



Waimakariri District Council Rural Futures analysis

Future agri-food scenario planning for a
prosperous District

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Initial impressions of the Waimakariri District's rural future

Over the last decade or so the Waimakariri District has seen land use evolve as a result of a single rural land zoning that has permitted subdivision of land down to 4 hectares for lifestyle blocks. As a consequence much previously productive land is no longer used for commercial purposes and many people living on the land are commuting into Christchurch for employment and entertainment purposes. The areas of the District closer to Christchurch City have experienced significant urbanisation facilitated in part by motorway upgrades to the north of Christchurch; some of this urbanisation has occurred in a planned manner (for example the development of the Pegasus New Town) while other activity has been more reactive in response to people migrating (potentially temporarily) out of Christchurch following the earthquakes. People are moving to the District either for lifestyle or because land prices are lower than Christchurch.

The southern area of the District, adjacent to the Waimakariri River has seen the conversion of land into medium to large scale dairy farms, cropping, livestock fattening and dairy support farms relying on irrigation water from the river, through mainly the Waimakariri Irrigation Scheme. The rest of the productive land in the District is mixed crop and livestock farming including sheep, beef and deer, some smaller scale dairy farms with small pockets of horticulture and forestry activities along the hills, where the land is not suitable for grazing.

The vision for the District is to combine the best of Town and Country. The Council wishes to ensure that the District is prosperous, environmentally sustainable and effective in utilising its natural environment. It has indicated a desire to add a further 30,000 people to the population over the next 30 years, with around 25% of these people living in the rural areas of the District.

Water is largely fully allocated across much of the District and work led by Environment Canterbury continues to allocate nutrient run off limits to landowners across the District.

Any rural futures scenarios developed for the Waimakariri District need to provide the District with the following attributes (1) increased local employment to support an ongoing growth in the population of the District (2) optimal use of water to generate strong economic returns that support higher land values and consequently increase the rating base of the District (3) land use that enables the District to protect, enhance and, potentially, restore its natural environment and water quality and (4) integration of plans with those adopted by other Councils in the region as well as Environment Canterbury.

Current Land-Use in the area of the Waimakariri District

The Waimakariri District current land use is dominated by agriculture. The development of irrigation has changed the land use over the last 10 years. Initially it was the sourcing of ground water by drilling and then more recently District irrigation schemes under pinned by water storage from braided river systems.

Like a number of other Districts in Canterbury irrigation development in the form of District schemes have led to increased intensification of land use.

The Waimakariri Irrigation Scheme (WIS) situated between the Ashley and Waimakariri Rivers now provides water to 18,000 hectares and we understand that WIS is at capacity (that is, no further water is available for allocation). WIS is the largest irrigation scheme in the District. It was built to allow development, support existing ground water wells and ensure the reliability of agricultural production.

The availability of water has seen an increase in land area utilised by dairy farms of around 20,037 hectares (or around 10% of the total District land area) and an increase in cow numbers (65,468 additional cows) in the District. With the expansion of the dairy industry, land use for dairy grazing, replacement dairy stock, wintering of cows and production of supplemental feed for the dairy systems have also increased significantly in the District. We note that the milk produced in the District is all transported out of the District for processing, with farmers predominately supplying Fonterra at Darfield and Clandeboye, Westland at Rolleston and Synlait at Dunsandel. As a consequence there are no processing jobs in the District associated with dairy activity.

The irrigation developments have also provided additional resource for cropping and livestock trading operations; either fattening store lambs or cattle on reliable irrigated land. The stock are either bred in the District on breeding properties or imported from other farming Districts.

The remainder of the area is made of sheep farming, much of it producing early season lamb for the export trade and beef farming which is dominated by fattening cattle for either local trade, or export. These farms are of medium scale, with property areas of between 100 and 500 hectares. Stock farmed in the District is taken to processing facilities outside the District for slaughter, again meaning that there are no processing jobs in rural areas of the District associated with red meat farming activities.

Land is also used in the District for horticulture and forestry activity. We note that there is a timber processing facility at Sefton (Daiken NZ) which utilises local resources as well as material imported into the District, providing employment.

The increased land use for lifestyle type activities has meant land values in some areas have increased past the economic value of the land that would enable farmers to purchase and utilise the land to expand their commercial farming operations.

Initially the lifestyle properties often had businesses attached to the land, growing vegetables, fruit trees, olives or calala lillies however due to these businesses become less viable, and the relaxation of subdivision plans, these types of land uses in the last 10 years have decreased.

The availability of water and nutrient limitations in the District, given current policy settings, reduce the ability for further expansion of intensive agriculture especially in regards to livestock farming.

Overview of three Rural Futures scenarios

The Waimakariri District has a proud rural heritage however in a world of technological disruption we have developed three potential Rural Futures scenarios for the District which are explored further in this report. The scenarios reflect a range of opportunities for the District to respond to the mega trends that are influencing the global agri-food sector. The scenarios presented are being driven by different consumer and technology trends.

1

Waimakariri becomes Canterbury's FoodBowl with a focus on supplying premium food to local consumers with strong provenance

Connecting Cantabrians and other consumers to premium, storied food through direct to consumer retail models, including farm gate distribution. Over time a diverse mixture of artisan food production businesses emerge across the District and a hub is developed to showcase the region's produce to visitors and to facilitate collaboration between producers.

2

The Agri-Tech District: Utilising technology to maintain the contribution that primary industries make to the District – specifically responding to environmental and water issues

Agri-Food businesses adopt technology to demonstrate clearly to the wider community the role that they play as guardians of the land and water. Innovation boosts productivity as the ability to add inputs to farming systems is restricted. Technology is adopted quickly and used to augment the intuition of farmers and provide more comprehensive reporting on outcomes.

3

Leading the global food eco-system: alternative farming methods and food opportunities focused on supplying premium global consumer markets

Food producers in the Waimakariri District become leaders in emerging food trends and integrate these novel products into their traditional product portfolios. As a consequence, the region gains geographical association with some novel food products. Multi-product farms, vertical farming systems and cultured farming all emerge in the District over a 15 year period.

Planning implications associated with the Rural Futures scenarios

The three potential Rural Futures scenarios we have articulated for the Waimakariri District all have a range of planning implications. While we are not planning specialists, we have set out below our thoughts on some of the implications that arise from the future scenarios that we have created.

While we are presenting the three scenarios with our thoughts on planning implications we are not in a position to make any recommendations into the precise land use and zoning options that Council may ultimately adopt. KPMG's role is to provide a suite of opportunities to explore to support discussion around the land use and zoning proposals ultimately adopted by the Waimakariri District Council. There are many factors that influence zoning decisions and this report is prepared to provide a future lens onto the analysis being completed by Council staff.

Irrigation

It has become very apparent in the last year that the core of any land use plan must be the alignment of the use of available water with the long term protection and restoration of natural eco-systems and the efficient utilisation of water resources to maximise agricultural production outcomes. Having clear water management systems in place will assist in facilitating the transition to alternative crops and production options.

