Arable Research , 2022).

Fertilisers are accurately applied to targeted growth stages to ensure nutrient inputs match crop growth demand and achieve yield requirements (Dunbier, 1996). Recently precision agriculture technology such as variable rate fertiliser spreaders and satellite imagery has allowed farmers to deliver the specific fertiliser rates to different areas at a paddock scale.

Inaccurate fertiliser application and timings can reduce product quality and quantity (New Zealand Fertiliser Manufacturers' Research Association Inc, 2009) High input costs and implications of inaccuracies mean on-farm efficiency is imperative to running a successful arable business. In short, there is no room for inefficiency in the arable sector.

Farming systems with high Simple N Surplus (SNS) have a greater risk of N-leaching (Dairy NZ , 2022). The SNS is a tool used to understand the amount of nitrogen brought into a system that is not used to make a product. The irrigation schemes of Mid Canterbury

undertook an analysis of the SNS for all 600 of their shareholders in 2020. Arable farms were found to be the most efficient at converting nitrogen inputs to product compared to other land uses in the scheme (See Appendix 1).

4.2.3 A Flexible and Reactive industry?

New Zealand's competitive advantage in food and fibre production has traditionally been in producing high-quality commodities at a cost-competitive price (Proudfoot, 2022).

The New Zealand dairy and red meat industries have invested heavily in supply chains to capture more value. Vertical integration has come at a high cost, and the bricks-and-mortar nature of the milk factories and freezing works are heavily geared toward producing commodity products. As production costs rise and consumer preferences change, the ability of these large vertically integrated industries to be flexible to meet new consumer needs may be difficult (Proudfoot, 2022).

Conversely, there have historically been limited examples of arable farmers collaborating and investing into supply chains (Sim, 2022). One benefit of not being integrated into supply chains is that it has allowed arable farmers to be flexible and reactive, allowing them to move quickly into new markets as they arise.

Modern customers are increasingly demanding more from suppliers, and keeping up with trends will require focus, understanding and agility to quickly pivot into new markets (Proudfoot, 2022). The arable industry's historical lack of cooperation and investment in supply chains may mean they are poised to move into new markets as they arise.

Canterbury arable farmers are undeniably world leading. The complex, diverse nature of Canterbury arable farm systems means that the skill level required to operate a successful arable farm is very high. High attrition levels to other land uses have whittled the industry down to a core group of passionate growers working on some of the best soils. A highly skilled grower group coupled with excellent infrastructure and a favourable climate means that Canterbury arable farmers can grow nearly any temperate crop.

Although the arable industry has not been as profitable as other land uses, the industry still provides a significant contribution to New Zealand's economy. The arable industry's value also lies in its ability to support New Zealand's other key primary industries, contributes to New Zealand's food security and provides a sustainable flexible land use option.

5 An Industry Under Pressure

The arable industry in Canterbury is increasingly coming under more pressure. The following section provides an overview of some of the problems the industry is currently facing.

5.1 NOWHERE TO GO

In July 2020, the New Zealand Government released the 'Essential Freshwater Package' intending to achieve genuine freshwater improvements for New Zealand's waterways "within a generation". A key policy within the Essential Freshwater Package limits intensive land use to what occurred on a property between 2014-19, requiring operators to seek a consent from environmental regulators to start or expand these activities.

Many arable farmers in Canterbury utilise store lambs as the stock component of their operation and have not used dairy animals in their systems. This policy has, in essence, boxed arable farmers into their current land use and makes shifting to dairy or dairy-support land use very difficult while also reducing the value of their land which relied on the ability to capture potential returns of more intensive land uses (Landcare Research, Manaaki Whenua, 2012).

5.2 LAND VALUES

The dairy industry's success, coupled with a favourable climate, soils, amenities, and infrastructure, has seen land values on the Canterbury Plains increase rapidly over the last 30 years. High arable land values have made farm succession challenging as low returns compared to capital land value make it difficult for the next generation to purchase into businesses (Kerr, 2014). The gross margin per hectare of a typical Canterbury arable farm is generally anywhere between \$2,000 to \$4,000 per hectare (Merrilees, 2021). This is typically half that of a high performing Canterbury dairy farm (Sim, 2022).

5.3 ATTRITION IN THE INDUSTRY

In the early 2000s, there were over 1200 arable farms in Canterbury. Improvements in pumping and irrigation technology resulted in many arable and mixed farms converting to dairy (Pangborn, 2012). In areas with lighter soils, such as Te Pirita and the Hekaeo/Hinds Plains (Cushnie, 2015), lower land values and good irrigation supply made the returns of converting very appealing.

Today, only 500 arable farms remain in Canterbury (Merrilees, 2021). The arable farmers remaining are passionate, efficient, and skilled. High land values and water costs have created a self-fulfilling prophecy where farmers must operate at the top of their game to exist. The reduced number of arable farms could eventually result in losing the economies of scale required for a viable industry.

5.4 PRODUCTION CEILING?

New cultivars, irrigation, and agronomic improvements have significantly increased yield over the last 25 years. For example, in 1995 the average New Zealand wheat yield was 5 tonnes per hectare (Millner, 2012). Wheat yields of 12-14 tonnes per hectare are now commonplace for irrigated Canterbury arable operations (Foundation for Arable Research, 2022).

Productivity gains have allowed our growers to keep ahead of inflationary pressures and maintain profitability. Grain and seed prices have remained relatively stable throughout the years, with farmers maintaining profitability through increased production, not price. An example is a price for Nui Ryegrass fluctuated between \$1.10 - \$2.00 per kg for the last 30 years (Rolston, 2006) (Sim, 2022).

Input restrictions, environmental regulations, and no new silver bullets to increased production mean that continuing to rely solely on increases in yield to maintain profitability may no longer be an option.

