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Kawatiri Nature Environment and Communities Trust (KNECT)

Foodshed and Food System Analysis

Part of KNECT's 'Local Food Economy' project

Date: 4 April 2024

BIODIVERSITY AND RESTORATION

FRESHWATER, FOOD, FARMS, AND FOREST

COMMUNITY AND CLIMATE

ENERGY, CARBON, AND WASTE

Report prepared for client by Niki Bould

Report reviewed by Rhys Millar

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1 Executive Summary

Kawatiri Nature Environment and Communities Trust (KNECT) is committed to helping their community and natural environment thrive through projects that bring people and nature together. One of these projects is the 'Local Food Economy' project.

KNECT started talking with their local communities about local food at the start of 2023, with the aim of understanding current barriers to changing the way they feed themselves, as well as peoples' aspirations for growing more locally. Community aspirations were inspiring. KNECT learnt that across the district, there is strong support for the reversal of the unintended consequences of the global food system.

The Foodshed and Food System Analysis for the Buller district is part of the Local Food Economy project. In providing insights into the foodshed and food system, KNECT has a better understanding of the capacity for the Buller district to supply its own food needs with the purpose to promote more resilient food economies that have a stronger focus on localisation. The Foodshed and Food System Analysis is in two parts. Firstly, the food production potential of the district's productive land relative to the food needs of its population was evaluated. Secondly, an understanding of the systems that food must travel from production to plate were explored including a snapshot of stakeholders involved in that food system.

Part One of the project is based on a methodology developed through the Otago Food Economy Report (Millar, et al., 2016), and using data from AgriBase® (a product of AsureQuality Limited[1]), a baseline foodshed analysis[2] was completed. The high amount of productive agricultural land, on a per capita basis, is demonstrated. For example, the Buller foodshed area is 4,987 hectares, amounting to 8.3% of the current productive land area for food as recorded in the AgriBase® dataset for the Buller district (59,974 ha). The remaining 91.7% of the Buller district's existing food producing land is beyond the community's needs for self-sufficiency and, in this report, is classed as 'surplus'.

Furthermore, the foodshed analysis of the consumption of food for the Buller district shows that an estimated six tonnes of food (5,898 t) are required to feed the Buller district population per year.

The foodshed analysis of the production of food for the Buller district shows significant volumes of milk and red meat are grown in the district, which reflects the export-focussed nature of Aotearoa New Zealand's primary production. There are approximately 136 sheep and/or beef cattle farms and 156 dairy farms across the district. Land required for milk production accounts for 70% of the existing

[1] AgriBase® spatially maps almost every farm in the country. Providing each with its own traceable ID, it holds information on approximately 144,500 live (current) New Zealand rural properties. These include properties involved in livestock farming, arable cropping, horticulture, viticulture, or forestry. Lifestyle blocks and conservation estate are also included in AgriBase®. However, there are limitations with the dataset, see Appendix two for more details.

[2] A baseline foodshed analysis provides information on the current estimated amount of food needed to feed the population residing within the study area and compares it to the estimated amount of food produced within the study area.

mapped food productive land use (recorded in the AgriBase® dataset), but only 0.2% of the existing milk production is needed to meet local community needs. Current red meat production (beef cattle, sheep, and deer) account for 28% of the existing mapped food productive land use (recorded in the AgriBase® dataset) and only 2% of the existing red meat is required to feed the current population.

The remaining 1.3% of the food producing land area is used for fruit production (four orchard fruit and two berry growers), honey[3] production (two producers), tomato production (one farm) and egg production (one farm). There is no recorded pig farming, no poultry farming for meat, and no recorded crops for human consumption in the AgriBase® dataset. The KNECT team and interviewees (from Part Two) confirmed there are no known pork or poultry meat, no commercial grain, legume, nut, or seed crops grown in the district.

Despite the lack of diversity of food grown within the Buller district, an estimated 39% of all the food required to feed the population of the Buller foodshed is grown in the district (approx. 2,280 tonnes per year). Of that 39%, there is 100% red meat, 100% fish and 100% milk grown within the district, there is currently only 11% of all eggs, 16% of all vegetables (tomato only), and 10% of the fruit required for the Buller district community grown in the Buller district.

Part Two of the project produced a baseline food system analysis which identified the key aspects and stakeholders of the food system for the Buller district. Stakeholders of a food system are businesses, organisations, groups, and individuals that are involved with food anywhere along the supply chain - from paddock to plate - and therefore potentially stand to be affected from changes to it. Stakeholders include those involved in:

- The production of food, such as the growers of primary produce (e.g. fresh fruit and vegetables, meat, fish, eggs, and milk). This includes farmers (arable, livestock and poultry), growers of fruit and vegetables, egg producers, and game and fisheries workers.
- The packing and processing of food, such as abattoirs, butchers, milk processing, cheese making, fruit packhouses, honey packers, flour millers, and makers of baked goods and lightly processed food (e.g. cheese, sausages, home-made style pies, jams, or breads).
- The distribution of food (such as meat traders, and distributers for local, regional, national, or overseas export).
- The retail of food including through food outlets (café's, bars, restaurants, convenience stores, organic stores, butchers, bakers, fish mongers, takeaway food stores, supermarkets, and global fast-food outlets).
- The direct sellers of food, primarily primary produce such as farm shops, market stalls, vegetable box schemes, food cooperatives, grocers, supermarkets, and other food delivery schemes. However, mobile shops and online food shopping/ food delivery companies are excluded from the research due to incomplete data.
- The consumption of food (consumers).

[3] Land can be utilised for other purposes when producing honey, such as animal grazing, flower growing, native bush, etc.

Part Two of the project also considered how the food system functions, as such the bulk of the second part of the project was conducted through quantitative surveys and interviews. The AgriBase® dataset was further interrogated to identify growers to engage in the research. Due to a lack of access to growers only a small percentage of food growers were surveyed (1.8%). However, 20% of all known food retailers were engaged in the research and 0.9% of the overall population (90 consumers) were engaged in the research. The data gathered, therefore, provides a snapshot of key stakeholders and the existing food system within the Buller district.

Interviews with six food growers (one just starting in the business) showed a wide variety of business operations, with four selling to one commercial market (local, national or export), and one supplying two types of markets (local and national) and the up-and-coming grower aiming to sell to all three. Four of the six have the belief that there is 'limited growth potential' in selling to the local market. This can be due to larger producers (e.g. sheep, beef, dairy farmers) believing they have more supply than is needed for the local market, meaning they must sell nationally or for export to ensure their business is profitable. Research shows that in the Buller district, there is more supply than demand for red meat and dairy. The same view was held by the up-and-coming berry farmer, who believed the local market was flooded with berries so is looking at supplying regionally and nationally as well as locally to ensure they are profitable (research shows the local market is not flooded with berry growers).

Pricing competition poses a potential hurdle for growers, especially when compared to the lower prices available in the conventional food economy. Imported products (into the district) can often be sold at similar or even more affordable prices than their local counterparts. Large-scale purchasing can also influence prices, meaning supermarkets can often sell cheaper than a grower selling direct-to-consumer. The pricing challenge can also be exacerbated as some growers emphasise ethical production, incorporating sustainable practices and fair wages for workers, which are factors that contribute to elevated production costs. A common belief is that there is just not the population to support local food, *"I don't think there is enough people here who will invest in local food"*. The comment reiterates the belief that local food is not necessarily the cheapest option, and some food producers indicate they find it challenging to achieve satisfactory returns from local market participation due to consumers' unrealistic expectations of lower prices for locally produced items.

Understanding whether there is an appetite from local food producers to supply into the local market was explored. A lack of demand, limited growth potential (including lack of population, as already indicated) and a lack of significantly better returns are common reasons stated as to why it is challenging to supply the local market. The key motivations for growers selling locally are predominantly due to supporting the local economy, community values, and building or keeping local relationships, with participating in a low carbon economy as the fourth motivating factor. The key opportunities for selling to the local community in the future included a willingness from the local supermarkets to sell their produce, and an increase in consumer demand for local food. Suggested changes required to improve the local food system were varied, however responses linked closely to the opportunities already mentioned, such as better consumer education leading to more consumer demand for local food, and more support from the local supermarkets.

Key findings from within the food processing and distribution sector shows that Westland Milk Products (based in Hokitika, which is outside of the Buller district) dominate the milk processing for all the milk produced in the Buller district.

For meat processing, despite there being 303 recorded livestock farms (136 sheep and/or beef cattle, 11 deer, and 156 dairy) there are no processing facilities (abattoirs/ meat works) in the Buller district, meaning all animals must travel outside of the district for slaughter. The closest processing facility is ANZCO Foods Kokiri in Greymouth (Grey District) then Silver Fern Farms in Hokitika (Westland District). Farms can be affiliated with one or the other, or none, and therefore send animals to the abattoir that have availability to process the animal or have the best price. Research shows that for some this means they may send animals as far as Taylor Preston in Wellington.

In terms of processing and distribution for other food types, the only known commercial vegetable farm sends 99.7% of its produce to Christchurch for distribution, the remaining 0.27% stays for local consumption. The orchardist interviewed sends the majority of their fruit to Christchurch for distribution, although when market prices drop fruit stays behind for local consumption or until a new value-added product is found. The only egg producer sells approximately 50% locally. Currently, 0.03% of fish being processed within the Buller district, stays local.

In summary, with no processing facilities in the Buller district all[4] the red meat and milk that is commercially produced within the foodshed leaves the district for processing. Most of all other food grown in the district leaves the district for national distribution. Meaning, an estimated 99.66% of all food required to feed the population of Buller district currently comes from outside the district, even though an estimated 39% is currently grown within the district.

Of the 78 known food retailers in the Buller district (identified through the Ministry for Primary Industries' dataset and KNECT's local knowledge), 16 were engaged in the research. Each were asked to define what 'local' meant for them, and a wide range of responses was collected. When looking at the furthest away selection, three of the 16 interviewed stated local means 'same district', whilst nine stated either 'same region' or 'same island', meaning the word 'local' varies widely.

Of those 16 food retailers, 10 indicate they source a small amount of food items locally (bearing in mind the diverse meanings of local, it does not necessarily mean within the Buller district). Four food retailers indicate that some (but less than half) of the food they sold was purchased locally. No one was sourcing all their food items locally. Clearly, the production and processing of food in the Buller district are the biggest problems. However, when asked what the positives are of sourcing local food, 13 state they thought that 'supporting local people/ economy' was a positive. 10 indicate it 'feels good' and nine state that their 'customers are more receptive to locally sourced food', and there are 'less freight/ transport costs/ arrives quicker and fresher'. A key comment stated, "*We need people to be registered to grow food, then I can buy from them. Also, we don't have the supply here, no one is*

[4] Home-kill meat would mean that not all animals travel out of the Buller district for processing, however, home-kill is not for commercial sale, therefore is not included in the research.

growing vegetables. It would be great if we could have our basic needs met, such as butter, flour, meat, vegetables, herbs, etc."

Overall, there is interest from the food retailers in being able to purchase and sell local food; the right price and consistency of supply are fundamental, however to a successful local food economy.

90 consumers were engaged in the research, they were asked to define the meaning of the word 'local'. Similarly to the retailers, a wide variety of meanings were selected. From those who were interviewed, 'the closest place that food can be grown', was selected the most times (33%), followed by food grown in the 'same town', 'same region' and 'same country' (16% for all three). For those consumers who took the online survey, local meaning the 'same district' was the most common response (27%), followed by 'same region' (20%), 'same town' (17%) and then 'the closest place that food can be grown' (14%).

Key findings from the consumers show that 78% of consumers engaged in the research are conscious about where their food comes from. Despite there not being a large variety of local food grown or available for consumption in the district, 86% of consumers indicate they buy local food from their local supermarket, which correlates to the wide variety of meanings provided for the word 'local'.

In general, there is a lot of support for local food, for many and various reasons, including 'supporting local people/local economy', 'fresher produce,' 'better quality (taste/ flavour),' 'knowing the source,' and 'community sustainability and/or resilience.' 50% of the respondents indicate they would pay a premium for locally grown produce.

The Foodshed and Food System Analysis Report for the Buller district has explored the district's current foodshed. It has evaluated the district's current food system from the perspective of the grower (producer or farmer), processor, distributor, retailer (food outlets), and consumer. It engaged the hearts and minds of over a hundred people about why local food is important to them and what the opportunities might be for strengthening local food system within the Buller district.

1.1 Glossary of Terms

Food: For the purposes of delineating the research, food is defined as having nutritional value. Therefore, drinks and heavily processed foods are not included. It could be argued some drinks have nutritional value, for example some smoothies, juices, or shakes, however, due to no healthy smoothie companies being registered with the Ministry for Primary Industries (MPI) within the Buller district, they are not included in the research.

Food Group: A food group comprises foods with similar nutritional properties or biological classifications. Nutrition guides commonly categorise foods into distinct groups, for example, Aotearoa New Zealand Ministry of Health (MOH) discusses five key food groups (vegetables, fruits, proteins, grains, and milk products).

Food Type: For the purposes of the research, a food type is a way to describe specific foods categorised within a food group. For example, meat or red meat, poultry meat, pork meat and fish are all food types that are part of the protein food group.

Foodshed: A 'foodshed' is a definitive geographic area and is used to describe the food that is produced and consumed within that specific geographic area and to indicate what potential that specific geographic area must meet the food needs of its population.

Food System: A food system includes all processes and infrastructure involved in feeding a population: growing, harvesting, processing, packaging, transporting, marketing, retailing, and disposal of food and food-related items. A dominant food system could be described as the existing large-scale high export-focused commercial food system that currently operates predominantly across Aotearoa. An informal food system could be described as that operating outside of the commercial food system that includes hunting and gathering of food with the aim of eating, processing, or trading food, where money doesn't change hands instead people are fed by the kindness of whanau and neighbours.

Local Food: Raw food (fruit, vegetables, meat, eggs, milk, fish) that is produced or grown close to the place where it is sold and lightly processed food (sausages, pies, drinks, jams, chutneys, dairy produce, and baked goods) where the main ingredient is supplied from nearby. The definition of close, nearby, and local can vary according to who you ask. Some people say local means Aotearoa New Zealand, others say it means regional. Within this Local Food Economy Report, local food means raw food and lightly processed food grown and processed within the Buller district.

Local Food Economy: A food system operates within and is influenced by social, political, economic, and environmental contexts. The term food system is used frequently in discussions about nutrition, food, health, community economic development and agriculture. Local food economies encompass the economic and social systems involved in growing, processing, distributing, and consuming food within a specific locality. They aim to enhance social capital and bolster resilience in farming communities by fostering increased economic activity locally. By fostering collaboration, local food economies contribute to building community cohesion and enhancing consumer awareness of food and farming systems.

Producers: Producers of primary produce (e.g. fresh fruit and vegetables, meat, fish, eggs, and milk) and lightly processed food (e.g. cheese, sausages, pies, drinks, jams, and baked goods). This includes farmers (arable, livestock and poultry); growers of fruit and vegetables; game and fisheries workers and processors; dairy producers; egg producers; flour millers, and makers of baked goods, jams, and chutneys.

Retailers: Food outlets or sellers of food through shops, farm shops, market stalls, box schemes, food cooperatives, supermarkets, and other food delivery schemes (such as mobile shops and online shopping/ delivery companies).

Stakeholders: The businesses, organisations, groups, and individuals that influence the local food economy and potentially stand to lose or gain from changes to it.

Contents

2 Introduction

Local food systems provide a multitude of economic benefits to local communities, from the creation of local jobs and new industry opportunities like food tourism, the recirculation of wealth back into the local economy, and marketing opportunities that support food retailers and restaurants. However, the benefit from local food systems does not stop with the economic. Locally grown food is fresher, tastier, and more nutritious. It is also kinder on nature as it doesn't require as much carbon to distribute. Yet arguably most importantly, a local food system leads to increased food sovereignty for all, and far greater community self-sufficiency and resilience – very important due to earthquake- and weather-vulnerable roading network.

For indigenous communities, food sovereignty is "*regularly expressed as the right and responsibility of people to have access to healthy and culturally appropriate foods, while defining their own food system*"[5]. Food sovereignty and self-determination is of cultural significance to Māori.

In 2016, Ahikā Consulting Ltd (Millar, et al.) produced a Local Food Economy Report for Otago and a Toolkit to assist community organisations, government organisations or local councils to understand their own local food economy. Localising a food economy helps communities to work towards protecting and strengthening their own food systems. Mapping key elements, including the built, social, physical, financial, natural, political, and human capital already available in a community, can help identify crucial threads to enabling a resilient, local food economy. These threads are often woven together to create a food economy and must be unwoven to identify where food comes from and how it is produced, distributed, and sold. Mapping this information can be used to establish new links between different components of the food economy.

Kawatiri Nature Environment and Communities Trust (KNECT) has launched Buller Kawatiri's Local Food Economy Project to determine reliable access to quality local food. Ahikā has committed to assisting with the project, delivered in three key stages:

- **Stage 1.** Across the Buller district there have been numerous grassroot efforts to establish and support a local food economy. However, as far as the project is aware, efforts to date have not been strategically coordinated nor supported and anecdotal evidence suggests that many initiatives have failed to endure in the longer term. Engaging the community in the development and expansion of a local food economy is the first of three stages in a larger project so that the community builds the food system it needs and takes control of developing its own resilience.

[5] Towards Understanding the Role of Kai in the Complex Lives of Whanau (Te Whatu Ora, University of Canterbury, Manatū Hauora).

Stage 1 was completed in August 2023 by KNECT, and a progress report[6] was produced that summarised the community's concerns, aspirations, and hopes for a better way to feed themselves.

- **Stage 2.** The second stage is focussed on continuing to engage the local community and understanding and evaluating the district's current food shed and food system and identify barriers and opportunities for achieving desired change.

Stage 2 was completed in January 2024 and is summarised in this report.

- **Stage 3** and beyond. The third stage will take a much wider look across the district and consider the land capability and look for opportunities to expand and optimise food production across the district. This stage will culminate with a Business Case and Implementation Plan for the initiatives that hold the greatest potential for success.

Stage 3 will be undertaken in 2024 and beyond.

Stage 2 of the project focuses on analysing the foodshed and food system. The following sections explore these concepts in two parts:

- Part One: Baseline foodshed analysis.
- Part Two: Baseline food system analysis.

[6] Buller Kawatiri LFE Stage 1 Progress Report.pdf - Google Drive

3 Part One: Baseline Foodshed Analysis

A foodshed is a geographic area or region that encompasses all the sources of food produced in that area that could supply the population or community from the same area. It is a concept used to understand and map the flow of food from its production, distribution, and consumption within a specific geographic area. Similar to the concept of a watershed, which defines the boundaries of water drainage, a foodshed defines the boundaries of where a community or region could obtain its food resources.

The idea behind a foodshed is to promote and support local and regional food systems by emphasising the importance of sourcing food from nearby producers and reducing the reliance on distant or global sources. This concept aligns with principles of sustainability, reducing food miles (the distance food travels from production to consumption), and fostering a closer connection between consumers and local food producers. It can also be a valuable tool for discussions around food security, agricultural planning, and promoting local agriculture and food production.

The first part of the report is in six sections:

1. Determining the foodshed (explanation of how the foodshed is calculated).
2. Determining the mass balance (explanation of how the mass balance is calculated).
3. Total estimated consumption (part of the mass balance calculation = Factors i & Factor ii).
4. Total estimated production (part of the mass balance calculation = Factors iii & Factor iv).
5. Mass balance (comparing total estimated consumption to total estimated production in the foodshed).
6. Findings (a short summary of the baseline foodshed analysis for the Buller district).

These six sections are explored in detail below.

3.1 Determining the foodshed

There are four elements to determining what the foodshed is for the Buller district:

1. Understanding the land area of Buller district.
2. Understanding the population within Buller district.
3. Understanding the Ecological Footprint calculations per person.
4. Calculating the foodshed.

These elements are explained in detail below.

3.1.1 Land area of Buller district

Figure 1 (page 4) shows a map of the Buller district; the total land area is **794,333** ha (StatsNZ).

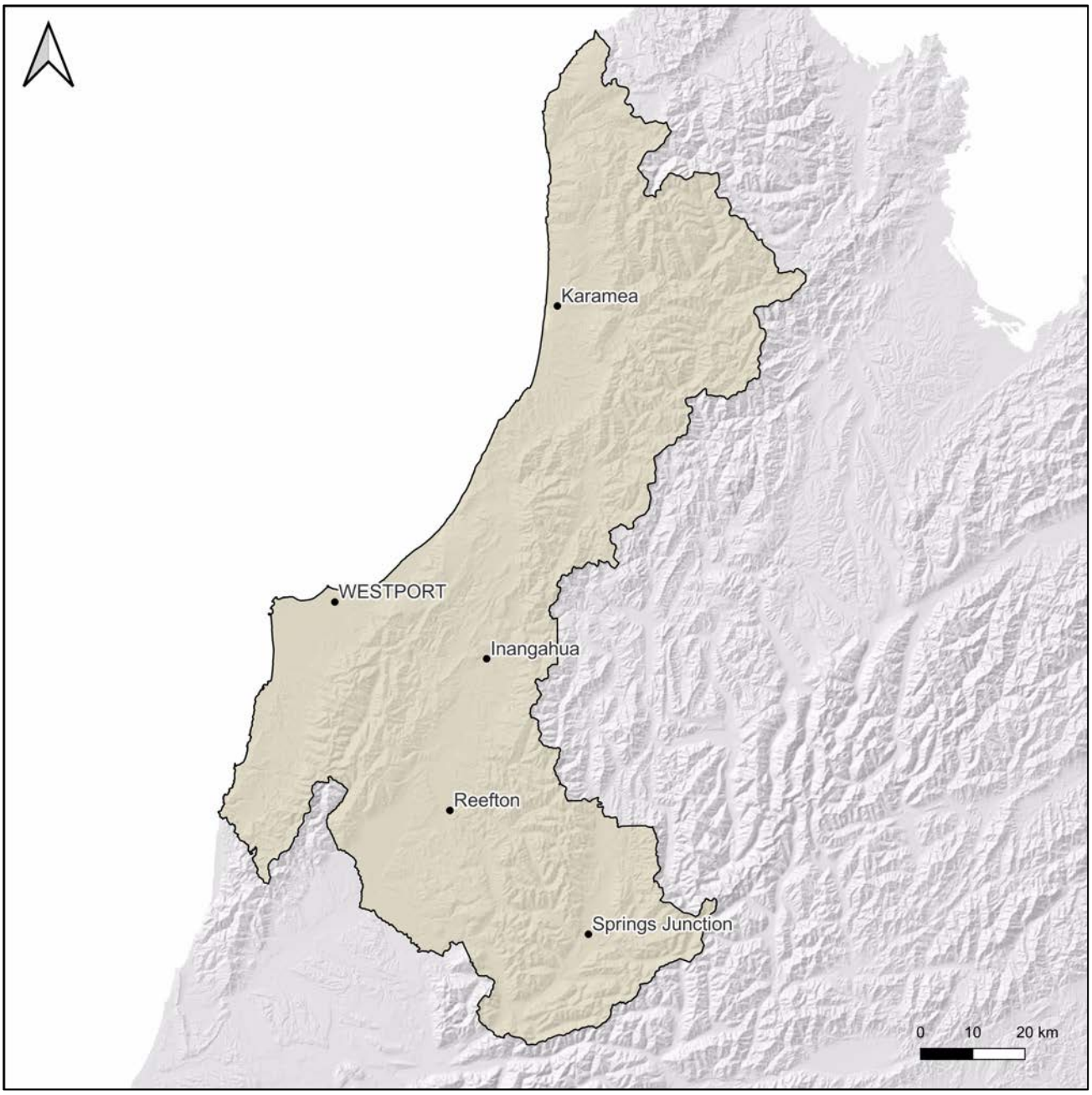

Figure 1: Map showing the Buller district

3.1.2 Population of Buller district

According to New Zealand Statistics (2022), there are an estimated **9,760** residents within the Buller district. The estimated resident population is based on the census resident population count. This is updated for residents missed or counted more than once by the census (net census undercount); residents temporarily overseas on census night; and births, deaths, and net migration between census night and the date of the estimate.

3.1.3 Ecological Footprint calculations

The Ecological Footprint represents the quantity of resources necessary to sustain a population's food needs, encompassing a multifaceted array of factors. It extends beyond the mere land required for food cultivation and encompasses inputs such as chemicals and energy in agricultural processes,

energy for transportation, food processing, refrigeration, and the infrastructure supporting these activities.

In cases where populations consume more processed or imported foods, the complexity of the system intensifies. The Ecological Footprint (Figure 2) serves as a valuable metric for gauging this complexity. It operates on the principle that all consumables can be traced back to the natural resources used in their production, including the associated land requirements. The Ecological Footprint of a population quantifies the land needed to meet all its consumption demands and manage the waste it generates.

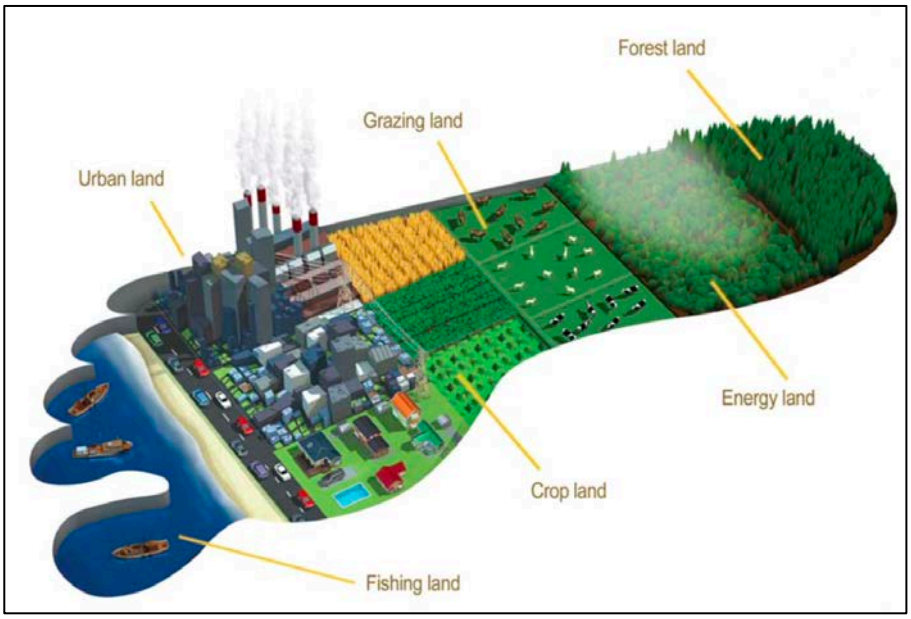

Figure 2: Image based on Composition of Ecological Footprint (MfE, 2007, p.73)

There are six categories of land considered in Ecological Footprint calculations (fishing clearly occurs in the Ocean but for the purposes of this research is referred to as 'land'), as illustrated in Figure 2. For instance, the production of an apple necessitates physical land for the apple tree, potentially forested land for trees used in paper packaging, and energy land, which accounts for forested areas responsible for offsetting the carbon emissions generated throughout the apple's lifecycle, including chemical usage, transportation, and refrigeration (Lawton, 2013).

The annual food footprint for residents of Aotearoa New Zealand is estimated at 0.511 hectares (Millar, et al. 2016). This 2013 calculation is based on results from Lawton's New Zealand Footprint research (Lawton, 2013) and considers the food aspect only. It's important to note that this figure represents the Ecological Footprint of an omnivorous diet and is not an exact science. For the Buller district Foodshed and Food System Report, 0.511 hectares per person is used to determine the necessary foodshed area for feeding the population of the Buller district, allocating this land per individual.

3.1.4 Calculating the foodshed

Using Lawton's Ecological Footprint calculation of 0.511 ha/person, the "foodshed" for Buller district is **4,987 hectares** (Table 1, page 6). Meaning, for the 9,760 people living within the total project area, 4,987 hectares of land would be required to sustain them.

Table 1: Calculating the foodshed within the Buller district

	Population estimates at 30 June 2022 (StatsNZ)	x Ecological Footprint 0.511 ha / person (Lawton, 2013)	Buller district's land area	Deviation
Buller district (all land area)	9,760 ppl	4,987 ha	794,333 ha (StatsNZ)	789,355 ha
Buller district's estimated current food producing land	9,760 ppl	4,987 ha	59,974 ha (AgriBase® dataset)	54,987 ha

Table 1 shows the land required according to the Ecological Footprint calculations and the overall foodshed for the Buller district is less than 5,000 ha. The column on the right represents the deviation between the Ecological Footprint requirements and the actual land availability. Two calculations are shown, one showing the total amount of land within Buller district according to StatsNZ, the second with areas such as native bush, urban areas, road reserves, waterways, etc., removed, and the assumed food producing land calculated (data taken from Table 4 on page 22). Overall, there is a significant surplus of 54,987 hectares of estimated current food producing land between the foodshed requirements and the land available within the Buller district.

3.2 Determining the Mass Balance using a Detailed Foodshed Analysis

Further analysis of the foodshed requires an understanding of the mass balance of each food type required and consumed within the Buller district. Determining the mass balance shows whether there is surplus, or deficit of specific food types currently grown within the district. There are four factors to the mass balance equation, listed below and shown in Figure 3.

- Factor i: Population.
- Factor ii: Average per capita consumption of food.
- Factor iii: Amount of land.
- Factor iv: Volume of current food production per land use type.

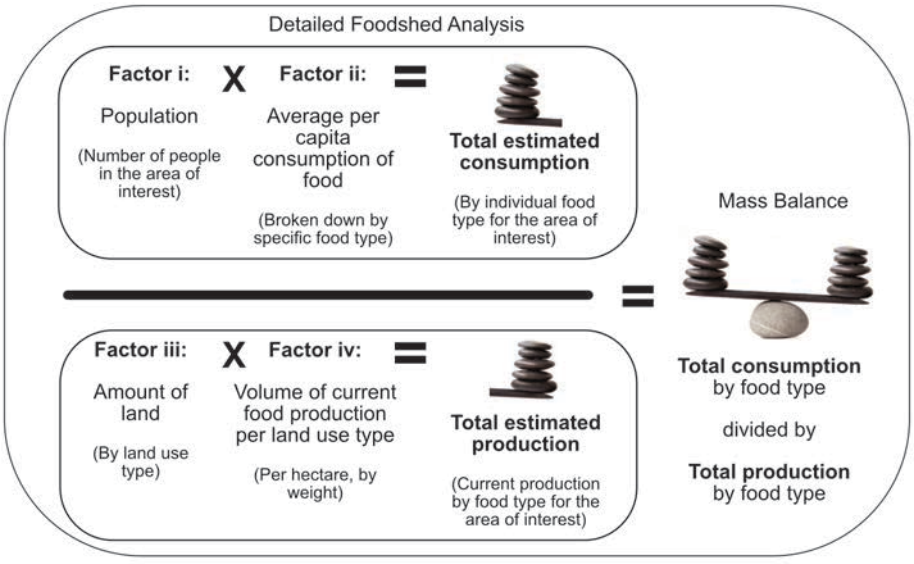

Figure 3: Diagram showing detailed foodshed analysis calculation

A detailed analysis of the average per capita consumption of food, existing land use and recorded food production that is occurring within the foodshed provides a clear understanding of how much food is being produced in the area. Subsequent data provides a robust analysis on the types and quantities of surplus and deficit food production. More details regarding the methodology for the baseline foodshed analysis can be found in Appendices one and two.

The following sections explore the four main factors, in two parts "Total Estimated Consumption" and "Total Estimated Production".

3.3 Total Estimated Consumption

The first two factors to address when considering the likely total estimated consumption within the Buller district are the size of the population, and the population's estimated average food consumption (see Appendix one for full details of how an average food consumption is calculated).

3.3.1 Factor I: Population

The estimated population in the foodshed area, as of 30 June 2022, based on New Zealand Statistics data, stands at **9,760** people.

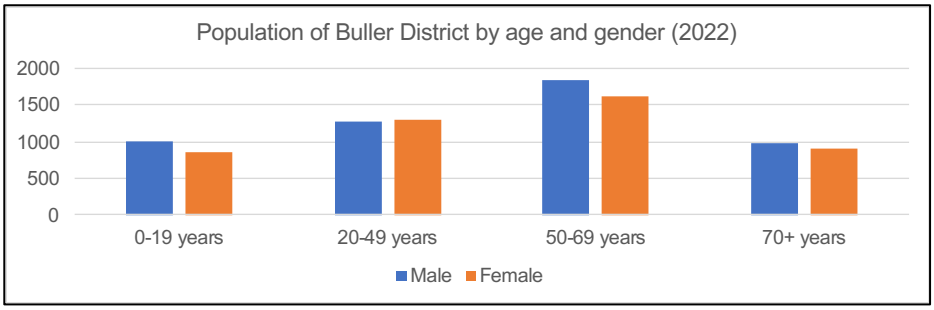

Figure 4: Population of the Buller district by age and gender

As illustrated in Figure 4, there is a noticeable gender disparity in the 50-69 age group, with a higher number of men than women. In the district, there are 400 more males compared to females, although it's worth noting that the 20-49 age bracket has a slightly higher female population.

3.3.2 Factor II: Average food consumption

Determining average food consumption considered several different sources of information:

- Recent food trends, including:
  - Kantar Better Futures Report (2020 and 2022).
  - Beef and Lamb statistics on meat consumption (2020).
  - New Zealand Adult Nutrition Survey data (2008/09).
- FAOSTAT estimated national food consumption figures for Aotearoa New Zealand (2020).
- Ministry of Health's recommended average food consumption (2020).

These are explained in more detail below.

3.3.2.1 Recent food trends

Recent food trends show an increase in vegetarianism and veganism, if this is the case for Aotearoa New Zealand, it would affect the calculations for the Ecological Footprint significantly[7]. However, it is important to note that there is a lack of scientific evidence that proves vegetarian or vegan diets are on the increase. The following information is included in the report because reducing the consumption of commercially grown beef and commercially harvested fish are recommended ways to reduce Ecological Footprints (Lawton, 2013, page 291).

- Kantar Better Futures Report

Kantar (previously Colmar Brunton) have been producing *Better Futures Reports* since 2017. These are freely available reports that provide key insights into consumer perspectives on sustainability and social and environmental issues that are important to the people of Aotearoa, and how these change over time. The average number of participants in the surveys is 1000 (n=1000).

In the 2020 report, Kantar states that since 2015 the trend towards meat free eating is increasing, growing from 5% to 15% of respondents by 2019 (see Figure 5).

Figure 5: Colmar Brunton (now Kantar) Better Future Report 2020, p.9

Whilst, in Kantar's 2022 report, they documented an increase in a "flexitarian[8]" approach to food with 19% of respondents stating they maintain a vegetarian or vegan diet (Figure 6).

[7] Lawton reports "changes in eating habits, such as consuming 50% home-grown food and reducing meat consumption could reduce the [New Zealand Ecological] footprint by 28%" (Lawton, 2013, page 250).

[8] The term "flexitarian" is a combination of "flexible" and "vegetarian," reflecting the adaptable nature of this dietary approach, for the Kantar report it tends to signify "plant-based options".

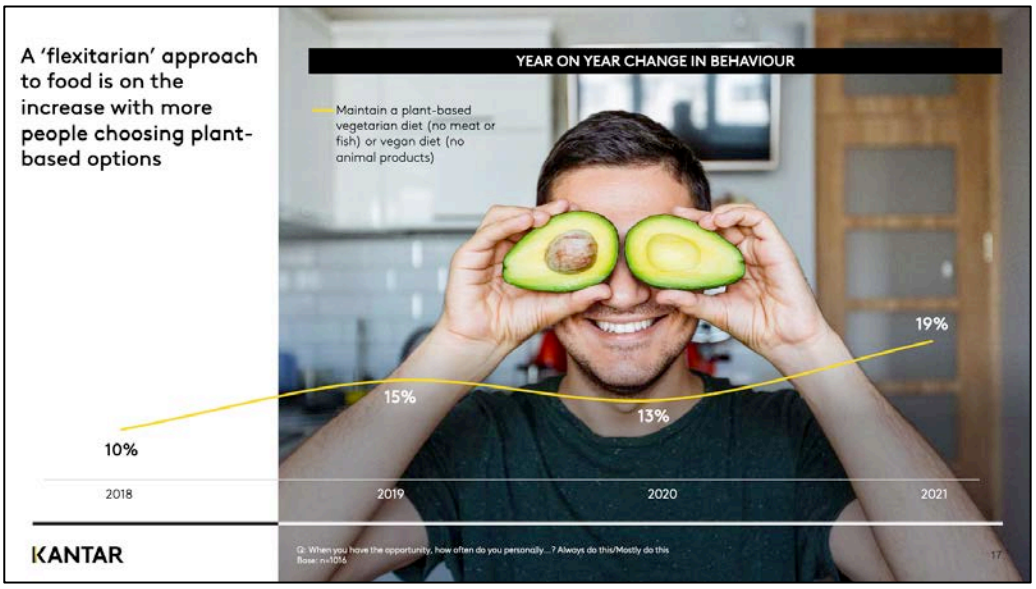

Figure 6: Kantar Better Future Report 2022, p.17

However, these results are significantly different to the latest analysis of data from the New Zealand Health Survey published in *Public Health Nutrition* (Greenwell, et al. 2023), which has stricter definitions of vegetarianism. The research shows 93% percent of Aotearoa New Zealanders eat red meat, 2.9% do not eat red meat, but do eat seafood and poultry, 1.4% are pescatarians (no red meat or poultry, but do eat fish), 2% are true vegetarians (no meat or seafood at all) and 0.7% are true vegans (no meat, seafood, or animal-derived products such as dairy). The research team found that for surveys where people label themselves vegetarian, they may not actually count as vegetarian with the new strict parameters. For example, when one of the research team was interviewed about the new findings, they stated, "*You really can't ask people how they identify… I've had people tell me, when they find out what I'm interested in and what I research… they say, 'Oh, yeah, I'm vegetarian.' And I said, 'Isn't that bacon you're eating in your sandwich?' They said, 'Oh, yeah. I mean, I eat bacon but, you know*"[9].