Unlocking the potential for water storage remains a significant opportunity for the region. Given the critical importance water has to unlocking wealth from agri-food systems, the Council needs to make decisions around how it supports farming businesses to secure reliable water availability. These decisions will be critical to unlocking any of the land use scenarios articulated in this report. An opportunity lies in creating programmes to enable smaller scale, localised water storage projects, given the Coalition Government has indicated that it will no longer provide seed funding to support a large scale irrigation system.

The government has indicated that they will look favourably on smaller scale projects designed to shift water between seasons and that are expected to result in restorative environmental outcomes. These smaller projects could be significant for enhancing rural futures and plan should have some consideration of how Waimakariri could make allowance for such developments to occur. Specifically there should be consideration of high value farm activities that could potentially be established in the region through the provision of additional reliable water sources. An example of this could be high value cropping activities that are currently not in use and can be seen as futuristic and forward thinking.

Zoning

Careful consideration needs to be given to creating more than one zone for rural areas. This will enable protection of land for productive and economic purposes and will ensure preservation of rural aspects for current residents. With regards to some of the high tech enabled food growing/ processing operations, these could be developed in the coastal strip, in the Eastern area of the district, that is already relatively urbanised. Consideration will need to be given to how consenting is provided to the operators of novel food systems so that they are able to operate in areas that provide ease of access to transport links to quickly move exports to Christchurch Airport.

Another consideration would be zoning options that allow for a processor (for example a sheep milk processor) to set up in the District. Not only would this open up opportunities for multi purpose farms, it would create downstream jobs in primary sector that we have identified to be currently missing in the District. Multi-product farms (ie farms that use their land to produce multiple income streams, maybe cropping combined with animal raising together with some intense high value horticulture activities as well as non-directly farming related activities, such as operating holiday cottages, forestry blocks or cycle trails) are becoming increasingly popular as a way to diversify portfolios, and decrease risk. Planning rules will need to provide the necessary flexibility for these types of farming enterprises to be developed.

Connectivity / technology

As digital enablement transitions from being a nice to have, to a requirement to remain relevant and connected in every sense, any all the Rural Futures scenarios that we have articulated will require and rely on connectivity. This is challenging in parts of the Waimakariri region just as it is across rural New Zealand, with there being limitations in infrastructure impacting reliable digital connectivity. If the council has a commitment to enabling the development of innovative forms on agricultural activity in the District, long term plans should give consideration into how the Council could support the enhancement of connectivity across the district. While this is unlikely to involve the Council actually becoming directly involved in constructing infrastructure but they could seek ways to partner with other infrastructure providers (including Chorus, one of the telecommunication experts, the local electricity distribution business) to develop a business model that accelerates the provision of fast connectivity to all areas of the district. As a consequence plans could should take account of allowing space for the construction of distribution infrastructure, it could also include underwriting a base load of activity on the network through digitalising the Council's own services delivery to create demand and the plan could even think about a targeted rate to help fund the cost of development.

Talent capability

Having a sufficient amount of skilled and capable people to support the development of the industry in the district is a crucial element that is key to creating a thriving and innovative agri-food district. Attracting and retaining talent into the agri-food industry has historically been challenging but as technology permeates the industry, and innovation spans the entire value chain, the appeal of the industry as an employer for talented people is increasing. There are challenges with regards to having sufficient skilled people available to support the development of the industry in the District due to the way that businesses have developed over time which has consequently kept skill sets focused on farming rather than processing and marketing activities. Creating innovative Rural Futures is a way to attract higher value, diversified skill sets to the District, but the Council needs to recognise that it will be competing against other districts in Canterbury, as well as across the country, so needs to be present a compelling proposition to attract high value roles.

We would suggest that the Council gives consideration in its planning to ensuring that the District has the right structures in place to support economic development and job attraction. This further raises the questions as to whether Waimakariri is best served within Canterbury wide economic development initiatives or if the district should take an individual track given region wide initiatives have diverted high value jobs away from Waimakariri District in the past. Looking long term, the council could explore community education initiatives that are focused on evolving primary sector activities. These types of initiatives could take the form of providing facilities for information days, holding future agri-food sector roadshows in the Districts schools, supporting the development of a District A&P show that specifically sets out to disrupt the traditional thinking around what makes a good show – there are things the council can do to help attract and inspire talent to opportunities in the sector.

Global connections

Creating global connections to the wider agri-food industry for business and organisations in the District could be delivered by including a range of initiatives in long term planning. These could include:

- Initiating trade missions to or bringing in groups from potential key markets to showcase the district
- Twin town/ district relationships with potential key offshore markets could be developed,
- Enhancing the District's economic development presence on the web,
- Organising a unique event with global input to put a stake in the ground about Waimakariri having bold ambitions to be a leading innovative food hub – for instance Nelson is doing this work in NZ, but there are good examples internationally including Toowoomba in Queensland and Skivareen on the West Coast of Ireland.

Specialty / technical facilities

Developing high value Rural Future ecosystems will require the provision of specialist facilities such as research centres and labs for innovation. In preparing its plan, the Council could look to replicate approaches that we have observed other Councils taking to support and enable the development of economic development zones (either individually or with a private partner). This has the potential to develop the infrastructure and accommodation to create a food-hub or an agri-tech hub centre of excellence. There is potential for a Waimakariri Cluster to develop, looking to the Waikato Innovation Hub as a regional example. Other examples of recent developments include work that has been undertaken in Adelaide to create an agri-food hub as part of regenerating South Australia following the pull out of the motor vehicle manufacturers and the Mixing Bowl Hub, which has been established in the Bay Area in California.

Structures and business models to encourage sustainable businesses and sustainable environments for the entire ecosystem

Thinking outside of traditional farming models could enable the development of innovative approaches that support young people and agri-food innovators to come to the Waimakariri region to establish their businesses. Given the prevalence of lifestyle blocks the Council could create an exchange platform that enables young farmers and innovators seeking small plots of land to be connected with owners of underutilised blocks of land. For example if a group of lifestyle blocks have approximately 4ha of land each that are not being utilised, they could have an opportunity to provide this to a farmer to use on cost recovery basis. The opportunity could give young farmers an opportunity to utilise the land where they may not be able to afford buying it. It has the potential to create a new Waimakariri unique pathway into the industry and enable innovative businesses to explore new market opportunities without committing to large scale capital investment.

Priority implications to be considered	Scenario One – Food Bowl	Scenario two – Agri-Tech Hub	Scenario three – Global eco-system
Irrigation			
Zoning			
Global connectivity			
Technology capability			
Talent capability			
Speciality Facilities			
Infrastructure			
Intensification of land			
Proximity to landmarks			

Mega Trends

Mega Trends influencing the global agri-food ecosystem

Recent data from AgFunder indicated that in excess of US\$10 billion was invested in 2017 into early stage agri-food innovation. This was up 29% on the previous year and represented a new record level of investment. This level of investment, which is 10 times greater than five years ago, reflects the emergence of new investors into the sector who are seeking to use technology and alternative business models to disrupt all aspects of traditional agricultural activities. We have previously written about our belief that the global agri-food sector is entering a new agrarian revolution, presenting huge opportunities for industry participants to transform their business and benefit from emerging technologies that are responding to a range of key megatrends.

