

Farm share of retail prices

Analysis of domestic farmer margins in a globalised world

NZIER report to Federated Farmers and Horticulture New Zealand

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NZIER was established in 1958.

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Key points

Purpose

This report illustrates the farm share of domestic food prices in New Zealand.

The farm share has remained constant over time

Table 1 sets out the farm share of retail prices over time. It shows a relatively constant share despite the ebb and flow of prices in what is a very competitive market (between 20% and 23%).

Table 1 The farm share

	Farm share			
Weighting	2008	2012	2016	2019
Meat	30%	30%	29%	31%
Dairy	19%	20%	20%	19%
Grains	22%	21%	22%	22%
Fruit	10%	10%	10%	10%
Vegetables	18%	18%	17%	16%
Eggs	2%	2%	2%	2%
Farmers share of total basket	21.41%¹	22.53%	20.00%	20.32%

Note (1) This is a slightly different result from the 2008 NZIER report. To be consistent with reported prices from Statistics NZ in 2019 we have taken out honey, mushrooms, onions, asparagus and pasta (wheat product) and reweighted the basket. Apart from mushrooms these product prices are not recorded in the 2019 Food Price Index see <https://www.stats.govt.nz/information-releases/food-price-index-january-2019>. Mushrooms are a non-typical horticultural product.

Source: NZIER

Higher or lower food prices are due to a variety of factors

Farmers are only one part of the supply chain. Higher food prices can be caused by many factors along the marketing chain. Costs include transportation, processing, marketing, and wholesale and retail mark-ups. When these other costs increase, they not only put upward pressure on the retail price of food but may also put downward pressure on farmer's returns from higher food prices.

Small, open economies are typically price takers

International factors have a large impact on food prices in New Zealand. The demand for exports such as meat, milk, apples and kiwifruit are typically referenced to overseas

prices. Significant imports such as pork and wheat are subject to the ebb and flow of commodity prices.

The entry of China to the world markets over the past 20 years has had a significant positive impact by increasing demand for New Zealand food products and reducing inflationary pressures in New Zealand (by providing cheaper goods). The so called 'double dividend'.

The focus is always on prices paid for food

Periodically, there is concern over the affordability of food by consumers. More recently there has been comment about domestically-produced food that is much more expensive than other industrialised nations.

The fluctuations are usually due to weather conditions (cold snaps, wet weather, or drought). As one commentator suggested *"higher prices usually occur when growers/farmers have the least amount of product to sell"*.

New Zealand food produced exclusively for the domestic market is more expensive than overseas jurisdictions. The much smaller size of operation and labour costs all along the marketing chain limit the ability to produce at substantially lower prices e.g. the wage price per hour for rural workers in horticultural/vegetable production in the United States is roughly half that of equivalent workers' labour costs in New Zealand.

Small changes overseas have big impacts in New Zealand

The recent outbreak of African swine fever in China demonstrates the impacts of market-based changes. The fall in Chinese pork production has pushed up demand for New Zealand beef and increased the price of pork in New Zealand as the Chinese look overseas to make up their short fall in protein.

Similarly, production surges in the Americas and European Union of beef, pork, and milk can have depressing impact on prices.

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1. Food prices show steady growth

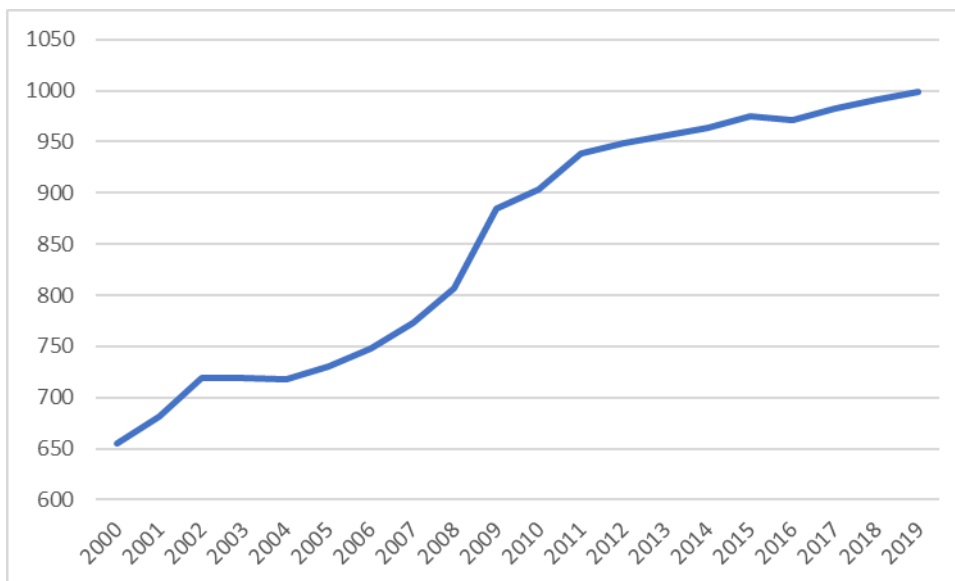
Incomes are rising; food prices show steady growth

There is always concern about food prices. Politicians, food stakeholders, media, and the general public all take a keen interest in the Stats NZ's food price releases. Currently, food prices show steady growth (2.8% between January 2016 and January 2019). However, incomes are growing faster (average gross hourly earnings increased by 7% between January 2016 and January 2019).