- Beef and lamb statistics on red meat consumption

According to Beef and Lamb NZ (2020, p.30), historical data indicates that in the last national nutrition survey conducted in 2008/9, the average consumption of beef and lamb in Aotearoa New Zealand was reported to be around 400 grams per week. More recent data from the 2020 Organisation for Economic Co-operation Development (OECD) and the Food and Agriculture Organization (FAO) Agricultural Outlook [10] reveals that the average Aotearoa New Zealander now consumes approximately 3.4 kilograms of sheep meat and 11.5 kilograms of beef per capita annually (OECD/FAO, 2020). This translates to roughly 63 grams per week for sheep meat and 221 grams per week for beef.

[9] https://www.rnz.co.nz/news/national/504179/vegans-in-aotearoa-rarer-than-you-might-think-study-finds

[10] *The OECD-FAO Agricultural Outlook 2020-2029* is a collaborative effort of the Organisation for Economic Co-operation Development (OECD) and the Food and Agriculture Organization (FAO) of the United Nations, incorporating expertise from collaborating member countries and international commodity organisations. It provides market projections for national, regional, and global supply and demand of major agricultural commodities, biofuel, and fish.

This trend aligns with findings from the Kantar survey (2022), which indicates an increase in vegetarian diets and a reduction in overall meat consumption, but conflicts with the latest research from New Zealand Health Survey (Greenwell, et al. 2023).

- New Zealand Adult Nutrition Survey data from 2008/09 on red meat consumption

The New Zealand Adult Nutrition Survey provides a comprehensive insight into the dietary habits, nutritional status, and health outcomes of adults in Aotearoa New Zealand in 2008/2009. The survey underscores the significance of meat consumption in the Aotearoa New Zealand diet, particularly the consumption of beef and lamb, which serve as important sources of protein, vitamins, and minerals for most adults. However, it's worth noting that there is an emerging trend towards the adoption of alternative protein sources such as poultry and fish.

The New Zealand Adult Nutrition Survey does not explicitly specify the weight of a single serving of red meat, however, using the Aotearoa New Zealand's Ministry of Health's recommended serving size and number of servings per person for red meat, an analysis of the data indicates an annual consumption of approximately 25.24 kilograms per capita (equivalent to 485 grams per week) of red meat. This figure is slightly greater than the Beef and Lamb's reported figure of 400 grams per week for beef and lamb consumption, however it does correspond with the reduced consumption of red meat over time considering the 485 grams is from 2008/09. These insights provide valuable information about meat consumption trends and dietary habits in Aotearoa New Zealand.

3.3.2.2 FAOSTAT national dietary consumption figures

- About United Nations FAOSTAT

The Otago Food Economy report completed in 2016 (Millar, et al. 2016), estimated the volume of foods consumed by the foodshed residents (those living in Dunedin and Wānaka, Otago) using the United Nations FAOSTAT[11] data (2011). The food supply dataset provided estimated national food consumption figures. The food supply quantity (kg/capita/yr) is a measurement used to represent the average amount of food available for consumption per person in a given country or region over the course of one year. This figure is typically expressed in kilograms per capita per year.

The FAOSTAT (2007) food supply dataset had been used previously by Lawton in her PhD research on The Ecological Footprint (2013) when calculating food ecological footprints and although it is a top-down method that has limitations of accuracy; it is considered the most reliable dataset available. It was acknowledged by Lawton (2013) that there might be inaccuracies in the national data submitted to the FAOSTAT because food that is not purchased is excluded and because FAOSTAT reports the total food consumed within the country for a given year, including by tourists.

[11] FAO food and agriculture statistics collects and disseminates timely and reliable food and agricultural statistics globally. They develop statistical methodologies and standards, and support member countries develop statistical systems through technical assistance and capacity development activities. They disseminate statistics through their dissemination platforms (FAOSTAT and RuLIS) and produce publications, working papers and statistical yearbooks that cover food security and nutrition, crop and livestock, economic, social, and environmental statistics.

Also, it is not clear whether the FAOSTAT data includes food that is commercially grown or all food including home-grown. There is some suggestion that household food production is on the increase, however the most recent quantitative data for food grown by Aotearoa New Zealand households is from the 1957 census (Statistics New Zealand, 1957) so they are not helpful for current production. This type of reporting does not capture any food caught, hunted, or traded or through any mahinga kai practices[12].

As a result, the FAOSTAT food figures could be an underestimate depending on the amount of non-commercial food is consumed in Aotearoa New Zealand. Furthermore, Lawton concluded that while there are several gaps in the FAOSTAT data which created uncertainties in the Ecological Footprint calculation it remained the dataset of choice because the food data are presented as raw (loss-adjusted primary weights) rather than processed food. Using raw foods are the clearest way to calculate footprints. As a result, the FAOSTAT data is included in this report for the total food consumed by those residing in Aotearoa New Zealand.

To determine which year's data set to use, the years from 2011 to the latest available (2020) were compared, Figure 7.

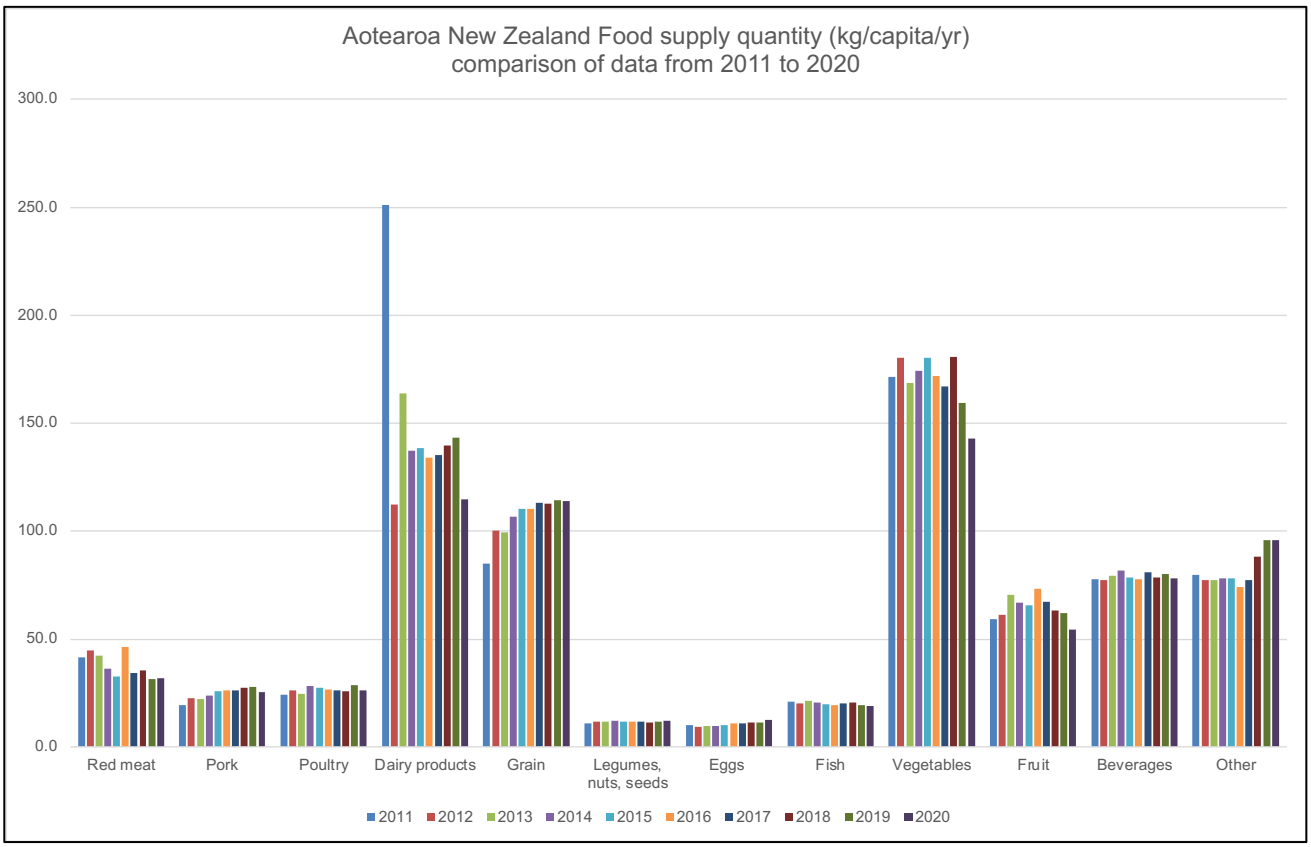

Figure 7: FAOSTAT food supply data from 2011 to 2020

Figure 7 shows a pattern across the food supply data from FAOSTAT across the years 2011 to 2020. There is one obvious outlier, which is the dairy products for 2011 (251 kg/capita/yr), which is nearly

[12] Mahinga kai/mahika kai literally means 'to work the food' and relates to the traditional value of food resources and their ecosystems, as well as the practices involved in producing, procuring, and protecting these resources.

double the amount of dairy supplied for the following years (for example, 2012 is 112 kg/capita/yr). There is no way of knowing what caused this anomaly. Therefore, two sets of data are used below, one that averaged data between 2012 and 2020, and the other in the year 2019 (due to 2020 being the COVID year).

- Meat consumption analysis

Over the span of nine years, data from the United Nations FAOSTAT reveals a decline in red meat consumption, dropping from 44.7 kg per person per year in 2012 (equivalent to 860 grams per week) to 31.3 kg per person per year in 2019 (equivalent to 602 grams per week), with a notable exception in 2016 (see Figure 8). A trend seemingly in line with the Kantar reports and the Beef and Lamb NZ findings, despite the amounts being significantly higher than the reported by Beef and Lamb.

It is interesting to note that fish consumption also experienced a slight decrease during this period. However, pork consumption displayed a noteworthy trend, increasing from 22 kg per person per year in 2012 to 28 kg per person per year in 2019, marking a 27% rise, only to dip by 10% in 2020 to 25 kg per person per year.

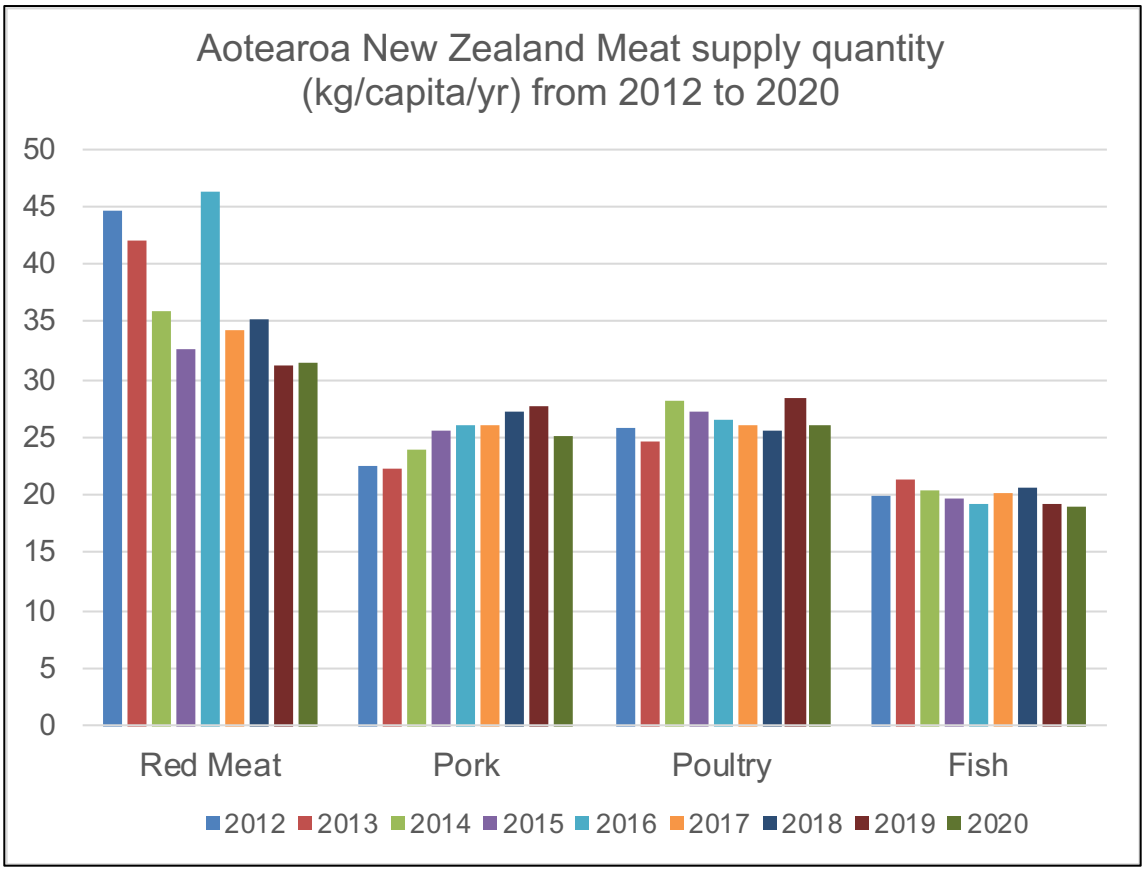

Figure 8: FAOSTAT shows estimate supply quantity of red meat, pork, poultry and fish

The consumption of poultry presents a challenge in terms of clear trends, as it appears to fluctuate throughout the nine-year duration. When the collective meat figures are examined together (refer to Figure 9, overleaf), an overarching pattern emerges – overall meat consumption has been on a decline, starting from 113 kg per person per year in 2012 and reaching 102 kg per person per year in 2020, representing a decrease of 9.73%. However, it's worth noting the anomaly in 2016 when there was a notable surge in red meat consumption.

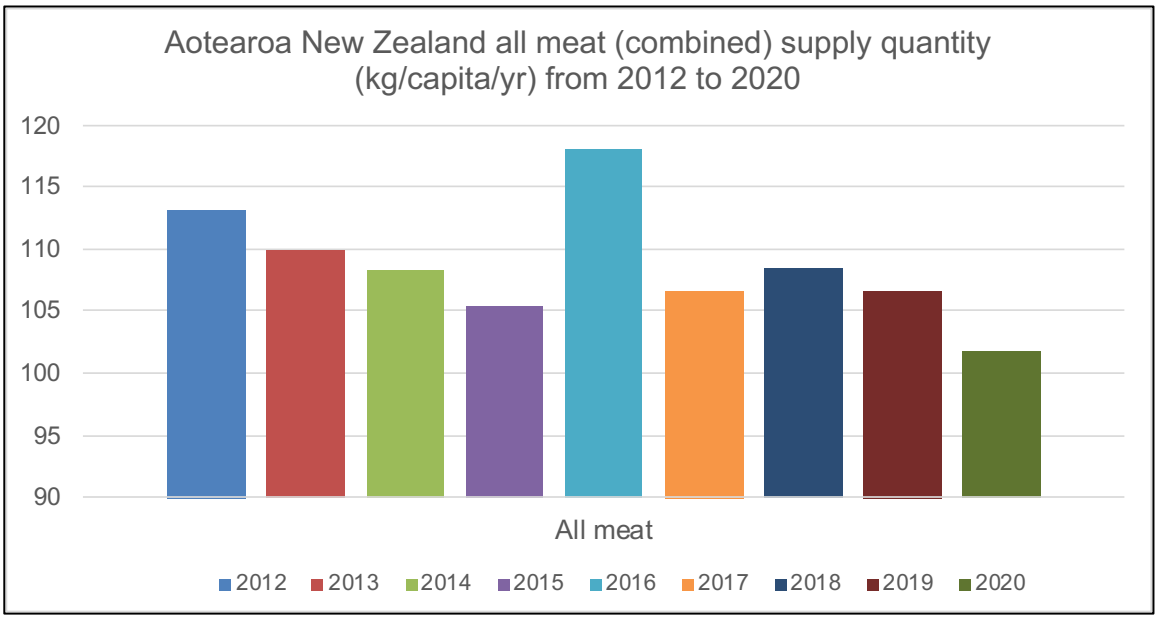

Figure 9: FAOSTAT shows an estimated overall decline in meat consumption between 2012 and 2020

FAOSTAT shows a considerable increase in egg consumption from 2012-2020 (9 kg per person per year to 12 kg per person per year; a 33% increase), however dairy consumption fluctuates somewhat (Figure 10), increasing in 2019 to 143 kg per person per year then decreasing in 2020 to 115 kg per person per year.

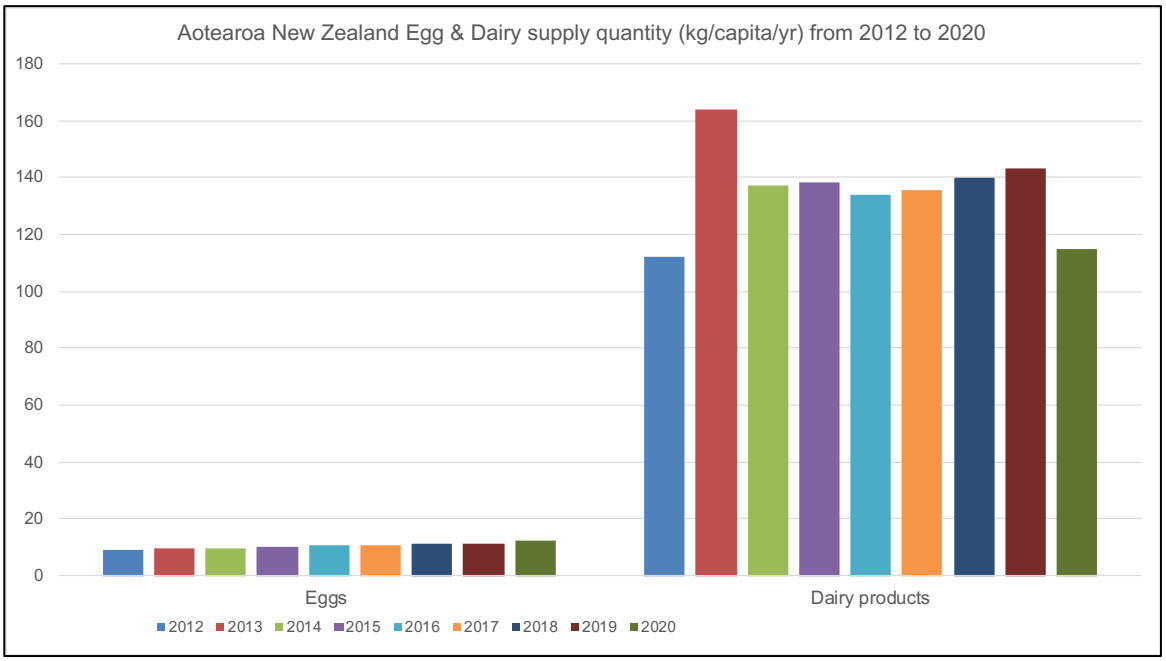

Figure 10: FAOSTAT showing an estimated minor increase in egg consumption, and some fluctuation in dairy consumption

Interestingly, FAOSTAT shows there has also been a reduction in vegetable and fruit consumption over the nine-year period (Figure 11, see overleaf). This seems at odds with the decreasing meat consumption and stated national food consumption trends of increasing vegetarianism.

The reasons behind the decrease are most likely multifaceted. Home gardening could be on the increase due to the rising cost of living, or more processed foods may be replacing the fresh fruit and vegetables.

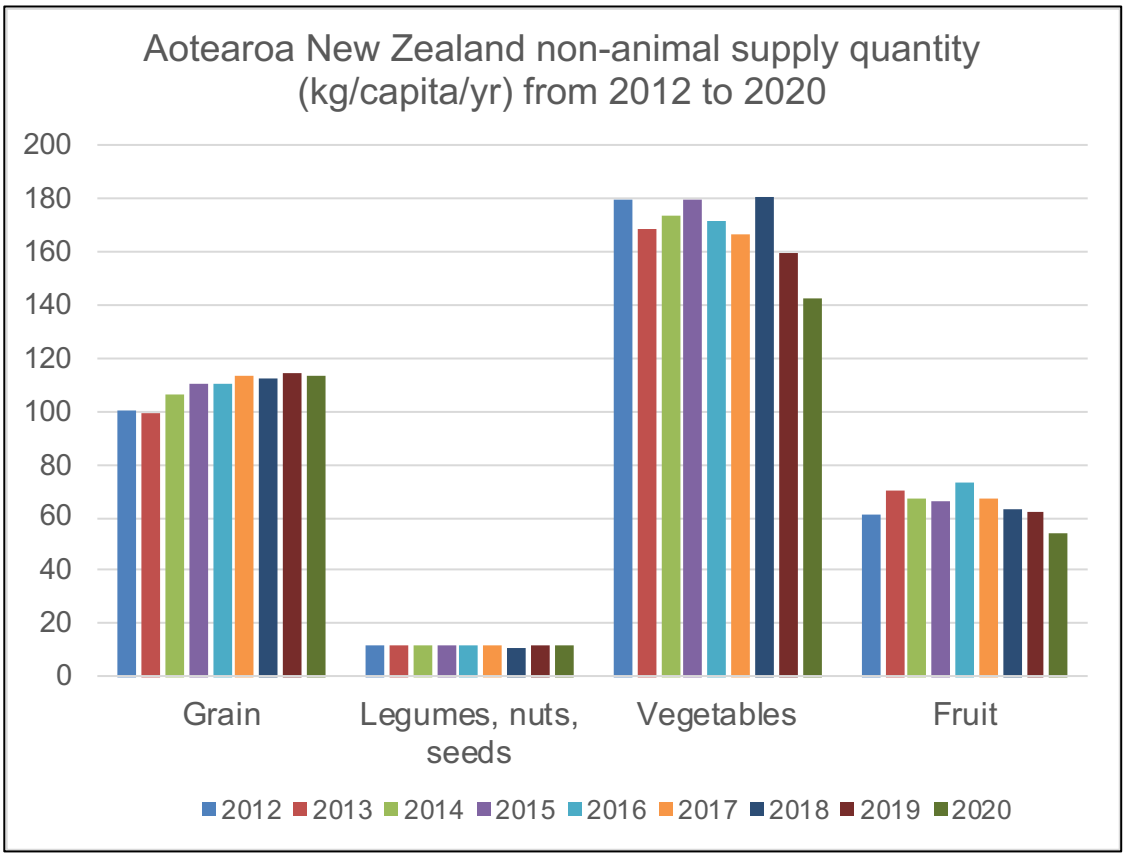

Figure 11: FAOSTAT showing grain, legumes/nuts/seeds, vegetables, and fruit consumption

In summary, the observed trends in meat and vegetable/fruit consumption could be influenced by various factors, including economic considerations, dietary choices, consumer behaviour, health considerations, as well as access to these food items.

Processed foods are not included in the research (see Appendix one), which makes it difficult to hypothesise on any trends including processed foods. However, research indicates, "[u]*ltra-processed foods have the worst nutrient profile, yet they are the most available packaged products in … New Zealand supermarkets*" (Luiten, C. M., et al. 2016). Therefore, processed foods may be more accessible for some members of the community than fresh fruit and vegetables, as well as (potentially) being lower costs compared to fresh produce, and maybe have a longer shelf life. Processed foods may include items with varying amounts of meat, contributing to fluctuations in meat consumption.

The differential trends in specific meat types (e.g., pork rising while overall meat consumption declines) could be tied to the relative affordability of different meats, meaning consumers might adjust their purchasing behaviour based on price fluctuations.

- FAOSTAT average food consumption

According to FAOSTAT 2019 data, the estimated food supply quantity per person is **784 kg**, (including categories 'beverages' and 'other') comprising the food types shown in Figure 12 (overleaf)**.**

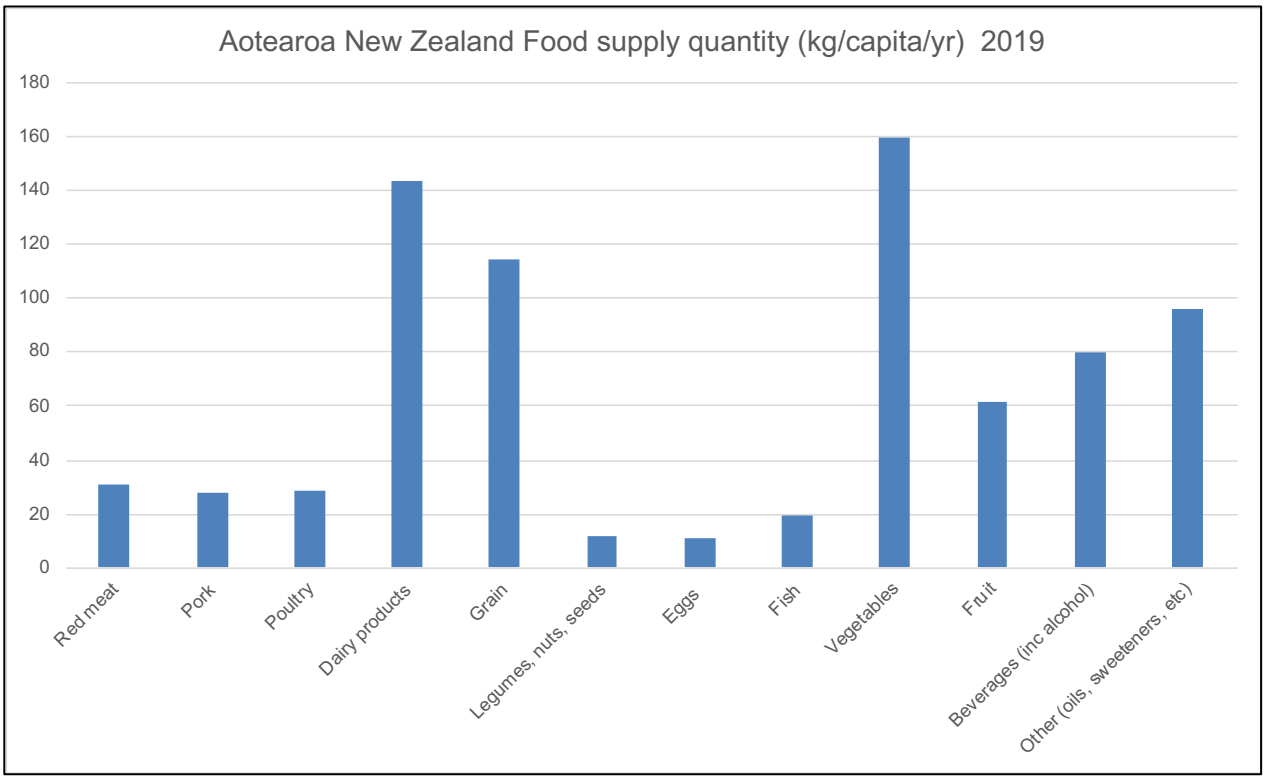

Figure 12: FAOSTAT for 2019, showing estimated food supply quantity for Aotearoa New Zealand

The FAOSTAT data includes 'Beverages' (such as tea, coffee, cocoa, wine, beer, and other fermented drinks) as well as 'Other' (which include foods hard to incorporate into the other food types, such as oils, fats, offal meat, sweeteners, and crustaceans).

3.3.2.3 Ministry of Health recommended average food consumption

Aotearoa New Zealand Ministry of Health (MOH) provides "Eating and Activity Guidelines for New Zealand Adults" (Ministry of Health, 2020b), with "New serving size advice" that explains serving sizes from each food group for different age ranges and gender (Ministry of Health, 2020a).

Calculations based on MOH advice regarding the serving size and number of servings per person shows the approximate percentage of different food groups required for all people across different ages and genders, as shown in Figure 13 (also see Appendix one for further details).

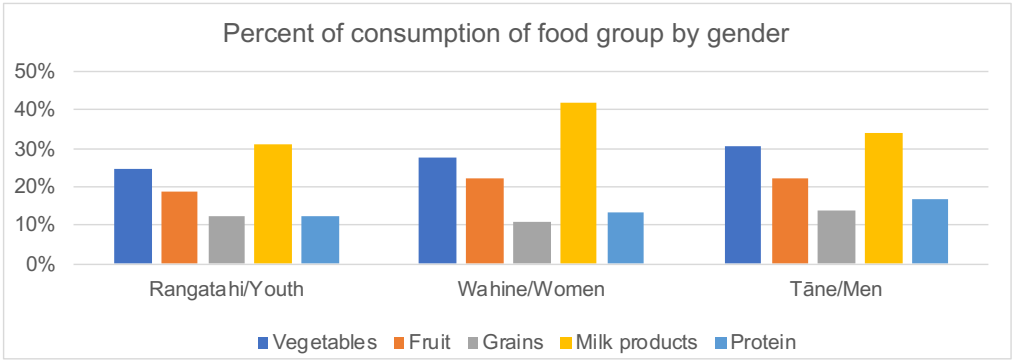

Figure 13: Data based on serving size and number of serving averaged across age ranges and genders

Figure 13 shows that the patterns of consumption for the five different food groups are relatively similar. An exception is the amount of milk products recommended for over 50-year-old women,

which is nearly double the recommended amount compared to women under 50 (2.5 servings for under 50 and 4 servings for over 50). "Increased consumption of milk and milk products is recommended for women over the age of 50 to help maintain bone density and reduce the risk of osteoporosis after menopause" (Ministry of Health, 2020a). Milk products are described as low or reduced fat fresh milk, UHT long-life milk, reconstituted powdered milk or buttermilk, low- or reduced-fat yogurt and cheese, or calcium-fortified plant-based milk alternatives. The milk product group does not include foods made from milk that have little calcium and a high fat content, such as cream cheese, sour cream, cream, and butter (which are included in the FAOSTAT data).

The protein group includes nuts and seeds (including nut butters), legumes (such as beans, lentils, chickpeas, split peas), fish, eggs, chicken and red meat and pork and is shown in Figure 14.

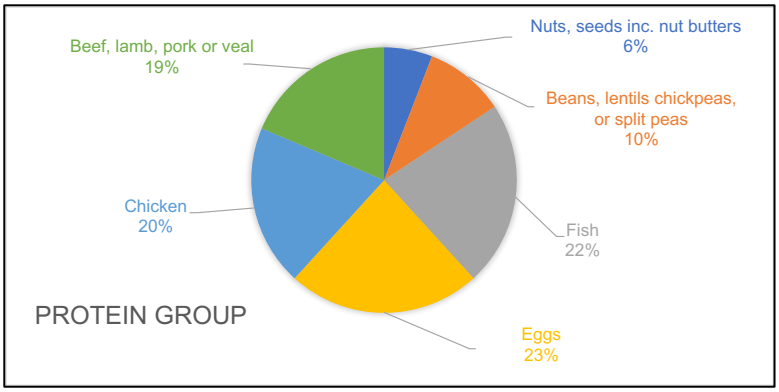

Figure 14: Different weighted amounts of each of the six types of food that makes up the protein group for MOH

Presented in Figure 15 is a graph determined from MOH's recommended serving size x number of servings for different ages /genders (per person per year) from the five food groups, showing minimum and maximum quantities.

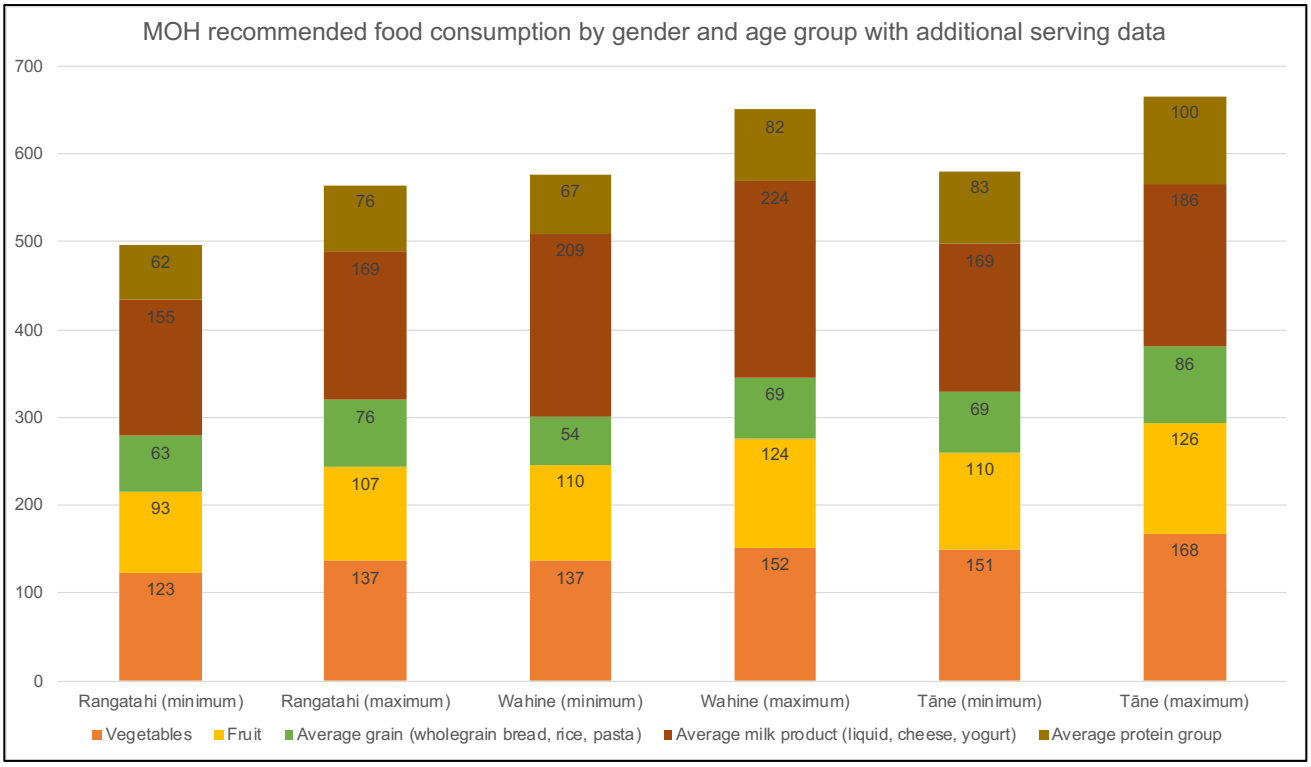

Figure 15: MOH: Data calculated from recommended serving size x number of servings (in kg of food per person per year)

Within the serving sizes, MOH has an additional column referring to the “approximate number of additional servings from the food groups”, the data includes fats and ranges from zero additional servings to five in the case of teenage boys. With the additional servings added, the total amounts for each average Rangatahi/Youth, Wahine/Woman or Tāne/Men can vary by 13-15%. This additional data makes up the “maximum” amounts in the graph in Figure 15, as follows:

- Rangatahi/Youth = 496-565 kg/yr
- Wahine/Woman = 577-651 kg/yr
- Tāne/Men = 581-666 kg/yr

In summary, MOH average recommended food consumption ranges from 496 kg to 666 kg per year.

3.3.2.4 Working out Buller district’s food consumption

Using dataset gathered above, a model of the food requirements for an average person was created, then multiplied by the Buller district's population. An average of the MOH's model of a recommended diet was used for most of the food types, except for the protein group, as there is not enough data to calculate the different protein types. The MOH's model is chosen because it represents a set of healthy food consumption recommendations for the population. Data from FAOSTAT and other datasets provide the breakdowns of percentages of consumption of different types of dairy products and different types of protein products. Based on all the datasets, averages were used to create the food types required to align with food types reported in the FAOSTAT data (Figure 12).