Future World Citizens

Consumers are becoming more attuned to the food that they eat and this is having a significant impact on how the food system is functioning globally. As advances in technology introduce innovation across the supply chain, consumers (particularly millennial consumers) are seeking to be connected to their food and have instant access to the latest food solutions via various digital platforms, any time of the day.

Many millennial consumers are more socially aware than previous generations and prefer to utilise businesses that have a purpose beyond profit. With millennials now the largest group of consumers in many global markets, they are looking for alternative options, products that are not just providing nutrition but offering functional benefits and social impact. Companies are designing products and services to appeal to these needs; whether this be in the form of alternative meat options (including plant based, cultured and alternative animal) or a digital platform aiming to provide instant access to products and services, or compact appliances or new forms of social interaction for urban communities.

Consumers are becoming increasingly clear about the foods they want to eat, and there is growing interest – especially amongst the high-income consumers that New Zealand producers need to target – in consuming healthier diets. At the same time, however, many consumers are also becoming increasingly remote from the production of food, mainly on account of urbanisation. This is creating an environment where consumers are wanting to understand the provenance of their food and have opportunities to interact with the people growing the product. Technologies such as virtual reality, present the opportunity to take producer/ consumer engagement to a level well beyond the supermarket or farmers market, to make a deeper connection between farmers and the end user.

Entirely new business models have emerged in recent years focused on providing instant access to services. Uber and AirBnB redefined business models in their sectors, creating entirely new ways of doing business without physical assets and utilising technology. Hyper connectivity means customers expect to have instantaneous access to products and services. Agri-food sector players are evolving their models as consumers seek access to innovative new products and services through a channel that will best fit within their lifestyle.

Amazon acquiring Wholefoods is an example of not only creating a rapid urban delivery model for a popular branded, premium food offering, it also has given Amazon an entire new realm of data they previously did not have. Uber Eats is an example of instant access in line with customer expectation that they can order what they want when they want, from whom they want. Taking this a step further is the ability to use data to design the ideal diet promote better health outcomes. Personalised nutrition programs, such as Habit, are evolving health based eating through the use of genome testing to design tailored diet solutions.

Growing Populations

The United Nations predicts a population of 9.7 billion people by 2050. The ability to feed the global population will be challenged by the addition of around a third more people on the planet over the next 30 years. Many suggest that current food production trajectories will leave significant food shortfalls as the population grows. Additionally, The United Nations Food and Agricultural Organisation (FAO) report that the number of malnourished people increased from 777million in 2015 to 815 million in 2016. Consumers are questioning current agri-food production systems and challenging their environmental impacts, animal welfare outcomes and the nutritional quality of the products being produced. While we require more food there is a general belief that these products need to be produced in a way that utilises less inputs and delivers more sustainable outcomes. They also point to the increasing number of malnourished people in the world as an indication of system failure.

Challenges nourishing the global population accentuates the requirement for nutrient rich foods to be a part of the solution. Focus is shifting beyond creating huge volumes of food towards ensuring that the nutritional content of a product is sufficiently high to sustain life productively. This is also in part being driven by the growing middle classes that have more money available to spend on high quality products.

As the population grows and the demand for food increases, farmers and agricultural companies are turning to the Internet of Things (IoT) to collect data that can be utilised by analytics tools with goal of maximising yield while minimising inputs. FAO estimates suggest that population growth, increased wealth, together with longer life expectancy, is going to require the production of around 60 percent more food by 2050.

IoT solutions, technology start-ups and various industry innovators are able to offer solutions in the form of drones, robotics, big data platforms as well as precision irrigation, soil, and crop technologies to increase effective yield. These technologies, collectively referred to as precision agriculture, are being developed to augment the intuition of the farmer rather than to just replace their inherent understanding of their land.

The requirement for creating more, with less, is also focusing attention on the use of genetic modifications technologies. As the conversation around genetic modification (including emerging gene editing technologies like CRISPR) increasingly focuses on the ethics of using the technologies to make a contribution to meeting the demand for food, consumers are expected to become more accepting of these technologies and open to their use in producing products they eat.

Urbanisation

By 2050, it is expected that 70 percent of the global population will live in cities. Practically and environmentally, it often makes sense to grow food near these cities. Many premium consumers prefer to purchase fresh, local food for a range of reasons including nutrition, food safety and supporting local communities. Having the ability to create a local production system can provide more security for the community and greater food resilience. The contribution local food systems make to social stability is a driver for many governments to support initiatives aimed at promoting local farmers and encouraging consumers to eat the products that they produce.

With 50% of the world's population currently living in urban areas, new forms of farming utilising existing urban infrastructure are being developed such as vertical farming in industrial buildings, and farms from home and at office farms to ensure fresh, local produce that meets consumer's needs. Local food precincts and artisan markets are becoming popular as a way to provide locally sourced fresh produce, grown by local residents in intensive production areas. Local food activities are being used to bring communities together and also to attract tourists and visitors to regions and cities.

Innovative technology is emerging to enable agricultural production to occur in facilities that have not traditionally been associated with farming. This is resulting in greater flexibility in the way farms are operated. Areas of climate-controlled, indoor hydroponic farms in the heart of cities are being developed and are training next generation entrepreneurs how to grow and sell their food all year-round.

The global shift towards urban living is happening across developed and emerging regions, slowly changing the supply/demand balance of traditional agriculture as people move from working the land to living in cities. In many cases, while there is a clear desire for local food, the ability to produce close to the consumer is constrained. Many markets will continue to rely on imports to provide sufficient food to meet the base demand of the population. Premium, storied products cannot be grown everywhere. As a consequence trade will continue to occur to meet the needs of premium consumers wanting to be able to experience the best food the world has to offer.

Sustainability

In 2016, the United Nations set 17 Sustainable Development Goals (SDGs) for the global community to collectively work towards to eliminate poverty, malnutrition and neglect inherent across society. Many of these goals revolve around using the planet's resources in a balanced, sustainable manner.

Many experts consider the biggest challenge facing the global agri-food system can be linked to the forecast impacts of climate change. Analysts suggest that climate change could have material impacts on crop quality and yields together with material shifts in where particular products are able to be grown. There is focus on adapting technologies to respond to climate shifts and the impacts that these are expected to have on water, food waste, human activity and food resilience.

Traditionally, farming practices are energy intensive, and through reducing power consumption, and utilising renewable energy, there are opportunities for agriculture to increase its energy self-sufficiency. Opportunities such as utilising effluent, waste biomass, the sun, geothermal and growing plants to produce energy will enable more farmers to move off the grid.