5.5 INFLATIONARY PRESSURES

Following the Covid-19 pandemic, high inflation has seen costs rise dramatically. Agriculture has been particularly affected, with operating expenses increasing at nearly twice the rate of the consumer index, primarily driven by increases in the cost of fuel and fertiliser.

Fertiliser prices have lifted 23% yearly, and fuel costs have increased by 54% since the pandemic's start (Kilsby, 2022). Traditionally, arable farms have been able to service debt and cover increased expenses through productivity gains.

As growers begin to reach their production ceilings, they may be unable to compete with countries that can produce products for less, subsidised by their governments and with fewer environmental restrictions.

5.6 LACK OF INVESTMENT IN SUPPLY CHAINS

Historically there have been few examples of arable farmers investing in supply chains collectively (Sim, 2022). Investment by farmers outside the farm gate has usually been undertaken by entrepreneurial individuals who have not taken the rest of the growers with them. This has continued to consign the remaining growers to the role of commodity producers and price takers.

"Once you go beyond the farm gate, the numbers get out of hand quickly if you are not making value" (Canterbury Arable Farmer)

Reluctance to invest in supply chains can be attributed to low on-farm profitability, reduced flexibility and high perceived risks associated with integration (Sim, 2022). Farmers have traditionally stuck to farming and are generally reluctant to venture beyond the farm gate.

Examples of cooperation and investment have usually been short-lived as weak sellers have been picked off, reducing the collective power of the groups. A lack of collaboration and investment between farmers has meant arable farmers have remained at the lowest return part of the supply chain, manufacturing (Shin, 1992).

5.7 COMMODITISATION

New Zealand agriculture's competitive advantage has consistently been producing high-quality, safe commodity products using a relatively low input system. While New Zealand agriculture's ability to make high-quality products efficiently hasn't changed, New Zealand's ability to do so in a low-cost manner has. The costs of people, environmental regulations, shipping, and inputs mean that prices are likely to increase (Proudfoot, 2022).

Commoditisation is when products with distinct traits become homogenous commodities that can be interchanged easily with alternative products (McGee, 1986). Initially, launching a new product creates a monopoly in the market. Over time as competitors move in with products with comparable features, competition starts to drive prices down. As each product becomes less differentiated, consumers will begin to buy on price (Mankiw, 1999).

The arable industry's products are either pure commodities like wheat and barley or have been commoditised through farmers having no ownership of the intellectual property. Pine and Gilmore's, (*Progression of the Economic Value Model*), suggest that commodity producers must evolve their economic offerings or services to maintain their market value share (Gilmore, 1998). Pine and Gilmore suggest that as economies continue to evolve, less market value will remain in the hands of the commodity producers, with more of the value to be captured higher up the chain. Rising land values compound these issues as the returns from commodity arable crops will continue to become more marginal if land values increase further.

6 External Factors Influencing Canterbury Arable Farming

The 2022 KPMG agribusiness agenda described the state of the world as VUCA squared (Volatile, Uncertain, Complex and Ambiguous) (Proudfoot, 2022). VUCA describes the current state of the arable industry very well. A problematic 2022 Canterbury harvest coupled with a significant increase in costs has led to grave concern among arable farmers in Canterbury. However, many of the issues Canterbury farmers are dealing with are also occurring internationally (Te Puna Whakaaronui, 2022). The scale and intensity of overseas problems are often far more magnified than those seen by New Zealand operators.

Global geopolitical issues, adverse weather events, the impact of Covid 19 and outbreaks of diseases such as the African Swine Flu in China, all indicate that we should expect both volatile and high commodity prices in the near to short term (Te Puna Whakaaronui, 2022). The significant impacts that other countries are seeing mean that New Zealand growers will be in a good position to capitalise on this.

6.1 PESTLE ANALYSIS OF THE EXTERNAL ENVIRONMENT

Several external factors mean understanding where the future lies for the industry is complex and challenging to interpret. PESTLE analysis is a model used to examine an industry's external environment, by understanding the Political, Economic, Social, Technological, Legal and Environmental factors which can influence an industry. These factors have a one-way effect on an industry, meaning they can control the industry significantly, but the industry has little reciprocal impact on the factor. PESTLE factors enable a strong overview of an industry's attractiveness (Aguilar, 1967).

6.1.1 External Factors

Geopolitical instability primarily caused by Russia invading Ukraine and the global response to the Covid-19 pandemic, have led to significantly disrupted supply chains driving high global food prices (Benny, 2022).

The arable industry is also closely tied to the red meat and dairy sectors. China accounted for 42% of New Zealand's red meat and dairy exports in 2022 (Stats NZ, 2022). China's reaction to the Ukraine invasion has been to sit in silence. There is increasing concern about the implications for profitable export markets if China is to take sides (Proudfoot, 2022).

Inflation is affecting farmers across the globe. The increasing costs of people and the need to meet environmental regulations suggest that input prices will continue to increase in the long run (Proudfoot, 2022).

Covid 19 has caused significant disruptions to global shipping networks driving up costs and reducing reliability. The total value of arable exports in 2021 was \$260 million, mainly made up of vegetable and ryegrass seeds (Hurren, 2022). Reliable and affordable shipping is crucial to the arable industry's ability to deliver contracts on time and is likely to continue to be an issue in the foreseeable future.

Modern arable farm systems rely heavily on synthetic inputs to maintain productivity and profitability. Continuing to rely on this strategy moving forward may become more difficult. Changing consumer preferences has meant consumers are now more informed and interested to know what is happening behind the farm gate, which will likely lead to more scrutiny of synthetic inputs and farming practices (Kilsby, 2022).

The cost of inputs is continuing to rise and is unlikely to reduce. Furthermore, new agricultural varieties are taking longer to get to market, and their general effectiveness is less than previous products (Drummond, 2021).