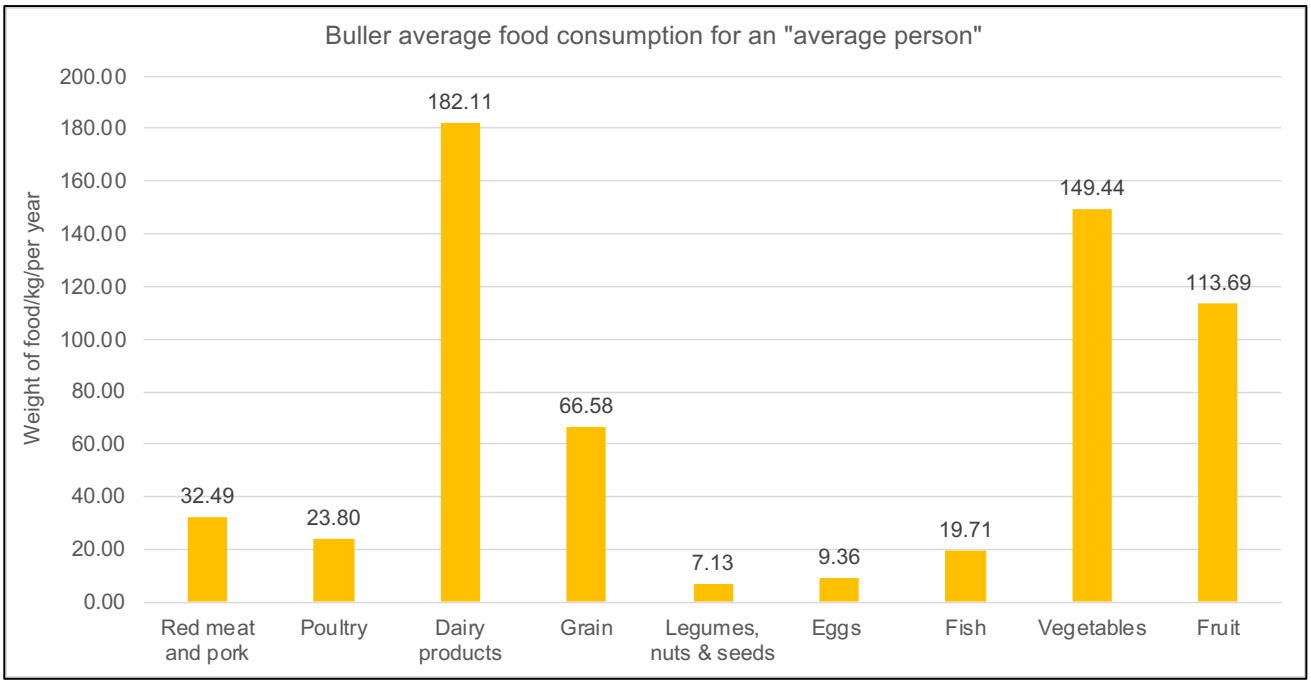

Figure 16: Buller district average estimated food consumption for an average person across food types (in kg/yr)

Figure 16 shows a graph of the data, which summarises the estimated amount of food consumed by an average person in the Buller foodshed. The Buller district’s average food consumption model incorporates meat in the protein food group, so is more in line with average omnivore food consumption (as opposed to only plant-based proteins). Using this approach, variations in dietary preferences are not considered, however, due to the averaging, it does acknowledge that some

individuals may not consume meat while others may consume more than the recommend amounts. Figure 16 also shows the assumed Buller foodshed's average food consumption for a year for an average person is an estimated at **604 kg** (broken down across nine food types). This figure excludes "beverages" and "other" that are included in the 2019 FAOSTAT estimate (Figure 12), which showed 784 kg. If "beverages" and "other" are removed from the 2019 FAOSTAT average food consumption for a year for an average person, the estimated figure is **608 kg**.

The following section compares average food consumption for the Buller foodshed with data collated from research within Aotearoa New Zealand.

3.3.2.5 Comparison across data sets

Data has been gathered and analysed from the following datasets:

- OECD-FAO Agricultural Outlook - Meat consumption 2019 (meat data only).
- New Zealand Adult Nutrition Survey 2008/2009 (meat data only).
- FAOSTAT: NZ food supply quantity 2019.
- Otago foodshed study (created by Ahikā Consulting) 2016.
- MOH 2020 data for recommended serving size x number of servings for adults and children, which has been averaged over genders and ages (minimum consumption).
- MOH 2020 data for recommended serving size x number of servings for adults and children, which has been averaged over genders and ages (maximum consumption).

Data from both the New Zealand Adult Nutrition Survey 2008/2009 and the OECD-FAO (2019 data) only show meat consumption in the country. These two datasets serve as a guide to understanding average food consumption for an average person in the Buller foodshed.

As explained above (and in data limitation in Appendix one), FAOSTAT may not capture data on all the food that is grown at home (in the back garden) or hunted, caught, or traded for home consumption (such as mahinga kai), so it is expected to be lower than the recommended food consumption by MOH. However, FAOSTAT 2019 data (with beverages and other removed) shows the average food supply quantity per capita, per year as 608 kg and the MOH recommended consumption is between 496 kg to 666 kg per year. FAOSTAT data is the potential amount of food available for consumption and MOH data is the recommended amount of food to be consumed, and as such FAOSTAT data does not account for any food waste.

Research by Love Food Hate Waste (2018) revealed that household food waste is a significant issue, with each household (in the study area) discarding approximately 79 kilograms of avoidable food (food fit for consumption, e.g. not banana peels) annually, amounting to an average cost of $563 per household. If 79 kg were removed from the FAOSTAT 2019 data set (with beverages and other removed) to account for household food waste, the average food supply quantity per capita would decrease from 608 kg to 529 kg/capita/year (13% decrease). Therefore, being more in line with the expectation that FAOSTAT data would be lower than MOH data.

Data used for the 2016 Otago foodshed from the Otago Food Economy report was used as the starter for creating the food consumption data, but the dataset it was based on had altered, so it is here as a

reference but not as a guide. Two datasets from MOH are used to illustrate the minimum and the maximum amounts of food that make up recommended average food consumption.

Figure 17 compares the results of these seven datasets across as many food types as possible, they are all calculated in kg per capita per year. Included in the graph is the "Estimated average food consumption for Buller district: 2023" described in the section above and illustrated as a graph in Figure 16 (page 17). An arrow is used to serve as a pointer, for ease of reading the graph.

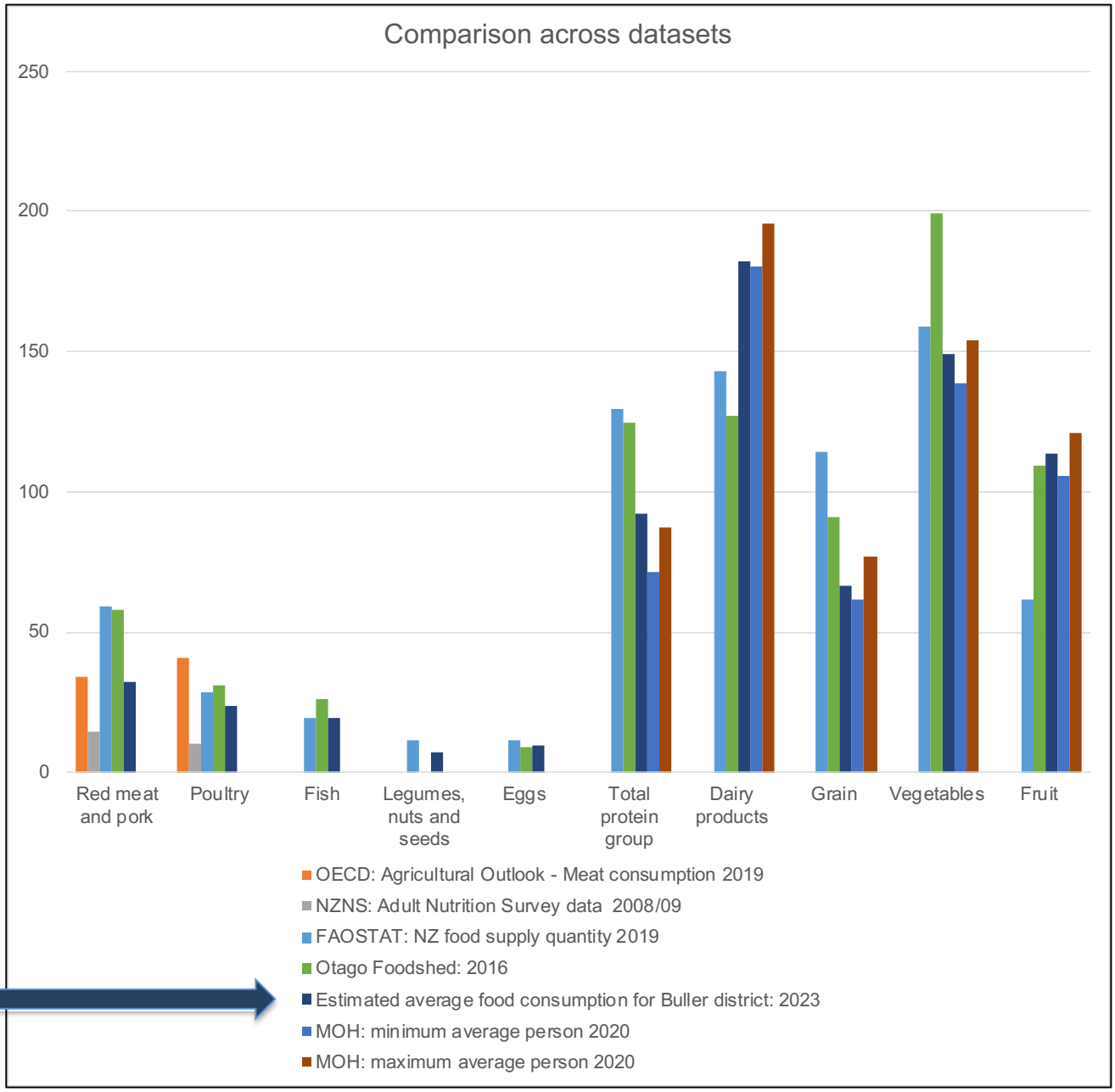

Figure 17: Comparison between multiple datasets

The aim of the comparison is to see how the "Estimated average food consumption for Buller district: 2023" compares to the other datasets. Despite the huge variations across each dataset, the "Estimated average food consumption for Buller district: 2023" sits comfortably in the middle and is well averaged.

3.3.3 Factor I x Factor II = Total Estimated Consumption

Based on an estimated 9,760 people living in the Buller district (Factor i), it is estimated that **5,898 tonnes** of food are consumed every year (based on calculations from Factor ii). This number represents the estimated total amount of food that needs to be produced to feed the 2022 population of the Buller district annually.

Table 2 shows the total estimated consumption by food type per capita per annum and total food needs for the foodshed population in 2022. Due to rounding, some figures may not add up precisely.

Table 2: Buller foodshed consumption estimates, by food type

Food Type	Per capita annual consumption (kg)	Total foodshed consumption for 2022 population data (tonne)
Red meat and pork	32.5	317.1
Poultry meat	23.8	232.3
Fish	19.7	192.3
Legumes, nuts, and seeds	7.1	69.6
Eggs	9.4	91.4
Dairy products	182.1	1,777.4
Grain	66.6	649.9
Vegetables	149.4	1,458.5
Fruit	113.7	1,109.6
Total	**604.3**	**5,898.1**

Dairy products are estimated at the highest total requirements, with an annual consumption demand of 1,777 tonnes, closely followed by vegetables at 1,459 tonnes annually. Fruit ranks as the third-largest requirement within the foodshed, with an annual requirement of 1,110 tonnes to meet the foodshed population's needs.

It is important to note that highly processed foods (described in Appendix one) are not included in the per capita annual consumption of food, by food type. Research shows a correlation between low-economic areas and fast-food outlets, however, Part Two shows that there are no global fast-food outlets (e.g. McDonald's, Kentucky Fried Chicken, Pizza Hut) registered with MPI in the Buller district.

To compare the total estimated consumption of food and the total estimated production of food, additional food types are required. Therefore, the following table and subsequent graph separates red meat and pork into their own food types (based on an average % split from the different datasets) and estimates the amount of milk versus other dairy products that may be consumed by the population of the Buller foodshed.

Table 3: Total estimated consumption of food with additional food types (and in different order)

Food Type	Per capita annual consumption (kg)	Total foodshed consumption for 2022 population data (tonne)
Red meat	18.36	179.2
Pork meat	14.13	137.9
Poultry meat	23.80	232.3
Eggs	9.36	91.4
Fish	19.71	192.3
Milk only	158.10	1543.0
Other dairy products	24.01	234.4
Grain	66.58	649.9
Legumes, nuts & seeds	7.13	69.6
Vegetables	149.44	1458.5
Fruit	113.69	1109.6
Total	**604.31**	**5898.1**

When red meat and pork are separated out, there is estimated to be slightly more red meat (beef, lamb, mutton, venison) consumed than pork products. When milk is separated from other dairy products, milk is estimated at 86% of the overall dairy product consumption, due to the amount of milk products consumed in Aotearoa New Zealand.

Figure 18 shows the data represented in Table 3 in a graph.

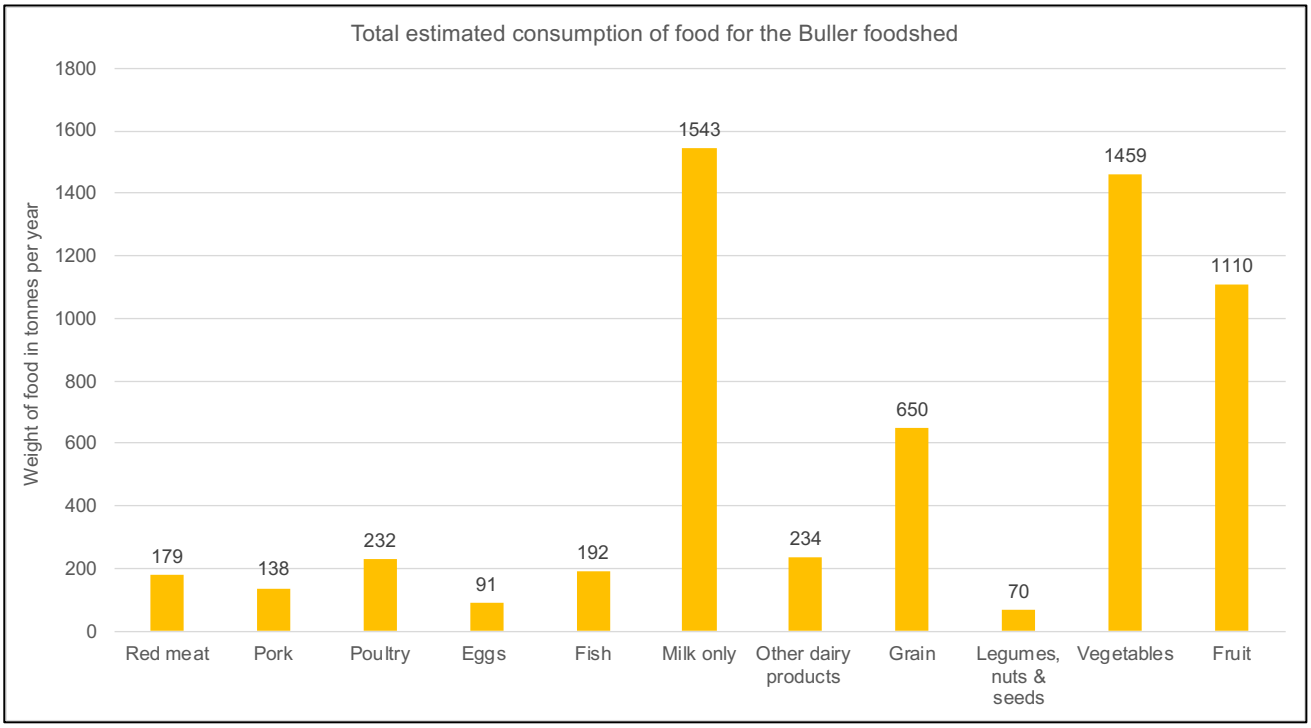

Figure 18: Graph showing the total estimated consumption of food for the Buller foodshed

3.4 Total Estimated Production

The second two factors to address when considering the mass balance of food within the Buller district is the current use of the land, and the food produced in the district (see appendices one and two for full workings).

3.4.1 Factor III: Land use analysis

Using the AgriBase® dataset (AgriBase® data is a product of AsureQuality Limited), the foodshed is mapped and classified into main land uses. Non-food productive uses, road reserves, waterways, mines, urban area and any unconfirmed, are also classified (explained in appendices one and two).

3.4.1.1 Determining land use

Table 4 provides further detail about the number of farms associated with each land use, the net area of each land use, and its contribution to the total land area of the Buller district.

These results are a high-level analysis of the land identified through the AgriBase® dataset (some obvious changes have been made, once identified through ground truthing and local knowledge). However, due to the data collection methods, this dataset needs to be treated as high-level and indicative. Due to rounding and corrections, the totals may not add up precisely.

Table 4: Land use in the Buller foodshed from AgriBase® dataset

Land use types	Farm count	Total area (ha)
Assumed "food producing land":		
Dairy (dairy cattle farming = 140 and dairy dry stock = 16)	156	42,192
Extensive pastoral (beef cattle farming)	73	5,832.9
Extensive pastoral (grazing other people's sheep/ beef cattle)	37	2,947.7
Extensive pastoral (mixed sheep and beef cattle farming)	14	5,548.1
Extensive pastoral (sheep farming)	12	427.3
Deer farming	11	2,236
Fruit production (including berry, corrected from AgriBase®)	6	12.97
Vegetable production (corrected from AgriBase®)	1	0.6
Honey production	2	761.3
Poultry (for eggs, corrected from AgriBase®)	1	15.5
Total assumed "food producing land"	**313 farms**	**59,974.4 ha**
Other land use types:		
Lifestyle use	455	2,557.2
Forestry	32	5,933.9
Unspecified (i.e. farmer did not give indication)	31	2,765.2
Non-food uses (plant nurseries, sawmill, tourism)	15	366.0
Not farmed (idle)	8	579.1
Non-food animals (dogs, horses)	4	160.3
Total other land use types	**545 farms**	**12,361.70 ha**

Land use types	Farm count	Total area (ha)
Total assumed "food producing land" plus Total other land use types (AgriBase® dataset)	n/a	**72,336.07 ha**
Native bush	n/a	689,056.8
Urban areas, road reserves, watercourses, mines, etc.	n/a	32,932.4
Total Land Area Buller district	n/a	**794,333 ha**

At 794,333 hectares, the land area of the Buller district represents 3% of the area of Aotearoa New Zealand. Of this 794,333 ha, 689,057 ha (87%) is native bush, an estimated 59,974 ha (8%) is used for food production while urban areas, waterbodies, road reserves and the mines account for approximately 32,932 ha (4%). The remaining 1.5% (12,362 ha) is plantation forestry, lifestyle blocks (which could be small scale sheep and beef production, but also various other uses, such as horses or native forest restoration or unused) and non-food production uses.

The land use across the Buller district is shown in the AgriBase® data map in Figure 20 (page 24), and as a graph in Figure 19. Due to confidentially, the maps cannot be shown by township across the district.

Figure 19 provides a graphical breakdown of the assumed food producing land from Table 4 (shown on page 22) across the Buller district.

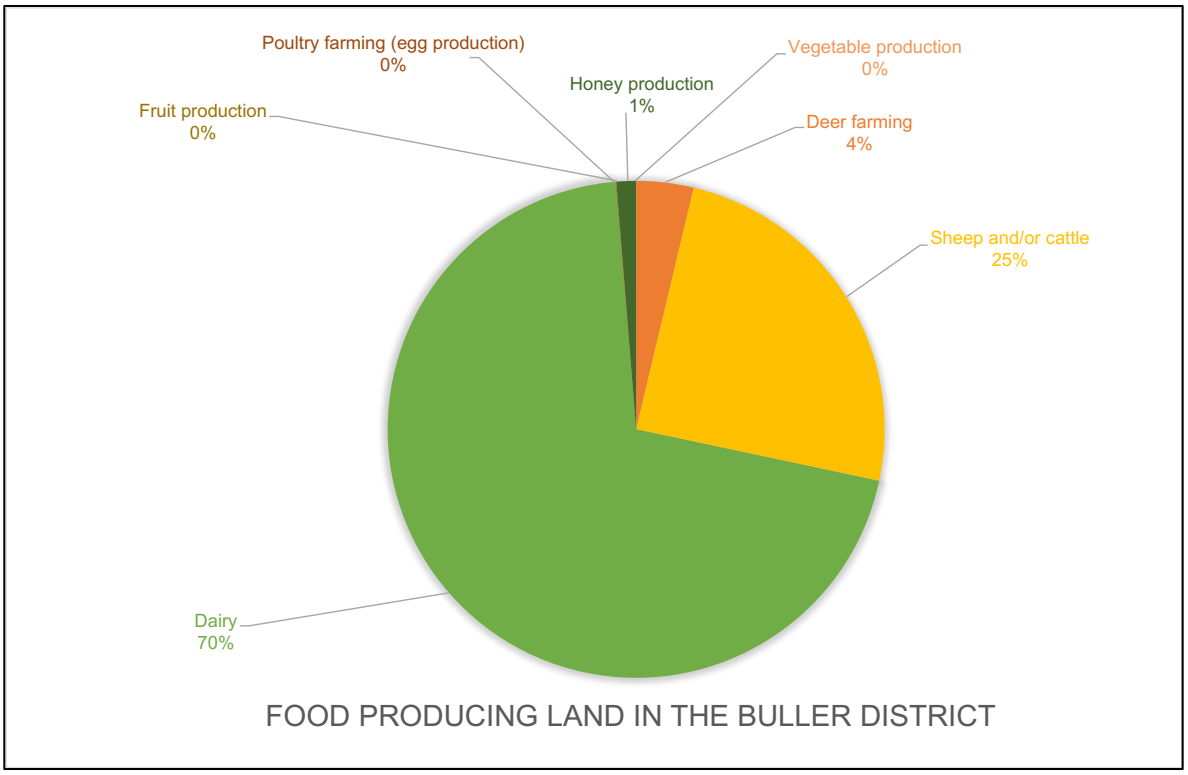

Figure 19: Pie chart showing land use (by %) of the 59,974 hectares of food producing land in the Buller district

It is important to note the chart in Figure 19 only shows the 8% of the Buller district, which is the estimated 59,974 hectares of food producing area. The food producing area is referred to as the "Buller foodshed".

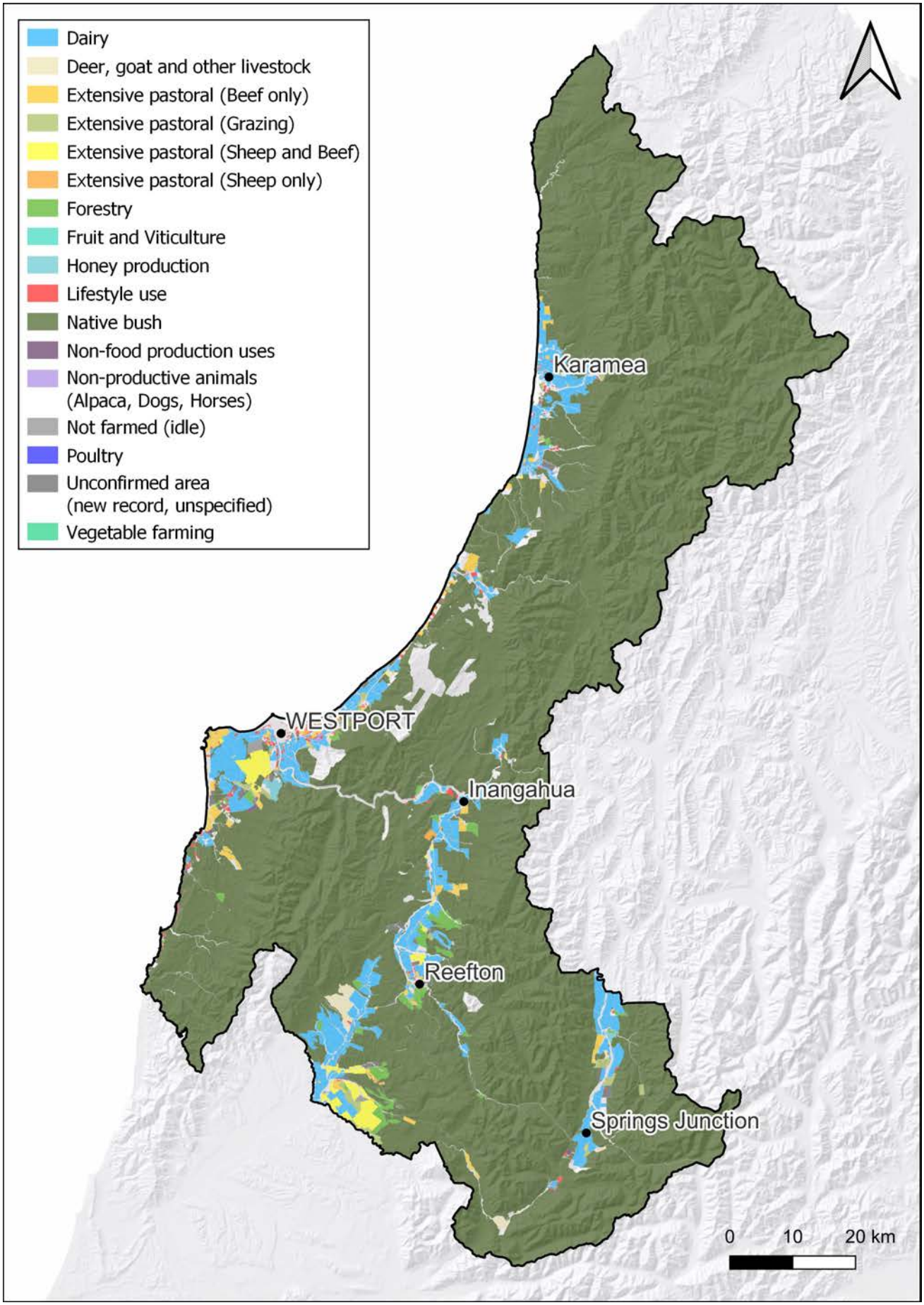

Figure 20: Map showing the overall land use across the Buller foodshed (data from AgriBase®)

3.4.1.2 Ground truthing of AgriBase® dataset

The AsureQuality's AgriBase® spatially maps almost every farm in the country. Providing each with its own traceable ID, the database holds information on approximately 144,500 live (current) New Zealand rural properties. These include properties involved in livestock farming, arable cropping, horticulture, viticulture, or forestry. Lifestyle blocks and conservation estate are also included in AgriBase®. Through Part Two: Baseline Food System Analysis on page 31, the AgriBase® dataset was further interrogated to identify growers to engage in the research.

3.4.1.3 The foodshed requirements compared to current land use

The foodshed theoretically required to feed the Buller district's community today, as described in Table 1 (page 6), is 4,987 hectares of food producing (or potentially food producing) land. The AgriBase® data shows that currently, 59,974 hectares are food producing land, meaning only 8.3% of the currently mapped food producing land area of the Buller district is required to feed the 2022 population.

Note: these calculations do not include potential other food producing land (not currently mapped as food producing land) such as that found within Lifestyle use (which may be growing food commercially, maybe on a small scale and therefore is not mapped through AgriBase®).

3.4.2 Factor IV: Volume of food production

The goal of the volume of food production component of this study is to determine the types and amount of primary food production that occurs within this foodshed. For the land use types that produce food, the food types produced are quantified by hectare and yield (weight in kg per year) and shown in Table 5. This data does not distinguish between what is exported or what is consumed nationally or locally and for some food types there is not a full hectare of that food type grown in the Buller district. Zero is recorded next to food types that have no known data (e.g. pork).

Table 5: Food production modelling data for the Buller district by food type in kg per hectare per year

Beef and lamb	Beef from dairy culls[13]	Venison	Pork (no pig farms)	Poultry meat (no chickens for meat)	Poultry for eggs
239	123	50	0	0	664

Milk	Tomatoes	Orchard fruit	Berries	Grain crops (no cropland)	Fish	Honey
21,004	400,000	10,167	3,500	0	4	231

Table 5 shows that on a per hectare per year calculation, tomatoes are significantly more productive with a substantial 400,000 kg per hectare compared with orchard fruit or berries. Likewise, milk

[13] Dairy cows can be culled for several reasons, including to maintain herd size, to generate profit from the sale of surplus cows or heifers, or when a cow's milk production reduces.

production is substantially more productive at 21,004 kg per hectare when compared to other free ranging animals such as sheep and cattle, dairy cows for meat (culls), and deer which all produce less than 250 kg per hectare.

The following sections describe how food production modelling data for the Buller district is calculated.

3.4.2.1 Meat production

Meat production calculations are based on model farm scenarios that are common for the Buller district. See Appendix one for a description of the farming systems analysed.

Meat production weights are calculated as carcass weights, loss-adjusted primary weights. They represent the amount of meat that is produced given current Aotearoa New Zealand industry food handling, storage, and processing practices. It is the meat weight that results from an animal that is processed within the existing meat processing systems.

The following functions were used when calculating meat yields:

- The average carcass weight of beef cattle and cull dairy cows killed.
- The average carcass weight of lambs and cull sheep killed.
- The proportions of beef cattle and lambs supplied by typical farms and finishing farms.
- The total area of sheep/ beef farming enterprises and the density of animals on that area.
- The average carcass weight of deer grown for venison.

Red meat includes meat from sheep, beef, deer, and dairy farms. There are no recorded pig or goat farms or chickens grown for meat in the Buller district.

3.4.2.2 Milk production

Predominately a dairy farming area, the Buller foodshed produces a considerable amount of milk. The milk production calculations are based on litres of milk. Total annual milk production is the actual quantity of liquid milk that is produced, whereas milk solids refer to the solid components (milkfat and milk protein) that are left after all the water is removed from liquid milk. In Aotearoa New Zealand conventional dairy farmers are paid on the amount of milk solid produced, and as such it is a recognised unit for dairy commodities. For the purposes of this part of the foodshed analysis the kilograms of raw milk (liquid) unit is used, unless otherwise stated (note: in the estimated consumption section, dairy was used which includes milk processed into items such as butter, yogurt, cheese, etc.).

3.4.2.3 Orchard fruit production

As data is limited on precisely what is grown in the Buller district, estimates have been used. For orchard fruit, yields of apples and pears are taken from information gathered from New Zealand Apples and Pears. From this an average yield rate based on kilograms per hectare multiplied by the percentage of the area each crop covers were used. Other orchard fruit (tamarillos, passionfruit and feijoas) are calculated on data gathered from the interviews, which provided an average yield rate based on kilograms per hectare. The orchard these fruits are from is approximately 20% of the overall

hectares recorded for the district, it is assumed the remaining 80% is used for growing apples and pears.

3.4.2.4 Berry production

Berry production figures are based on blueberries (the most common berry grown in Buller district). Data gathered directly from the grower provides the number of kilograms produced per year.

3.4.2.5 Honey production

Honey production is calculated on an average of 6.5 hives per ha (data shows hives range from three to ten per ha) with approximately 35.5kg of honey produced per hive in the South Island (data from Ministry for Primary Industries (MPI), 2022).

3.4.2.6 Egg production

As there is only one commercial egg producing farm in the Buller district. Data gathered directly from the grower provided the number of birds kept per hectare. Using this data, and the average amount of eggs one bird can produce a week, multiplied by the average weight of an egg provides a weight in kg per hectare per year (data gathered from The Poultry Industry Association of New Zealand).

3.4.2.7 Tomato production

Research shows there is only one commercial vegetable grower in the Buller district, growing tomatoes. Data gathered directly from the grower provides the number of kilograms produced per year.

3.4.2.8 Fish production

Fish harvest data is very difficult to estimate due to fish not living on land. However, for the purpose of the foodshed analysis an estimated figure has been calculated based on the fishing region FMA7 Challenger/ Central (Plateau) (Figure 77, page 81). FMA7 Challenger/ Central (Plateau) has a total coastline of 3,390 km. Buller district is approximately 6% of FMA7's coastline (at approximately 200 km). Data was calculated based on the TACC (Total Allowable Commercial Catch), retrieved from Fisheries New Zealand, and compared to the Talley's Catch figures published on their website[14]. A model was created from these figures and a fish harvest from the in-shore area of the Buller district coastline was calculated.

3.4.3 Factor III x Factor IV = Total Estimated Production

To establish the total estimated production, the estimated area of each type of land use within the Buller district was determined (Factor iii) and multiplied by the estimated volume of food produced (Factor iv).

[14] https://www.talleys.co.nz/seafood/species

Table 6: Annual total estimated food production from the Buller district

Food produced from the Buller foodshed	Tonnes per year
Milk	886,210
Red meat	8,934
Fish caught	1,960
Tomatoes	240
Honey	176
Orchard fruit	106
Egg production	10
Berries	9
Pork meat	0
Poultry meat	0
Grain crops	0
TOTAL	**897,645**

Figure 21 provides a graphical breakdown of the total estimated food production, showing only the food types grown in the foodshed.

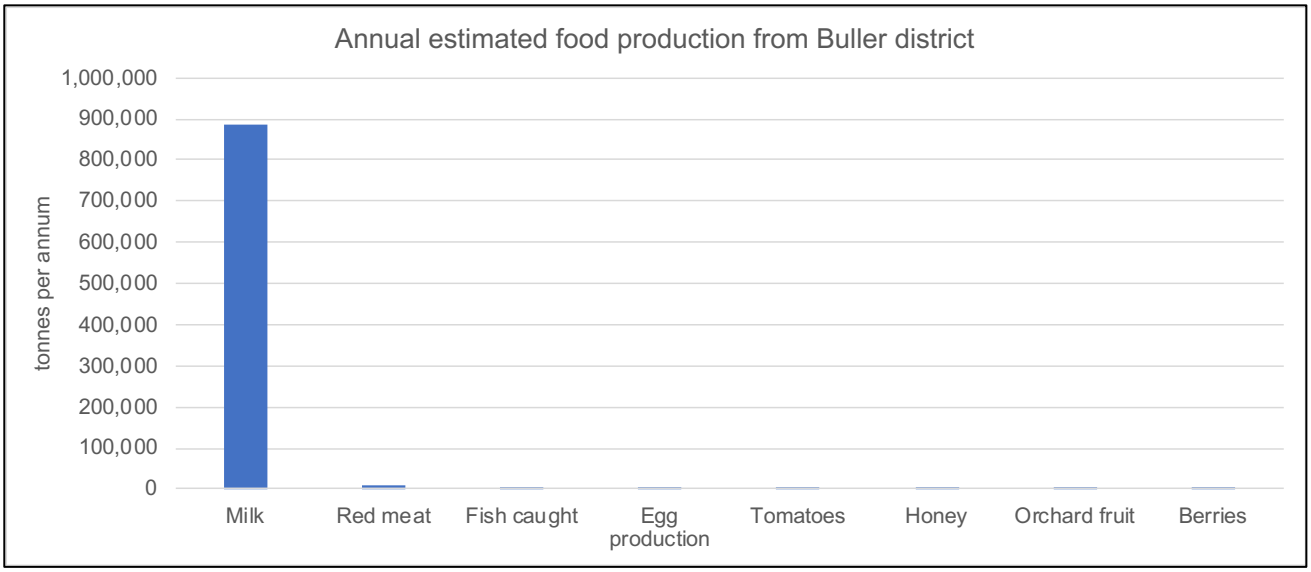

Figure 21: Total estimated food production within the Buller foodshed in tonnes per annum

Overall, milk is the most productive food product supplied from the foodshed. The dairy sector utilises 70% of all known food producing land, a total of 42,192 hectares.

Due to the high level of milk production, the graph in Figure 21 is reproduced in Figure 22 (overleaf) without the milk. The reproduced graph provides a better understanding of the other food types estimated to be grown in the Buller foodshed.

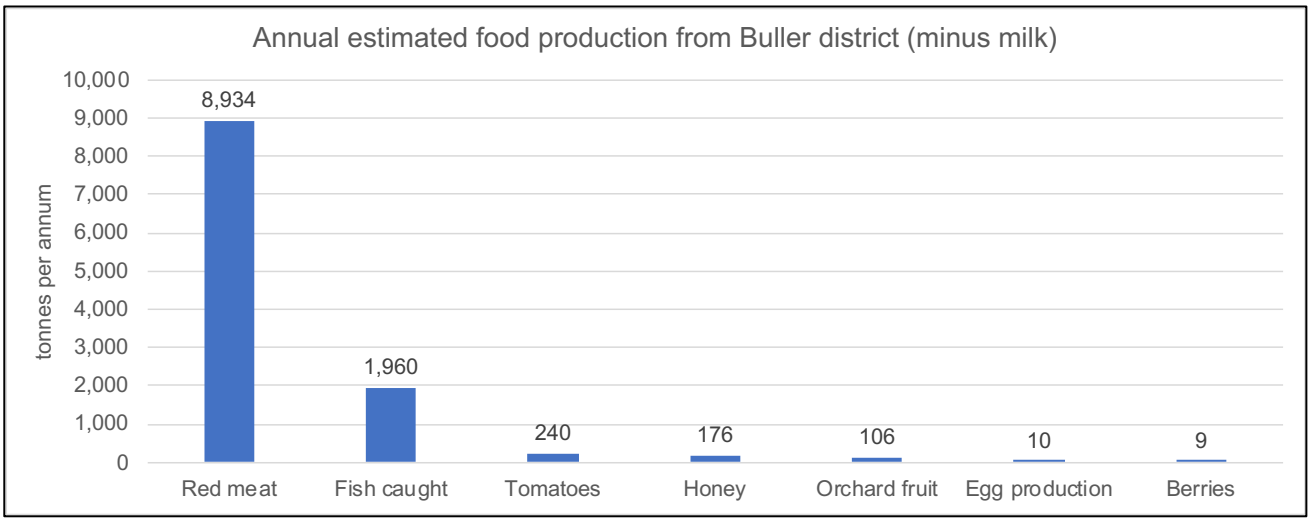

Figure 22: Total estimated food production within the Buller foodshed in tonnes per annum without milk production

In the reproduced graph, the other food types produced in the foodshed can be interpreted more clearly. Red meat is estimated as the second largest food type produced in the foodshed at 8,934 tonnes per year. The estimated tonnage of fish is third highest, at an estimated 1,960 tonnes per year. Tomato production is estimated at 240 tonnes per year, honey estimated at 176 tonnes per year, orchard fruit production at 106 tonnes per year with egg production (estimated 10 tonnes) and berry production (estimated 9 tonnes) being the lowest tonnages per year. There are no recorded grain crops for human consumption, nor pork or chicken grown for meat.

3.5 Mass Balance: The Buller Foodshed

Based on the total estimated food consumption and total estimated food production data available, assumptions have been made to enable the completion of the mass balance (explained in detail in appendices one and two). The 'mass balance' is a way of comparing total food consumption to total food production for those items that can be produced in the foodshed. As a result, it does not account for items such as bananas, which are frequently consumed but not necessarily grown in this district. Nor does it account for the processing required before food can be consumed, which is covered in Part Two (baseline food system analysis).