Recognition that the industry's licence to operate is no longer guaranteed is shaping how organisations and industries need to act. Governments around the world are providing farmers with both a carrot and a stick through programmes and incentives that will lead to the adoption of more sustainable systems in the agri-food sector. Making technology available to manage issues like carbon emissions from animals is a key enabler for achieving transformation across the global agri-food system.

Water scarcity is a significant issue facing many major agricultural production regions. Droughts and water shortages are increasing the value placed on water resources and more focus is being placed on using technology to minimise the amount water consumed in all aspects of production systems. Precision irrigation, atmospheric water capture solutions, utilisation of genetically edited crops and other technologies are being adopted in response to water shortages. Agri-food companies are reviewing their production to ensure that they are capturing and retaining the value inherent in liquid components of their products.

Food waste is a global issue and agri-tech is a channel through which this can be addressed. According to the World Bank, the amount of edible food lost due to poor crop management, storage, processing and transportation amounts to about USD750 billion a year. Agri-tech technologies can offer solutions to offset these losses, such as technologies to make food last longer, reduce wastage in transit or identify the right time for harvest to improve quality and create longer shelf lives. Minimising waste will support more sustainable use of the planet's natural resources.

Scenario 1:

Waimakariri becomes
Canterbury's FoodBowl with a
focus on supplying premium food
to local consumers with strong
provenance

Most Cantabrians buy their food from the local supermarket, having little, if any, idea about where it comes from. It is no longer like the old days where you could drive a couple of kilometres and buy your apples from an orchard, veggies from a market garden and source meat or milk from the farm gate. However, global evidence suggests that affluent consumers increasingly want locally sourced, fresh produce, and they want to understand where it has come from. Evidence globally suggests many consumers wish to support local farmers and are prepared to pay a premium for such products. We consider it likely that there are consumers in the Canterbury region and across New Zealand that wish to reconnect themselves with their food producers and are prepared to pay a premium to achieve this.

The proximity of the District to Christchurch, and the fragmented land holding pattern, creates a scenario for the Waimakariri District land use to evolve to grow and supply premium, storied food predominately for domestic consumption. This could be facilitated by virtual channels to market or bought directly from the producer by affluent consumers in Christchurch and beyond. The land would support a variety of farming activities being conducted to provide a wide range of agricultural products to consumers who are prepared to drive out of Christchurch to find high quality products.

Existing intensive dairy activity would continue in accordance with regional operating constraints. The opportunity potentially is finding alternative uses for the other 10,000 hectares of irrigated land. Over time new market gardens and orchards, vineyards, alternative animal milking (such as sheep, goat or deer), innovative cropping and diverse livestock rearing for meat would emerge and sit comfortably in the landscape alongside traditional dairy, sheep and beef and forestry activities.

A hub at Oxford could be developed that showcases to visitors the regions produce and works with the Lincoln Hub to support growers and processors to increase the quality and value of their production. Zoning evolves to create natural farming zones in the District while consideration could be given to developing a Waimakariri Natural brand, which could be used as a co-brand by many of the Districts farmers and food producers, as an indicator of sustainably farmed, high quality products.

The drivers and trends in the market that would support the development of this scenario include:

Local and fresh food

Premium consumers are increasingly interested in the provenance and story that lies behind their food. Local food supports economies in the consumer's backyards, an attractive consumer attribute. Local food also gives the producer an opportunity to fully explain their products, further educating and connecting consumers to the growers of their food and what they stand for. It creates synergies between the producer and the consumer, and provides the consumer an emotional connection back to their food.

The closer produce is grown to the consumer, the more health benefits it retains. When produce is grown locally for domestic consumption, crops are able to be picked at the peak of their maturity; nutrient value is optimal at harvesting and due to the proximity to the end consumer and the nutrients density is more available when it is eaten. The further distance the product has to be in transit, the earlier it has to be picked to maintain shelf life in market. Consequently produce is not able to be grown to hit peak level of nutritional content. An elongated time spent in the supply chain means nutrient levels in the produce decay.

As well as nutrient retention, seasonal eating would be encouraged in a local FoodBowl.

Costs are minimised as it costs less to farmers and distribution companies to harvest and get produce to the end distribution channel. Through diet diversification, consumers get a broader variety of foods in their diet, expanding the vitamins, minerals and nutrients they consume. A well-rounded and balanced diet offers exposure to myriad aspects of food which can sometimes be restricted in modern diets

Given the close proximity of the District to Christchurch, there is the opportunity to gear production to a fresh local produce offering. Reducing the amount of handling through the supply chain, the risks associated with food safety and contamination also decrease.

The proximity to the Christchurch International Airport from the District builds creates the potential for the region to become a local food supplier to markets that are directly served by flights from Christchurch. Given Christchurch Airport has a growing international reach, and rising frequency of flights to markets including China, South East Asia and the Middle East, a Waimakariri FoodBowl could deliver an influx of new revenue to the District.

The use of technology in the form of virtual and augmented reality can also connect consumers straight to the source of their food. Virtual reality can create the visualisation, connectivity and give a real-time experience of being on farm, from wherever a consumer happens to be. Having the ability to augment the physical world from any location can create a sense of locality and connection to the source of food without physically being there. This can be used as an education tool, but also as a marketing tool for producers.

Job opportunities and growth through support of local communities

The creation of a FoodBowl creates job opportunities in the District; jobs directly in growing activities, in processing and marketing as well as service industries that support the growers. With much of the current agricultural production in the District being exported to other regions for processing, this leaves the District with very limited follow on employment opportunities. The creation of a more artisan production system has the potential to create more local employment opportunities and consequently boost the Districts economy and sense of community.

From a social stand point, regional food hubs create a sense of togetherness and connection between producers and within communities. Hubs create the opportunity for producers to share operational, marketing and logistics information to support new and existing producers to build more successful next generation agri-food businesses.

Food systems extend well beyond on-farm production to include activities across the entire supply chain, such as food processing and packaging, marketing, transportation, retailing, restaurants, and many more services. The off-farm aspect of the food system has the potential and ability to account for a large share of the potential Waimakariri District economy.

Providing premium products for affluent premium consumers

Consumers are demanding more from their food. This demand extends from consumers wanting functional qualities from their food (i.e. to aid health and wellbeing) through to preferring sustainable and ethically produced products. Having the ability to understand what attributes affluent consumer's desire in food will be a crucial element when defining what makes a product premium. This is where the District can play a role in the larger food system, and add the most value playing on the areas strengths. When consumer insights are paired with the ability to utilise technology to implement high-quality agricultural processes, there is an opportunity create premium products, offering a high return for farmers.

As consumers become more concerned with processes that sit behind the production of their products, the ability to implement systems that align with their preferences, such as organic, grass-fed, free-from attributes, are important characteristics to leverage. Systems that have the ability to generate a greater amount of output, with less input (i.e. less water, but creating more produce) offer a strong value proposition. Complimenting this, is creating a transparent value chain where the consumer has access to data that verifies its authenticity, creating a platform consumers feel confident with and all pay extra for trust in source.