Glyphosate is a crucial tool used as a herbicide in the arable industry to minimise damage to soil and improve seed purity. Glyphosate has been classed as a probable human carcinogen by the International Agency for Research on Cancer (Marr, 2019), with regulators introducing more stringent requirements to reduce its use. Potential key markets, such as the European Union, may restrict products that have used Glyphosate in the future.

Agricultural technology has seen significant investment in recent years. Increasing the use of precision technology will help farmers continue to operate more efficiently and reduce costs.

High food prices and changing consumer preferences have led to a boom in the creation of alternative plant-based protein products (Te Puna Whakaaronui, 2022). Understanding where the arable industry sits in the space will be crucial in capitalising on opportunities in this new market.

Addressing the impacts of agriculture on freshwater quality and greenhouse gasses will continue to become more prevalent. New national-level freshwater and greenhouse gas policies will likely pressure farmers whose existing land use adversely impacts these factors.

Canterbury's climate is predicted to become hotter and drier (Fitzgerald, 2022). A warmer-than-average climate may provide more opportunities to grow crops previously not seen as viable options. Examples include sweet corn and maize, which are already becoming more common in Canterbury. Investing in water storage is critical to mitigating the impacts of a drying and warming climate. Water storage is one of the critical factors in ensuring consistent irrigation water is available. Many of the irrigation schemes in Canterbury have invested heavily in water storage. An excellent example is Barrhill

Building Resilient Farm Systems

David and Justine Birkett farm a 200ha, irrigated arable farm just out of Leeston on the Canterbury Plains. David was named 2022 arable farmer of the year. David has focused heavily on building resilience into his farm for several reasons.

“One of our main techniques to help build resilience into our farming system is to have diversity in as many aspects of the business as we can. Over the past 10 years we have seen a steady reduction in profitability on arable farms, which has highlighted the need to build resilience into the farm and this can be done in many ways. The obvious one is to have a range of crops within your rotation, but this can be expanded to include the time of sowing of the crop to spread risk and even a spread of the companies that you grow that crop for.

Designing a farm system that has a lower reliance on outside inputs has the ability to remove the risk from global influences, exchange rates, shipping costs and product shortages, while reducing overall costs of production. This type of farm system requires a good understanding of your soils and their attributes. In times like we are seeing now, with inflation and interest rate rises, the ability to invest less capital into your crops is a good way of building financial resilience. The ability to have greater influence or investment up the value chain also moves you from being a price taker to being a multi-level part of the value chain, but does require both time and capital investment. Arable growers shouldn't be in the position they are in now, where they are relying on resilience in their farm system to cover for the lack of profitability. Change is needed within the industry and this needs to be done in a collaborative way, as the current model of pricing is broken and has lead to our current position of profitability.”

Chertsey Irrigation and Central Plains Water, utilising Lake Coleridge and a pre-existing hydroelectricity scheme to store water during high river flows and release it for use when river levels drop below minimum flow levels (Barrhill Chertsey Irrigation, 2022). Figure 1 (located below) provides a summary of the PESTLE analysis of the arable industry in Canterbury. Considering the complex nature of the world that we live in continuing to build resilience into farm systems will be imperative moving forward (See Building Resilient Farm Systems Case Study).