It is important to note three variations in the presentation of the data for the mass balance calculations. Firstly, due to there being no pork grown within the foodshed, the total estimated consumption of red meat and pork (Table 2 on page 20) have been separated so a more accurate comparison to the production of these food items within the foodshed can be made. Secondly, due to there being no commercial milk processing facilities in the Buller district (described in Part Two), milk and dairy[15] have also been separated so a comparison across the foodshed can be made. Thirdly, figures for orchard fruit and berries are combined for the comparison to the estimated food consumption figures.

Table 7 (overleaf) shows the estimated current food production and the estimated food consumed by the 2022 population of the Buller district within the Buller foodshed.

[15] Dairy products are defined as 'milk that has been processed into other items', such as cheese, butter, yoghurt, etc.

Table 7: Buller foodshed Mass Balance

Food type	Estimated kg/person/yr	Consumption (t/yr)	Production (t/yr)	Surplus (t/yr)	Deficit (t/yr)	*If it could stay*
Red meat	18.4	179.2	8,934	8,754.5	/	*179.2*
Pork meat	14.1	137.9	0	/	-137.9	*0*
Poultry meat	23.8	232.3	0	/	-232.3	*0*
Eggs	9.4	91.4	10	/	-81.1	*10.3*
Fish	19.7	192.3	1,960	1,768.1	/	*192.3*
Milk only	158.1	1,543.0	886,210	884,666.6	/	*1,543.0*
Other dairy products	24.0	234.4	0	/	-234.4	*0*
Grain	66.6	649.9	0	/	-649.9	*0*
Legumes, nuts & seeds	7.1	69.6	0	/	-69.6	*0*
Vegetables	149.4	1,458.5	240	/	-1,218.5	*240*
Fruit (including berries)	113.7	1,109.6	115	/	-994.8	*114.8*
Total	**604.3**	**5,898.1**	**897,469**	**895,189.2**	**-3,618.5**	***2,279.6***

There is an estimated 574 times the amount of milk produced in the district than is required to feed the current population. There is an estimated 50 times the amount of red meat produced than is required. It is estimated that there could be ten times the number of fish caught along the Buller district coastline than is needed to feed the current population. For all the other main dietary food types, consumption is greater in the district than production.

Overall, 2,280 tonnes of food that is required to feed the population is grown in the Buller foodshed, which is 39% of the overall food requirements for the 2022 population. It is important to note, however, that although there is excess red meat and milk produced within the district, all of this is removed from the district for processing elsewhere (explored in detail in Part Two). Meaning, despite 39% of the required food being grown in the district, an estimated 99.66% of all food required to feed the population of the Buller district currently comes from outside the district.

The amount of food production within the informal food economy, such as backyard production, where residents grow some fruits and vegetables for their own consumption without selling it commercially, is unknown. The amount of mahinga kai (traditional way of gathering and processing food) is unknown, as is the amount of hunted meat caught and consumed. Backyard production, mahinga kai and hunted meat all contribute to the foodshed's food production, but not at commercial levels.

3.6 Findings from the Baseline Foodshed Analysis

The foodshed analysis for Buller district provides similar findings to the Otago Food Economy report (Millar, et al., 2016). The Buller district produces significant volumes of milk, with red meat being the second food type produced. There is significantly more milk, red meat products and potentially fish being produced than are required to meet the needs of the local community. For the Buller district, milk production accounts for 70% of the land use from the assumed food producing land (59,974 ha).

In summary, the Buller foodshed is 4,987 hectares (amount of land required to feed the current population), amounting to approximately 8.3% of the currently mapped food producing land area of the Buller district. These calculations do not account for changing populations (population growth over time) or that the productive land may reduce over time due to a changing climate or land degradation, or from the additional pressures from urban development or housing intensification.

4 Part Two: Baseline Food System Analysis

A food system includes all processes and infrastructure required to sustain a population including growing, harvesting, processing, packaging, transporting, marketing, retailing, and consumption. The predominant food system in Aotearoa is characterised by large-scale, export-focused commercial operations. In contrast, an informal food system operates independently of the commercial framework, involving activities like personal production, such as vegetable gardens, hunting and gathering for personal consumption, processing, or trade. In the latter system, exchanges are often based on mutual support within the community, with no monetary transactions involved; individuals are sustained through the generosity of family, whanau, and neighbours. Due to a lack of data recorded for the informal food system, Part Two provides an overview of available information, which is predominantly the commercial food system for the Buller district.

4.1 Defining the 'Local' in Local Food?

Amongst the literature there is a lack of clarity regarding the definition of the term 'local food'. The definitions that exist tend to relate to physical distance between production and sales and can vary by countries, regions, companies, consumers, and local food markets (Martinez et al. 2010). In the United States (US) the overall distance that produce can be transported and still considered local food is less than 400 miles (640 km) from the source (Martinez et al. 2010). In Canada the 100-mile diet (160 km) has become a popular trend (Wittman et al. 2012); between just these two large countries the physical distance is hugely different. Clearly defining local only as a physical distance will never have consistency across countries. However, in the US and in Canada both countries are very supportive of their own state boundaries, in the US for example local food is also considered to be food consumed within the state in which it is produced (Larsen et al. 2008; Martinez et al. 2010; Wittman et al. 2012). This type of regional definition seems to correspond across countries, in Aotearoa New Zealand the Otago Farmers' Market, for example, prides itself on selling local food produced within the region.

When Buller's local food growers, retailers, supermarkets, and consumers were asked what they understood by 'Local', the answers were varied (note: more than one answer could be selected).

4.1.1 Defining local by the food growers

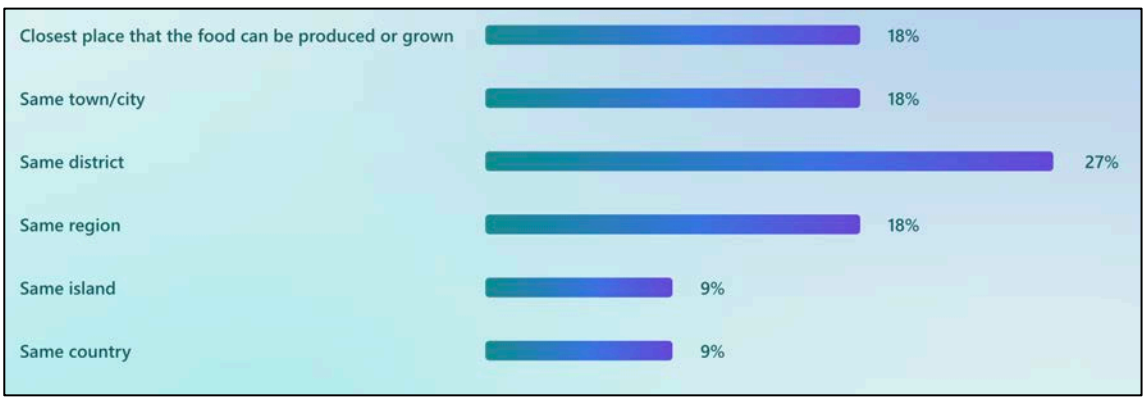

Figure 23: Defining local by the food growers (n=6)

Local being in the 'same district' was the most common response from the food growers (Figure 23).

4.1.2 Defining local by the food retailers

When food premises (food retailers) were asked the same question, the responses were equally mixed, 'same district' was selected more than others. When analysed further (response that is furthest away), the retailers' responses were still mixed with 'same district' defining 'local' for three retailers, as shown in Figure 24.

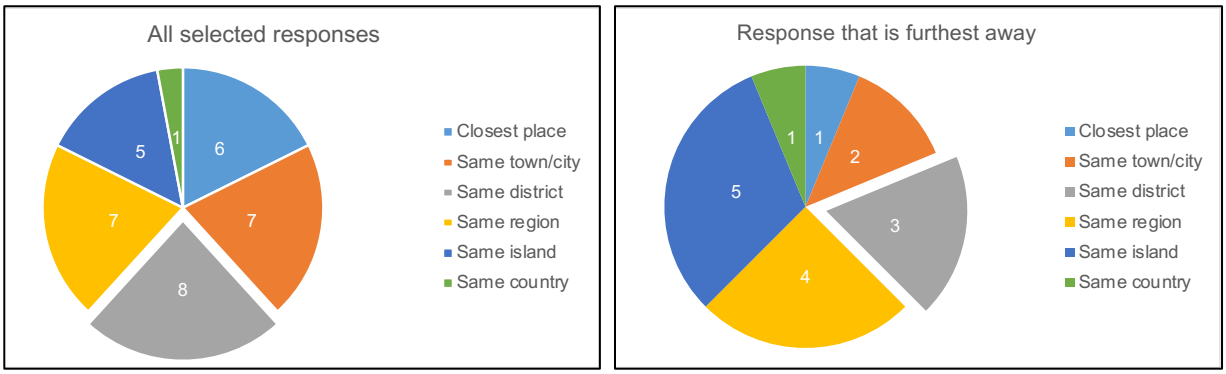

Figure 24: Charts showing all selected responses (left) and (right) furthest away meaning of 'local' made by the food retailers in survey and interview (n=16)

4.1.3 Defining local by the consumers

From the Buller consumers who were interviewed (shown in Figure 25), 'the closest place that food can be grown' was the most selected as being 'local'. For those consumers who took the online survey (see Figure 26), local being in the 'same district' was the most common response.

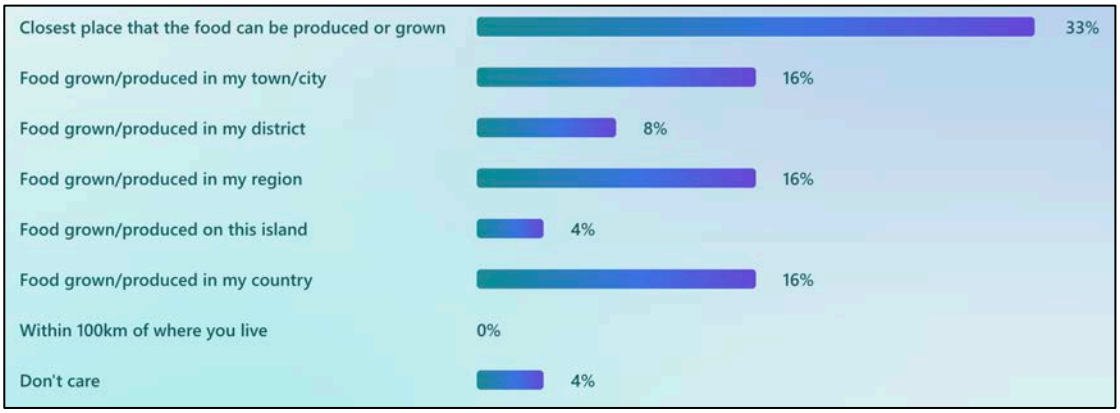

Figure 25: Defining local by interviewed consumers (n=21)

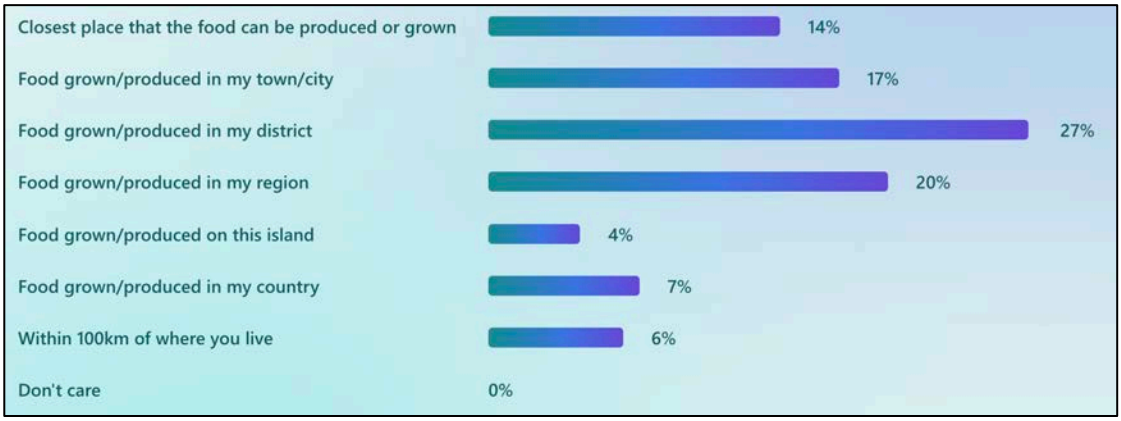

Figure 26: Defining local by surveyed consumers (n=69)

One response from the surveyed consumers added, “food grown in my garden”. Out of the 112 people surveyed or interviewed, this was the only response that indicated home grown food. ‘Food grown in my district’ is the most common response for all groups except the interviewed consumers, where the most common response is the ‘closest place food can be grown’. In summary, local can mean many places to people. For the purposes of this research, the word ‘local’ means within the Buller foodshed (Buller district), unless otherwise stated.

4.2 Key Stakeholders in the Existing Food System

Delving into further detail regarding what is happening in terms of food within the foodshed provides a bigger picture and better understanding of the food economy. To do this the key stakeholders in the existing food system are identified, and a snapshot of the roles they play are explored.

Stakeholders in the food system encompass businesses, organizations, groups, and individuals involved at various stages along the supply chain, from production to consumption. This includes those engaged in:

- Food growing, such as animal or horticulture farmers and growers, egg producers, game, or fisheries workers.
- Packing and processing, like abattoirs, butchers, milk processors, cheese makers, fruit packhouses, honey packers, flour millers, and producers of baked goods and lightly processed foods (which, in this research, includes locally handmade pies).
- Food distribution, including meat traders and distributors for local, regional, national, or overseas export.
- Food retail, through cafes, bars, restaurants, convenience stores, organic stores, butchers, bakers, fishmongers, takeaway food stores, supermarkets, and global fast-food outlets.
- Direct sellers of food, primarily offering primary produce through farm shops, market stalls, vegetable box schemes, food cooperatives, grocers, supermarkets, and other food delivery schemes (excluding mobile shops and online shopping/delivery companies).
- Food consumption, involving consumers.

Each of these are explained in further detail below.

4.2.1 A sample of food growers

The food growers have a key role to play in any food system. Food growers can specialise in one food type (such as dairy or beef cattle farming) or can diversify across several different products (dairy or beef cattle as well as chickens for meat and eggs, and fruit and vegetables). To understand more about the existing food system, six food growers were asked a series of questions regarding growing food in the district. To identify these growers, mapping who is currently growing food was required.

4.2.1.1 Mapping food growing

The estimated number and locations of different types of farming systems across the Buller foodshed is explored in Part One (Section 3.4.1). From the farm type descriptions (page 82), and after ground-truthing, AgriBase® dataset shows there are no significant vegetable growing, no grain crops for human consumption, and no pig or bird farming for meat (note: Dataset Limitations on page 83 for

further details). However, further research was conducted through local knowledge from the KNECT team, phone calls (where a phone number was provided), and an online search. The information gathered determined whether certain food types (not the predominant two of milk and red meat) were still being grown in the district. The results of which are shown in the table below.

Table 8: Food growers in the Buller foodshed

Locally grown food types in Buller district	Farm count	Total area (ha)
Growing orchard fruit	4	10.41
Growing berries	2	2.56
Poultry farming for eggs	1	15.5
Growing tomatoes	1	0.6

Table 8 shows growers of berries, fruit, vegetables, and eggs. There is only one known vegetable grower (growing tomatoes) and one known poultry farm for eggs. Due to the minimal number of growers, their locations have not been mapped for confidentiality reasons. Honey is hard to map as hives are spread out for any one registered honey producer. The producers of milk and red meat are well documented in Part One: Total Estimated Production on page 22. In summary, the results show there is limited types of food grown around the Buller district.

4.2.1.2 Types of food grown

In the Buller foodshed, there are significantly more dairy farms and sheep & beef cattle farms than anything else. Most farms will be independently owned. Approximately ten farms (18,592 hectares) are part of Pāmu (formerly Landcorp Farming Limited) which is a significant player in Aotearoa's agriculture. Pāmu is primarily involved in farming operations, including sheep and beef cattle farming, deer farming for deer milk, and forestry. It is a state-owned enterprise and operates as a farmer and a marketer of farm products. Pāmu farms produce milk, meat, and other agricultural products, which are then typically sold to processing companies for further manufacturing and distribution. It's important to note that Pāmu's focus is on sustainable and environmentally responsible farming practices. However, Pāmu operates its farms using a national balance approach and so local Buller farming practices may be offset by farming practices undertaken elsewhere within the country.

In the Buller foodshed there are 313 known properties growing eight types of food (see Figure 27).

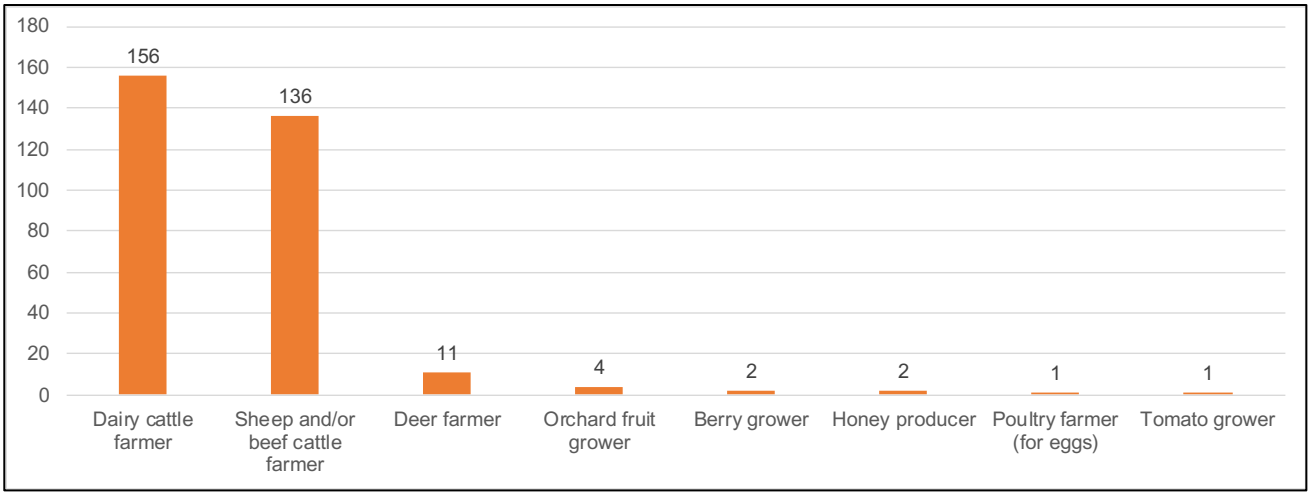

Figure 27: Graph showing the different types of food growers in the Buller foodshed

Figure 27 shows that of the 313 known properties, there are very few known vegetable growers, orchardists, berry growers and egg producers in the foodshed.

From these 313, six growers were interviewed (1.8%). The growers interviewed included two berry growers (one has just started growing on one hectare and one is not yet established but is planting 4.5 hectares of blueberries – note: this 4.5 ha property is not included in the production calculations), an orchard fruit grower who sells two types of orchard fruit commercially and who also grows 90% of their own vegetables and has sheep and chickens (for their own meat and eggs, not commercial). Two dairy farmers, one who makes cheese (non-commercially), and a grower who has beef cattle as well as a section of land for vegetables (one type only), both for sale commercially. The sixth farmer has commercial beef cattle only. From the eight types of food growing in the Buller district, five different growers were interviewed. Figure 28 shows the types of food grown and sold commercially by the six growers interviewed.

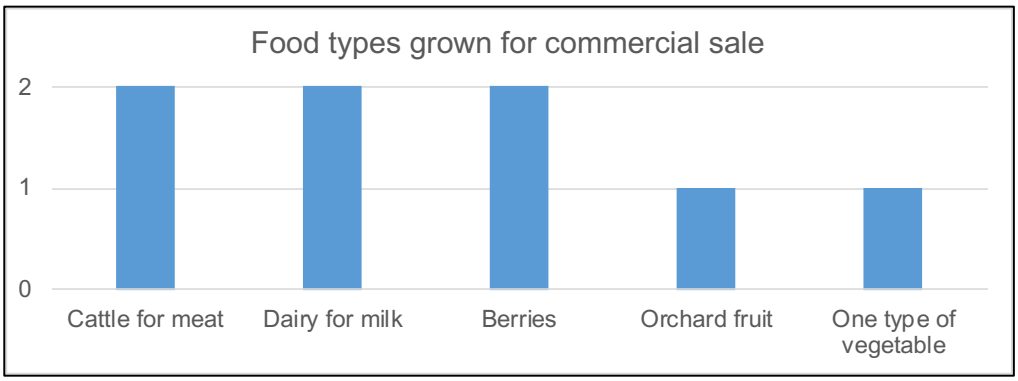

Figure 28: Graph showing the range of food commercially grown by the six food growers (n=6)

4.2.1.3 Existing challenges for growers

When asked what the key challenges are for growing food in this area, the responses from the six interviewees are varied.

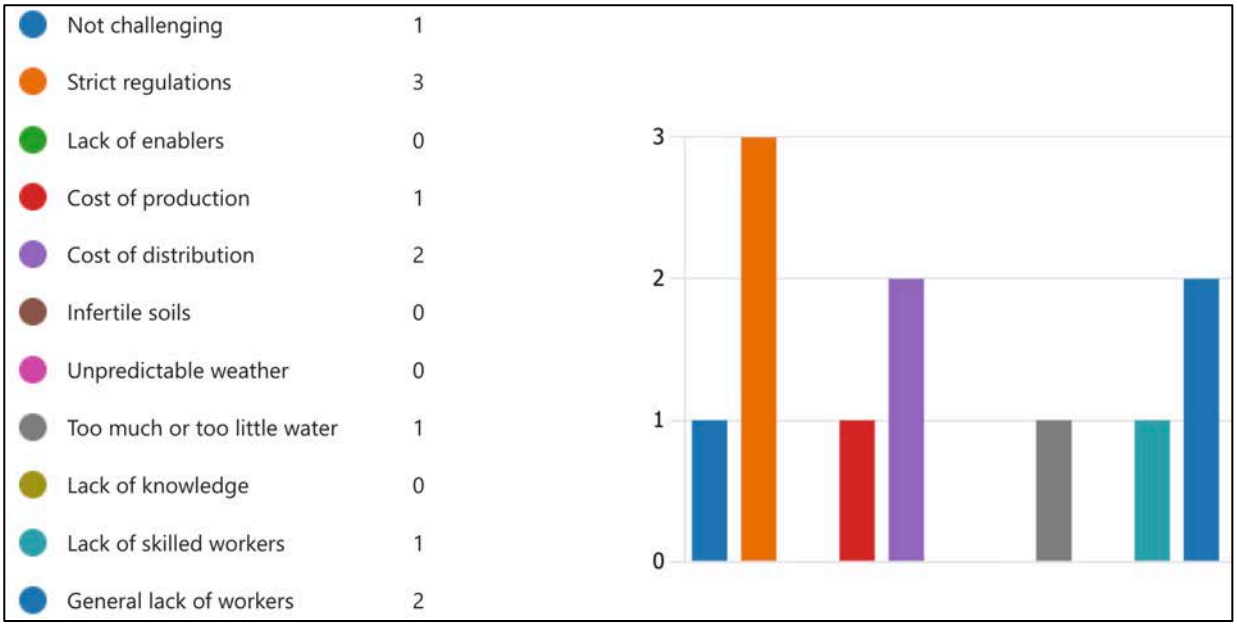

Figure 29: Key challenges for growers in the Buller district (n=6)

Figure 29 shows key issues which include 'strict regulations', 'cost of distribution', and a 'general lack of workers'. Other comments include a "*concern over supermarket duopoly,*" and "*ownership of the dairy processing company*". One farmer indicated they do not think there are any current challenges to growing food.

4.2.1.4 Current business model

Understanding what food is grown in the Buller district and what is sold domestically and/ or internationally is challenging. When interviewees were asked, 'What markets does your food growing/producing business currently supply?', their responses (shown in Figure 30) show 30% is for national supply, 23% for both local and for export and 15% stays within the region (for the Buller district this is the West Coast Region).

Figure 30: Current operation for business (n=6)

When the responses are analysed further, the six interviews revealed a mix of markets for the different food types grown in the Buller district that are for commercial sale, shown in Table 9.

Table 9: Markets for different food types

Type of grower	Markets for food types
Beef cattle (2 growers)	Export only
Dairy cattle for milk (2 growers)	Export only
Orchard fruit	National only (what they can't sell national goes local)
Vegetable (one type of vegetable only)	Local and national
Berries	Local only
Berries (planting 4.5 hectares)	Aiming to sell to local, regional, and national

From the interviews, it seems beef and milk products tend to be grown for export, whilst horticulture tends to stay nationally. This supports our foodshed analysis findings. Berries are the most likely to stay local. The new berry grower is also aiming for a national market as they believed blueberries "*saturated the local market*". Some smaller crops also stay local, such as the orchardist also raises chickens and sells excess eggs at the farm gate, they also have some fruit they sell at the farm gate or to the local farmers market when their commercial (national) market falls too low for their profit margins. However, they are experimenting with other value add products to find a commercially viable

product when the fruit price drops. Out of the six interviewed, four sold something for local consumption. One dairy farmer also made cheese and gave it away or traded it to local people, when asked, they said it was not a local business as they were not doing it for financial gain.

4.2.1.5 Benefits of supplying outside the district

When asked what the drivers are for supplying outside of the district, and the benefits of doing so, the response is mixed (Figure 31).

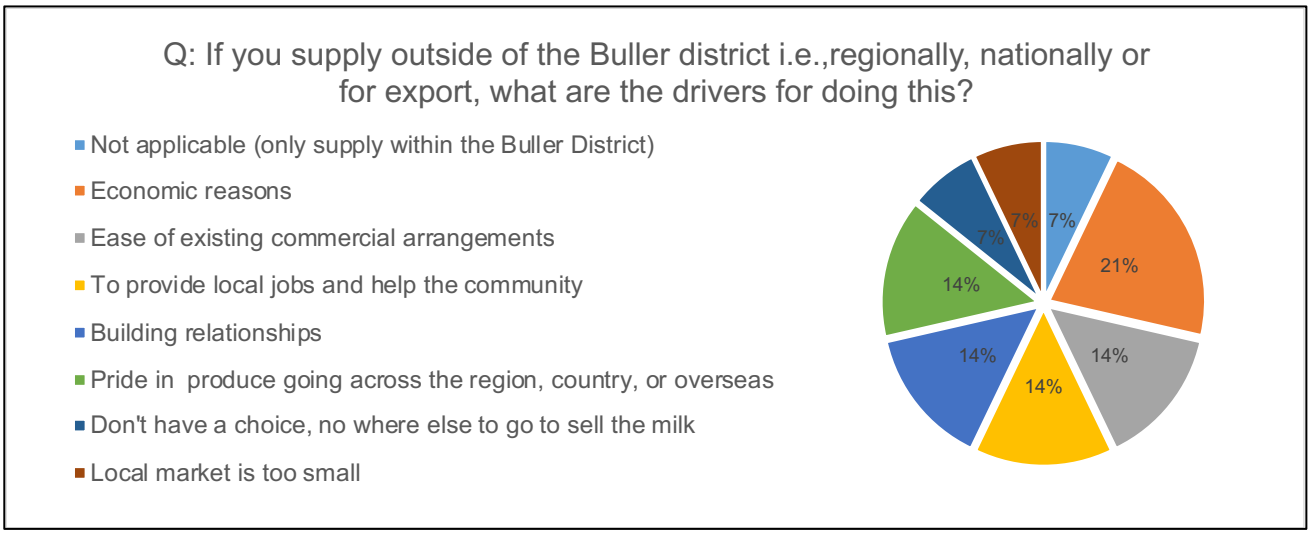

Figure 31: Pie chart showing motivation for supplying outside of the district (n=6)

Figure 31 shows one response indicates the question was not applicable to them (as they only intend to supply locally), for the other five, a wide range of responses were recorded.

4.2.1.6 Challenges of supplying locally

When asked to describe what makes it challenging to supplying the local market, the answers are varied, as illustrated in Figure 32. Four growers indicate there is 'limited growth potential' selling to the local market. A 'lack of demand from the local community' was indicated by three growers. Two people indicate economic reasons, and the rest of the responses are quite varied, including too much produce for the local demand, and compliance, distribution, and time challenges.

Figure 32: Various answers to what makes it challenging (n=6)

4.2.1.7 Opportunities to supply local market

The growers were asked to explain what opportunities there are for them to sell their food locally, bearing in mind the responses above, two stated there are no opportunities right now. However, three believe an increased willingness from the local supermarkets will help, and two people want to see 'demand from local consumers for local food' increase, see Figure 33.

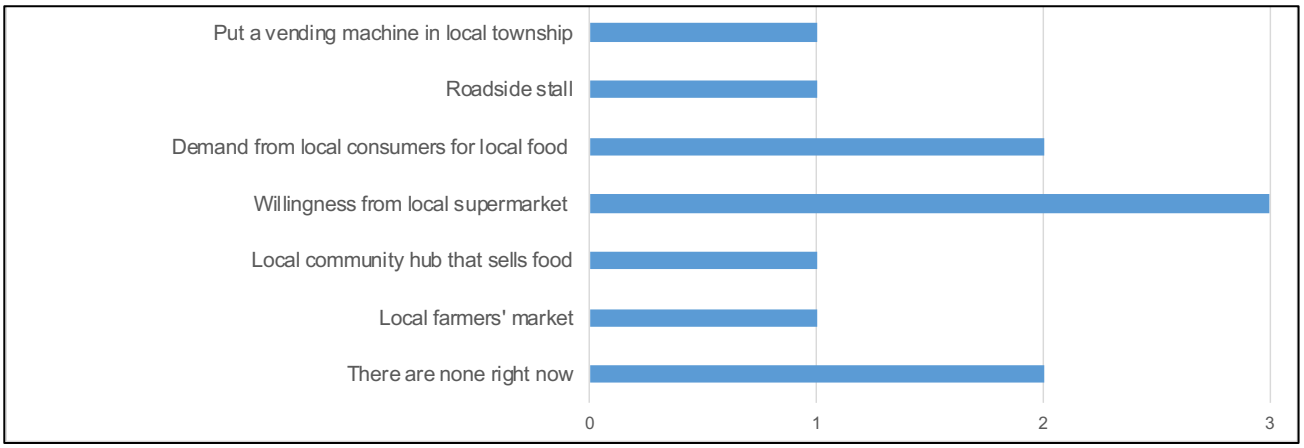

Figure 33: Responses to what opportunities there are to sell locally (n=6)

In addition, one dairy farmer indicated they have diversified from just growing milk, they also grow cattle for beef, and they grow one type of vegetable (for national supply) in 1% of their dairy farm. Furthermore, when a dairy farm manager was discussing opportunities for the future, they indicated there was interest from owners of some of the dairy farms they managed in diversifying production, therefore having an ability to supply different food types to the Buller district.

When the food growers were asked what motivates them to sell food locally, of the six responses, one stated 'not applicable' as they do not sell food locally. The other five all indicated the key motivations to sell locally are 'supporting the local economy', four of them stated 'local relationships' and 'community values', see Figure 34. It is important to note that one berry grower is talking about "*in the future*" selling to the local market, as they are not selling any berries yet.

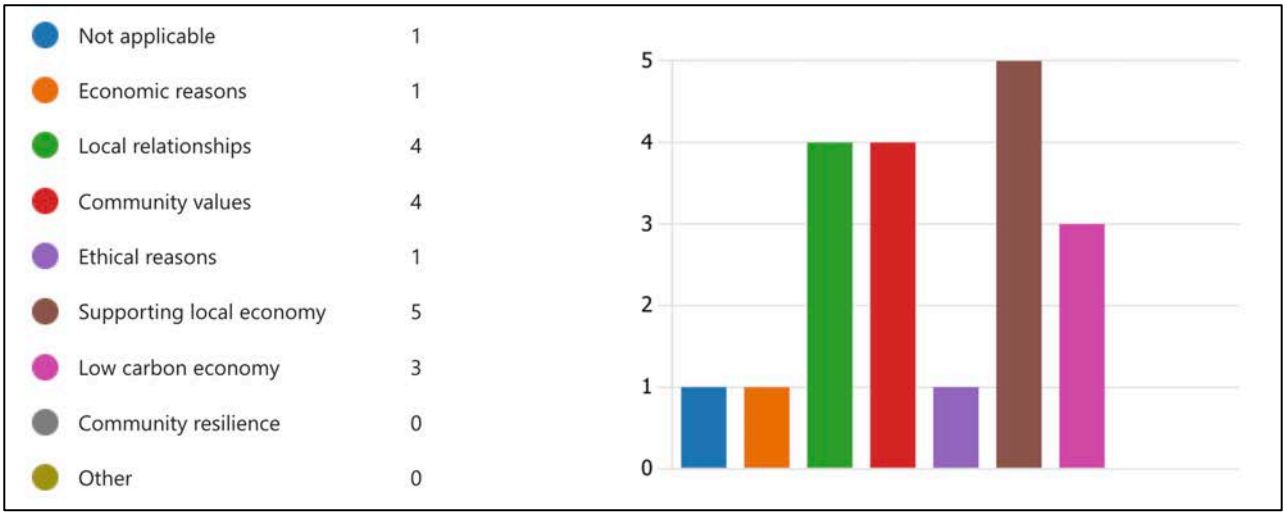

Figure 34: Motivations to supply local (n=6)

4.2.1.8 Changes needed to sell locally

When asked about the changes needed to make it easier to sell locally, responses are mixed. Having 'more consumer demand' and 'better consumer education' were both common responses, see the graph in Figure 35.

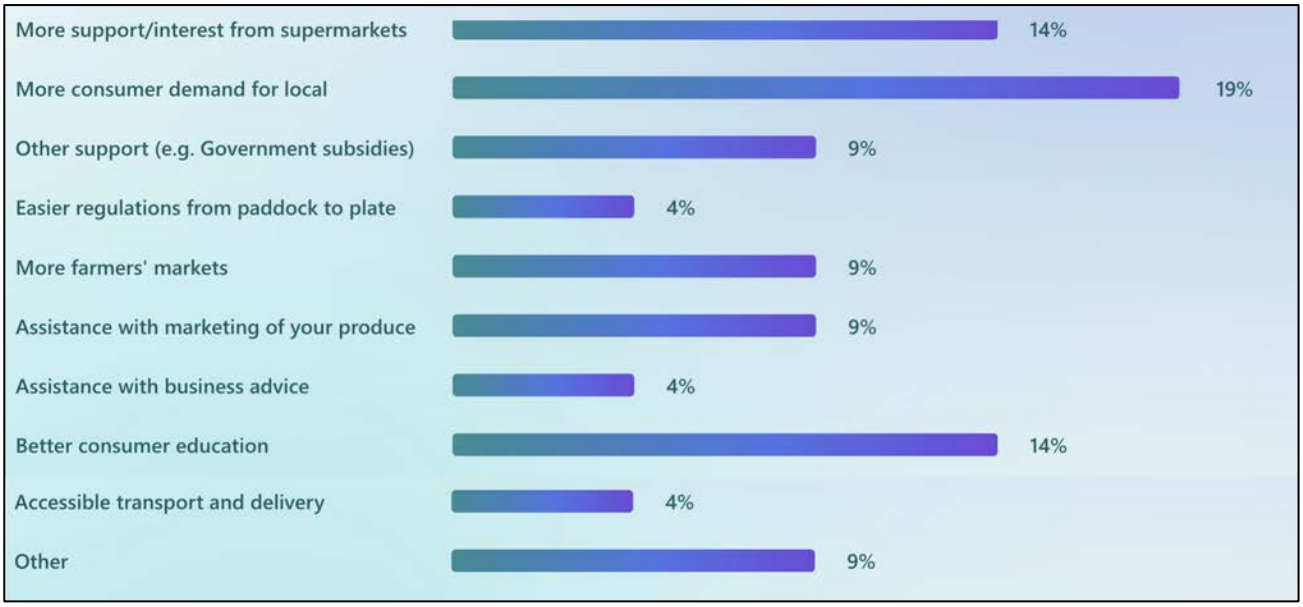

Figure 35: Q: What do you think needs to change to make it easier and more enticing for you or others to sell locally? (n=6)

For one respondent, there was a concern that consumers have a "*lack of disposable income*", and "*people are too busy to shop around*", and they "*need convenience*". Another indicated there "*needs to be more farmers*". A further indicated that for them, they wanted *"assistance with understanding and completing compliance"*.

4.2.1.9 Other relevant comments regarding local food

> *"I don't think there is enough people here* [Buller district] *who will invest in local food."*
>
> *"I don't think people value local food enough to make a buying decision on that alone, well, some people would, but it would only ever be a small proportion of the community who could afford it, maybe 20%."*
>
> *"We need a deli here, for cured meats, cheese, etc."*[16]
>
> *"Compliance is next level - as soon as you become the processor of a food, it becomes insurmountable."*
>
> *"If we had a processing plant that was separated from the farm, then it would become a community type thing, we would have more interest then."*

[16] This comment is from a food grower, however when interviewing food retailers, it was noted that one food retailer sold a range of organic cured meats and cheeses.

"There used to be horticulture here, market gardens, they went well for years, but [the growers] *would buy product in as they got older, then it all went south, they got too old, no one wants to take over, none of it stayed, it is just not reliable enough."*

"[Name] *had tunnel houses, in the end they just grew bell pepper and sent it just to* [name of distributer], *but that went as well, they had a dabble but didn't stick!"*

"There was a guy growing lettuce in Charleston, but he retired."

"I'm pretty down on the idea of a Farmers' Market – there is just not enough people to support it, and it's so hard for the grower."

"Maybe we have to rely on the supermarkets here, because of the size of our population."

"Making cheese is a hobby. My family doesn't want it, my grandkids are not into it, I would like to teach someone else how to make the cheese."