With a natural reputation and high food safety perception, New Zealand is at a competitive advantage when it comes to agri-food natural products. Creating a differential advantage through efficient systems, high value ingredients and innovation will maintain and boost this image. Value lies in the way in which we create a story around premium products and offers an opportunity for consumers to be connected to their food, and the location it is grown in.

There is also the opportunity to create a knowledge hub or educational insights forum in which producers and the wider ecosystem could co-invest in developing consumer insights, Research and Development, branding, marketing etc to really understand what consumers want and consequently design solutions that they will value. As well as acquiring rich consumer insights, this would also offer a collaboration forum for industry to work together and utilise unique skills, technical and soft, to create a FoodBowl of world class produce and leading consumer insights and expertise.

Collaborative platforms with the ability to create sustainable initiative standards locally, and globally.

The opportunity to create a collaboration platform for producers and suppliers to be a part of could create a set of standards and models to facilitate the growth of the District. An initiative could involve creation of a “best practice” operating model with environmental and sustainable standards for all those involved in the supply chain. This can reinforce better quality control across the value chain, and the assurance to consumers that sustainability(both environmental and social issues are considered and managed). It would also offer an education platform for learning and sharing of resources, as discussed above, as well as marketing and brand tools to facilitate a District of thriving Agri-Food businesses.

Case Study

The Bay of Plenty- New Zealand's AgriFood Innovation powerhouse



In the Bay of Plenty region, local businesses and government have collaborated to build a compelling economic story for the region. With the goal of building a solid foundation they have developed the necessary infrastructure to attract talented and capable people, and their businesses, to the region.

Alignment between the public and private sector has enabled the development of the regional purpose and vision. Seed investments have been made by both the private and public sectors to support economic development in the region.

Investment has gone into bringing part of the Waikato University Campus to Tauranga. Programmes have been specifically chosen to be relevant to the regions purpose, with a further pull to retain capable people into the region. The intention is to leverage the Bay of Plenty's strengths in horticulture to accelerate and commercialise research and innovation for the benefit of the region.

This has been further enhanced by the recent establishment of Plantech, a government/ industry backed research institute to support relevant innovation in the horticulture sector.

The largest angel group in the country operates from the Bay of Plenty, Enterprise Angels, as is at the core of an innovation ecosystem based on an incubator model.

The Bay of Plenty is one of New Zealand's strongest growing regions. The success of the region comes from empowering a range of primary industries sectors, with horticulture, agriculture and forestry underlying the growth.

Having the capability to further develop, adopt and utilise new technology in the region is proving to increase productivity and sustainability of the Horticulture sector in the region.

Scenario 2:

The Agri-Tech District: Utilising technology to maintain the contribution that primary industries make to the Waimakariri District - specifically responding to environmental and water issues

The wider community expects farmers, producers and land owners to be better guardians of our land and water for the benefit of all New Zealanders. As a consequence of this expectation, the regulatory framework around traditional pastoral agriculture will become increasingly restrictive over time. This will require farmers and land owners to utilise a range of technologies to both enhance the efficiency of their farming systems and capture data to enable them to report regularly on compliance with the rules that govern their day to day operations. It is likely that tighter regulations will impact intensive dairy areas of the District the most. Farmers will need to adopt data based technologies to collect a range of operating data from sensors embedded across their farms, analyse this data and utilise it to enhance the day to day decision making to enable inputs to be reduced and outputs maximised.

As natural resources become increasingly constrained, there will be heavy reliance on innovation to boost productivity. Restriction on inputs, such as fertilisers and chemical sprays, will drive innovation that delivers farmers more sustainable and natural ways to operate economically while maintaining, and preferably restoring, the environment. To maintain the license to operate in the Waimakariri District, farmers will have to clearly demonstrate to the local community and beyond that they are doing what is right because it is the right thing to do.

Utilising technology has the ability to both deliver enhanced production and environmental outcomes but also to enable producers to verify and report the standards that they adopt to regulators and the community. As a consequence, the investment required to adopt emerging technologies should make economic and practical sense to farmers. However there are examples where despite there being clear direct and indirect benefits from the adoption of technology, uptake across the industry has been slow, often due to the challenge of change associated with new processes.

The Waimakariri District has the potential to become a region where innovative technology is welcomed, deployment and uptake is fast and the benefits of technology benefit not only farming businesses, but the wider community. Innovation offers the ability to adopt leading edge technologies to enhance and protect agricultural land.

Partnering and collaborating with technology and science companies to demonstrate the practical application and benefits of technology in the District will help accelerate adoption. The Council can also be proactive in mandating the use of innovation that has clear environmental benefits.

The drivers and trends in the market that would support the development of this scenario include:

IoT systems; big data to augment the intuition of farmers

The Internet of Things (IoT) will be a core component to transform, enhance and streamline practices throughout the food value chain from farm to fork and beyond. It creates an opportunity to integrate multiple data sets generated from multiple sources in the most efficient and streamlined way possible. Given the Districts constrained water supply, IoT solutions offer the opportunity to optimally utilise natural resources through real time data.

Emerging farm management systems integrate data on and off the farm that can then help the farmer to make informed, smart and efficient choices when it comes to the management of their water, land and animals.

These networks of inter-connected sensors that connect mechanical equipment, digital machines, people, animals and objects, all have unique characteristics and with collaboration the value of the data can be maximised. Having the functionality available to connect all of these sensor-enabled devices to the cloud can transform systems and optimise their impact. Unlocking this potential relies on building the algorithms that can integrate the data with an understanding of the biology of the region and finding the people with the skillsets that can complete these tasks. Developing the District as an Agri-Tech hub has the potential to attract high value jobs into rural areas.

Through IoT based vehicle sensors, there is continual visibility of trucks and physical transport infrastructure, so routing and delivery can be tracked in real time and optimised if required; the end goal being the customer receives high quality goods on time with a high degree of trust in the whole process. Additionally, systems can also send alerts that address any issues in a supply chain, enabling the issue to be fixed on a real time basis.

Applying technologies to farm and agricultural practices provides significant opportunities for the District. From small tasks such as checking farm gates are closed at night and stock is where it should be from the palm of a farmer's hand, through to precisely measuring the amount of water soil requires to maintain its nutrient richness, without being wasteful, will make daily and tactical management decisions easier, faster and safer.

Technology to enable transparency

Transparency throughout a supply chain is transitioning from being a nice-to-have to a necessity to continue to have a license operate. Consumers expect to have transparent access to data, and want certainty about where their products have come from. We expect complete visibility through a value chain to become the norm with all participants being expected to contribute data to help deliver this visibility through emerging industry standard platforms, like Blockchain.

Blockchain technologies were developed to facilitate cryptocurrencies transactions. However, the concept of an immutable (or tamper-proof) digital record that underpins trust, traceability and security for a supply chain is rapidly being explored and proved for agri-food value chains given the lack of trust many consumers have about the authenticity of their food.