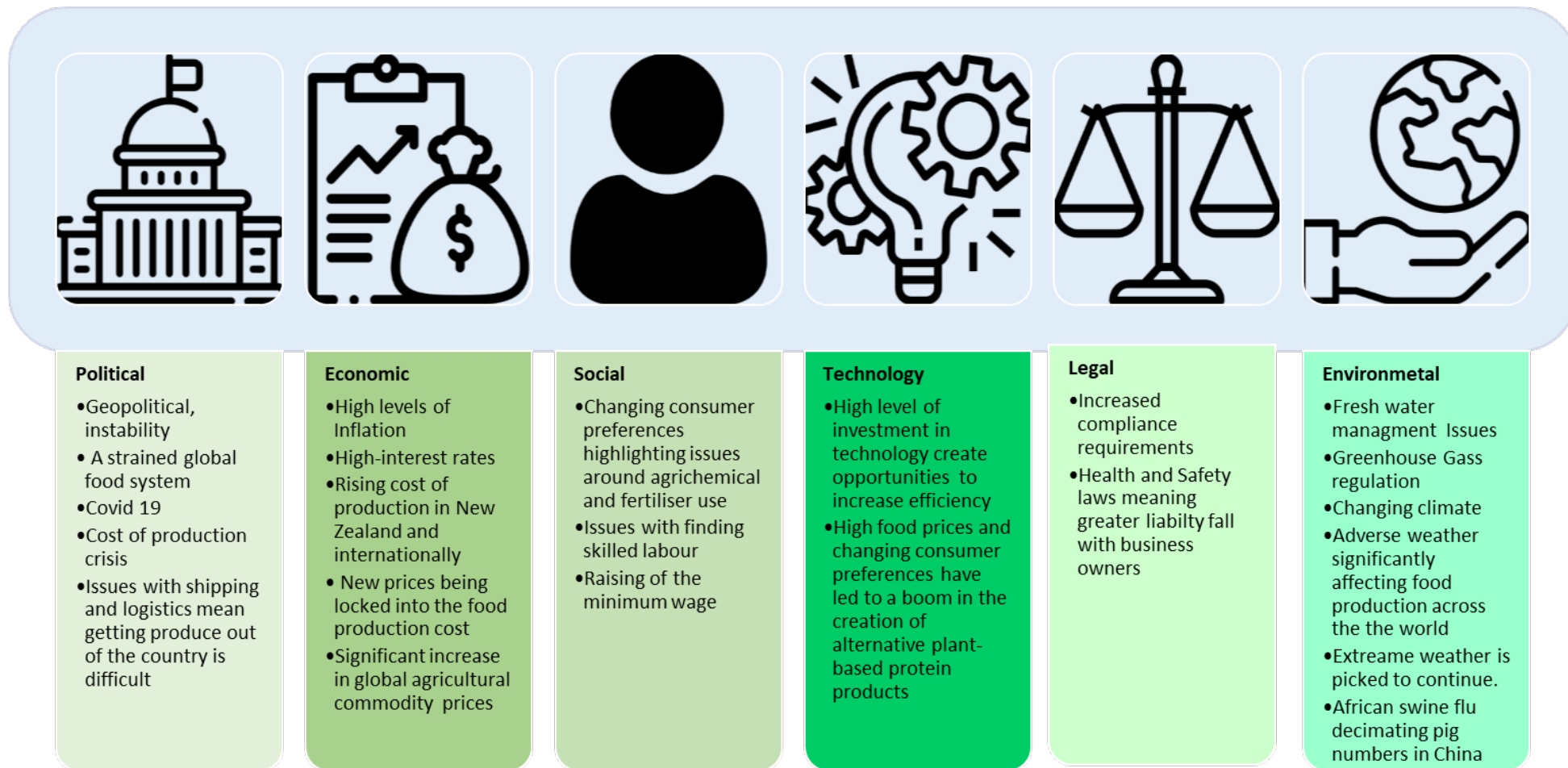


Figure 1: PESTLE Analysis of the macro-environmental factors that influence the arable industry in Canterbury, Adapted from Aguilar (1967)

7 What is the Root Cause of Poor Profitability?

Arable farmers are operating in a highly competitive industry, predominantly producing commodities at prices fixed by a merchant or international markets. There has been very little historic investment by growers in supply chains, meaning that growers have very little influence on the price they get paid for their products (Sim, 2022). Low returns compared to land values and high risk have led to significant attrition, with many farmers changing land use to dairy or dairy support. The following section examines the root cause of poor profitability in the arable industry and how the sector could fight back to leverage more value from the crops they grow.

7.1 PERFECT COMPETITION

Perfect competition is an idealised notion. In perfect competition, many firms produce identical products with competition forcing them all to sell at a price determined by the market (Mankiw, 1999). Although there are few examples of pure, perfect market structure, many industries come close. Many of the characteristics of the industry that Canterbury arable farmers operate in come close to perfect competition.

Perfect competition is built on four assumptions.

1. There are many sellers and many buyers, none of which is large in relation to the total sales and purchases
2. Each firm produces and sells a homogenous product.
3. Buyers and sellers all have relevant information about prices, product quality, sources of supply etc.
4. There are low barriers to entry and exit (Mankiw, 1999).

Basic economic theory demonstrates that when firms must compete for customers, it leads to lower prices, higher quality goods and services, greater variety, and more innovation. Perfectly competitive industries are allocatively and productively efficient, producing the amount society wants at the lowest possible price. Industries that operate in markets with high levels of competition are generally less profitable in the long run-in comparison with industries that operate with low levels of competition (McGee, 1986). The highly competitive nature of the arable industry means that under its current structure farmers will continue to get paid market rate and find it difficult to leverage further value from the products they grow.

7.2 PORTERS FIVE FORCES ANALYSIS OF ARABLE FARMS IN CANTERBURY

Michael Porter's *Five Competitive Forces that Drive Strategy* draws a comparison between competition and the long-term profit potential of an industry (Porter, 2008). Porters 5 forces is an external analysis framework and falls within the task environment containing factors where the industry can influence the environment as much as the environment can affect the industry; they interact with each other. Firms can fight the forces (Porter, 2008).

Table 1 provides a visual representation and description of the power of each force from the perspective of an arable farmer.

Porters Five Forces include:

- Rivalry Amongst Existing Competitors
- Threat of New Entrants
- Threat of Substitutes
- Bargaining Power of Suppliers
- Bargaining Power of Buyers

Arable farmers generally have low power. This is discussed in further detail in the section below.

Key Points

- Effect on the long-term profit potential in an industry and there for its attractiveness
- The main purpose is to evaluate the root causes of profitability in the industry through the competitive forces
- Porter draws a comparison between competitive forces and profit potential.
- If competitive forces in an industry are high the profit potential in that specific industry will decrease
- Each of the 5 forces can affect the profit potential of the industry both positively and negatively.
- Different forces take on prominence in shaping competition in each industry.
- The focus of porter's analysis of industry structure is on identifying the basic underlying characteristics of an industry rooted in its economics and technology that shape the area in which competitive strategy will be set (Porter, 2008)



Table 1- Porters 5 Forces of the Arable Industry from a Farmers Perspective - Adapted from Porter 2008

Porters 5 Forces of the Arable Industry from a Farmers Perspective					
Rivalry amongst existing competitors (High)	The threat of new entrants (Low)	The threat of substitutes (High)	The bargaining power of suppliers (Arable Farmers) (Low)	The bargaining power of suppliers (agricultural service providers) (Low)	The bargaining power of buyers (High)
<p>High rivalry amongst existing competitors.</p> <p>Farmers are many and are all a similar size meaning no one operation makes up a large enough proportion of the industry to exert excess power over buyers.</p> <p>Slow growth has led to a fight for market share, with larger farming entities increasing their land area to grow.</p> <p>Lack of product differentiation. Where the product is perceived as a commodity or near commodity choice by the buyers is primarily based on price.</p> <p>Variance in expectations leads to weak sellers eroding the value of the market</p> <p>High exit barriers</p>	<p>High land values, low returns relative to other sectors, a minimum viable land area and the extra cost of machinery and infrastructure mean that the economies of scale and capital requirements to enter into the arable industry are high.</p> <p>A highly skilled grower base and long existing track records lead to customer loyalty associated with existing growers</p> <p>Existing players have extensive experience to cut costs and increase service levels.</p> <p>Nutrient policy restricting land use intensification in Canterbury has meant that changing land use is now difficult.</p>	<p>Several substitute products to contend with. See Table 2 below.</p> <p>The homogenous nature of the products that arable farmers grow means that buyers will switch if the price of the product outweighs the performance.</p>	<p>Many growers and a few buyers mean that buyers hold significant power over the grower base as there are few options for growers to choose from.</p> <p>The high-quality, consistent product that growers produce does provide value to buyers. Conversely, the homogeneous nature of the products means that it is easy for buyers to switch to substitutes if the price outweighs the performance.</p> <p>The threat of forward integration is low. Existing supply chains are too big and powerful to take on directly.</p>	<p>Service providers' concentrated nature means they can easily pass costs on to farmers.</p> <p>The specialised nature of the arable service industry means that there are limited options for alternative service providers and products.</p> <p>Supplier inputs are subject to fluctuations in the global markets, which can change significantly because of geopolitical and other factors.</p>	<p>Few large buyers and many growers factors mean arable farmers lack the leverage to negotiate prices, with contract values determined by the market and merchants, not the grower.</p>