"I know you must have regulations, but the costs are too high. As a small artisan business, it is discouraging. Then there is ongoing compliance, like water testing, swabs of drains, floors, surfaces, etc."

These comments collectively reflect the complex landscape and various factors influencing local food initiatives in the Buller district and are summarised as:

- **Limited Local Investment:** Concerns raised about overall wealth and spending habits of consumers, specifically on local food (which could be more expensive than cheap supermarket-purchased food).
- **Compliance Challenges:** Recognition of significant compliance challenges in food processing that could be overwhelming for up-and-coming food growers.
- **Independent Processing Plant:** Proposal for an independent processing plant from farms to foster a community-oriented venture.
- **Succession Issues:** wide-ranging, from decline in horticultural growers due to aging farmers, and a decline in artisan cheesemaking due to family not being interested in taking over.
- **Challenges of Farmers' Markets:** Scepticism about the viability of farmers' markets due to perceived lack of community support and difficulties for growers.
- **Reliance on Supermarkets:** Acknowledgment of the potential need to rely on supermarkets in the Buller district due to the limited local population.

4.2.2 A snapshot of food growing in the Buller foodshed

In summary, the research in the Buller district's food system identifies eight types of food growers, with dairy cattle farms and sheep & beef cattle farms being the most prevalent (some farms are part of Pāmu, one of Aotearoa's largest farmers and 100% state owned by the government). Out of the 313 known properties, orchardists, berry growers, vegetable growers, and egg producers are relatively few. However, those who are growing vegetables, fruit, berries, honey, eggs, and those who harvest fish are essential to the Buller foodshed. Six growers were interviewed, and their challenges include strict regulations, distribution costs, and a shortage of workers. Current business models show a mix of markets, with red meat and milk products primarily for national and export, horticulture and orchard fruit for national supply, and berries either remaining local or for national

supply. Challenges for growers to supply locally include limited growth potential, a lack of demand, economic reasons, and various compliance issues. Opportunities to supply locally involve a desire for local supermarket support and increased consumer demand. A recognition from some farmers is the need to diversify farms from milk production to include other types of food production. Motivations from the growers to sell locally include supporting the local economy, fostering local relationships, and embracing community values. Desired changes to sell food locally include increased consumer demand, better education, and improved convenience. The interviews reveal diverse perspectives on the potential and challenges of local food production and distribution in the Buller district.

4.2.3 Examples of food processing, distribution, and supply chain

Some farms, like orchards, berry or vegetable farms, and egg producers, can process their fresh produce on-site. In contrast, other food growers, such as those dealing with animals, need to send their produce to secondary facilities for processing, such as milk processing plants or abattoirs, commonly known as freezing works. The following sections explore these food processing facilities, distribution, and different connected supply chains.

4.2.3.1 Animal product processing

From the farm the animal goes to an abattoir for slaughter then on to a butcher or meat trader. A meat trader will sell on to a butcher, into the national market for regional distribution or for export. A butcher may sell direct to the consumer, to local distributer or retailer, or for national or international sale. A butcher could be located within the supermarket or specialised, independent butcher shop, as shown in Figure 36.

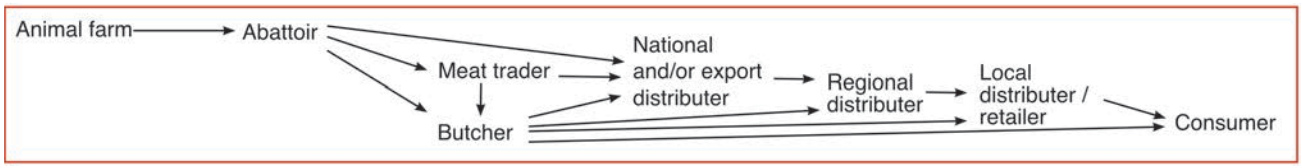

Figure 36: Typical supply chain for meat products

There are no meat processing facilities (abattoirs/ meat works) found within the Buller foodshed. The closest processing facility is ANZCO Foods Kokiri in Greymouth or Silver Fern Farms in Hokitika, see Figure 37 (on page 42). For sheep, cattle and deer grown in Karamea, they will travel nearly three hours and 200 km to Greymouth or an additional 30 km if heading to Hokitika. One interviewee who grows beef cattle for export sends animals to Taylor Preston in Wellington (meaning animals travel nearly 400 km, which is approximately four hours by road and approximately four hours by ferry). Due to pricing and demand, animals could be sent to Alliance in Nelson, or over to Canterbury (Silver Fern Farms Belfast or ANZCO Foods Rakaia).

There are no pig farms within the Buller district, and there is no pig processing either. It was not confirmed where the closest pig processing is for the Buller district. However, information from the known closest pig processing plant (in Wellington) indicated they only purchase 8% of their pork from local pig farms. The remaining 92% is imported frozen from Europe or North America. In Wellington, for example, that means 950 tonnes per year of pork meat is purchased locally, whilst 11,000 tonnes per year comes from overseas.

Animal products also includes egg producers; for them the processing includes cleaning, sorting, and packing on farm. The only egg farmer within the Buller foodshed sells free range eggs to one of the local supermarkets and direct to some restaurants, estimating 50% of their produce stays local.

Figure 37: Map showing closest abattoirs for animals grown for meat in the Buller district. Source: Beef and Lamb NZ[17]

In summary, due to the different processing facilities that could be used by farms in the Buller district, it is unclear how many animals are processed for national supply or go overseas. What is clear is that no animals grown for meat in the Buller district are processed or consumed in the Buller district.

4.2.3.2 Dairy processing

A conventional supply chain for milk involves the raw milk being collected by milk processing companies such as Fonterra or Westland Milk Products, who heat treat milk and either sell to wholesalers as milk or process further into cheese, yogurt, or milk powder, shown in Figure 38, overleaf.

[17] Map from https://beeflambnz.com/sites/default/files/Meat%20processors%20in%20NZ%20-%20May%202019.pdf. Note: The delineation of the West Coast Region is incorrect and does not match the actual shape of the Buller district.

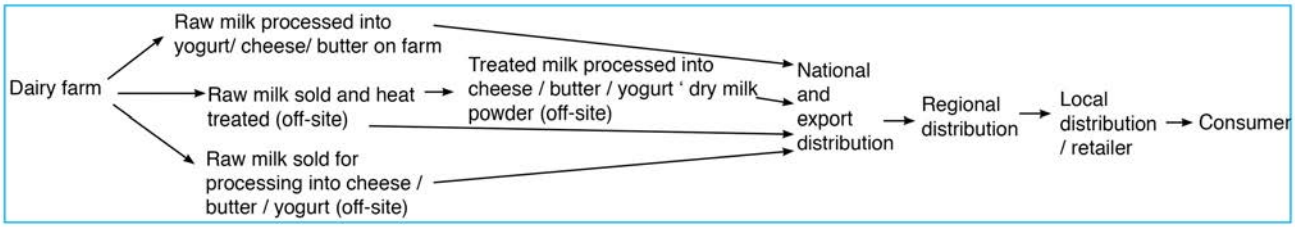

Figure 38: Conventional supply chain for dairy

Overall, Fonterra (a cooperative owned by thousands of the country's dairy farmers) dominates the milk processing in New Zealand at 84% of the market, with other major dairy processors owning 14% (when added together). These other large-scale milk processing companies include (in order of size):

- **Open Country Dairy Ltd** - largest independent milk processors (6%).
- **Synlait Milk Ltd** - leading dairy processing company, specialising in infant formula and nutritional products. It operates processing facilities in the South Island (3%).
- Westland Co-Operative Dairy Company Ltd (**Westland Milk Products**) - historically a cooperative, but it was acquired by Yili Group, a Chinese dairy company, in 2019. It operates mostly in the West Coast region (3%).
- **Tatua Co-Operative Dairy Company Ltd** - known for producing specialised dairy ingredients and products. It operates as a cooperative in the Waikato region (1%).
- **Oceania Dairy Ltd** - a subsidiary of Inner Mongolia Yili Industrial Group, it processes milk into a range of dairy products for export (1%).[18]

Figure 39: Location of Westland Milk Products and minimum distance travelled from Buller district

[18] https://www.dairyfarms.nz/about/nz-dairy-industry/

For dairy farmers in the Buller district, including Pāmu, their milk is collected on farm and transported to Hokitika for further processing, which is over 90 km (minimum distance travelled, see map in Figure 39, on page 43). Westland Milk Products[19] states, *"Our milk collection catchment area covers 440kms from Karamea in the north to Fox Glacier in the south and Canterbury and Rolleston. With more than 390 supplying farms, we collect and process more than 500 million litres of milk per annum."*

For example, milk from dairy herds grown in Karamea is filtered and chilled at the farm immediately after milking, then the milk travels approximately 230 km in a chilled milk tanker to the Hokitika factory. Westland Milk Products claim their *"fuel-efficient engines deliver maximum power with minimum emissions."*

The International Organization for Standardization (ISO) and Food Safety System Certification (FSSC) accredited plants are fitted with state-of-the-art equipment to turn the milk into a variety of different products. Products include: Westgold butter, UHT milk, and cream[20], and Easiyo [21] (powdered milk for making yogurt at home). These products could stay local to Hokitika (outside of the Buller district), travel for national supply (including into the Buller district) or are exported to some 40 countries around the world[12].

Due to Westland Milk Products dominating the milk market in the Buller district, it is unlikely any alternative supply chain is in practice in the district. An alternative supply chain would be national and local supply only and is shown in Figure 40.

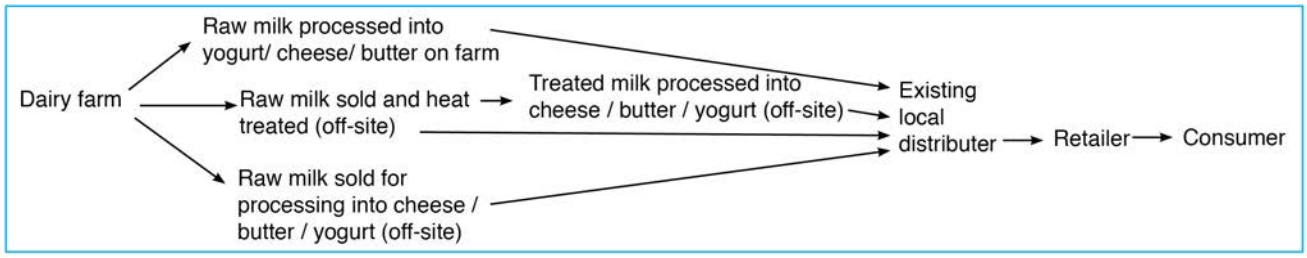

Figure 40: Alternative supply chain for small scale milk processing (note: It is unlikely this is in practice in Buller district)

One small scale cheese maker was identified in the research. Their supply chain will be significantly different to either Figure 38, or Figure 40. Instead, they pasteurise their own milk as well as make their own artisan cheese. For farmers who produce milk and wish to sell direct to consumers, they can do so from their farm gate only. They can sell raw or pasteurised milk, or they can carry out secondary processing such as making of yogurt, cheese, or butter (Figure 41).

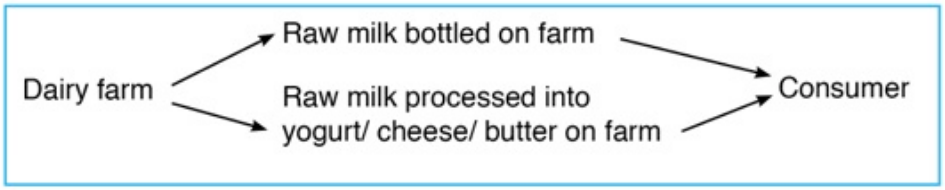

Figure 41: Direct grower to consumer supply chain

In this model, direct to consumer sales can be either at the farm (farm gate sales / vending machines) or through farmers' markets, but not through food retailers.

[19] https://www.westland.co.nz
[20] https://westgold.com/nz/products/category/butter
[21] https://nz.easiyo.com/

In summary, all the milk that is collected from dairy cows grown in the Buller district leaves the Buller district in tankers for processing outside of the district. Some comes back into the community through the supermarkets as milk, butter, or yogurt, but most will be for national supply or for export.

4.2.3.3 Horticulture processing

Processing of harvested vegetables will include rinsing, trimming, shelling, sorting, packing, storing, and transport; processing of harvested fruit can include sorting, waxing (in some cases), packing, storing, and transport. Often this happens onsite at the farm.

In terms of how the product reaches consumers, this can happen in different ways depending on the scale of the business. For example, large-scale horticulture farms tend to be registered with either NZ GAP (previously the New Zealand Fresh Produce Approved Supplier Programme) or with the wholesaler/ retailers' registration programme. Then, from the farm the produce typically goes to the wholesaler for processing and distribution to retailers, for some farms they have on farm stalls or 'pick your own' which is called direct-to-consumer sales.

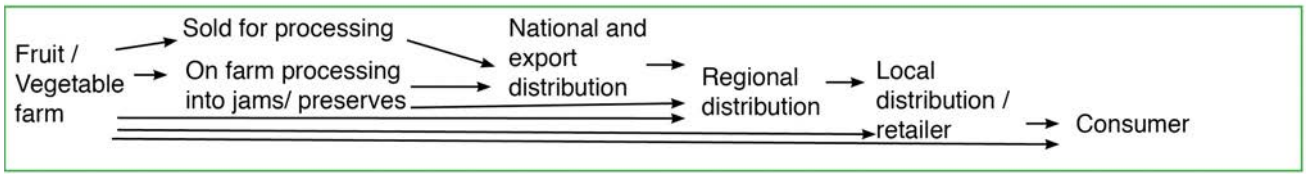

Figure 42: Typical supply chain for horticulture

In the model shown in Figure 42, there are many different options for how the grower sells their produce, some will do one or more of the options. One of the interviewed fruit growers within the Buller foodshed sells direct to a national distributer. They indicated they sell approximately nine tonnes of orchard fruit to national markets a year, which is through a Christchurch based distribution company who deals directly with the two large supermarket owners (Foodstuffs and Woolworths), which then send the fruit around the country. They also indicate that over the last few years 3-4 tonnes of one species have very low returns, therefore they have not sent it to national market, instead they are experimenting to add value to the fruit to find a commercially viable product.

For growers selling their produce to existing local distributers (wholesale) who are already set up and operating, prior to the retailer, a simpler supply chain is created, as shown in Figure 43. For growers to sell to wholesalers they must be registered as a grower; for many wholesalers the NZ GAP accreditation is widely recognised. For the larger wholesalers and the supermarkets, they often have their own accreditation scheme that growers must achieve prior to being accepted as a registered grower.

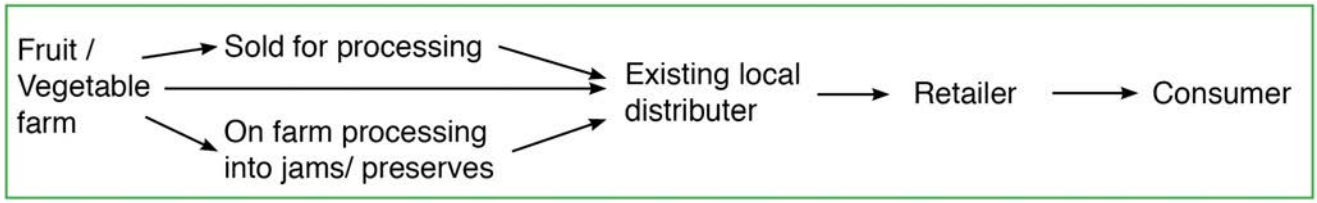

Figure 43: Alternative supply chain for smaller growers

Some existing distributers (or even sometimes a retailer, cutting out the distributer) could be more lenient with local growers. In some instances, if a local grower is practising organic or certified organic, then the likes of organic speciality stores may be the most likely retailers who would deal directly with the grower. However, stringent organic rules must be adhered to.

A third potential option for growers is to sell their products directly to consumers either at the farm (farm gate sales), through farmers' markets or through a Consumer Supported Agriculture (CSA) model, shown in Figure 44.

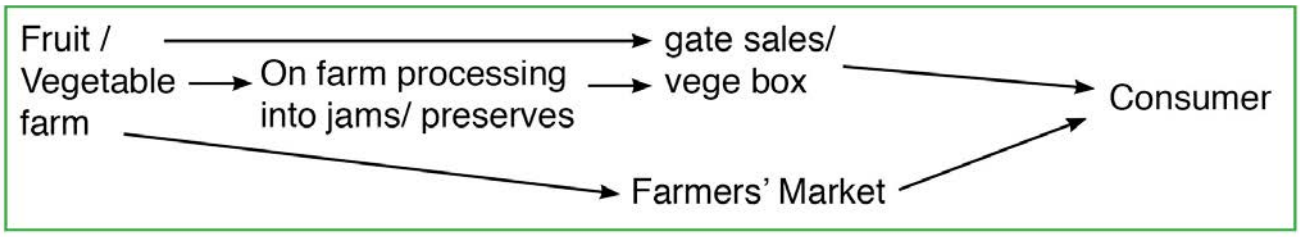

Figure 44: Grower direct-to-consumer supply chain

Farmers who grow fruit and vegetables and wish to sell direct-to-consumers can do so in several ways but only if the produce is subjected to minimal processing (for example, wash / rinse or heat treated into jams or preserves).

In summary, the only commercial growers of vegetables identified within the Buller district estimates they sell approximately 0.27% of their crop in the local community, the rest is sent to Christchurch for distribution around the country. The berry growers indicate they would keep some produce for local sale, but of the two interviewed neither are selling berries yet.

4.2.3.4 Mapping other food processing

Within the Buller district, there are two known bakeries, a butchery of small produce, a pie manufacturer (trying to use local and hunted meat products), a sauce manufacturer, one wholesale distributer and a seafood processing factory, they are mapped in Figure 45 (overleaf).

The one wholesale distributor (and transporter) of food products that was identified within the Buller district transports fresh produce (information from MPI database[22] only, not confirmed). It is not known how much produce they deal with annually.

The seafood company is one of the largest in the country and they own and operate the seafood processing factory in Westport. It is a diversified company with interests in deep-sea fishing, dairy, and frozen foods (including vegetables and ice cream). Seafood caught off the Buller district coastline is processed at their Westport site and sent to several wholesale distributers, mostly outside of the Buller district but also to the one wholesale distributor located in the Buller district.

In summary, there are few food processing facilities in the Buller district. Those who are processing food will not be processing food from within the Buller district, unless it is hunted meat (data

[22] https://mpi.my.salesforce-sites.com/publicregister

unavailable). However, information gathered directly from the seafood company suggests an estimated 0.03% of the fish processed in their Westport facility goes to the local wholesale company, which distributes into supermarkets and other local retailers within the Buller district.

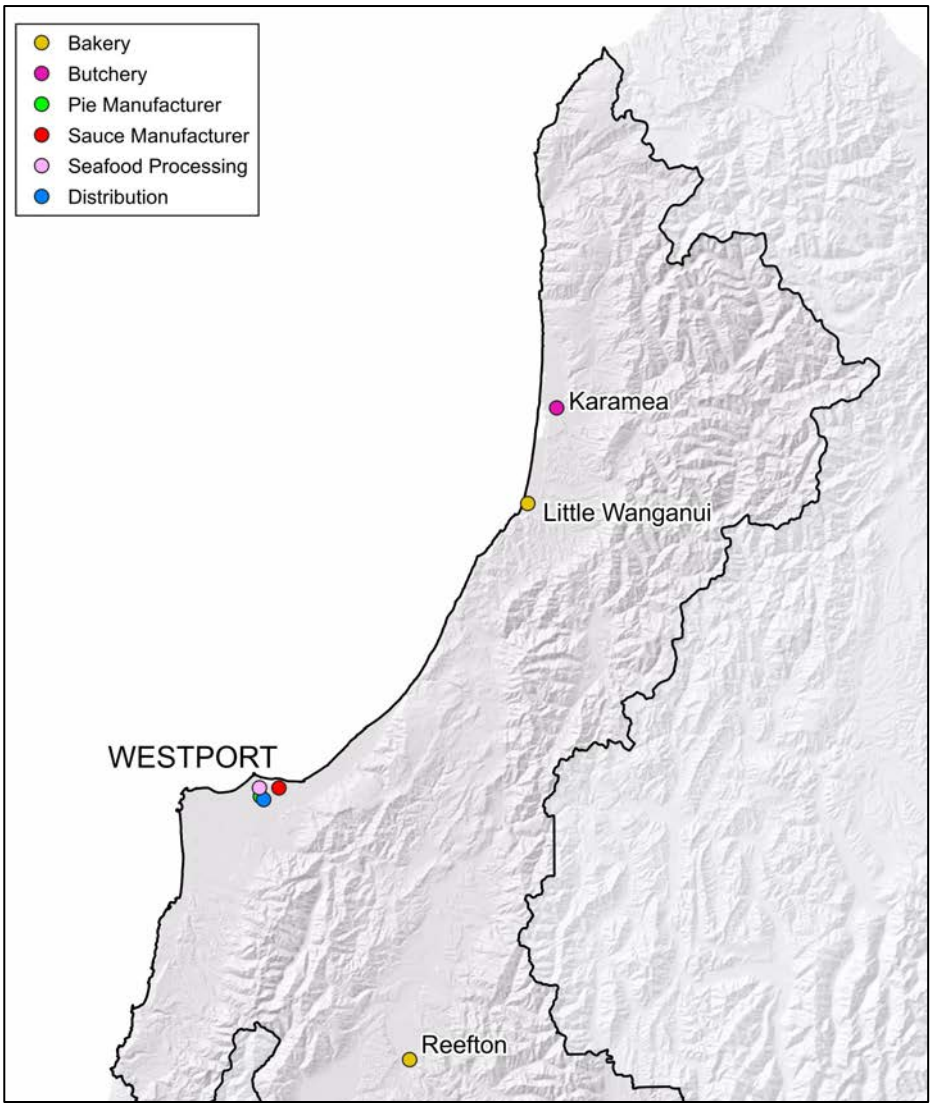

Figure 45: Map of food processing in the Buller district

4.2.4 A snapshot of food processing, distribution, and supply chains in the Buller foodshed

In summary, the Buller district has few food processing facilities. Animal farmers send their produce to abattoirs or processing plants outside of the Buller district. Animals travel to facilities in Greymouth and Hokitika, as well as further afield, such as to Nelson, Canterbury, and Wellington. With no milk processing facilities in the Buller district, all milk from dairy cattle grown in the Buller district is sent to Westland Milk Products in Hokitika.

For producers of fruit, berries, vegetables or eggs, their food can be grown and processed on-site, therefore being easier to stay local. However, data shows that nearly all the farms growing at a commercial scale tend to send their produce outside of the Buller district to large wholesalers for distribution nationally.

The only seafood processing in Westport sends the majority of their processed fish outside of the district for distribution regionally and nationally.

Table 10 shows the difference between the food required to feed the Buller population, the food that is estimated as currently being grown in the Buller district, the estimated amount that is processed in the Buller district and the deficit of food available to the local community for each food type (note: due to rounding some figures do not add up precisely).

Table 10: Buller foodshed local food deficit

Food type	Estimated kg/person/yr	Consumption (t/yr)	Production (t/yr)	Processed locally	Local food deficit
Red meat	18.4	179.2	8,934	0.0	-179.2
Pork meat	14.1	137.9	0	0.0	-137.9
Poultry meat	23.8	232.3	0	0.0	-232.3
Eggs	9.4	91.4	10	5.1	-86.2
Fish	19.7	192.3	1,960	14.0	-178.3
Milk only	158.1	1543.0	886,210	0.0	-1543.0
Other dairy products	24.0	234.4	0	0.0	-234.4
Grain	66.6	649.9	0	0.0	-649.9
Legumes, nuts & seeds	7.1	69.6	0	0.0	-69.6
Vegetables	149.4	1458.5	240	0.6	-1457.9
Fruit (including berries)	113.7	1109.6	115	0.3	-1109.3
Total	**604.3**	**5898.1**	**897,469**	**20.1**	**-5878**

Overall, despite the estimated 897,469 tonnes of food grown for commercial sale in the Buller district, an estimated 20 tonnes may be processed in the Buller district for local consumption. From Part One, an estimated 2,280 tonnes (39%) of the overall food requirements for the 2022 population can be grown in the Buller district. Meaning, an estimated 99.66% of all food required to feed the population of Buller district currently comes from outside the district.

4.2.5 A sample of food retailers

Previous report sections have explored food growing, processing and wholesale distribution. This section now considers the retailers who are the front facing, customer focused food premise. The following is an introduction to the various food premises across the different locations around the Buller district. The descriptions include different business categories. The purpose of mapping food premises is to understand the distribution and types of food premises in the local food economy, therefore helping to evaluate how people access food. Mapping helps to visually attain how well the current Buller district food economies could potentially achieve the core requirements of a local food economy, such as consumers having accessible and convenient access to locally produced food and producers having reliable distribution options and growth opportunities.

Across the whole of the Buller district there is approximately 78[23] known[24] food premises registered with the Ministry of Primary Industries (MPI). There are no global fast-food outlets (e.g. McDonald's, Kentucky Fried Chicken, or Pizza Hut) registered with MPI in the Buller district. Subway did operate within the district for many years but was disestablished following the COVID pandemic. The known food premises can be categorised into one of six types of food premise, presented in Table 11.

Table 11: Category and descriptions with number of each known food premise within the Buller district

Category	Category descriptions	# of food premises
Restaurant or pub	Dine in evening premises	26
Café	Dine in during the day premise	23
Convenience store	Including grocers, minimarts, fuel, or gas stations, dairy or corner stores.	10
Takeaway only	No seated premises, mobile food carts.	10
Supermarket	Registered with MPI as supermarket	5
Specialised food store	Including organic stores, grocers, butchers, bakers, refill coop.	4
TOTAL		**78**

4.2.5.1 Mapping the food retailers

The food retailers in Table 11 have been mapped across the whole of the Buller foodshed and are shown in Figure 46 (overleaf).

Understanding how food retailers source food is important to the existing food system, therefore data was gathered from food premises across the Buller district. 13 surveys were complete online and a further five interviews were conducted (one interview conducted using the online survey as a base, meaning for the survey n=14). All four of the supermarkets completed the online survey and two of them were asked further questions through the interview. In total, 20% (16) of all the known food premises (78) within Buller district were engaged in the research.

[23] This figure does not include premises that solely trade in drinks, such as coffee roasters, mobile coffee shops, and coffee caravans with no food. It does not include premises that sell confectionary (e.g. ice cream). It also does not include recreational, educational or care facilities that provide food (schools, sports centres, cinemas, rest homes, etc.). It does not include retail shops that sell coffee on the side or retailers of wine and beer or other distilleries.

[24] At the time of printing, these are the known food premises.

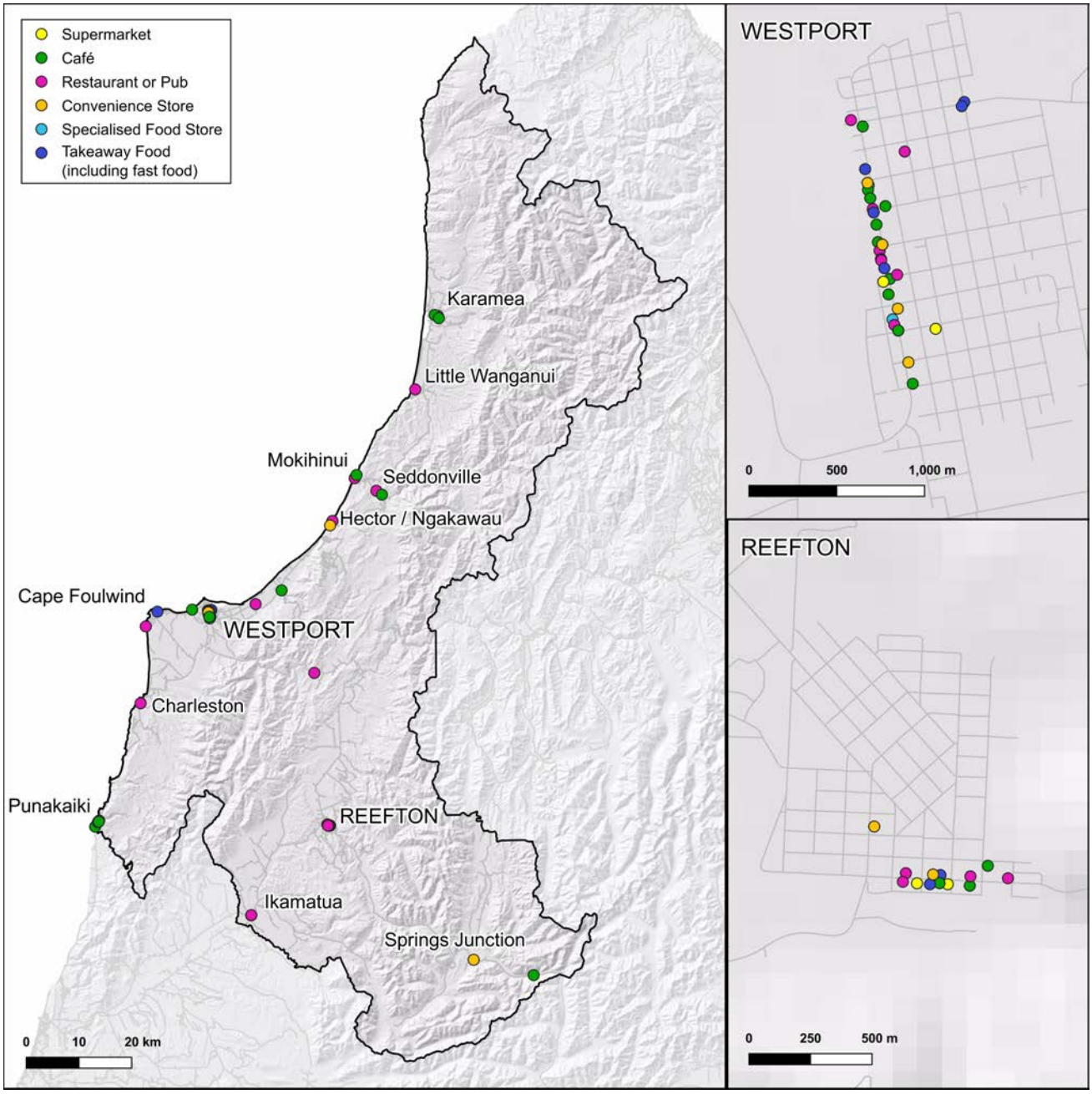

Figure 46: Known food premises in the Buller district

Westport and Reefton have a supermarket, café, restaurant or pub, convenience store, and a takeaway. Smaller communities tend to either have cafés or restaurants and/or pub.

4.2.5.2 Current business type and size

All surveys and/ or interviews were conducted with the owner, Managing Director, or Store Manager. The results of the interviews and the online survey are treated as one and shown as n=16, unless otherwise stated, for example where survey results are analysed (n=14).

The graph in Figure 47 (overleaf) shows how each food premises interviewed / surveyed identifies their business.

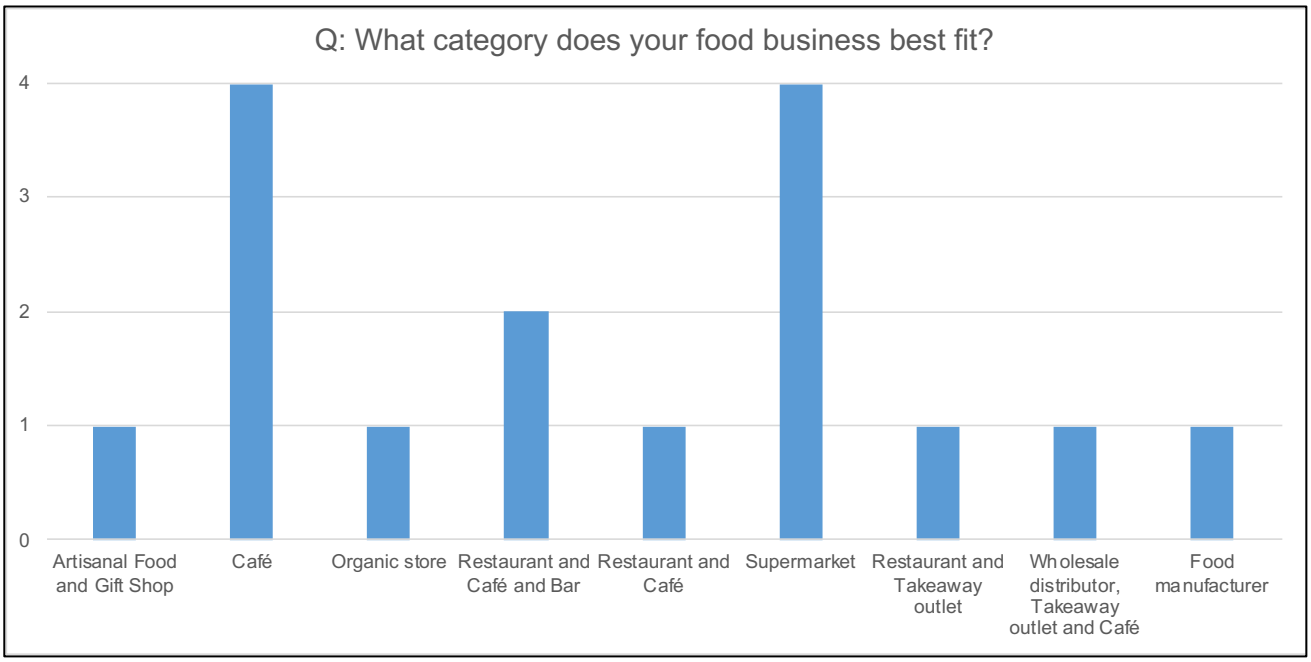

Figure 47: Types of food premises that answered the survey or were interviewed (n=16)

When asked how many paying customers food is sold to in a week, six responses show the businesses sell to 101-500 customers, three are much larger selling to 1,001-5,000 customers, as shown in Figure 48 (survey responses only, n=14). Two businesses sold to over 10,000 customers and two sold to less than 100 customers a week.

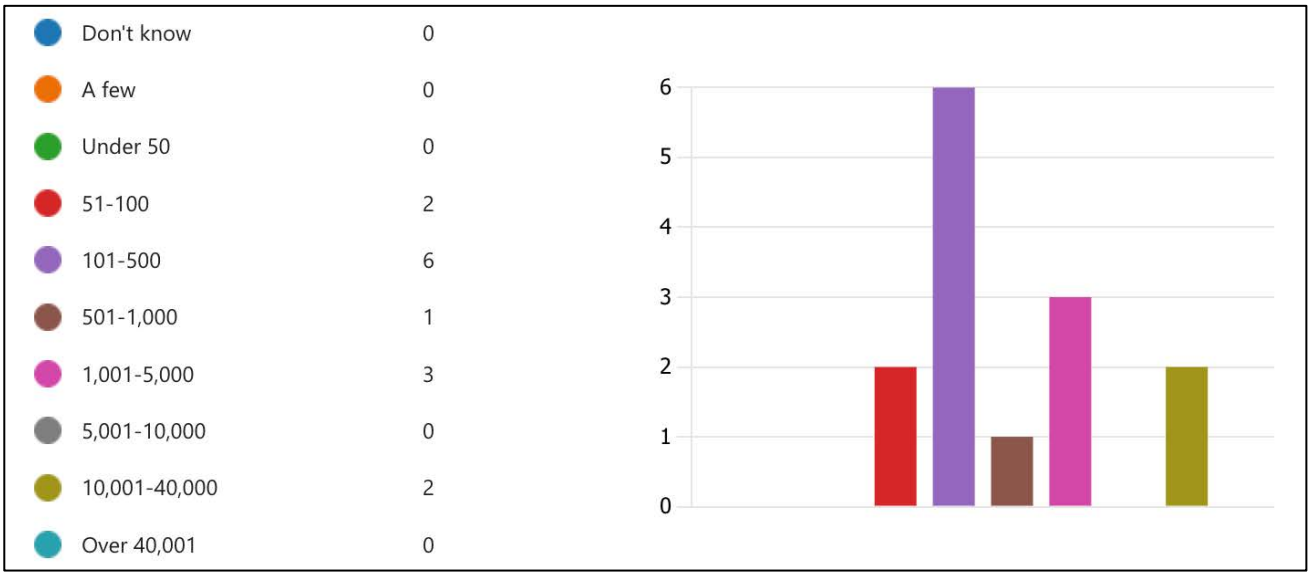

Figure 48: Size of the food retailers that participated in the online survey (n=14)

4.2.5.3 How food retailers source their food

When asked how they source the food they sell, 9 out of the 14 survey responses stated they source through a wholesaler, see Figure 49 (page 52). From the interviews, the two that were not supermarkets also stated they sourced from a wholesaler. There is only one known wholesaler in the Buller district.