Consumers are expecting access to detailed information about how the food they consume has been produced; the inputs that have been used, the processing it has been through and the parties that have had access to it throughout its journey to their plate. The cost of collecting and supplying data to consumers will be significant, however failing to provide sufficient information will make it increasingly challenging to secure market access. IBM have created a blockchain enabled platform specifically for the food industry. It creates a feedback loop that can track a product within two seconds. Not only does this address authenticity, it also creates a loop to track any food safety issues instantly.

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There are numerous examples of companies utilising IoT-connected equipment that can track food as soon as it leaves the factory or warehouse, right to the retail store. HyperLedger, is an example in the aquaculture industry of sensor enabled systems that track the fish from the ocean, to the consumer's plate. Variables such as temperature can be tracked via sensor enabled refrigeration systems, to ensure perishable goods don't go bad during transit. If the system is not able to auto-correct and fix the problem, an alert can be sent to the food supplier, who can replace bad goods before they arrive at the consumer.

Optimization and efficiency of systems, specifically water management.

In the Waimakariri zone there are approximately 29,500 ha of irrigated land. The Waimakariri Zone has been subdivided into five Groundwater Allocation Zones (GAZs): Eyre River, Cust, Ashley, Loburn and Kowai.

With the groundwater abstraction in the Waimakariri zone increasing exponentially over the last decade, the zone is now fully allocated under current allocation limits. Increases in groundwater abstraction can cause groundwater levels to decline, which may affect the reliability of water supply wells and reduce flow rates in groundwater-fed streams and rivers. There are three irrigation schemes in the District, with the largest being Waimakariri Irrigation Limited (WIL). WIL has an area of approximately 18,000 ha.

Historically agriculture has been a water and land heavy activity. The wider community no longer tolerates the unconstrained consumption of natural capital (land, water and soils) and is increasingly expecting farmers to take steps to protect and restore the environment towards its native state. The District will benefit from the sustainable management of land and water by adopting technologies that are becoming available to understand and manage water resources on a real time basis. Technologies are being developed, partly driven by recent droughts in California and Australia that embed sensors into groundwater courses and enable the utilisation of precision irrigation to understand and target water use to where it will generate the greatest benefit. Often these technologies are being utilised in partnership with water charging mechanisms to effectively match available water to the highest economic use.

Robotics, drones and space based technologies

The use of drones in the agri-food sector can essentially be broken down into segments: agricultural land scanning, GPS map creation through the use of cameras, transportation, and livestock monitoring with thermal-imaging camera-equipped drones.

Having the capability to scan fields of production has traditionally been done manually, requiring significant time, effort and often with a degree of health and safety risk. With the evolution of unmanned aerial vehicle (UAV) technologies, and the use of highly tailored robotics, costs can be reduced, clearer and more concise data sets can be developed in a faster and safer way. This allows for more efficient decision making for the producer, which hopefully drives better outcomes for the environment, employees and the wider community.

Map creation through the use of GPS can provide a more accurate view of land and property, offering a maximised ability to plan out where crops should be planted for optimal utilisation.

Thermal imaging, can also mean farmers can monitor livestock without being on the ground and can have a holistic view as to whether they are in harm, missing, or any events occurring in real time.

We are also seeing solutions being introduced to the market that analyse the changes in a series of satellite images to make recommendations to producers on actions they should be taken on farm. While some of these solutions are challenged in New Zealand,

given their reliance on clear images which can at times be hard to capture given our naturally cloudy skies, the utilisation of space based technologies will progressively support on farm decision making.

Biotechnology to enhance the value of products

Plants are an essential food and nutrient source to humans and livestock. There is an inconsistency in the level and composition of nutrients found in specific crops and these levels can vary significantly in different food crops, in different locations. Consequently, a lot of produce can be deficient in certain nutrient components. Relying on a limited range of crops to provide the necessary nutrients for life is unlikely to be sustainable in the long term and can often result in malnutrition and diseases that are related to deficiency. Biotechnology creates opportunities to enhance the nutritional value in crops and food (and as a consequence their economic value).

Historically, the emphasis of biotechnology with regards to agriculture has been directed towards the input traits of crops such as drought tolerance, insect resistance and disease resistance. With innovation and collaboration between science and technology there has been a greater focus on creating more nutrient dense products. The use of biotechnologies, particularly in the human food chain has faced issues with regards to consumer acceptance, but as food supplier's work transparently with consumers to educate them about the technologies, many commentators believe that these barriers can be eliminated.

A number of District Council's around New Zealand have articulated clear positions around the use of genetic technologies in their region. With the spectrum of genetic technologies constantly growing, we consider that it is important to recognise that one size fits all style rules will potentially result in producers missing opportunities that are acceptable to wider community and the consumers of products and this could come at a significant cost to the District in the medium to long term.

Food Waste

With food loss across global agri-food supply chains continuing to rise, reducing food waste has become a major global focus. While all participants along a value chain can make a contribution to reducing waste, producers have a critical role to play. Farmers and food producers now have the ability to utilise technology solutions to reduce food wasted during production and harvesting. The District has an opportunity to leverage a range of digital technologies, as well as exploring opportunities to utilise by-products and waste effectively, to take a lead on the path to position New Zealand as being a leading innovators in the area of waste minimisation.

Case Example

The Yield



A wider case example of the utilisation of the Internet of Things, is **The Yield**, an Australian based solution that integrates data sets through technology to improve outcomes for growers, consumers and local communities (including regulators). The Yield's technology combines wireless sensor networks and localised data collection which is used through algorithms to assist producers to making the informed decisions regarding their farming system.

The Yield uses Sensing+, a microclimate sensing system for agriculture that assimilates data sets from around the farm, providing hyper local predictions based on the farm's growing conditions by using data analytics and artificial intelligence.

The application is available as a mobile application and also on the web. A benefit of the app is that it allows the user to measure a range of variables including rainfall, water balance, wind speed and direction, evapotranspiration and soil moisture. Interpreting this data allows the user to make decisions about when they should harvest, irrigate, plant, feed and protect its crops.



An example of the way that such systems can work is the initial use case for The Yield's technology in oyster farms in Tasmania. Analysis revealed that around 30 per cent of closures based on rainfall gauge readings are unwarranted – the water quality and the oysters are fine, which has economic and regulatory implications.

In the oyster farming application, data from in-estuary sensors is collected and integrated with national weather data. Environmental data and near real time sensor data is integrated and presented to oyster growers and regulator enabling faster decisions to be made on when harvest occurs or when farms are closed given the risks of contamination, producing a better product for the consumer, a higher return for the grower and complete confidence on quality and safety for the regulator. The application delivers a dashboard full of rich insights and visualisations for the previous week, for today and forecasting for tomorrow.



Salinity measurement is important in terms of identifying contamination risks, but it isn't enough information. Data such as water temperature is just as critical to more accurately assessing the risk. Additionally, knowing if bad weather is going to hit the region, ensures farmers are able to adjust their rosters – facilitating efficient cost management and increasing efficiencies.