7.2.1 Rivalry Amongst Existing Competitors

This force examines how intense the current competition in the arable industry is. The fragmented nature of the Canterbury arable industry has led to high levels of competition between growers. Rivalry is high when several competitors are equal in size and power. Competition has meant that growers have been unwilling to work together as they have been vying against one another for sought-after contracts, leading to an unwillingness to share information, which may give away a grower's competitive advantage. The insular approach has meant that merchants have been able to play growers against one another, eroding the power of farmers as a collective.

7.2.2 Threat of New Entrants

New entrants in an industry bring new capacity and a desire to gain market share that puts pressure on pricing and costs and the rates of investments necessary to compete. Simply said you will have to share the pie with more players.

The threat of new entrants to the arable industry is low. High land values, machinery and infrastructure cost, low returns compared to land values, high level of experience required and nutrient policy restricting land use intensification all contribute to this. It is important to consider that one of the major barriers to entry into the arable industry is its lack of profitability in comparison to other land uses. Canterbury arable farms typically operate at a 3% return on investment (Dynes, 2010) or half that of a highly productive Canterbury dairy farm.

If the industry's fortunes picked up farmers from other industries could move in with the support of agronomists and contractors.

7.2.3 Threat of Substitutes

A substitute product performs the same or a similar function as an industry product by a different means. They essentially fulfil the same underlying need even though they might not look identical on the surface. Substitutes limit the potential returns of an industry by placing a ceiling on the pricing firms in the industry can profitably charge.

The threat of substitutes to the arable industry is high. Substitutes erode profitability in the arable sector by creating a price ceiling on product pricing. Many substitute options and the homogenous nature of the products we grow mean that switching to an alternative is generally quite easy (See Table 2). New Zealand's consistent reputation as a high-quality producer of grain and seed means that New Zealand-grown product is still a safe bet for merchants. Tension between quality and price sees buyers shifting between New Zealand-grown grain and seed and substitutes.

Table 2- Examples of Substitutes to the products that Canterbury Arable Farmers grow.

Market	NZ Arable Product	Substitute
Animal Feed	Feed Wheat and Barley. Cereal Silage,	PKE, Soy Meal, Molasses, Imported Grains
Milling Wheat & Malting Barley	Milling Wheat and Malting Barley	Imported Grains (It is often cheaper to import grains from international markets, particularly to the North Island).
Proprietary Seed Varieties	Herbage and Vegetable Seed	Herbage and Vegetable Seed from other countries (Chile, Australia, USA)

7.2.4 Bargaining Power of Arable Farmers as Suppliers

This force examines how much power and control a company's supplier has over the potential to raise its prices or to reduce the quality of purchased goods or services. Which in turn would lower an industry's profitability potential.

The bargaining power of arable farmers as suppliers, is low. The grain and seed industry in Canterbury is made up of a few major merchant companies. In comparison, there are around 500 arable farmers (Merrilees, 2021). Buyers hold significant power over the growers as there are limited options for growers. The fragmented nature of the arable industry has traditionally meant buyers have been able to pick farmers off and play growers against one another.

The homogeneous nature of many of the products farmers produce means buyers can switch easily. Lack of differentiation drives down the price farmers can obtain as weak sellers erode value.

The arable industry provides an important service to grain and seed merchants. In essence, the industry is the merchant's factory. New Zealand provides a counter-seasonal multiplication option for Northern Hemisphere seed companies, a means for proprietary herbage seed lines to be multiplied out for use in New Zealand pastoral farms and provides grain for the New Zealand flour, malting and animal feed industries. The high-quality, consistent product that growers produce does provide value to buyers. Conversely, the homogeneous nature of the products means that it is easy for buyers to switch to substitutes if the price outweighs the performance.

The extensive nature of the existing supply chains coupled with historically low farmer profitability means the threat of the growers getting together and taking on the merchants and mills through forward integration is low (See Farmers Mill Case Study).

The Farmers' Mill

In 2013 a group of Timaru Farmers got together and invested in a flour mill (see Farmers Mill New Zealand Flour). At the time, New Zealand milling was dominated by two companies, Champion Flour Milling and Mauri, with an oversupply of flour in New Zealand, low prices and tight margins. The existing New Zealand Mills came after the Farmers Mill dropped prices making it difficult for the Farmers Mill to gain a foothold.

The provenance story got the Farmers Mill into the marketplace but did not result in the higher prices or margins for the growers that they had envisaged, and many left the initiative. High global grain prices and shipping mean that a core group of suppliers close to the mill is now an advantage at present.