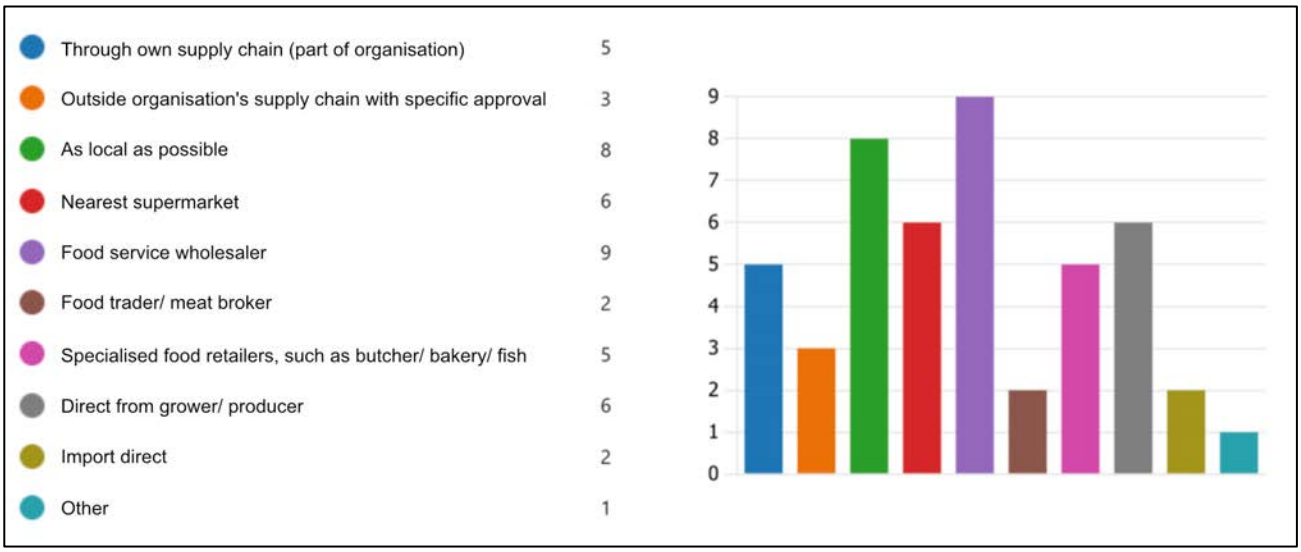

Figure 49: Question asked, "How do you source the majority of your ingredients or food products/produce?" (n=14)

Eight food premises indicate 'as local as possible', six also indicate they purchase 'direct from the grower'. Those who indicated they shopped at the nearest supermarket for ingredients, were cafés and/or restaurants. Two of the supermarkets indicated only a single source, 'Through own supply chain', whilst every other response had two or more responses, meaning most food premises have multiple methods of sourcing stock. One respondent indicated they had "*55 different suppliers*".

A follow-up question (in the survey only) delved into what was important for respondents when purchasing food items. 'Efficiency and reliability of ordering/ delivering' is indicated by all but one as being the most important factor to current sourcing of food items (Figure 50).

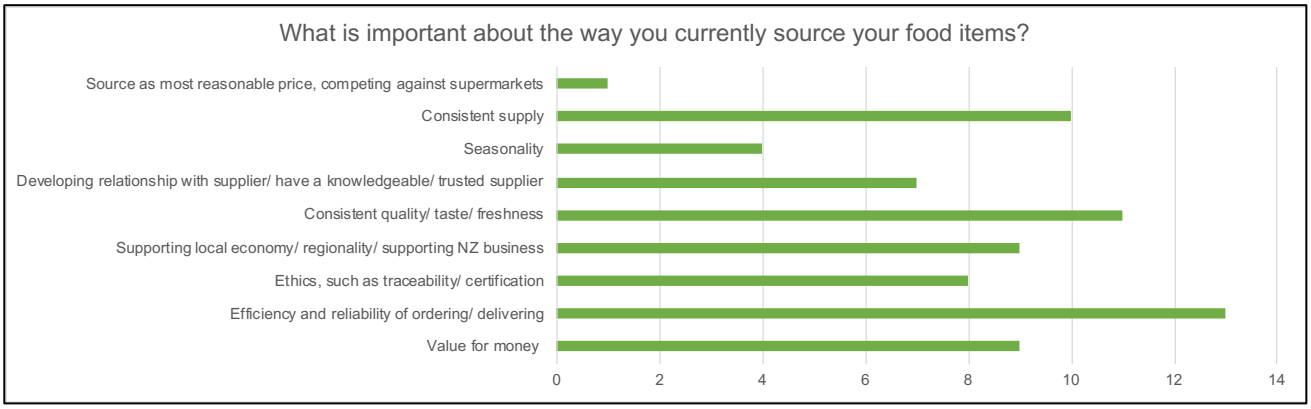

Figure 50: What is important about how food is sourced (n=14)

'Consistent quality/ taste/ freshness' is the second most important factor and 'consistent supply' is the third most important. Nine respondents indicated both 'value for money' and 'supporting local economy' as important factors.

When asked what is good about the arrangements they currently have, 12 of the 14 stated, 'reliable' (Figure 51, overleaf). Out of those 12, ten indicated both 'reliable' and 'simple', the other two were 'trusted' and 'reliable', and 'just normal' and 'reliable'.

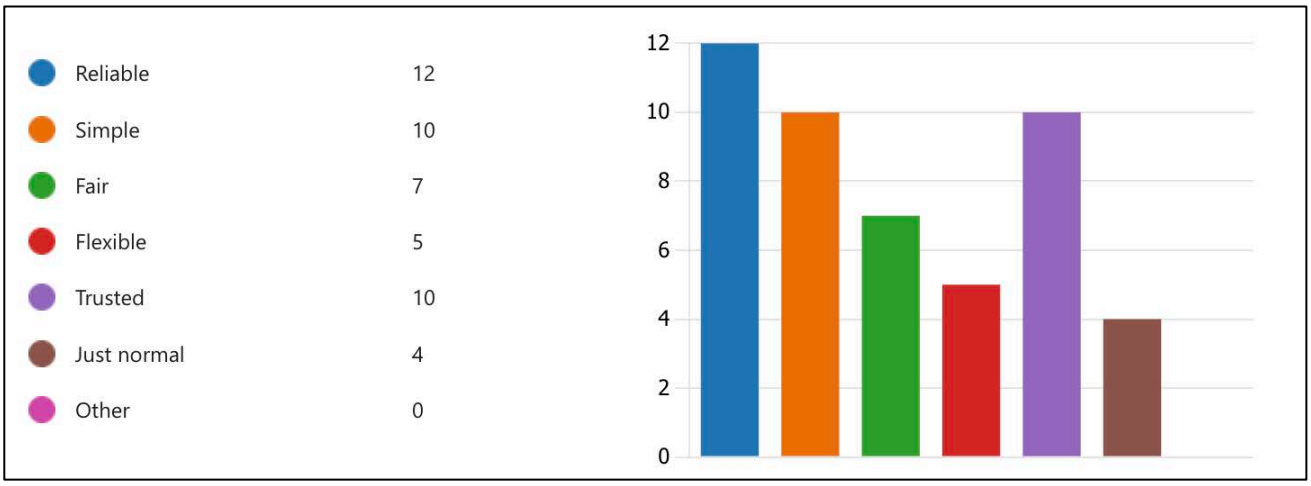

Figure 51: What is good about the arrangements you currently have? (n=14)

Figure 51 shows that having a reliable source is important for respondents, so is having a simple system and a trusted one.

When asked what was not so good about the current arrangements, a wide variety of responses were given, see Figure 52.

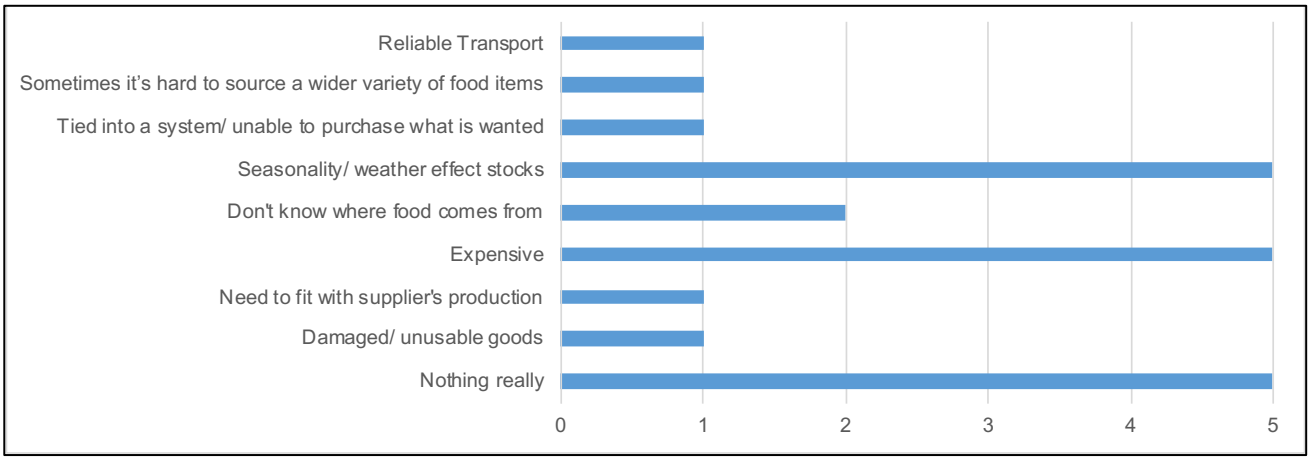

Figure 52: What is not so good about the arrangement you currently have? (n=14)

Five were happy with the current system and had nothing to add, five indicate it is 'expensive' and five indicate that seasonality (including weather) effects their ability to have consistent stocks.

4.2.5.4 Sourcing food locally

The interview and the survey asked respondents if they sourced local food products.

The answers from both interview and survey have been combined (the supermarket duplication removed). Furthermore, if the answer was yes, there were four options, as follows:

- A little / just started / when possible.
- Less than half.
- More than half.
- All.

Once the results are combined (n=16), they show that 63% of the respondents (10) indicate they source a small amount of food items locally (Figure 53).

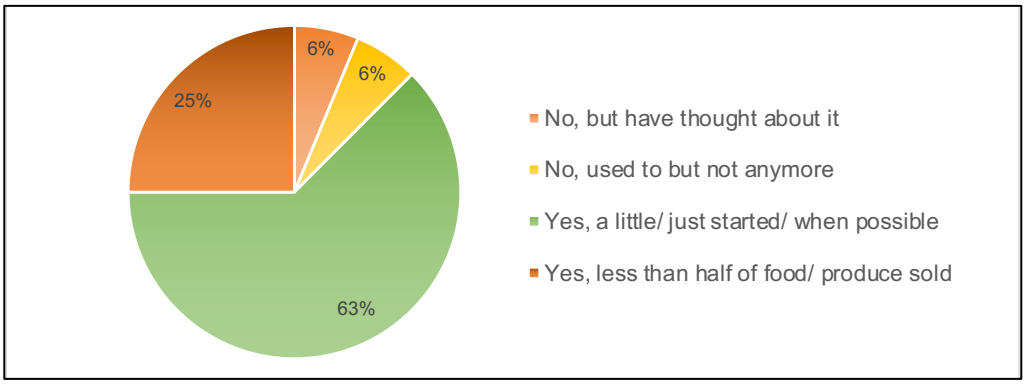

Figure 53: Question asked: Do you source local food products/produce? (n=16)

Four respondents indicated that some (but less than half) of the food they sold was purchased locally. One stated they have thought about it (but don't currently) and another indicated they used to but not anymore. No one was sourcing all their food items locally.

Figure 24 on page 32 show food retailers' responses to the question, "what is your definition of 'local' – where does local end?". To understand how much this changes the data from Figure 53, a matrix table has been created to show who answered what in terms of their understanding of local versus how much of the food they source is 'local'. Due to the question being multi-choice, if they answered with 'Closest place that the food can be produced or grown', then that superseded all other responses. Otherwise, the response that was the furthest away was the response used.

Table 12: Matrix showing how many respondents indicate they source local and their definition of local (n=16)

	No, but have thought about it	No, used to but not anymore	Yes, a little/ just started/ when possible	Yes, less than half of food/ produce sold	**Total**
Closest place that food can be produced or grown	1		3	2	**6**
Same country			1		**1**
Same island				1	**1**
Same region			4	1	**5**
Same district		1	1		**2**
Same town/ city			1		**1**
Total	**1**	**1**	**10**	**4**	**n=16**

The colouring on the table is intended to help see the different numbered responses (red is lowest, orange then yellow is medium amount and green is more responses). Table 12 shows that the 10 respondents who indicate they source a small amount of food items locally, have a broad understanding of the meaning of the word 'local' (nearly every definition is indicated). With one of those respondents indicating local is within the Buller district. Of the four who indicated that some (but less than half) of the food they sold was purchased locally, two indicate the 'closest place that food can be produced or grown', one indicates the 'same island' and the last indicates the 'same region'.

4.2.5.5 Positives and negatives to sourcing local food

When asked what the positives are to sourcing local food (Figure 54), 13 (of 16) state they thought that 'supporting local people/ economy' was a positive. 10 indicate it 'feels good' and nine state that their 'customers are more receptive to locally sourced food', and there are 'less freight/ transport costs/ arrives quicker'. Added to this is a comment, "*We need food delivered in the plastic crates, they are tradable, there should be no freight costs if local*."

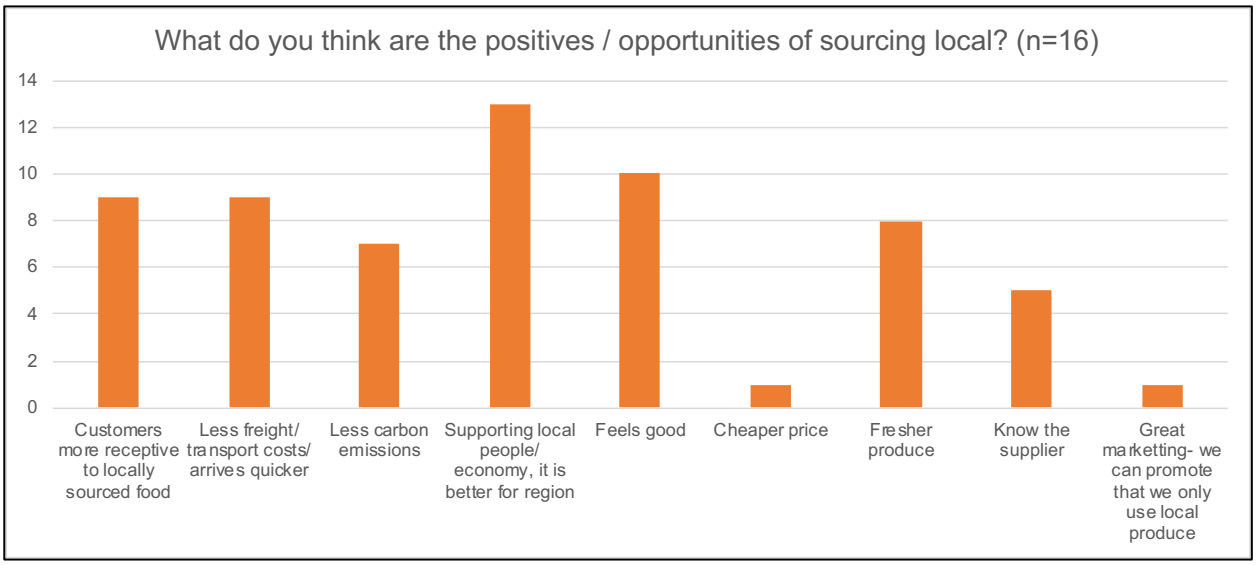

Figure 54: The benefits to sourcing local from interviews and survey results (n=16)

When asked what they think are the negatives or barriers of sourcing locally produced items, the responses provided are varied, see Figure 55.

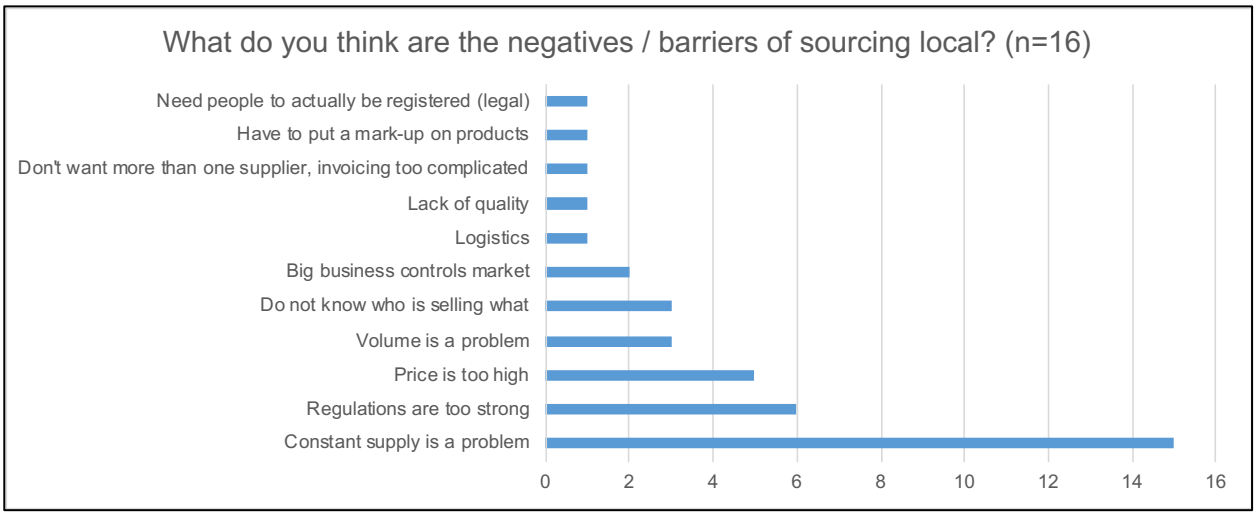

Figure 55: The barriers to sourcing local food from interviews and survey results (n=16)

15 out of the 16 people said that 'constant supply is a problem'. Additional comments, include:

> "*We have to put a mark-up on the products, yet people expect* [they receive] *the same price for what we can sell it for, but we have to cover the GST at the very least.*"

"*We need people to be registered to grow food, then I can buy from them. Also, we don't have the supply here, no one is growing vegetables. It would be great if we could have our basic needs met, such as butter, flour, meat, vegetables, herbs, etc.*"

These responses tie into the findings from Part One of the research, the baseline foodshed analysis (Mass Balance: The Buller Foodshed on page 29), where the demand for food (5,898 tonnes) outweighs what is currently produced in the district (2,280 tonnes, approximately 39% of the food requirements). However, once processing is considered only 0.34% of the food requirements for the Buller district are grown AND processed in the Buller District.

4.2.5.6 What changes might be needed to source local

The survey asked if food retailers had been asked by their customers or consumers for local food, the question was not relevant for two of them. Of the remaining 12, four said 'yes, regularly', four said 'yes, but not often', and four said 'no' (Figure 56). In summary, more of the respondents indicate that their customers want local food than those who had not been asked.

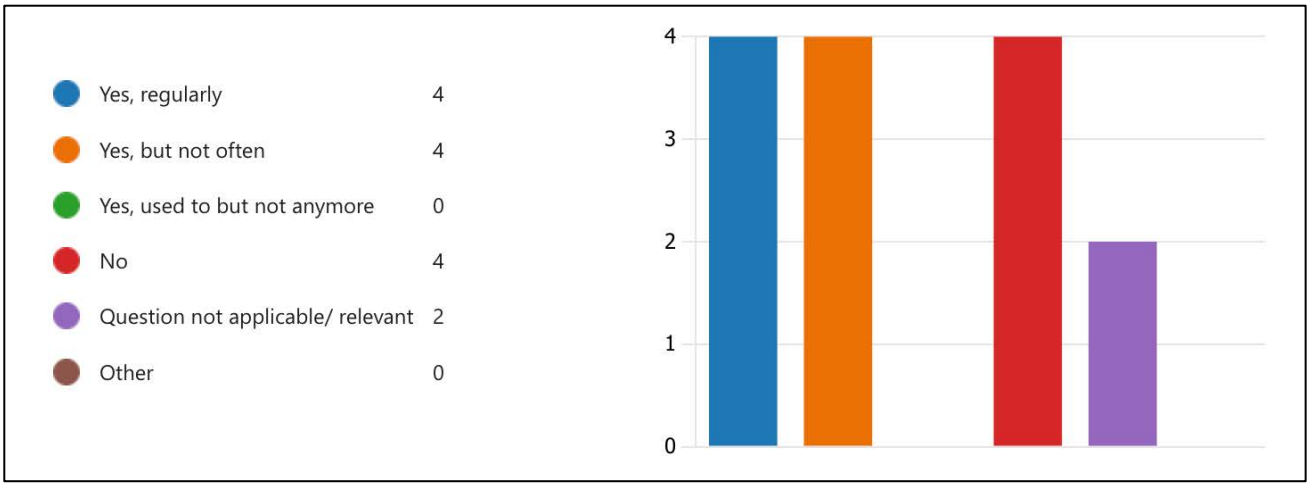

Figure 56: Rate of requests for local food (n=14)

Clearly, the production of food in the Buller district is the biggest problem. However, when asked if they could source more food locally, would they be interested in a verification process and if so, what type would they want to see, ten respondents indicated that they would be interested.

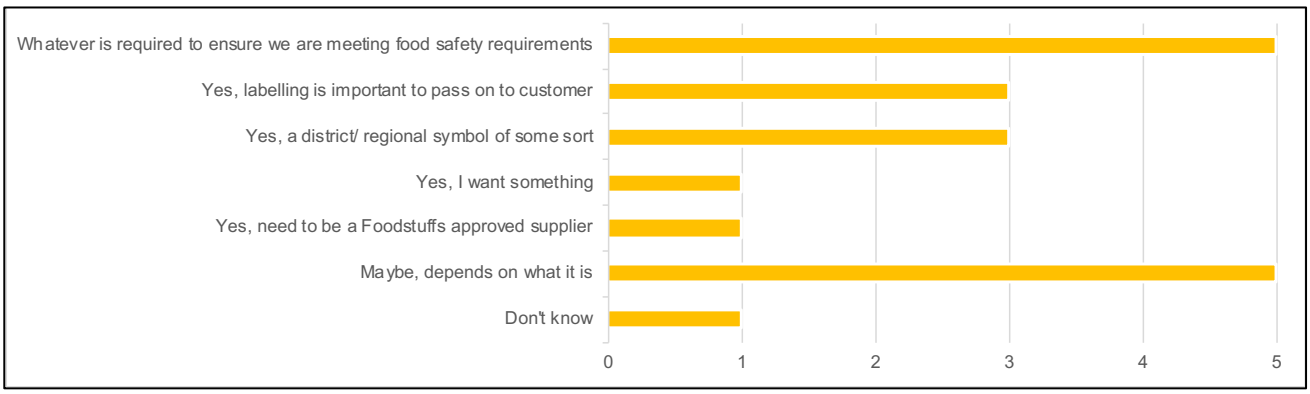

Figure 57: Type of verification processes required (n=16)

Of those ten, five indicate that they would want something which means their 'food safety requirements are met', and the other five gave reasons ranging from 'needing to be Foodstuff approved' to 'labelling being important to pass on to the consumer' (Figure 57 on page 56). A further five state that they may be interested, but it depends on what it is. One said they didn't know. Out of the 15 who indicated yes or maybe, two thirds were a definite yes.

In the survey, respondents were asked 'If all of your customers wanted to buy local food, what changes would you likely have to make in order to accommodate this?'. The responses were varied (Figure 58). 50% indicated suppliers would need to 'pass a food safety plan' first, closely followed by 'finding the right local supplier'.

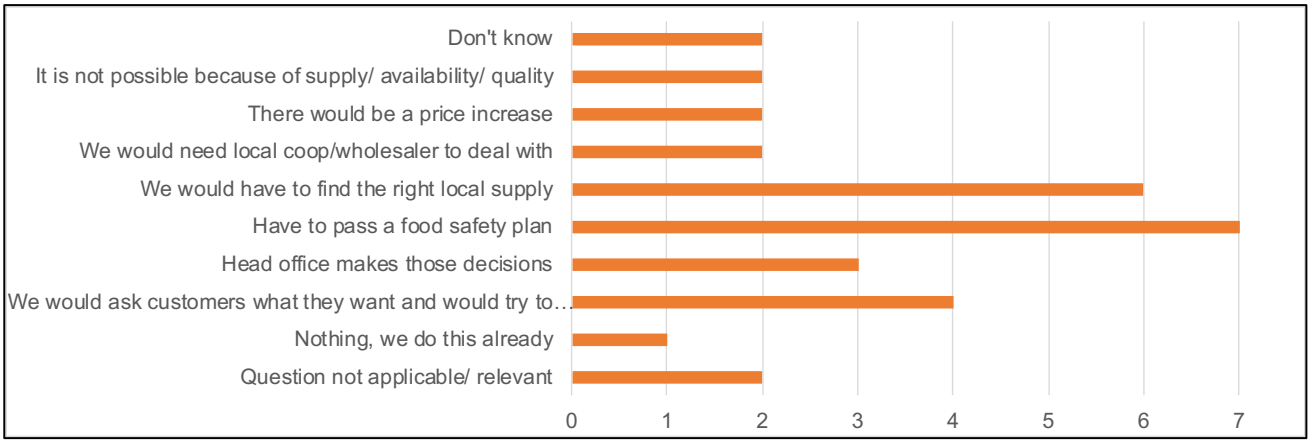

Figure 58: Changes made to accommodate customer requirements (n=16)

When asked which food products/ produce had the most potential to be sourced locally, the response included berries, eggs, milk (and cheese), meat, and fruit (Figure 59). Vegetables have, by far, the most potential to be sourced locally. In the 'other' category, there are "*pies*", "*whitebait*", and "*honey*".

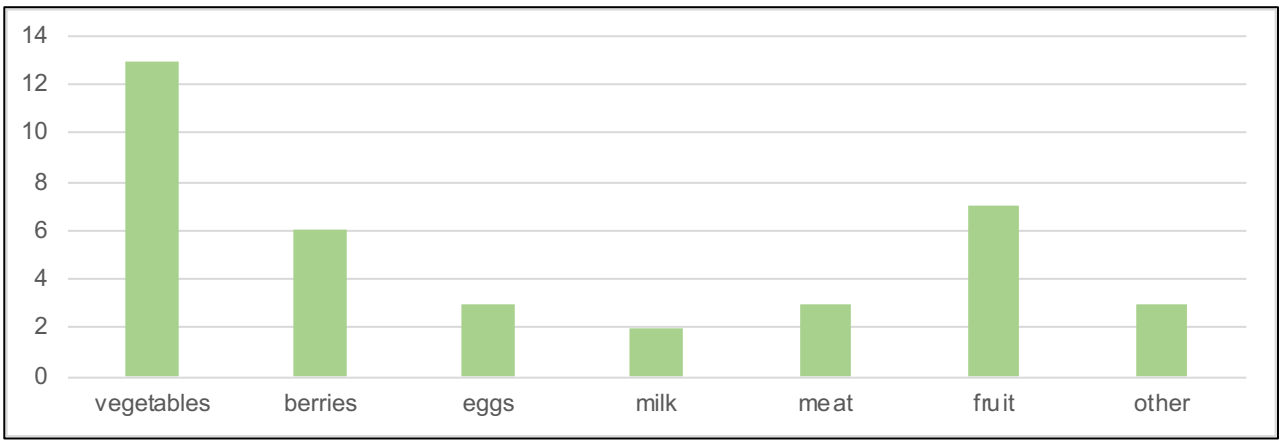

Figure 59: Variety of food that has the most potential to be sourced locally (n=16)

Other comments include, *"Citrus, eggs, herbs, vegetables, because many people grow these items"*, another stated, "*Karamea has an abundance of gardens… but there are only 1 or 2 that have the correct MPI certification that allows their produce to be sold in a shop*".

During the interview, one of the supermarkets stated, "*there is a huge possibility for us to sell the likes of pumpkin, broccoli, lemons, bananas, cauliflowers, basically all the staples - that is what we need."*

Furthermore, the survey respondents were asked if they would consider making a commitment to source some food items from within the Buller district, the answer was overwhelmingly 'yes' (Figure 60). Although, there were some caveats, such as 'only if the supply was as reliable as current supply' and / or the 'cost was competitive'.

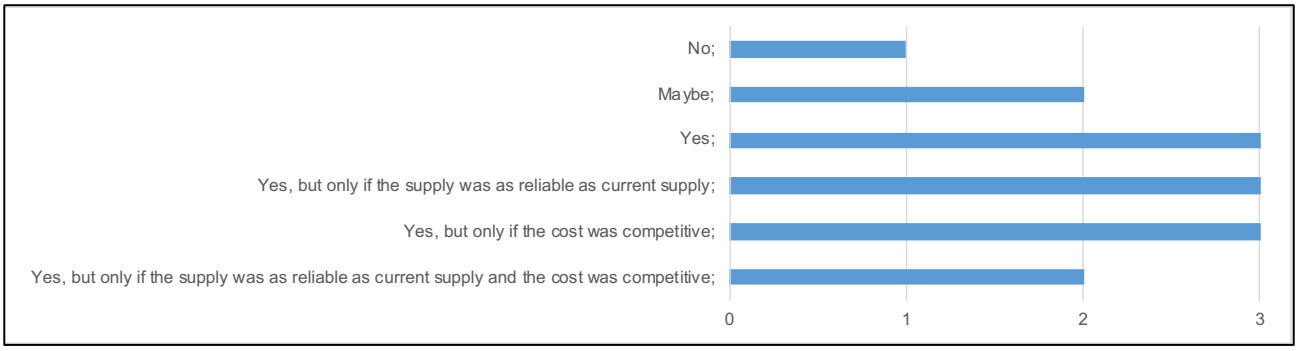

Figure 60: Survey responses making a commitment to supplying local food in the future (n=16)

Therefore, despite there not being a lot of local food grown in the Buller district, there is support by local food retailers to try and sell locally grown food in their stores.

One of the respondents reiterated, "*Supply a good consistency throughout the year, we understand seasonality. We expect it would be cheaper.*" In summary, despite the support, there are stipulations that price should be lower and consistency of supply are essential factors for food retailers when considering purchasing local food.

4.2.6 A snapshot of food retailers in the Buller foodshed

In summary, this section of the report delved into the mapping and analysis of food premises in the Buller district, specifically focusing on retailers as the customer-facing aspect of the local food economy. The goal was to understand more about the distribution and types of food premises and assess how people access food.

The findings indicate that there are 78 known food outlets in the Buller district, categorised into six main outlets: (1) restaurant or pub, (2) café, (3) convenience store, (4) takeaway only, (5) supermarket and (6) specialised food store. In terms of business types and sizes, most of the 16 respondents identified their businesses as restaurants or pubs, cafes, or supermarkets. Sizes varied, with some selling to 101-500 customers per week, while others sold to over 10,000 customers.

Regarding sourcing practices, most respondents indicated that they source their food through wholesalers, emphasising sourcing "*as local as possible*" and purchasing directly from growers where they could. Respondents value reliability, simplicity, and trust in their current sourcing arrangements. 63% of respondents indicate sourcing a small amount of food locally, with varying definitions of "*local*" ranging from within the district to across the country. Supporting the local economy and positive customer perceptions about sourcing local food were seen as positives, while challenges include constant supply issues and increased costs.

A significant interest in some form of verification is expressed by 10 out of 16 respondents, with varying preferences for verification types. Other changes, such as supplier food safety plans, would be necessary to potentially increase access for the retailers to local food.

Across all food items, the ones that are seen as having more potential to be sourced locally are vegetables (most potential), then berries, eggs, milk, meat, fruit, pies, whitebait, and honey.

Despite limited local food production, respondents overwhelmingly express a commitment to source locally if conditions such as reliable supply and competitive costs are met. Challenges like seasonality and supply consistency exist, but local food retailers in the Buller district show a keen interest in sourcing locally to support the local economy and meet customer demands.

4.2.7 The role of farmers' markets in a local food system

Farmers' markets are physical spaces where local farmers, growers, and producers gather regularly to sell a diverse range of fresh produce, and agricultural goods directly to consumers. These markets emphasise locally sourced and seasonal products, providing consumers with the opportunity to purchase directly from farmers and learn about the origins of their food. Operating as community hubs, farmers' markets contribute to a sense of community, fostering social interactions and cultural exchange.

Farmers' Market New Zealand (FMNZ) offer an optional authenticity scheme for all FMNZ member markets which promotes the 'three golden rules' for farmers' markets and their stallholders:

- A farmers' market is a food market (e.g. no arts, craft, bric-a-brac) with some exceptions for plants and flowers.
- Food is produced within a defined local area (each market can define their local area).
- The vendor must be directly involved in the growing or production process of the food (e.g. no middle person, on-sellers, wholesalers, retailers, etc.).

4.2.7.1 Mapping farmers' markets

There is one known farmers' market identified within the Buller district, and that is in Karamea in the Community Hall on a Saturday. There is a Granity Market Day (92 Torea Street) once a month on a Saturday, but it seems to be mostly craft stalls and a small amount of fresh organic produce.

4.2.7.2 Reliance on consumers

Research shows that the top reason that food growers participate in farmers' markets is because of the relationship they can build with their customers. Clearly, growers need consumers to attend farmers' markets for them to be able to sell their products and make a profit. The Otago Farmers' Market study (Millar, et al., 2016) showed that half of the vendors believed that half of their customers were regulars, and they gave the reason they believe they retain these regular customers is because of their quality products and that they have built 'trust' with the customer. 'Trust' from the vendors' perspective with their consumers is essential, not only does it create consistent demand, but it also enables product development, where vendors can literally experiment with their products on loyal customers; develop and test new ideas, receive instant feedback or recommendations and then make improvements.

Vendors are not alone in being motivated to build a relationship with the consumer. Of course, there are different reasons involved but research shows that some consumers want to know whom they are

buying food from. Millar, et al. (2016), showed that it was not just because consumers want to directly support their local producers, but it is also because with knowledge of who is growing the food comes 'trust'. With 'trust' comes informed decisions and a firm reliance on the integrity, ability, or character of the producer, meaning whatever reason it is that drives consumers to purchase direct from the producers (environmental issues, animal welfare issues, food safety, support for the local economy, etc.) is guaranteed.

Therefore, for farmers' markets it is essential to maintain these levels of trust for both consumer and producer, producers need to know that consumers will be there to purchase their products, and for them to be able to experiment and develop their products whilst consumers need to be able to make informed decisions and have reliance on their food producer.

4.2.8 A snapshot of farmers' markets in the Buller foodshed

In summary, farmers' markets are a great way for growers to access consumers directly. There is one known farmers' market in Karamea and a small craft market that has some organic produce in Granity.

4.2.9 A sample of consumers

The research to date shows that there is a limited amount of food grown and processed locally within the Buller district. However, there are some food premises that are going out of their way to ensure they support local the best they can, so if a consumer wanted to support locally grown, it is still possible. Therefore, understanding trends and consumer motivations for participating in local food economies are essential for enhancing stronger and more resilient communities.

This section, 'a sample of consumers', looks specifically at consumer choices, their understanding, and motivations for purchasing decisions. To gather different perspectives, research from the Otago Food Economy Report (Millar, et al., 2016) is included to allow a broader understanding of motivations from other places and cultures. Local interviews and online surveys were carried out and are compared to the Otago Food Economy Report findings and conclusions are drawn.

4.2.9.1 Otago Food Economy Report findings

Some consumers view "*buying local*" as a desirable goal, while for others, participating in the local food economy has become a lifestyle choice. This dedicated group of local food buyers is often referred to as "*locavores*," signifying individuals who prioritise purchasing as much of their food as possible from local sources. Several key motivations drive consumers to engage with local food economies (Millar, et al., 2016, p.65-68), these are explored below.

- Perceived freshness and quality:

  Consumers consistently cite perceived freshness and quality as primary reasons for participating in local food economies across countries like New Zealand, Canada, the US, and Australia. Access to fresh produce is a major motivator for attending farmers' markets. Farmers' markets have enhanced consumers' access to a variety of fresh produce, fostering a reconnection between farmers and consumers. This reconnection not only boosts farmers'

income but also provides better quality produce at more affordable prices to a diverse consumer base. Moreover, local food economies are perceived as healthier due to the freshness of the food, a highly valued attribute for consumers.

- Taste:

The aspect of taste is often intricately linked with the qualities of freshness and overall quality, playing a significant role in why consumers opt for local food outlets. Studies indicate that in New Zealand, consumers engage in local food economies because it offers a more enjoyable and better-tasting experience. Canadian research supports this idea, suggesting that producers not only sell products like tomatoes but also share their farm story, emphasising the taste and overall experience. Research shows in Australia, taste ranked fourth as a reason for attending Australian farmers' markets.

- Environmental reasons:

The rising awareness of climate change and other environmental issues is becoming a prominent concern among consumers. The localization of food is advocated as a means of addressing these challenges, for example by reducing food miles and carbon emissions. Research reveals that some consumers are motivated by personal, cultural, or environmental values when choosing to purchase from local food systems.

- Ethical reasons (animal welfare and fair trade):

Consumers who opt for local food are often driven by considerations of fairness and ethics, involving aspects like ethical animal raising methods, fair farm labour practices, fair trade, and animal welfare practices. Notably, the importance placed on animal welfare extends beyond free-range practices, as consumers perceive free-range options as contributing to a superior product (for example, taste).

Other motivations involve preferences and behaviours that may not directly impact the production or distribution system. Examples include brand preferences, such as Fair Trade, approaches to food preservation to reduce waste, and a desire to understand better food choices that minimise environmental impacts by excluding certain foods (palm oil, for example).

- Local economic development:

Research shows that consumers recognise the multitude of economic benefits associated with local food economies. This understanding encompasses keeping investment and resources within the community, fostering enhanced community well-being, and promoting improved health. Consumers believe that local food economies play a crucial role in recirculating income within the local economy and provide vital support to small-scale farmers.