Disclosure: KPMG in Australia holds a small investment in The Yield.

Scenario 3:

Leading the global food ecosystem: alternative farming methods and food opportunities focused on supplying premium global consumer markets

As the world's population continues to grow, food production needs to grow not only to respond to an increased number of mouths to feed but also in response to dietary changes and growing wealth. As a consequence, there is not only a need to produce more food, it needs to be nutrient rich and functional. Alleviating malnourishment presents a significant challenge to the global community, nutrient rich produce can make a contribution to effectively feeding people. It is estimated that food production must increase by between 60 and 70% by 2050 to meet growth in demand.

As we noted earlier, New Zealand's role in the global agri-food system is not to feed the world; as a country we lack the scale needed to achieve this. However, this does not mean New Zealand producers have no obligations to helping the world to feed itself. Any person operating in an industry that fails to feed sufficient food to over 800 million people every day cannot in our view consider themselves to be fully successful. We believe that there is an obligation to utilise the talented people and technological know-how inherent in the industry in New Zealand to help the world feed itself. Recognising this purpose also provides an opportunity to attract the best people into the industry as companies can provide opportunities for talented millennials to make a difference in helping more people to feed themselves.

Securing the most talented people into the sector is critical if New Zealand is going to maximise the value it is able to add to premium products for affluent consumers. However, the products traditionally produced around the country, and in the Waimakariri District, lack much of the innovation and novelty that premium consumers are expected to seek in the food they choose to eat. When the only significant choice that a consumer had was milk produced from a dairy cow, the differentiation was in the quality of product and how it was produced. In a world where milk (or equivalents) can come from multiple different types of animal, from a huge variety of plant based sources or from a cultured product, many of which have been developed to meet specific consumer needs it becomes increasingly difficult for traditionally produced products to stand out.

As a consequence, a further potential scenario for the rural future of the Waimakariri District is to become a leader in emerging food trends and integrate these products into all aspects of existing product portfolios. Moving quickly to gain leadership positions in selected novel product categories provides the opportunity to gain geographical association with particular products, define quality and production standards and create new processing jobs in the District (something which is missing in relation to the traditional agricultural activities that dominate current production). These emerging technologies potentially create products that can be integrated with traditional agricultural outputs to create new products, meeting consumer desires for both nutrient complexity and innovation.

Emerging trends like multi-product farms, vertical farming systems and cultured farming all place very different demands on land, water and infrastructure usage. The timeframes for some of these emerging technologies to reach commercial scale is likely to be towards the end of the 15 year time horizon of the Council's long term plan; they will require very different planning considerations to more traditional agricultural activities.

The drivers and trends in the market that would support the development of this scenario include:

Plant based alternative proteins.

New systems and technologies are emerging as a response to the challenges the food system faces. The emergence of a wide range of products produced from plant based proteins is becoming increasingly mainstream offshore, and a consequence we are observing significant levels of investment into these products from large food companies around the world.

The next generation of plant based products are being designed not only to alleviate the pressure on the environment, but also to support better health outcomes, through delivering proven and quantifiable health benefits. We expect that the nutritional attributes that a plant delivers to a particular food will in some cases be enhanced by biotechnology, but the tipping point will be dependent on consumer acceptance. Exchanging pastorally farmed milk or beef for products made from grains, nuts and other plant based materials included in the latest 'mylk' or meat-alternative products is increasingly becoming mainstream and expected as an option in many retailers around the world.

“We believe it will take a combination of innovative and traditional approaches. That’s why Tyson Foods is investing in alternative proteins through Beyond Meat and Memphis Meats, giving our growing population more ways to feel good about the protein they’re eating.”

Tom Hayes, CEO, Tyson Foods (quoted by Food Navigator USA on 29 January 2018)

Multi-product farms

In recent decades, many farming systems have evolved to become single product systems. This has aided production efficiency but it is perceived by some that this has driven intensification of farming practices, often at the expense of the environment, and impacted the nutritional density of food produced. To enhance environmental and economic resilience, we expect that more farmers will choose to operate multi-product farms to best utilise their land and natural resources. The ability to set up farms that have the ability to deliver multiple product streams could see farmers choosing to produce complimentary products, select products that provide greater resilience to their businesses or provide an opportunity to take advantage of emerging product opportunities. There is also the opportunity to utilise the natural environment to create a range of outputs while also supporting a healthy and restorative ecosystem, examples could include utilising forestry blocks on farm to benefit from carbon farming incentives.

As premium consumers seek greater diversity in their diets they may potentially reduce their consumption of the products that have traditionally been supplied.

The use of co and by products to deliver additional products to the market is also an opportunity for farmers. This is a multi-facet win-win situation; economically adding a stream of income, decreasing environmental impact (of waste) and creating products that would otherwise go wasted. For example ReGrained, reuses the grains that are stripped in the process of making beer. Their technology upcycles the left over grain into a flour that is nutrient rich, creating a muesli bar that has high protein, fibre and probiotics.

The ability to maximise the value of the total production system requires a wider lens of the product to be taken. While producers of animal protein have been effective in increasing productivity, and finding ways to utilise the majority of the intended production, there remains opportunities to improve economic resilience from utilising co-products and by-products as well as exploring diversification in the production systems. Producers need to consistently seek ways to ensure that all output creates value and that any waste stream is minimised.

Diversification of farm use

Traditional agricultural land use could come under threat as new forms of food emerge. Historically, the products that New Zealand has offered to the market have been driven by what we produce, however in future production decisions need to be based on consumer needs and demand rather than production capability. Diversification of land use will occur to future proof the industry in New Zealand. For the District, farmers and growers will need to be flexible to remain relevant in a very dynamic ecosystem. This could also see primary sector businesses turning to complimentary businesses, such as tourism, to generate income outside the sphere of traditional farming practices

We expect there to be an increasing amount of uncertainty and ambiguity in the global agri-food system as new forms of food emerge. This creates an opportunity for farmers and growers to become entrepreneurial and think more strategically about how they use their land to both generate stable income streams and protect their long term license to operate.

As consumers in developing countries become more affluent, food consumption patterns are transitioning. The movement away from a diet based on staples to one with a greater content of more premium food products (including animal products (meat, eggs, and dairy), wine, seafood and horticultural products) is emerging, although these products are often being fitted into traditional diets rather than replacing them. Understanding consumer needs and responding to them is critical, and we are observing a number of District Councils providing their regional producers with the in-market connections they need to develop the necessary understanding.

New forms of advanced farming

Farming systems are integrating technology to utilise land more efficiently. Novel farming practices are emerging in areas previously thought to be unsuitable for farming. The desire for local produce is supporting the development of new forms of farms in urban areas, that operate on a considerably less natural resources, while eliminating food safety and quality issues. Utilising technology to create more out of less, with less waste and environmental impact is the end goal for many of these systems.