7.2.5 Bargaining Power of Agricultural Service Providers as Suppliers to Arable Farmers

The bargaining power of agricultural service providers, who supply fertiliser, fuel, chemicals and machinery is high. Supplier inputs are subject to fluctuations in the global markets, which can change significantly because of geopolitical and other factors. The fragmented nature of the arable industry means that they are especially exposed to inflationary pressure, with suppliers passing costs directly on to growers.

*"The farmer is the only man in our economy who has to buy everything he buys at retail - sell everything he sells at wholesale - and pay the freight both ways." **John F. Kennedy***

7.2.6 Bargaining Power of Buyers

This force examines to what extent customers (Merchants) can put the company under pressure by demanding better quality (price, standards), thereby driving up costs or exerting control over price.

The concentrated nature of the merchants compared to the farmers means buyers hold power over the growers. There has traditionally been less area of contracted seed than growers with area available, meaning buyers held significant bargaining power over growers.

The homogenous nature of the products arable farmers grow has meant buyers can easily switch if the price outweighs the performance.

Historically a less than astute understanding by farmers of costs and international trends has weighed heavily against them and given buyers a significant advantage in the marketplace. Information on the cost of production, future pricing and strong

communication and collaboration provide a serious opportunity to share information and hold buyers to account (See where information leads to power case study)

Where information leads to power

Following the 2022 harvest, a group of Canterbury growers got together to discuss what could be done to strengthen the industry's cause. The growers brought together their accounts to try and determine their exact costs and identify what sustainable returns for different crops would look like.

From these discussions, a cost-of-production calculator was produced, taking into consideration all expenses related to growing a crop, from direct costs (fertiliser, chemical, seed, tractor work etc) to the broader costs of running an arable farm (insurance, rates, replacement of infrastructure, power ect). When the broader business costs are factored in, the group discovered that they have been producing crops for little margin. Once inflationary pressures were also included, it was easy to see recent pricing had been far from sustainable.

The group released their cost of production calculator through Federated Farmers with an aim to encourage farmers to use their own data to take a serious look at their businesses and hold the grain and seed merchants to account when contracting volumes. The group also took the calculator out to all the major merchant companies with the aim of making it implicit that the business-as-usual approach to determining prices will soon run the arable industry into the ground. Farmers know that they need to remain competitive if a small seed industry is to be sustained.

If grain and seed merchants are unable to come to the table with pricing, then arable farmers need to look at other options.



8 Discussion

8.1 ANALYSIS

This research project has provided an analysis to better understand where the future lies for the arable industry in Canterbury. To answer the research aim, four research questions were defined to refine thinking and provide a greater understanding of factors that impact the industries future:

1. Why is it important to have a viable arable industry on the plains?
2. Can arable farmers continue to operate business as usual?
3. What factors determine the underlying cause of poor profitability in the industry?
4. What are the potential solutions to improve the long-term viability of the industry?

A review of the literature and two proven models were used to overview where the industry currently stands and the external factors influencing the industry.

By comparing, contrasting, and evaluating the themes and ideas from the literature review, models and informal interviews, themes were distilled, and findings were produced.

8.2 WHY IS IT IMPORTANT TO HAVE A VIABLE ARABLE INDUSTRY ON THE PLAINS?

Although the arable industry has not been as profitable as other land uses, the industry still provides a significant contribution to New Zealand's economy.

The arable industry's value also lies in its ability to support New Zealand's other key primary industries, red meat and dairy, by producing the seed for pasture establishment and renewal, grain and silage for supplementary animal feed, and land for winter grazing and finishing.

In a region where the impact of agriculture on our environment is coming under more speculation, Canterbury arable farms provide a sustainable land use option which can assist with meeting freshwater and greenhouse gas emission expectations.

Disrupted global shipping supply chains, geopolitical tension and inflationary pressure indicate domestic food production will become more critical in the future. The arable industry produces many staple food products that New Zealanders consume daily, highlighting the importance the industry may have on New Zealand's ability to be food secure in the future.

Modern customers increasingly demand more from suppliers, and keeping up with trends will require focus, understanding and agility to pivot into new markets (Proudfoot, 2022). The arable industry's historical lack of cooperation and investment in supply chains

coupled with the efficient and skilled nature of the grower base, may mean they are well poised to move into new markets as they arise. This could provide an extremely valuable contribution to New Zealand's economy and increase opportunities for the growers.

8.3 CAN ARABLE FARMERS CONTINUE TO OPERATE BUSINESS AS USUAL?

8.3.1 A Strong Short Term Outlook

The complex and volatile nature of the world today indicate that high and volatile commodity prices are likely to hold in the short to medium term. This indicates a promising short-term outlook for Canterbury arable farmers.

8.3.2 A Challenging LONG-TERM Outlook

8.3.2.1 Changing Costs, Climate and Consumer Preferences

Canterbury arable farmers rely heavily on synthetic inputs such as agri-chemical, fertiliser and fuel. Input costs will likely continue to rise, which will continue to pressure the margin farmers can obtain for their crops.

The climate in Canterbury will likely continue to become hotter, dryer and more extreme. The changing climate means that farm systems, infrastructure and practices may have to be adjusted to allow this risk to be accounted for.

Consumers are now more interested and aware of how their food is being produced. Changing preferences and a greater awareness of the environmental and health impacts of the products we grow indicate that the heavy reliance on synthetic inputs of modern Canterbury arable farm systems will continue to come under more pressure.

8.3.2.2 Will Farming, Business as Usual Be Enough to Maintain the Industry?

Earnings from arable farming alone are unlikely to provide adequate returns if the industry continues its current trajectory in the long run. It is unlikely that a business-as-usual approach will allow arable farmers to thrive. At the very least it may allow them to survive.