- Support for local farmers (building relationships and trust):

Supporting local growers is a key motivation for consumers at farmers' markets. Consumers express a preference for 'alternative' systems, emphasising support for local economies and communities. Motivations also include valuing quality service, building relationships with honest and trustworthy producers, particularly for those seeking 'local' and certified 'organic' products. The crucial factor for farmers' markets' success lies in maintaining trust between consumers and producers, achieved through transparency about product origins. In Aotearoa New Zealand, consumers generally view farmers' markets collectively, considering factors like product quality, atmosphere, and trader interactions, building trust and relationships with growers is essential, providing a safeguard and robustness even if individual stallholders could potentially compromise consumer trust.

- Health and nutrition:

Consumers are increasingly mindful of health and nutrition aspects linked to food, displaying heightened concerns about food origin and production methods. An examination of local food consumer behaviour highlights a greater preference for fresh and unprocessed foods, coupled with a reduced inclination towards convenience and snacking items. The research suggests that local food consumers tend to be better educated, older, more liberal, and exhibit heightened social and environmental awareness compared to their non-local food-buying counterparts.

- Community and social benefits:

Beyond access to fresh, local, and healthy food, consumers seek a distinctive experience that diverges from the conventional retail system. Farmers' markets tend to offer engaging experiences, characterised by a unique atmosphere that provides enjoyment, and serves as social meeting places and venues for community activities. The market atmosphere is often described as an open-air setting with a village feel, bringing a vibrant, colourful, and old-fashioned food market to the area. This communal atmosphere underscores the community and social benefits associated with farmers' markets.

In summary, the Otago Food Economy Report findings show a variety of reasons why consumers support local food. The following section looks at consumers within the Buller district.

4.2.9.2 Mapping consumer respondents

Interviews with 21 consumers, in front of eight premises in both Westport (three) and Karamea (five premises), were conducted. An online survey of consumers was also conducted, this reached 69 people. In total, 90 consumers were engaged in the research, which is 0.92% of the resident population of the Buller district.

In terms of interviews, the most amount of people were interviewed in front of Westport's New World supermarket (Figure 61 on page 63). The "other" is the information centre in Karamea.

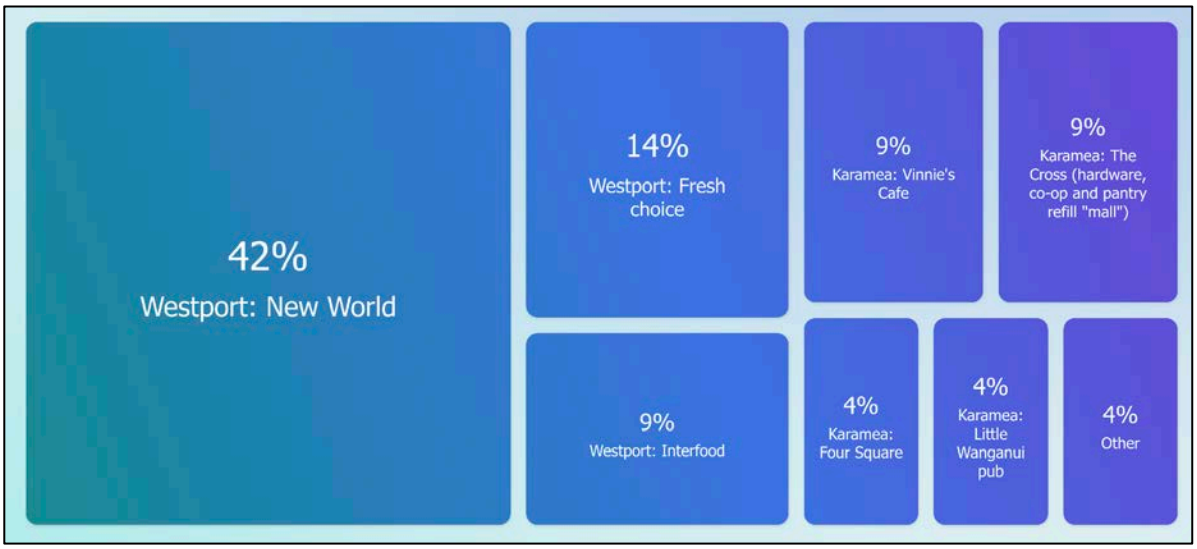

Figure 61: Interviews conducted in front of eight different premises (n=21)

In terms of the online survey, of the 69 responses, 26 (38%) indicate they live in the 7893 post code area, which is Karamea, a further six indicate the post code 7864 (which is close to Karamea). 22 respondents (32%) are from the centre of Westport (post coden 7825). The map in Figure 62 shows approximate locations of respondents.

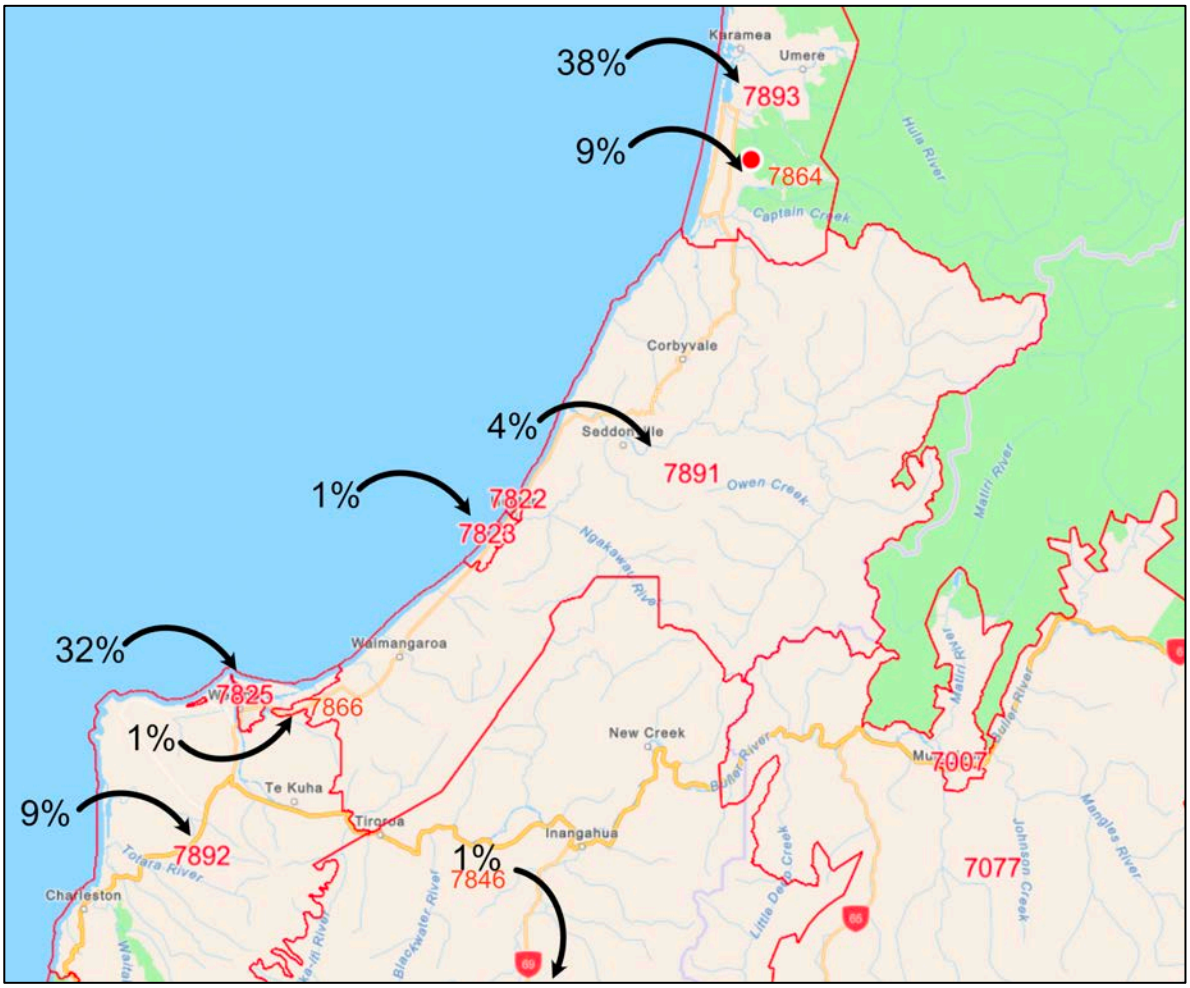

Figure 62: Location of respondents to the online survey (n=69)

Out of the 69 responses, 66 were within the Buller district and three were in adjacent communities.

For the remainder of the analysis, the results of the interviews (n=21) and the online survey (n=69) are analysed together and shown as n=90, unless specifically stated as otherwise.

4.2.9.3 Demographic of respondents

More women than men responded to both the interview and the online survey, with 28% of respondents being men, 71% woman and 1% preferred not to say. The gender skew was relatively even over different age ranges, except for the 65+ cohort where the same number of people were engaged in the research (Figure 63).

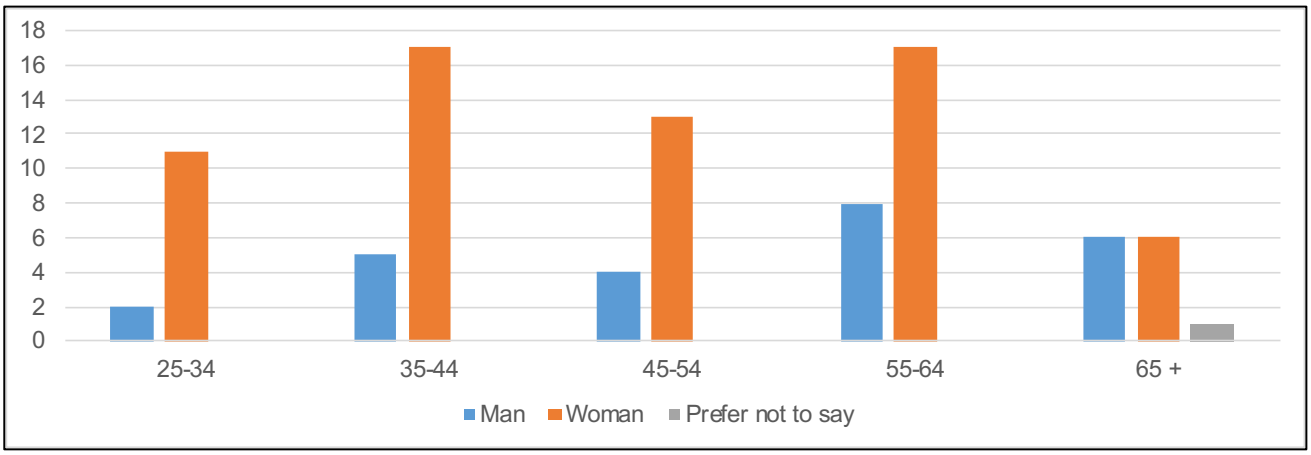

Figure 63: Age ranges and genders of respondents (n=90)

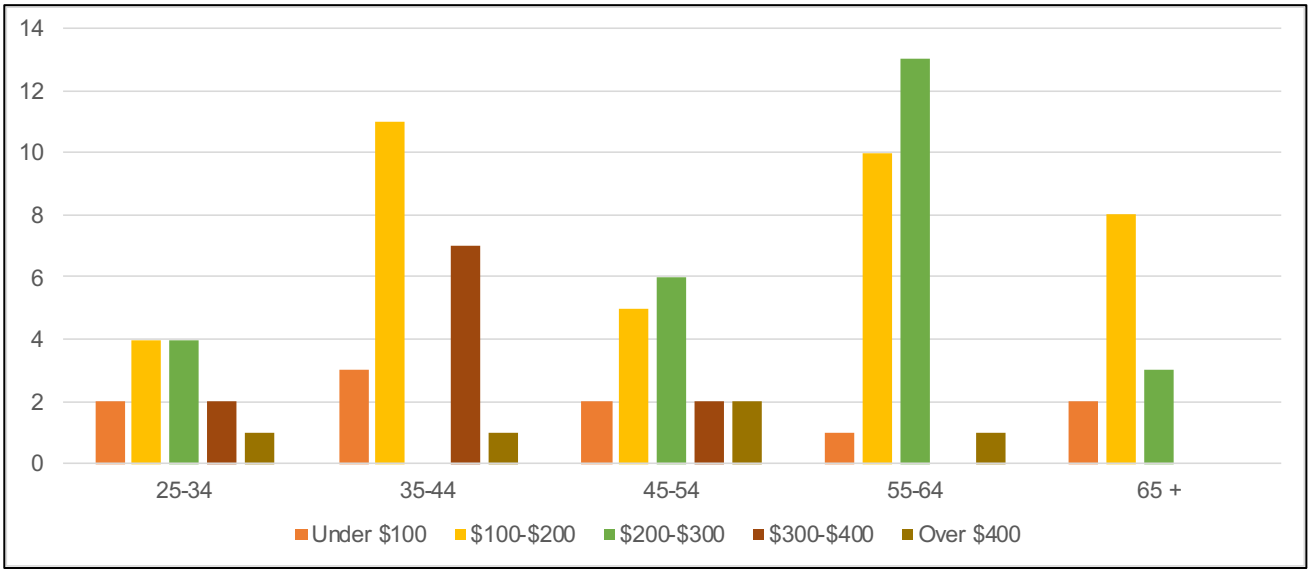

Figure 64: Age ranges and weekly household food budget (n=90)

Figure 64 shows the age range of people with different household budgets who completed the online survey or participated in the interview. Overall, there are 25 different age ranges and weekly food budget categories. More people aged 55-64 who budget $200-$300 per week were engaged in the research (13 respondents). The research captured a wide variety of people from different age ranges and with different budgeting abilities. Many respondents (42%) budget between $100-$200 per week on food, 29% of respondents budget $200-$300, 12% budget $300-$400, 11% budget under $100 per week, and 6% budget over $400. Overall, a good sample of different demographics was achieved.

4.2.9.4 Weekly household budget compared to number of people per household

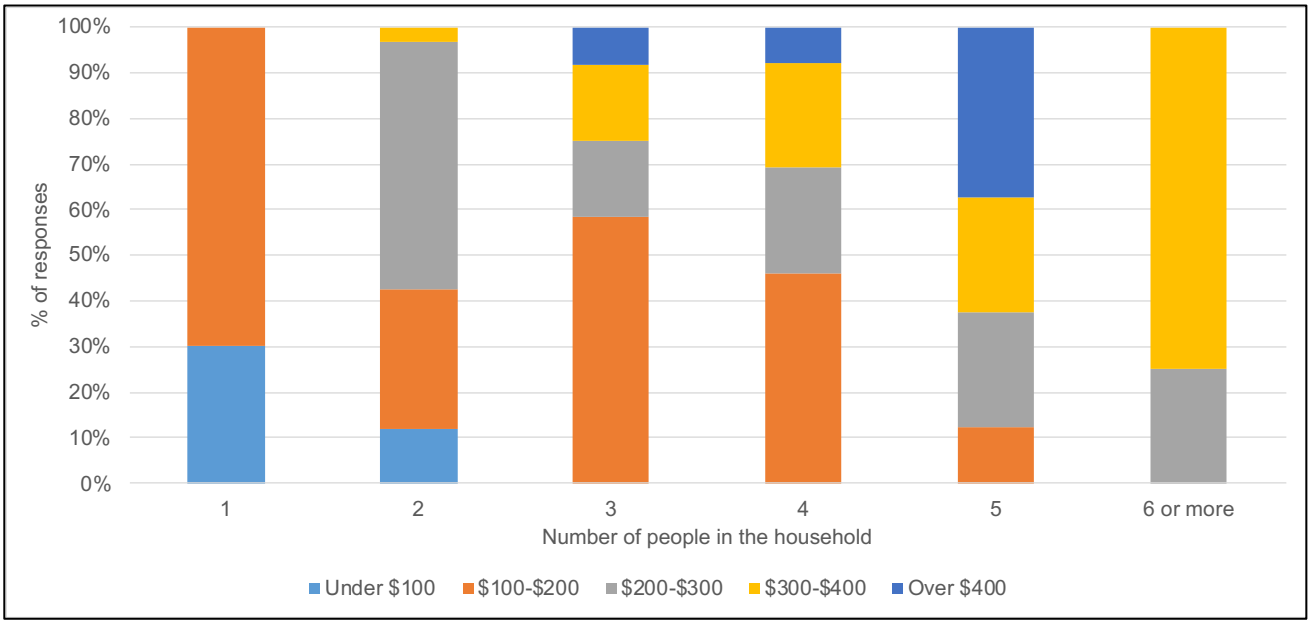

Figure 65: Weekly household food budget from number of people living in a household (n=90)

When the weekly food budget is compared to the amount of people living in a household, (Figure 65) the numbers reflect that for one person households, amounts under $200 are typically budgeted for food per week. For two person households the amount budgeted for food ranges across four of the budget categories (from under $100 to $300-$400). Similarly, three, four or five people households also range across four categories, but the top four, as opposed to the bottom four. For six or more people, most people budgeted $300-$400 per week, whilst ¼ budgeted $200-$300.

4.2.9.5 General purchasing behaviour

Consumers were asked what the most important thing is when in a store making food purchasing decisions, 32% of responses indicate 'freshness / quality' as the top priority. Second, with over a quarter of respondents indicating it, is 'cost / affordability'. 'Where food is grown' is third most important with 17% of respondents choosing it, see Figure 66.

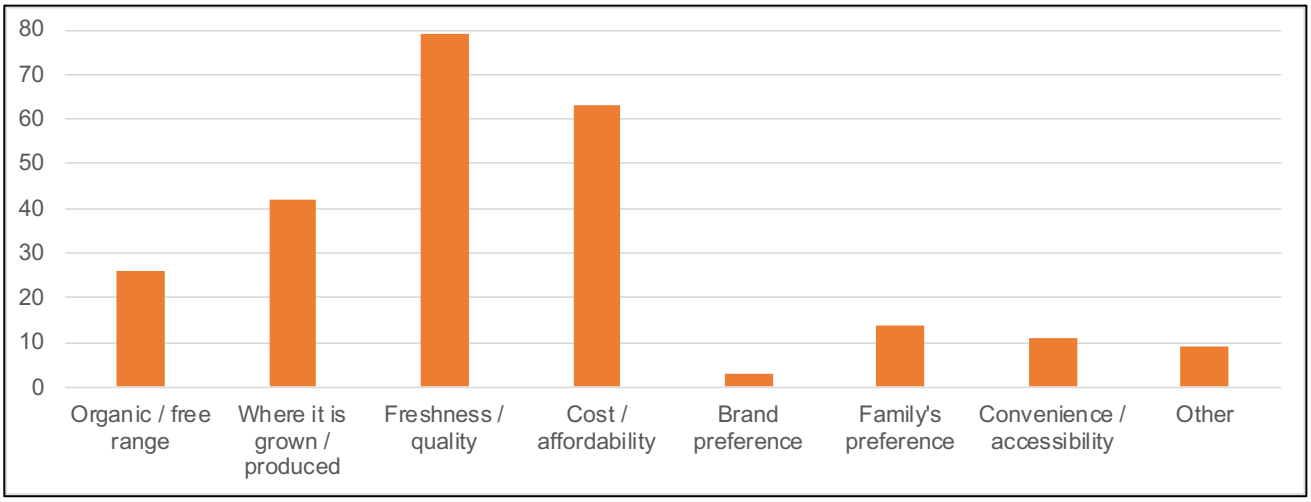

Figure 66: Consumer survey and interview data showing responses to the most important food purchasing decision (n=90)

When asked if they bought local food already and how much they spend on it from their weekly household budget, two stated they would not spend money on local food. 30% stated they spend less than 5% of their weekly household budget on local food, whilst 64% state they spend between 6-50% on local food (equally distributed between 6-10%, 11-20% and 21-50%). Three respondents indicate they spend over 51% of their weekly budget on local food (see Figure 67).

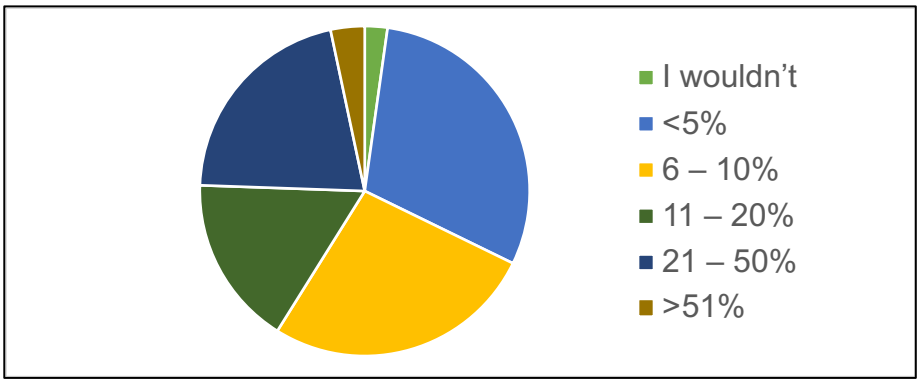

Figure 67: Q: How much would you typically spend on local food items, as a percentage of your total food budget? (n=90)

4.2.9.6 Conscious about where food comes from

When asked if they were conscious about where food items were grown, produced, or manufactured, most responses were "yes", Figure 68.

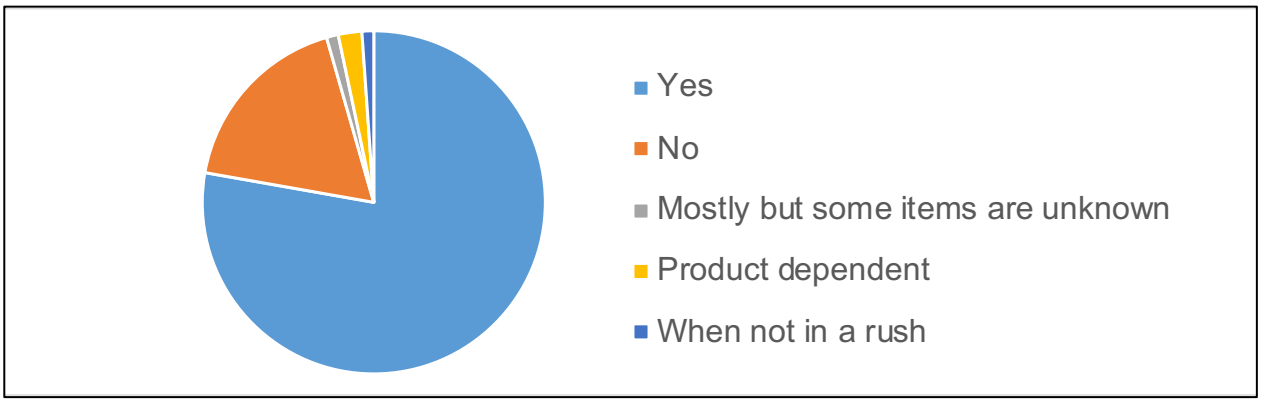

Figure 68: Conscious about where food items were grown, produced, or manufactured (n=90)

Additional comments include, "*Not usually, as I know very little is sourced close to home.*"

4.2.9.7 Purchasing local food

Consumers were asked where they usually buy local food from. The responses are varied as consumers could choose as many locations as they liked in their responses. However, 86% of respondents indicate they purchase local food from the supermarket. 33% state they purchase from local food co-operative / hub and 32% from farmers' markets (see Figure 69, overleaf).

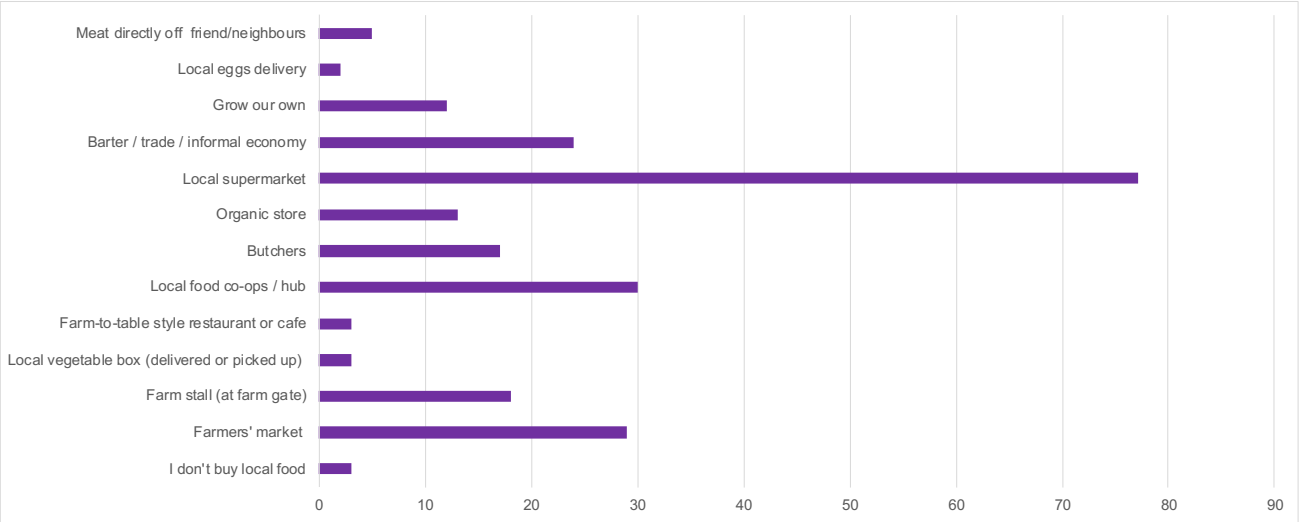

Figure 69: Where local food is purchased (n=90)

Grow your own/ home garden was not an option, yet 13% added it as an the 'other'. Also added was local eggs and food (often meat) directly from friends or neighbours. Additional comments include:

"Karamea market / my garden / home kill."

"The local market, but it is so small it's not really a farmers market."

"Not many options in Karamea."

"Lack of choice in Westport."

4.2.9.8 Food items most often bought or traded

When asked about the food items most often bought or traded, eggs, berries, vegetables, fruit, and meat were most common (Figure 70).

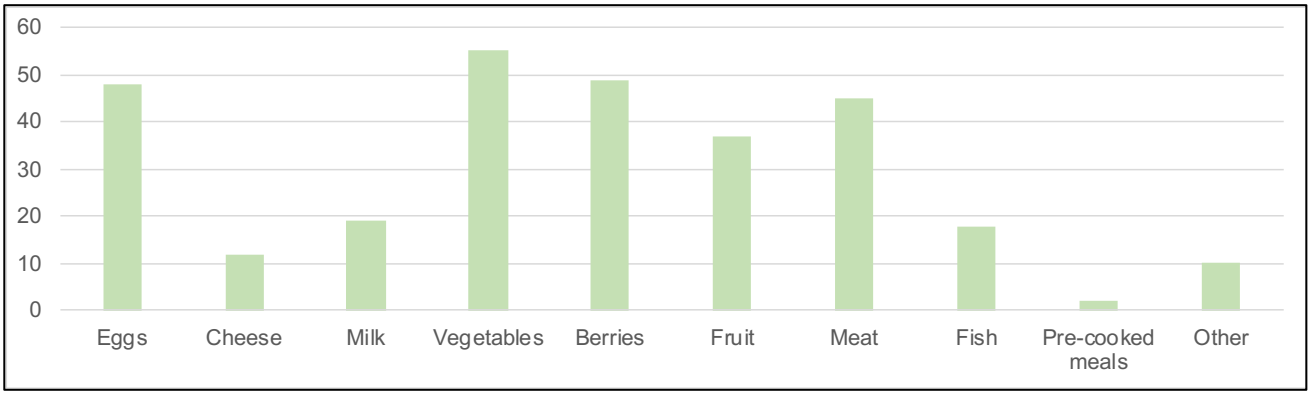

Figure 70: Q: Which food items do you most often buy or traded from local food producers (n=90)

Under the "other" section, comments include:

"We grow our own food and catch fish."

"Market goods, bread, slices, honey, cordials."

4.2.9.9 Desire to purchase more local food

When asked if they would like to buy more local food than they currently can or do, the response was 86% positive (Figure 71).

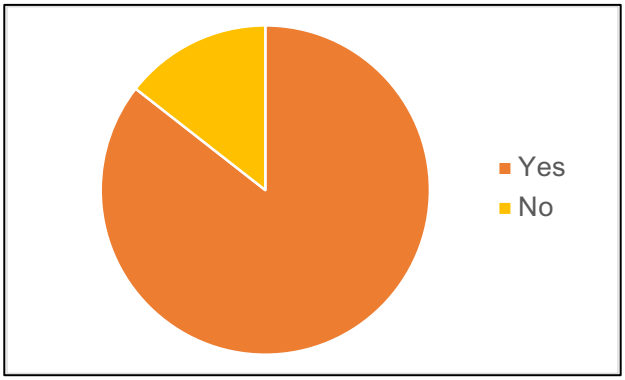

Figure 71: Q: Would you like to buy more local food than you currently do? (n=90)

Overall, respondents express a willingness to buy more local food. There was a desire to support local growers and farmers and to attend farmers' markets. Suggestions for opportunities in the future include a "*one-stop-shop that was open most days, but not necessarily 9.00 am-5.00 pm,*" or a "*local co-op*". However, many indicated a lack of awareness about local food sources, such as who was growing food and where it could be purchased from. Some highlight the current challenge of limited options for local vegetables and the need for more accessible markets or specialty shops.

Despite the positive support, the support seemed contingent on other key factors such as accessibility, availability, and price. For example:

> *"If local food was available in a consistent manner (product available most of the time, during growing season), and a in convenient place to purchase, preferably in my local town as I am unable to go to many different locations to purchase food items."*
>
> *"Definitely would love to buy more local food, if not too expensive and accessible."*
>
> *"My needs sometimes don't match up with availability."*
>
> *"Extended opening hours of suppliers, needs to be cost effective."*
>
> *"I'd like to have more readily available and affordable local food to buy."*
>
> *"Would love to be able to purchase a box of organic vegetables at a reasonable price."*

4.2.9.10 Discouraging factors to purchasing local food

When asked "What factors, if any, discourage you from purchasing local food products?" the responses were consistent, 46% and 47% (respectively) indicate a lack of availability ('not available') or supply ('lack of consistent supply'), as shown in Figure 72 (page 69). The third common discouraging factor is 'too expensive', with a third of the respondents selecting this.

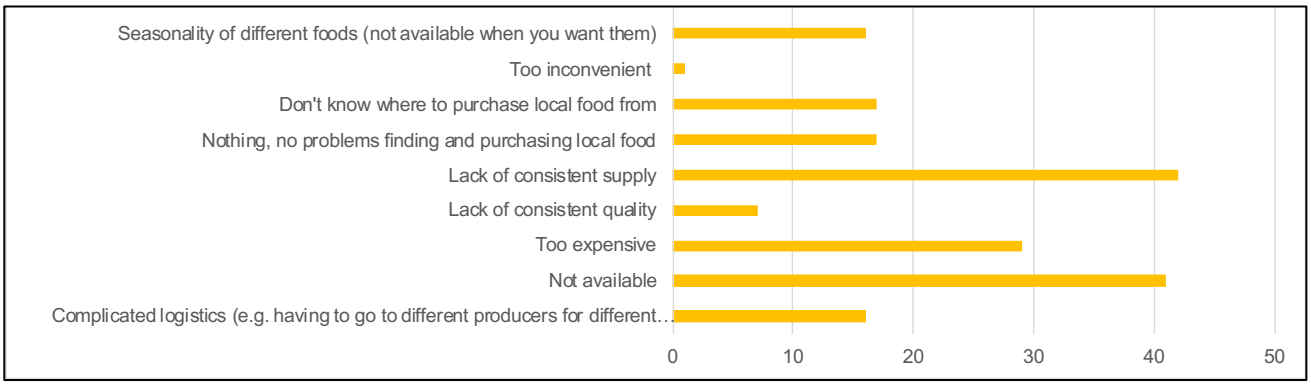

Figure 72: Discouraging factors from purchasing local food (n=90)

4.2.9.11 Benefits of consuming local food

When asked what the most significant benefits of consuming locally grown or produced food were, the responses were typically varied, however 81% stated 'supporting local people/ local economy' and 80% 'fresher produce'. Over 50% state, 'better quality (taste / flavour)', 'know where it comes from,' and 'community sustainability and / or resilience' (Figure 73). Additional comments include, *"healthier"* and *"spray-free".*

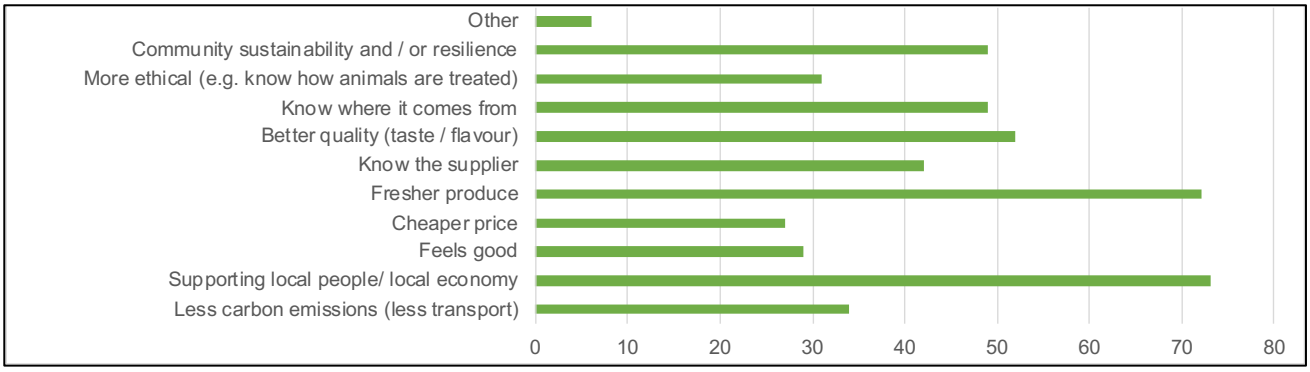

Figure 73: Benefits of supporting local food (n=90)

4.2.9.12 How much more to support local

When consumers were asked how much more would they be willing to spend to purchase local food items, the response indicate that a third of consumers would not pay more for locally grown produce, and overall, 11% expect to pay less (Figure 74). 16% would pay less that 5% more for local food.

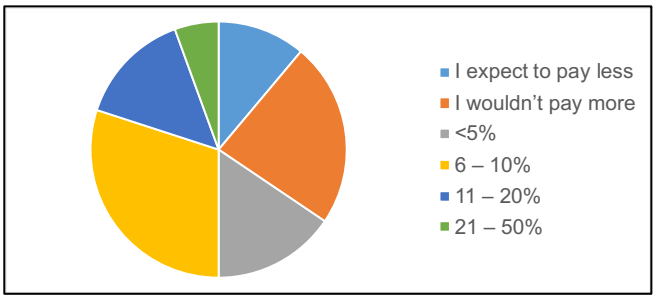

Figure 74: Q: If you could/would support local, how much more of a premium would you be prepared to pay to support locally grown or produced food products compared to non-local alternatives? (n=90)

However, two thirds of the consumers engaged in the research state they would pay a premium for locally grown food. Overall, 30% of respondents indicate they would pay 6-10% more for local food.

When the data is explored further to identify if there is a specific age range who would be willing to pay more, the results are inconclusive (Table 13).

Table 13: Matrix showing age ranges of respondents versus % premium potentially spent on local food

	% premium for local food						
Age range	I expect to pay less	I wouldn't pay more	<5%	6 – 10%	11 – 20%	21 – 50%	Total
25-34	1	4	2	4	2		13
35-44	2	2	5	8	4	1	22
45-54	2	6	3	4	1	1	17
55-64	4	6	3	5	5	2	25
65 +	1	3	1	6	1	1	13
Total	10	21	14	27	13	5	90

Table 13 shows that at least one person from each age range indicated nearly all the choices for the percentage premium paid for local food, except for the age group 25-34 not selecting 21-50%. More people from all age ranges selected 6-10% premium. No one selected over 50%.

Table 14: Matrix showing weekly food budgets of respondents versus % premium potentially spent on local food

	% premium for local food						
Food budget	I expect to pay less	I wouldn't pay more	<5%	6 – 10%	11 – 20%	21 – 50%	Total
Under $100	2	6		1	1		10
$100-$200	6	9	5	10	6	2	38
$200-$300	1	3	5	12	4	1	26
$300-$400		3	3	3	1	1	11
Over $400	1		1	1	1	1	5
Total	10	21	14	27	13	5	90

Table 14 shows respondents with a food budget of under $100, eight individuals wouldn't pay more or expect to pay less for local food, and only two would pay between 6-20% more.

The greatest number of respondents are from the $100-$200 budget range and have varying expectations regarding the premium for local food. 15 of them wouldn't pay more and some of those expect to pay less, whilst 16 would pay 6-20% more. A similar pattern continues for the $200-$300 group, but they have a stand-alone group of 12 who would pay 6-10% more. Varying expectations are seen in the $300-$400 group and for those who spend over $400.

In summary, despite price being indicated as being a discouraging factor, 50% of respondents stated they would pay more for local food.

4.2.9.13 Comparison to the Otago Food Economy findings

Otago Food Economy research shows, the top three reasons cited by consumers for supporting local food are freshness, ethical choices, and support for the local economy. The findings are not dissimilar to the Buller district food system research, where 'supporting local people/ local economy' and 'fresher produce' were the most popular benefits chosen. Followed by 'better quality (taste / flavour)', 'know where it comes from,' and 'community sustainability and / or resilience'.

4.2.10 A snapshot of consumers in the Buller foodshed

In summary, the research involved 90 participants from Westport and Karamea, representing about 0.92% of Buller district's population. The majority were women, and respondents spanned various age groups and budget ranges. Key findings indicate that participants prioritise freshness/quality and cost/affordability in their purchasing decisions. Despite challenges, 86% expressed a desire to buy more local food, primarily from supermarkets. The study highlights a positive inclination toward supporting local food, contingent on factors like accessibility, availability, and price. Overall, participants value the benefits of local food, including supporting the local economy and enjoying fresher produce.