Vertical farms

Vertical farming systems are evolving around the world. This type of farming is undertaken in indoor environments, often involving stacked layers of produce in a highly controlled systems through the use of irrigation and LED lighting systems. Often old warehouses, tops of high rise buildings, and in some cases old bomb shelters are utilised for vertical farming. The systems are designed to deliver continuous year round crops, while decreasing the amount of time from producer to consumer as they are based around growing local produce in urban areas. Urban based farming systems can also create a sense of community in cities, where consumers are often disconnected from rural agricultural practices.

To date there are three vertical farming systems that are being commonly adopted:

Hydroponic farms

Hydroponic farms grow horticultural products without the use of soil. This type of farming utilises a water solvent that contains all the minerals and nutrients plants need to grow and be nutrient dense. One of the most commonly used forms of hydroponic farms, is called the floating raft system. This system suspends the plants in a polystyrene sheet, with no soil, and the roots then hang below to absorb the oxygen-aerated solution. The nutrient film technique is another popular technique used, specifically for growing lettuce. With this technique a stream of the nutrient-dissolved solution is pumped into an angled channel, typically a plastic pipe, containing the plants. This runs past the plants' root mat and can then be recirculated for continuous use.

Aeroponics

Aeroponics, is a technique used that essentially mists the roots of produce with nutrients, water, and oxygen. Aeroponic systems are closed loop and generally used approximately 95% less water than field farming and 40% less than hydroponics. Although aeroponics enables plants to grow much more quickly than hydroponics, it requires more solution and is often energy intensive; it is consequently more costly to operate.

"Our crops get the perfect amount of moisture and nutrients misted directly onto their roots in a completely controlled environment. With our patented technology, we take indoor vertical farming to a new level of precision and productivity with minimal environmental impact and virtually zero risk."

Aquaponics

Similar to a hydroponic system, aquaponics draws on water as the basis of its growing system. Hydroponics utilises a soil-free plant bed system that suspends over a body of highly nutrient dense water. The difference being that within the body of water is an aquaculture farm, which is used to grow commercial quantities of fish. The waste produced by the fish is reused as a fertilizer for the plants. Therefore the plants purify the water to make the water suitable for the fish.

Social enterprise farms

The concept of social enterprise farming is based on using business models to solve major social and environmental problems. Due to some of the social issues inherent in the global agri-food system, many entrepreneurs and investors that are exploring opportunities in the sector are attracted by the ability to not only make a profit but the ability to make a difference, through assisting people to feed themselves or improve their health or living outcomes. The ability to develop businesses that have a dual lens, is not unique to agri-food but we expect it to shape how many farmers and growers around the world think about their business moving forward. In respect of the Waimakariri District this could see farmers and growers looking to engage with the wider community to educate them around the importance of enhancing our natural environment or cultivating and consuming nutrient dense produce. Even if a producer does not choose to operate their business with a dual lens, it is likely they will be impacted by growing numbers of social enterprise farmers, as these operators will not always make decisions driven solely to make a profit, there decisions will also be shaped by having an impact.

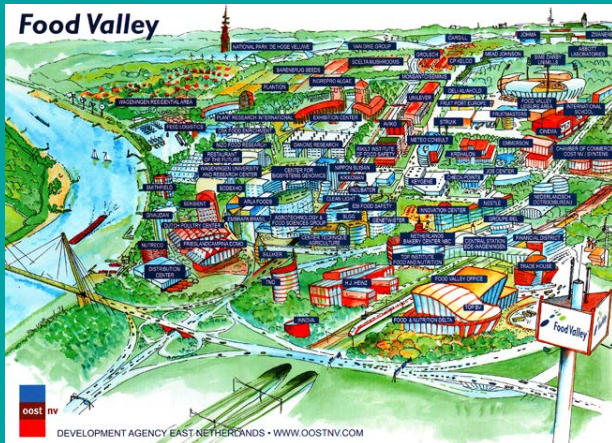
Rent livestock farms

This concept is a fairly new one, in which livestock can be rented out to farms to give an urban dwellers a farming experience without them having to own their own livestock. As farmers become more open to the idea of experimenting with different types of livestock and different ownership models, they may look to options where they do not have to carry the full financial commitment of investing in livestock themselves.

There are various examples of this model developing. Rent-A-Chicken markets itself as providing an urban farming experience with the reward of home grown, fresh eggs. In this case urban dwellers rent a mature, egg producing hen and everything needed to maintain a backyard chicken coop. In other examples, farmers sell an interest in the meat or milk produced by an animal in advance of rearing it to a consumer and effectively farm the animal on their behalf. The consumer, in some cases, is able to use to technology to track their animal as it is raised.

Case Example

The Netherlands Food Valley



Dealing with resource pressure and scarcity is something the Dutch are well conditioned to. Consequently their agribusiness sector has developed practices and systems to become the leading example of best practice when it comes to managing natural resources effectively, in particularly the Food Valley concept which facilitates collaborations between industry, farmers, government and academia. The Dutch Agribusiness and Food sector contributes 6.6 percent of global food exports. Given the relatively small population and size of the country, this is a significant output, even more so considering the physical constraints on land in the Netherlands. It is the globe's number two exporter of food as measured by value, second only to the United States, which has 270 times its landmass.

Considering the limitations of land, the expensive labour costs, production in high density urban environments and a high social awareness of sustainable practices, this is a great example of innovation thriving and is an excellent example of best practice to utilise land, systems and people to create a successful and thriving ecosystem.

Approximately twenty years ago a national commitment was made to sustainable agriculture; 'Twice as much food using half as many resources.' This bold commitment has led to an innovative and a highly productive sector with a big focus on sustainability.

Since implementing this ethos into the culture, farmers have reduced dependence on water for key crops by as much as 90 percent. They've almost completely eliminated the use of chemical pesticides on plants in greenhouses, and since 2009 Dutch poultry and livestock producers have cut their use of antibiotics by as much as 60 percent. The Dutch are leading by example and proving that when farmers, the community, businesses, government and science providers all work collaboratively it creates an environment to nurture technological and social innovation as a way to produce high quality, healthy and safe food produced in a sustainable way. This knowledge can be permeated through to other parts of the world and continuously increase collective knowledge on best practice sustainability for the global food system.



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This report is presented under the terms of our engagement letter.

Circulation of this report is restricted. The content of this report is based solely on the procedures necessary for our engagement.

Purpose of this report

This report has been prepared in connection with our engagement letter with regards to our engagement work that we consider might be of interest, and for no other purpose. This report summarizes the key issues identified.

Limitations on work performed

This Report is separate from any other reports and does not provide an additional opinion on the company's financial statements, nor does it add to or extend or alter our duties and responsibilities.

The matters reported are based on the knowledge gained as a result of being your advisors. We have not verified the accuracy or completeness of any such information other than in connection with and to the extent required for the purposes of our insights

Restrictions on distribution

The report is provided on the basis that it is only for the information of those charged with governance of the company; that it will not be quoted or referred to, in whole or in part, without our prior written consent; and that we accept no responsibility to any third party in relation to it.

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