Over the last 30 years, the highest and best land use in Canterbury from a profitability standpoint has been dairy. The success of the dairy industry, coupled with excellent amenities and infrastructure, has caused land values to increase dramatically on the plains. The rapid increase in land values has translated through to the price of arable farms primarily due to the opportunity that switching to dairy provided. As land values continue to rise, the returns from the commodity crops we grow have become more marginal. Low returns compared to capital value have made succession difficult and have led to significant levels of attrition in the industry.

Recent national-level environmental regulations now mean that converting to more intensive land uses will be difficult, if not impossible, potentially impacting arable land values. Losing equity is a concern for many modern arable farmers as borrowing has been undertaken on the proviso of status quo land values, which assumed the potential to use the land for dairy or dairy support.

Productivity gains have allowed our growers to keep ahead of inflationary pressures and maintain profitability. Up until recently, grain and seed prices have remained relatively stagnant. Input restrictions, environmental regulations, and no new silver bullets to increased production mean that continuing to rely solely on increases in yield to maintain profitability may no longer be an option. Inflationary pressures will erode the margin as production gains become harder to come by.

Pine and Gilmore (1998) suggest that as economies continue to evolve, less market value will remain in the hands of the commodity producers, with more of the value to be captured higher up the chain. Rising land values compound these issues as the returns from commodity arable crops will continue to become more marginal if land values increase further.

8.4 WHAT IS THE CAUSE OF LOW PROFITABILITY?

8.4.1 A lack of value in the crops

Many crops that arable farmers produce are either pure commodities or have been commoditised through farmers having a lack of ownership in supply chains. Many of the crops that farmers grow lack value as they are directly linked to international markets where crops can be produced for lower prices often with subsidies, with little recognition for the sustainable methods of production utilised by our farmers. A lack of collaboration and investment has meant that arable farmers have remained at the lowest supply chain return, manufacturing (Shin, 1992), despite being undeniably world-leading in yield, quality, and sustainability.

8.4.2 A lack of power

Another limitation on the profitability of arable farms is the lack of power to negotiate better value for their contracts. Farmers are operating as fragmented individuals in a highly competitive market, meaning buyers can pick growers off one by one and growers are competing against one another for sort after contracts.

The products that Canterbury arable farmers grow are largely undifferentiated, creating a price ceiling on product pricing as switching to cheaper alternatives is generally relatively easy.

The high availability of low-value commodity options has probably had uptake by farmers when the commercial reality is that they have not been providing a sustainable return. The information advantage and low power have made it difficult for farmers to make informed decisions about contract prices and whether they are viable or high enough to contract or hedge.

8.4.2.1 High Barriers to Forward Integration

Many markets arable farmers supply are already very competitive and lack value meaning the overall margin of the products are low. Examples include cereals and some of the counter-season multiplication of international varieties. If farmers cooperated and moved into these markets, they would likely only erode the sector's overall margin by

increasing competition. In this case, forward integration can weaken already competitive markets even more.

Merchant companies have invested heavily in intellectual property, marketing and relationship building. The development of PVR ryegrass varieties for the New Zealand pastoral industry is a classic example. Companies have invested heavily in plant breeding programs and developed strong, trusted brands. None of these investments are cheap and the companies deserve to be rewarded for their risk and entrepreneurship. The difficulty and cost of forward integration create a significant barrier to entry into existing supply chains, keeping competition low and power with the existing supply chains. Extensive barriers such as relationships, intellectual property and high cost mean that taking on existing supply chains will be difficult, risky and time-consuming.

Farmers are now in a unique situation where high cereal prices give them viable alternative options. Furthermore, merchants are now unable to fill their contracted areas. Information on the cost of production, future pricing and strong communication and collaboration provide a serious opportunity to share information and hold buyers to account.

9 Conclusions

Canterbury arable farmers are a highly skilled grower group operating on the best soils. The industry provides a valuable, flexible, and sustainable land-use option.

A drying and warming climate, changing consumer preferences and the likelihood of costs continuing to rise all indicate that building resilience into arable farm systems will become more important in the future. Continuing to farm with a lighter touch and investing in crucial infrastructure such as water storage will be important moving forward.

It is unlikely Canterbury growers will be able to compete on price alone in the commodities space against countries with grander scales and subsidies in the future. Rising land values, and a lack of value in many of the crops we grow, coupled with a highly competitive industry, mean that arable farming alone is unlikely to provide sustainable returns if the industry continues its current trajectory in the long run.

High barriers to entry and low value in existing supply chains mean that taking on existing supply chains directly is not a realistic option.

If continuing to operate at the lowest return part of the supply chain in the commodities space is not viable and integrating into existing supply chains is unrealistic, then a change of thinking needs to be undertaken.

Differentiating our crops or our offering will allow farmers to move into new markets and forge their own paths. If small areas of differentiated, more valuable crops increase, this will decrease the space available for more traditional crops and increase their value.

Farmers will need to invest if they want a more profitable future. Farmers cannot expect to be paid a premium if they are not taking on any risk associated with moving outside the farm gate.

The unstable nature of the world today has driven high commodity prices, indicating a robust short-term outlook for the industry is likely. This will provide the perfect platform for farmers to investigate new options and connect with higher-value markets. One risk of a robust short-term outlook for status quo production is that it may mean farmers take their eye off the ball. If Canterbury arable farmers continue to do well in the commodities space, there will be no incentive to seize the opportunity that a shift to a higher value, production will bring. Strong returns in the short term will provide the perfect opportunity for growers to look outwardly, collaborate, and connect with new markets. This needs to be at the front of mind for growers moving forward.

Collaboration and utilising information to inform and empower our farmers provides a genuine opportunity to ensure sustainable pricing is returned to the growers. Sharing knowledge and collaborating in investing in new business opportunities are both examples where cooperation would greatly benefit growers.

Modern customers are now demanding more from suppliers. Keeping up with trends will require a focused understanding and the ability to pivot quickly. The historical lack of integration into supply chains from arable farmers means they are not tied to one thing and are dynamic and reactive.