4.3 Findings from the Baseline Food System Analysis

Findings from the Buller food system research show a significant deficit in food types being grown and processed within the district, with an estimated 99.66% of food required to feed the Buller population being brought into the Buller district from outside of the district. This effects retailers' ability to purchase and sell local food to their customers, and consumers' ability to purchase local food.

A snapshot of various food growers (producers) revealed a diversity of business operations, with four catering to a single market (local, national, or export) for one of their products. One grower of two different produce supplied three types of markets (export for beef and local and national for the tomatoes), and the last grower aims to serve all three with their berries (however, they are not yet supplying to any market). However, four out of the six interviewed expressed a belief in the 'limited growth potential' of the local market. Larger producers with surplus supply for the local market often find it necessary to sell nationally or for export to ensure profitability, even the up-and-coming berry grower was aiming for a national market as they believed blueberries "*saturated the local market*". Overall, the belief that local food is grown, sold, and consumed within the district is held by some people, whether that is growers, retailers, or consumers. However, findings from the Buller food system research shows that the contrary is happening, and due to the lack of processing facilities very little food that is grown at commercial scale in the Buller district at can stay for local consumption.

Pricing competition poses a challenge, especially when imported products can be sold at comparable or even more affordable prices than local counterparts. Supermarkets, with their large-scale purchasing power, can undercut direct-to-consumer sales by growers. This pricing challenge is exacerbated for growers emphasising ethical production, sustainability, and fair wages, leading to higher production costs. There is a common perception that the local population may not be sufficient to support local food due to cost considerations, with some producers finding it challenging to achieve satisfactory returns. While growers' motivations for selling locally revolve around supporting the local economy, community values, and building or maintaining local relationships, challenges include limited demand, significant regulation, growth potential, and the expectation of lower prices from consumers. Key opportunities for the future involve cooperation with local supermarkets and an increase in consumer demand for local food. Improving the local food system could occur through changes like enhanced consumer education to increase demand for local food, as well as providing greater support from local supermarkets (to support local growers).

Key findings within the food processing sector highlight Westland Milk Products dominate the milk processing in the district. In meat processing, despite there being approximately 136 sheep and/or beef cattle farms in the district, there are no processing facilities, and all animals[25] must travel outside of the district for slaughter and processing. Vegetable farming is very limited, with only one known commercial tomato farm, and 0.27% of the produce staying locally, the remaining 99.7% goes to Christchurch for processing.

Among the 78 known food retailers in the Buller district, 16 participated in the research through online surveys or interviews. Ten source a small amount of food items locally, four source some (but less than half) locally, and none source all their food items locally. It is important to note, that when retailers were asked about local purchasing, they believed that purchasing through the local supermarket is purchasing local food. As the research suggests, there is actually a very limited amount of food that is grown and processed locally, meaning that despite them thinking they are supporting local food, they are not currently. However, it does mean there is the support for local food, but it highlights the need for better education regarding the meaning of local food (for this research project it is food that is grown and processed in the Buller district). In terms of why retailers are supportive of local food, supporting the local economy, the positive feeling, customer receptivity, and reduced transportation costs are cited as benefits of sourcing locally. When asked about challenges, the insufficient local food production was acknowledged as being a problem. Overall, there is interest among food retailers in purchasing and selling local food.

According to the Otago Food Economy research, consumers primarily support local food for three key reasons: freshness, ethical choices, and contributing to the local economy. These findings align with the Buller district food system research, where the most chosen benefits were 'supporting local people/local economy' and 'fresher produce.' Additional benefits included 'better quality (taste/ flavour),' 'knowing the source,' and 'community sustainability and/or resilience.'

[25] Home-kill meat would mean that not all animals travel out of the Buller district for processing, however, home-kill is not for commercial sale, therefore is not included in the research. Also, little data exists regarding how much home-kill meat would be produced within the district.

5 Appendix One: Methodology of the Baseline Foodshed Analysis

5.1 Factor I: The Size of a Foodshed's Population

The populations of each territorial authority within the Buller district are calculated from Statistics New Zealand estimate for the population as of 30 June 2022.

Using the estimate for the population, as opposed to the usual resident population, is a statistical projection or estimation of the population size at a given point in time, typically between official census years. These estimates are based on a variety of data sources and statistical methods, including birth and death registration, migration data, and demographic modelling. Estimates are essential for providing up-to-date population figures between census years. They are subject to periodic revisions to improve accuracy and reliability.

The usual resident population refers to the total number of people who reside in a specific geographical area, such as a country, region, city, or district. It includes both permanent residents and long-term temporary residents who have established their residence in that area. The resident population is typically determined through official census counts, which are conducted at regular intervals, such as every five or ten years in many countries. Census data provides a comprehensive and accurate count of the population at a particular point in time.

5.2 Factor II: Working out Average Food Consumption

As there is no data that specifically provides kg per person per year for Aotearoa New Zealand, many different data sets are analysed to produce a set of numbers that could be extrapolated out to create the average food consumption for the Buller foodshed.

5.2.1 Explaining the MOH data

The New Zealand Ministry of Health's Eating and Activity Guidelines for New Zealand Adults (Ministry of Health, 2020b) and the information sheet on serving sizes (Ministry of Health, 2020a) provides recommendations on how much food one person would eat to maintain a healthy diet.

They define 'healthy diet' as one which provides sufficient energy for the person plus ten key nutrients of protein, thiamine, vitamin A, vitamin C, folate, calcium, iodine, iron, magnesium, and zinc.

The serving size estimates are given in grams but are based on the energy content of the food type and their key nutrient content.

The weight of a serving of vegetables (~75g/serve) is less than half the weight of a serving of milk and milk products (~250g for a cup of milk). An adult consuming the recommended servings of 5 vegetables and 3 milk products will eat 375g/day and 700g/day of these food types respectively.

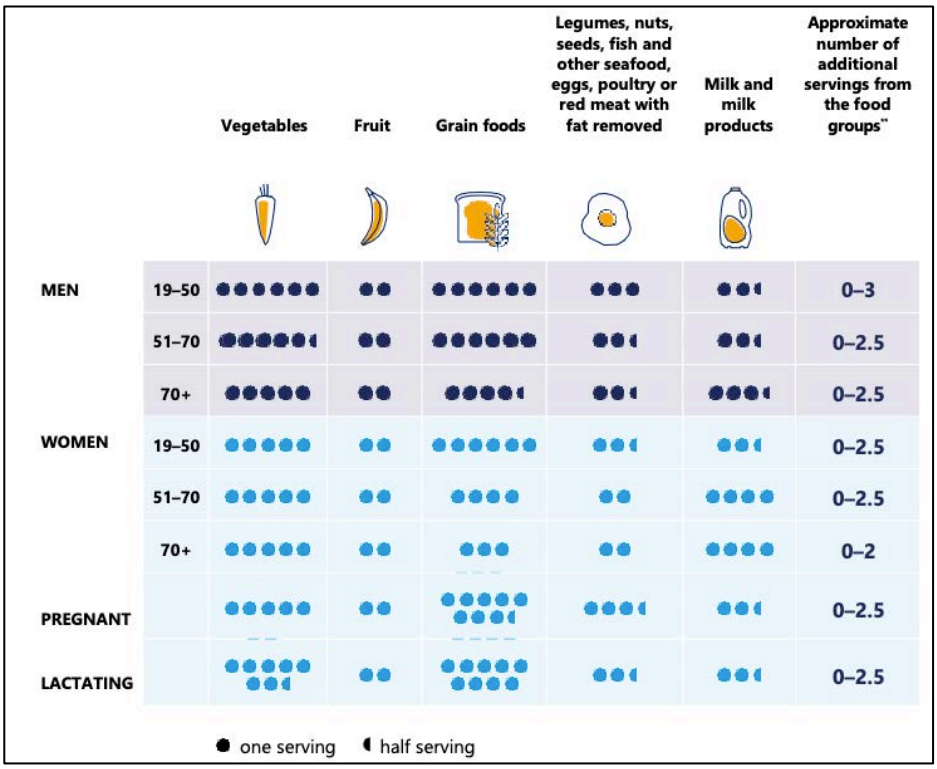

Figure 75: The recommended number of servings per day from each of the food groups for adults in different age groups (Ministry of Health, 2020a, p.5)

The food group referred to as “Legumes, nuts, seeds, fish and other seafood, eggs, poultry, and/or red meat with the fat removed” in (Figure 75) is often called the “protein group”, because this food group provides many important nutrients, such as protein, iron, zinc, B vitamins.

To determine average food consumption, the recommended number of servings per day from each of the food groups for men and women in the aged groups 19-50, 51-70 and 70+ (Figure 75) are multiplied by the standard serving weights provided for different types of food within each food group within the same document (Ministry of Health, 2020a). For example, in the protein group, a standard serving is 500–600 kJ, and is explained as being about the same as:

- 1 cup (150 g) cooked or canned beans, lentils chickpeas, or split peas (preferably with no added salt)
- 170 g tofu
- 30 g nuts, seeds, peanut or almond butter or tahini or other nut or seed paste (no added salt)
- 100 g cooked fish fillet (about 115 g raw) or one small can of fish
- 2 large (2 x 60g=120g) eggs
- 80 g cooked lean chicken (100 g raw)
- 65 g cooked lean meat such as beef, lamb, pork, veal (90–100 g raw) – no more than 500 g cooked (700–750 g) red meat each week.

Taking the weights listed above, the raw food weight is always used and where there are 2 or more weights, the weight is averaged out and multiplied with the number of servings per day, and then averaged across the food group, thus determining MOH’s recommended average food consumption.

5.2.2 Highly processed foods

Highly processed foods or ultra-processed foods (UPFs) are not included in this study. Processed foods mean food products that have undergone some form of alteration from their original state. The degree of processing can vary, and not all processed foods are unhealthy. However, highly processed foods or UPFs often contain ingredients are not commonly used in home cooking and contain additives, preservatives, flavourings, emulsifiers, sweeteners, colourings, and other substances to enhance flavour, texture, and shelf life. Highly processed foods or UPFs are often energy-dense and nutrient-poor, meaning they provide a high number of calories but offer little in terms of essential nutrients. Common categories and examples include:

- Soft Drinks and Sugary Beverages:
    - Soda.
    - Fruit-flavoured drinks.
    - Sweetened iced tea.
- Snack Foods:
    - Potato chips.
    - Crackers.
    - Candy bars.
    - Cookies.
    - Processed snack cakes.
- Instant Noodles and Ready-to-Eat Meals:
    - Instant ramen noodles.
    - Microwaveable dinners.
    - Frozen pizzas.
    - Pre-packaged soups.
- Fast Food:
    - Hamburgers and cheeseburgers.
    - French fries.
    - Fried chicken.
    - Fast-food sandwiches.
- Processed Meats:
    - Deli meats (processed ham and sliced turkey may undergo processing with additives to enhance flavour and shelf life).
    - Hot dogs are highly processed sausages made from a variety of meats, often including beef, pork, and chicken and are typically high in sodium and may contain additives.
    - Bacon is usually cured and smoked, and it can be high in saturated fats, sodium, and added preservatives.
    - Canned vienna sausages are small sausages preserved in a can, often high in sodium.
    - Canned corned beef is processed corned beef which often contains added preservatives.

    - Breaded and processed chicken products may contain additives for flavour and texture.
    - Processed chicken patties, often found in fast-food products may contain additives for flavour and texture.
- Breakfast Cereals:
    - Many sweetened and flavoured cereals.
- Microwave Popcorn:
    - Flavoured microwave popcorn with additives.
- Packaged Baked Goods:
    - Pastries.
    - Doughnuts.
    - Store-bought cakes and cookies.

Research has suggested that a high intake of ultra-processed foods is associated with negative health outcomes, including obesity, cardiovascular diseases, and metabolic disorders. In contrast, a diet rich in whole, minimally processed foods—such as fruits, vegetables, whole grains, and lean proteins—has been linked to better health outcomes.

5.2.3 Limitations of the data

It is important to note, that data of this nature has limitations, some are listed here:

- **Inaccuracies in data sources:** National data submitted to the FAOSTAT, for example, could be inaccurate because food that is not purchased (home grown or traded for example) is excluded from submitted data and because FAOSTAT reports the total food consumed within the country for a given year, including by tourists.
- **Mahinga kai, hunted, gathered and homegrown food:** As indicated above, FAOSTAT food supply data may not fully capture food grown at home, whether on farms or in back gardens, nor does it capture any information on the amount of mahinga kai or food hunted or gathered from land or ocean. Mahinga kai and homegrown produce often falls outside the scope of official statistics, which could lead to an underestimation of the FAOSTAT total food supply.
- **Data sources:** Different data sources, methodologies, and assumptions are used to compile the 'Total Estimated Consumption' data. The MOH's dietary recommendations are based on nutritional guidelines but do not separate out all the different food types required to create a comprehensive 'Total Estimated Consumption' dataset. The FAOSTAT dataset has a few anomalies (such as the 2011 double amount of dairy consumed) which also makes it unreliable as the sole 'Total Estimated Consumption' dataset. When a different global data site called "Our World in Data"[26] is analysed, it provides quite a different picture in terms of consumption of dairy, fish, and vegetables in Aotearoa New Zealand, see Figure 76.

[26] https://ourworldindata.org/grapher

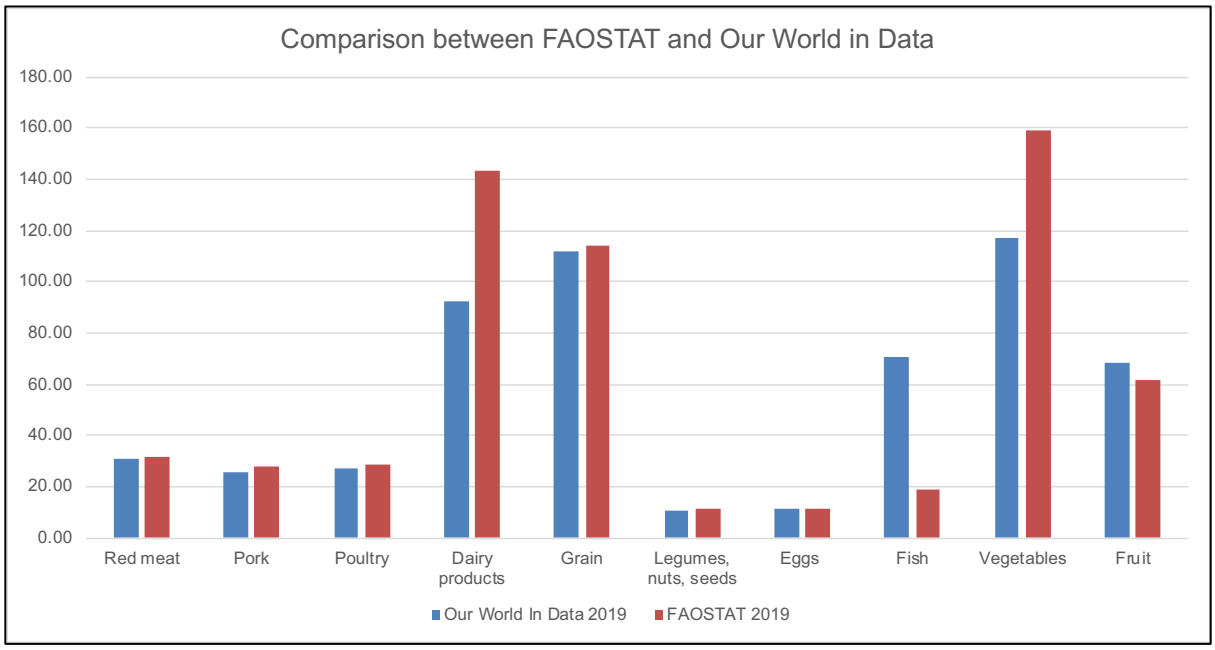

Figure 76: Data interpreted from Our World in Data website for Aotearoa New Zealand in 2019 (in kg/person/yr)

However, the Our World in Data shows dairy products are reported as 92 kg (but are only milk products). FAOSTAT reports on milk, butter and cream as shown in the graph in Figure 76 as 143 kg/person/year (135 kg/person/year is milk products), meaning there is a significant difference of 43kg per person per year. Fish is reportedly 70 kg/person/year in 2019 by the Our World in Data compared to 19 kg/person/year by FAOSTAT. Vegetable consumption is reported as 117 kg/person/year in 2019 by the Our World in Data compared to 159 kg/person/year by FAOSTAT.

Red meat, pork, poultry, grain, legumes, eggs, and fruit are very similar between datasets.

- **Difference between milk products and dairy products:** FAOSTAT includes all products within the dairy family, such as milk, cream, and butter. MOH and Our World in Data excludes high fat dairy products, such as cream and butter. The process of analysing the data could have resulted in errors whilst trying to match dairy or milk products.
- **Inclusion of "beverages" and "other":** The exclusion of "beverages" and "other" categories in the MOH data can contribute to inaccuracies in the data, oils are included in the “additional servings”, but have not been separated out in the comparisons presented in this report. These categories may also include items like tea, coffee, cocoa, wine, beer and fermented drinks, oils, fats, offal meat, sweeteners, and crustaceans, that are part of the FAOSTAT total food supply but are not included in the ‘Total Estimated Consumption’ dataset, due to them being too difficult to calculate.
- **Exclusion of highly processed foods:** MOH and FAOSTAT do not include highly processed food, which is included in the Adult Nutrition Survey data. Both the MOH and FAOSTAT data present results of raw food only. This could be problematic to the composition of the average food consumption model, but due to a lack of data it is difficult to make assumptions for people in the Buller district regarding how much highly processed food they do or do not consume.
- **Differences in years:** Data from the Adult Nutrition Survey is from 2008/2009, which is ten years difference to the FAOSTAT data (2019) and 12 years different to the MOH 2020

recommendations, this can result in variations due to changing consumption patterns over time.

- **Types of meat:** Data from OECD-FAO and the Adult Nutrition Survey highlight variations in meat consumption patterns among different types of meat, such as beef, sheep (lamb and mutton), pork, and poultry, whilst MOH group all protein products together. The process of analysing the data could have resulted in errors whilst trying to match types of meat across datasets.
- **New research supersedes old:** Data on vegan, vegetarian and meat-eating diets has recently (5th December 2023) been published in *Public Health Nutrition* (Greenwell, et al. 2023). According to the latest analysis of data from the New Zealand Health Survey, 93% of Aotearoa New Zealanders eat red meat, 2.9% do not eat red meat, but do eat seafood and poultry, 1.4% are pescatarians (no red meat or poultry, but do eat fish), 2% are true vegetarians (no meat or seafood at all) and 0.7% are true vegans (no meat, seafood or animal-derived products such as dairy). These figures are significantly different to the Kantar reports (2020 and 2022).

5.3 Factor III: Evaluation of the Different Land Use Types

The AgriBase® land-use dataset is used to spatially evaluate land use across the project area. The AgriBase® dataset is selected as the most appropriate and reliable dataset for this research and is purchased from AsureQuality Limited accordingly (note: there are limitations with the dataset, as outlined in Dataset Limitations on page 83).

The AgriBase® dataset was imported into ArcInfo, a fully featured Geographic Information System (GIS). The dataset overlaid existing topographic information sourced from the publicly available Google Earth data. Adjustments were made to the GIS layers, ensuring accuracy of alignment of the two layers.

5.4 Factor IV: Food Production Estimates

Factor IV is the approximate food weights produced from the farmland, based on the quantity of each food product that can be grown.

To calculate the volume of food produced across the foodsheds the predominant commercial farming systems that are common across this area were used as the basis by which to calculate farm productivity.

5.4.1 Farming systems analysed

The sheep and beef cattle farming model are representative of farms across the Buller district. This area is characterised by mountainous terrain and terraced valleys, coastal ranges, and alpine landscapes. Buller has moderate rainfall, about 2,593 mm/yr in Westport, a lack of persistent wind, and mild temperatures.

Alluvial deposits on the valley floors have high productive potential for agricultural use. Poor drainage has impeded the development of larger areas of good quality fertile soils. Large areas of upland and high country have soils which are generally of low fertility.

The typical sheep production system is breeding ewes with some hogget lambing, and most lambs finished. Twenty percent of lambs are held annually as replacement breeding ewes with cull ewes included in the farm's meat production. A beef cattle herd representing 30% of the farm's stock units has the majority of calves finished, and 20% retained as replacements.

Typical farm productivity values reported by Beef and Lamb NZ for extensive pastoral sheep and beef cattle farming in the northern-central South Island are used to characterise these farms[27].

Stock numbers present in the district can be estimated based on the stocking rate recorded by Beef and Lamb NZ and the area of land used for farming, recorded in AgriBase®. The stocking rate is calculated based on the effective farm area. Effective area is where animals are grazed and excludes areas fenced off to conserve water quality and biodiversity as well as bush and scrub areas and farm forestry blocks. It was assumed that 80% of the total area of sheep and beef farms recorded in AgriBase® was effective. For dairy farms and beef farms 90% was considered effective. The stocking rate is shown in Table 15.

Table 15: Stock units for pastoral farming models

Stock type	Stock units
Sheep	1.1
Beef cow	6
Rising 2 year old beef animal	5
Rising 1 year beef animal	4.5
Weaner calf	2

The sheep and beef farming systems are typically dependent on farmer's managing a herd of breeding animals, which are only culled for consumption at a time when they are considered to be unfit for purpose. That is, the breeding livestock are normally retained for breeding, rather than for consuming. Primarily it is the offspring of these breeding stock that are sold each year for consumption (Table 16).

Table 16: Sheep and beef farm productivity information

Sheep and beef farm productivity metric	Metric value
Stocking rate (SU/effective ha)	9
Lambing rate (%)	130
Calving rate (%)	82
Fawning rate (%)	80
Ewe replacement rate (%)	20
Cow replacement rate (%)	20
Percent of farm stock sheep (%)	70
Percent of farm stock cattle (%)	30
Area of farm non-productive (%)	20

[27] https://beeflambnz.com/industry-data/farm-data-and-industry-production/sheep-beef-farm-survey

Beef and Lamb NZ in their 2022 annual report calculate meat production across all classes of sheep and beef farm at 125 kg/ha [28]. In the model prepared for the Buller district, overall meat production across sheep and beef cattle, sheep only, and beef cattle only farms was lower at 102kg/ha/yr reflecting the lower stocking rate of these farms in this district.

It is important to note that dairy cows contribute to the total red meat numbers, as dairy cow culls.

Dairy farms in the West Coast and Nelson Marlborough regions make up 5.1% of the national herd count and 5.6% of the dairy farming area in New Zealand. The dairy farming model (Table 17, page 80) is based on owner-operated seasonal supply dairy farms which make use of a run-off dairy grazing block. Dairy farm productivity information was drawn from Livestock Improvement Corporation[29] and Dairy NZ[30], while dairy cow numbers for the Buller district were drawn from Statistics NZ[31].

Table 17: Dairy farm productivity information

Dairy farm productivity metric	Metric value
Stocking rate (cows/ha)	2.2
Milk production (kg Milksolids/ha)	750
Dairy cow replacement rate (%)	22%
Liveweight at culling (kg)	480

Dairy products have been analysed as milk liquid (raw milk). This is not the common measure for milk production within the Aotearoa New Zealand dairy industry but is the measure that consumers can easily relate to and is easily understandable.

Poultry production information was sourced by phone call from the New Zealand Poultry Association[32] to estimate the number of layer chickens and broilers in the study area and egg production information.

Production from horticultural land was estimated based on production information for lettuces[33], potatoes[34], pumpkins[35], and broccoli[36]. Despite there being no horticulture land identified within AgriBase®. It assumed these types of products each occupied a quarter of the total horticultural land

[28] https://beeflambnz.com/sites/default/files/2023-06/BLNZ-AR-2022.pdf
[29] https://www.lic.co.nz/about/research-publications/dairy-statistics/
[30] www.dairynz.co.nz/media/uzeekwgr/nz-dairy-statistics-2021-22-web.pdf
[31] https://www.stats.govt.nz/indicators/livestock-numbers
[32] https://www.pianz.org.nz/
[33]https://wikifarmer.com/how-to-grow-lettuce-lettuce-complete-growing-guide-from-seeding-to-harvesting/#:~:text=The%20average%20lettuce%20yield%20per,2%2D4%20crops%20a%20year.
[34] https://www.tupu.nz/en/fact-sheets/potatoes#:~:text=The%20yield%20depends%20on%20the,of%2064%20tonne%20per%20hectare.
[35] https://wikifarmer.com/pumpkin-yield-harvest-and-storage/#:~:text=Pumpkin%20producers%20report%20that%20they,stresses%20during%20the%20growing%20period.
[36] https://agriculturegurujji.com/broccoli-farming/#:~:text=Harvest%20broccoli%20when%20it%20Heads,hectare%2C%20depending%20upon%20the%20variety.

area and that two crops of lettuces were produced per year, while for the other vegetables there was a single crop per year.

For orchard fruit, yields of apples and pears were taken from New Zealand Apples and Pears information[37] and the yield for other orchard fruit was estimated based on data provided through the interviews.

5.4.2 Fish harvest

Fish consumption per capita for the Buller district was estimated at 22kg/person/year. This figure is based on the report by FAO of per capita consumption across Aotearoa New Zealand of 22kg[38] and of 26 kg per capita in 2010[39].

Fish harvest data was obtained from Fisheries Inshore New Zealand[40] and is an estimation based on details for the fishing region FMA7 Challenger/Central (Plateau) (Figure 77). FMA7 Challenger/Central (Plateau) has a total coastline of 3,390 km. Data was then calculated based on average annual fish harvest (2023), retrieved from the Ministry for Primary Industries[41].

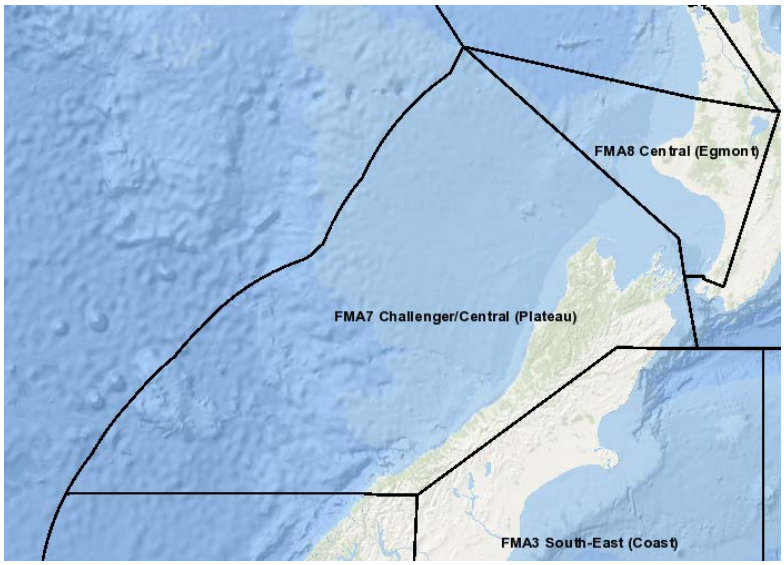

Figure 77: Map showing FMA7 Challenger/Central (Plateau)

Assumptions made:

- It is assumed that the Buller district coastline (approximately 200 km) is approximately 6% of FMA7's coastline.
- It is assumed that a 12 nautical mile boundary exists within the Fish Management area (NIWA 2012).

[37] www.productivity.govt.nz/assets/Submission-Documents/immigration-settings/DR-172-New-Zealand-Apples-and-Pears-Inc.pdf
[38] https://www.fao.org/documents/card/en/c/ca9229en
[39] https://www.fao.org/fishery/en/facp/nzl?lang=en
[40] https://www.inshore.co.nz/
[41] https://fs.fish.govt.nz/Page.aspx?pk=41&fyk=36

6 Appendix Two: GIS Spatial Evaluation of Land Use

The GIS spatial evaluation of land use across the project area used the best available dataset. The following data was supplied as part of the purchased AgriBase® dataset.

6.1 Data Supply Specifications

6.1.1 Farm identification

Each farm within the study area is allocated an identification character, and has total farm size quantified, and the predominant land use categorised, these are shown in Table 18.

Table 18: Farm identification

farm_id	Unique farm identifier assigned by AsureQuality Limited
size_ha	Total area of the property in hectares as reported by farmer/occupier, rounded to one decimal place
ftype	The predominant land use on the property (refer to the Farm Type Descriptions in Table 19)

6.1.2 Farm type descriptions

Based upon information that the landowner submits to AsureQuality Limited, each farm is assigned a farm type code. The farm type code represents the predominant land use on that property. The codes are described in Table 19.

Table 19: Farm Type Descriptions

Farm Type Code	Description
ALA	Alpaca and/or Llama Breeding
API	Beekeeping and hives
ARA	Arable cropping or seed production
BEF	Beef cattle farming
DAI	Dairy cattle farming
DEE	Deer farming
DOG	Dogs
DRY	Dairy dry stock
EMU	Emu bird farming
FIS	Fish, Marine fish farming, hatcheries
FLO	Flowers
FOR	Forestry
FRU	Fruit growing
GOA	Goat farming
GRA	Grazing other peoples stock
HOR	Horse farming and breeding
LIF	Lifestyle block

Farm Type Code	Description
NAT	Native Bush
NEW	New Record - Unconfirmed Farm Type
NOF	Not farmed (ie idle land or non-farm use)
NUR	Plant Nurseries
OAN	Other livestock (not covered by other types)
OPL	Other planted types (not covered by other types)
OST	Ostrich bird farming
OTH	Enterprises not covered by other classifications
PIG	Pig farming
POU	Poultry farming
SHP	Sheep farming
SNB	Mixed Sheep and Beef farming
TOU	Tourism (i.e. camping ground, motel)
UNS	Unspecified (i.e. farmer did not give indication)
VEG	Vegetable growing
VIT	Viticulture, grape growing and wine
ZOO	Zoological gardens

6.2 Ground Truthing AgriBase®

Due to inconsistencies noted by the researchers whilst mapping data from AgriBase®, some landowners were contacted to ground-truth information. For example, AgriBase® indicated pig farming and poultry farming for meat were occurring within the Buller district. Once landowners were contacted, these types of food production were dismissed and deleted from the maps. Other landowners were contacted to determine the amount of land used for other food types, such as vegetable growing, berry growing and orchard fruit growing.

6.3 Dataset Limitations

AgriBase® data faces several issues. Data is collected via a questionnaire. Interpretation of the questionnaire varies, especially in determining the dominant farm type with multiple land uses. For example, criteria for determining the dominant farm type poses challenges, such as economic return, land area, or the landowner's preference for classification, are not clearly defined. Despite improvements in the questionnaire over the years, significant omissions persist, including details on grazing stock owned by others and discrepancies in stock numbers provided. Respondents provide varying levels of detail, with inconsistencies like a farm specified as predominantly sheep (SHP) having more cattle than sheep. Updates from AsureQuality have not been provided, and after ground truthing some large properties, not every farm is updated. Moreover, AgriBase® has overlapping polygons, potentially leading to double counting, with errors or shared land use by different enterprises.

Examples of specific errors in the main classification include 0.25 hectares of vegetable growing was included for the Buller district (sourced in January 2022). However, local knowledge and a phone call to the property owner revealed this was not the case, apparently, "*they shut down about two years*

ago, retired with no one to take the business over." In the subclass categories, 29.4 hectares of vegetable growing was included in the dataset, however, phone calls to these landowners revealed that none of them grow vegetables commercially on this land. Furthermore, a significant vegetable grower, well known within the district, did not appear in the AgriBase® dataset. This error could be because the primary production on the land is dairy cattle, however, the land owned confirmed at least 2 hectares is for commercial vegetable growing. A further error showed 8.43 hectares of pig farming in Blackball, which is outside of the Buller district.

Therefore, errors were noted with the data from AgriBase®, which leads to limitations for analysis due to there not being enough time to ground truth every line of data.

7 Appendix Three: Methodology of the Baseline Food System Analysis

7.1 Food Grower Interview Design and Collection

Farmers and growers were identified through KNECT who attempted to contact as many farmers and growers as possible in the district. Six interviews were conducted, five in person and one over the phone.

7.1.1 Data gathering

A series of questions were developed based on the previous experience from the Otago Food Economy research (Millar, et al., 2016). The questions were modified to draw out relevant data from the food producers (farmers and growers of different food types). The intention of the interview was for data to be collected directly from farmers and growers in the Buller district. Three of the six interviews were conducted at the home of the growers by researchers from Ahikā. One was in a café and two were over the phone. The Ahikā researchers were taken on two tours of key food growing areas in the Buller district (Karamea and around some Pāmu farms). Through these tours additional information was gathered and added as additional comments through the analysis, where relevant and informative.

7.1.2 Data analysis

Interview data was recorded directly into Forms (an Office 365 product) then exported into Excel for analysis. The qualitative data was analysed and within each question, organised into conceptual categories to create themes that were used to analyse the data. The data was reviewed several times to allow for the multiple layers of coding, each time assessing the data to identify key themes.

7.1.3 Data limitations

A diverse range of farmers and growers were sought. Due to limitation in the amount of diversity of food growers there are in the Buller district, a reduced number of interviews were conducted. There are no known pig farms or chicken farms (for meat). There are no grain crops grown and very few vegetable, fruit, and berry growers. There is only one egg producing farm, who did not respond to the invitation to participate.

7.2 Food Processing and Distribution

There is minimal food processing in the Buller district, there are two known bakeries, a butchery of small produce, a pie manufacturer, a sauce manufacturer, one wholesale distributer and a seafood processing factory.

7.2.1 Data gathering

Talley's is a large seafood processing company in Westport and was approached for information and data. A conversation was held with one of the researchers and data was promised in email form,

however, after 3 attempts to connect, no data was received. New Zealand Pork was approached for information on pork processing in the area, but no response was received. There is one wholesale distributer in the area who was approached to participate in the research, but no response was received. The pie manufacturer was interviewed but due to them also owning a café, their results are included in the food premises analysis.

7.2.2 Data analysis

One of the respondents to the food retailer survey (described below) indicated they were wholesale as well as a café and grocer. The data from this survey response was analyses with the food premises data.

7.2.3 Data limitations

There are minimal food processing facilities in the Buller district, unfortunately, from the ones contacted there was a lack of willingness to participate in the research (which could be a result of time, resource, or confidentiality constraints).

7.3 Food Premise Interview and Survey Design and Distribution

The KNECT team approached many food retailers and asked if they wanted to participate in the research. Four of the five supermarkets within the Buller district were engaged in the research. 14 food retailers of the 73 known food retailers were also engaged in either an interview or a survey. In total 20% of food retailers were engaged in the research.

7.3.1 Data gathering

A series of questions were developed based on the previous experience from the Otago Food Economy research (Millar, et al., 2016). The questions were modified to draw out relevant data from the commercial food retailers in the Buller district. Data was gathered in two ways; an online survey was complete by those businesses who were too busy to participate in an interview but showed interest in participating in the study. Two supermarkets completed the online survey and were then interviewed later. A different set of questions were used to draw out further information from the supermarkets. Three other in-person interviews were conducted, one used the online survey as the basis of the interview, meaning survey results were n=14, and the other interview results were n=4. Due to the duplication in the two supermarkets, the total food premises is n=16.

7.3.2 Data analysis

The interviews were recorded directly into Forms (an Office 365 product) then exported into excel for analysis. The surveys were also recorded directly into Forms then exported into excel for analysis. This allowed results to be combined where the same question had been asked to both groups of respondents. The interviews were shorter in questions but longer in answers. Some questions were asked of the survey participants but not of the interview participants, therefore some results are n=14 (to indicate where the survey results were used) and others are n=16 (to indicate when all responses

were combined and analysed together). The data was reviewed several times to allow for the multiple layers of coding, each time assessing the data to identify the key themes.

7.3.3 Data limitations

A wide range of food premises were identified and surveyed. However, some food premises are also food processing premises, and all the data has been analysed together as food premises.

7.4 Consumer Survey Design and Distribution

A series of questions were developed based on the previous experience from the Otago Food Economy research (Millar, et al., 2016). The interview questions were modified to draw out relevant data from the consumers, a specific survey was created to gather further data and was sent out as an online survey. The intention was for data to be collected directly through an interview, however due to the busy nature of many consumers, a survey was emailed to consumers who showed an interest in participating in the study.

7.4.1 Data gathering

One of the KNECT team loaded the interview questions onto an electronic tablet and approached consumers outside a variety of food retail premises in Westport and Karamea. Many people declined to participate on the grounds that they were in a rush/too busy. The team member specifically chose different types of people and different times of the day to ensure a wide range of participants were engaged in the research. In total, 21 interviews were conducted over a couple of weeks. Due to the time-consuming nature of interviews and the many people who requested an online survey, one was created and circulated via the same KNECT team member. The online survey was left open for four weeks and a total of 69 consumers responded.

7.4.2 Data analysis

The interviews were recorded directly into Forms (an Office 365 product) then exported into excel for analysis. The surveys were also recorded directly into Forms (an Office 365 product) then exported into excel for analysis. This allowed all results to be combined, meaning the 21 interviews and the 69 surveys were treated as one group (n=90). The qualitative data was analysed and within each question, organised into conceptual categories to create themes that were used to analyse the data. The data was reviewed several times to allow for the multiple layers of coding, each time assessing the data to identify the key themes.

7.4.3 Data limitations

A variety of consumers were interviewed and surveyed; however, a limitation of the data gathering is that it is likely consumers with limited time would not have completed the survey or would have refused to participate in the interview.

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