Changing consumer preferences means they are more interested than ever in what is happening behind the farm gate. The highly efficient nature of Canterbury arable farmers means they are well-placed to meet expectations.

It is important to acknowledge that the risk and cost of moving outside the farm gate is still as prevalent as ever. Farmers are not experts in marketing and distribution, and the lack of profitability means there is often little money to invest. Understanding who will connect farmers with new higher value supply chains is largely outside the scope of this report. This risk will need to be balanced with more conservative crops to ensure the business's overall risk profile is managed.

The arable industry in Canterbury is at a crossroads. If farmers want to obtain a higher value for their crops in the future, they will need to be proactive. Expecting companies to take on the risks associated with moving outside the farm gate and hoping for a premium is unlikely. If we continue to sit back and expect a better future without taking action, the industry will likely continue to struggle. If farmers take the opportunity that a favourable short-term outlook provides them, then the opportunities are endless.

10 Recommendations

These recommendations indicate steps that Canterbury arable farmers can take to improve their outlook.

10.1 BUILD RESILIENCE

Resilience is the process and outcome of successfully adapting to complex or challenging experiences through flexibility and adjustment to external and internal demands. Continuing to build resilience into our farm systems will be imperative moving forward, for instance:

- reducing reliance on inputs such as agrichemicals, fertiliser and fuel
- adapting crops or their management to meet consumer demands and a changing climate.
- investing in critical infrastructure, such as water storage

If farmers can look to build resilience into their farm systems now, they will be prepared for the day when they need it.

10.2 COOPERATE

With the benefit of hindsight, it is easy to see that a historical lack of cooperation has meant that arable farmers are in a position with little power. The fragmented nature of the industry

Potential for an Analyst

Information is a very powerful way that growers can take back power. There is potential for the industry to employ a full-time analyst who visits growers and compiles reports to assist future pricing and changes in costs. Under what entity this person sits within and how the analysis would fit within the rules of price fixing and collusion is outside the scope of this report.

Commerce Act 1986

It is essential to acknowledge the legality of what is being proposed and understand where sharing information and the employment of an analyst sit within competition and antitrust laws.

The purpose of the Commerce Act 1986 is to promote competition in markets for the long-term benefit of consumers within New Zealand. If there is an agreement formed on the price between competitors (farmers) this falls into anti-competitive behaviour laws and is illegal.

If farmers make a unilateral decision and information on pricing is not shared between farmers, what has been proposed will not fall under these laws (Commerce Commission , 2022).

Important things to keep in mind-

- Any interaction must be done on an individual bases
- There is no dictation of price
- Providing and explaining information is fine, but farmers must make their own choice
- The legality of the concept will depend on the analyst's discipline. Sharing information about pricing between growers must not occur.

and high levels of competition between growers vying for contracts has meant that merchants have been able to play growers against one another, eroding value in the process. High cereal prices and the fact that merchants can now not fill their contracted areas mean arable farmer's position has strengthened. If farmers want to increase their competitive advantage in the future, they will need to work together.

10.3 STOP BEATING UP THE MERCHANTS

A common theme that has come through is that grain and seed merchants are undervaluing the growers and are not providing adequate compensation for the cost of production and risk associated with grain and seed production. Although this may be the case in certain situations, the lack of power that arable farmers hold means that they have traditionally not been able to do a lot about it.

Farmers have had opportunities to invest in supply chains and intellectual property and even sold out of a cooperative in Crop Mark in the mid-1990s. Farmers have been happy to sit back and not take the risk associated with moving outside the farm gate, leaving growers with little control of the price they get for their crops.

The key to markets is the idea of voluntary exchange, where buyers and sellers willingly decide to make a transaction (Mankiw, 1999). The 2022 harvest was the first season grain and seed merchants could not fulfil their contracted volumes (Sim, 2022). Although growers have been frustrated with prices for some time, they have still been willing to sign grower contracts. The fundamental lack of power on the grower side means they have felt they have had little choice but to do this. Currently, high cereal prices and a reduction in the area of the grower pool have increased the bargaining power of arable farmers. If the price for cereals reduces back to more realistic levels in the long run, farmers will return to where they were initially.

Integrating into existing supply chains will be challenging, risky and expensive. Beating up the merchants over pricing is not going to change anything. If merchants cannot provide more sustainable pricing to the farmers, it will be at their peril as further grower attrition is likely to continue. The symbiotic relationship between growers and merchants means that both rely on each other to survive. Understanding how growers and merchants can work more collaboratively in the future is out of the scope of this report but is worthy of mention.

10.4 DIFFERENTIATE THE OFFERING.

We know remaining at the lowest return part of the supply chain in the commodities space is not a viable long-term option. Any new options must return more value to the growers. Options for differentiating include differentiating the offering and differentiating the product. Defining specific opportunities is largely beyond the scope of this report.

Doing something different is the best way to put pressure back on merchants and forge a future where farmers have more control. If small areas of differentiated, more valuable crops increase, this will decrease the space available for more traditional crops and increase their value.

10.5 INVEST OR PARTNER IN SUPPLY CHAINS

*"Insanity is doing the same thing over and over and expecting different results."
Albert Einstein*

Although moving into higher-value markets may see more value returned to the growers, if farmers continue to sit back and not invest in supply chains, they will continue to remain in the lowest-value part of the supply chain. All be it dealing in more valuable products.

If farmers want to a higher value for their crops in the future, they will need to do something about it. Sitting back and expecting companies to take on the risks associated with moving outside the farm gate and expecting a premium will never happen.

With any investment comes risk. This risk will need to be balanced with more conservative crops to ensure the business's overall risk profile is managed.



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12 Appendix

12.1 APPENDIX 1

Summary of simple N- surplus from the Mid Canterbury Irrigation Schemes