This report examines the farmers' share of revenue from domestic food prices. As part of this process we also illustrate the impact of globalisation and how small changes in the international market place can have significant impacts in New Zealand.

Figure 1 Food Price Index

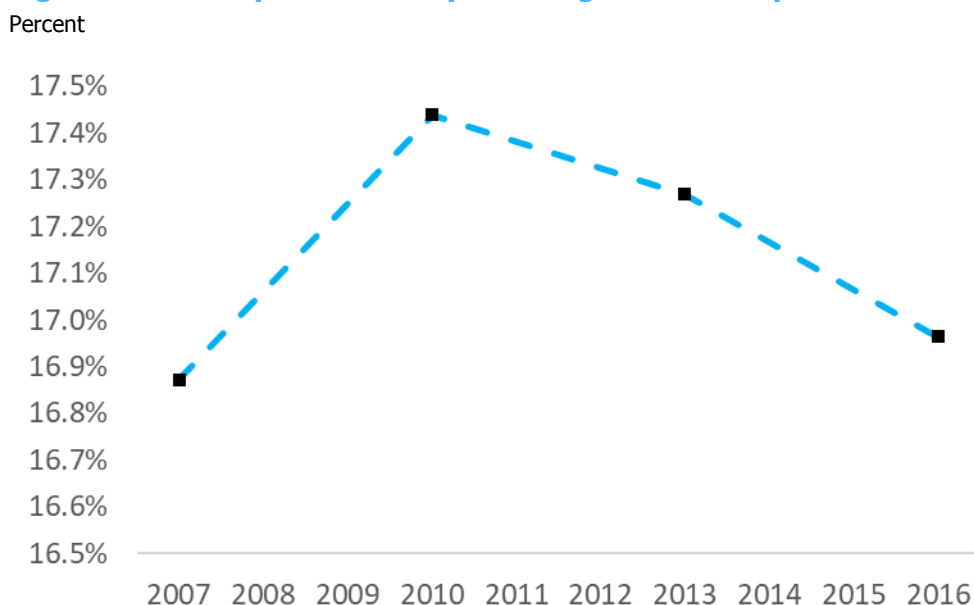
Index numbers; 2017 June Year = 1,000



Source: Stats NZ

Figure 2 shows that food as a proportion of incomes has declined. Although this is masked somewhat by the impact of the Global Financial Crisis (GFC). If the GFC was removed from this picture it is likely that food expenditure as a percentage of income would remain at similar levels as 2008.

Figure 2 Food expenditure as percentage of total expenditure



Source: Stats NZ, Household Expenditure Survey

Evaluating performance of the food system depends on where you stand...

It might be thought that the performance of a supply system could be evaluated in terms of how well the agricultural and food marketing system performs and what society and the market participants expect of it.

However, it soon becomes apparent that marketing systems have multiple and often conflicting goals. Compromises and trade-offs are necessary if the various participants in the marketing system are to be satisfied. For example, consider the perspectives of four parties involved in agricultural marketing systems: consumers, farmers, society and government.

Consumers are likely to evaluate a marketing system in terms of its performance in avoiding high and fluctuating prices, shortages in supply, and consistency in delivering products or produce of acceptable quality.

Farmers' concerns could be rather different. Their criteria might include the margin they receive, the price, and accessibility of marketing infrastructure at reasonable cost (e.g. suitable storage and transportation).

Government's perceptions of a marketing system will also be coloured by its impact on employment, food safety, environmental impacts, and ethical issues such as animal welfare. In addition, government will probably take into account the sector's contribution to investment, economic growth and the national treasury through its taxable income and its impact on other sectors.

1.1. The extent of food price rises

The Food Price Index is steadily growing ...

Over the past five years Stats NZ's Food Price Index (FPI) has risen on average by 0.7% per annum, although there was one slight fall in 2016.

The FPI is the main source of information for measuring increases and decreases in food prices. The FPI measures the prices in a standard "basket" of foods purchased by households over a year.

To check the impact of value-added products we broke food expenditure down by income deciles and found that the proportion spent by decile 10 has declined.² For other deciles, food expenditure has increased over time for decile 1 (as a percentage of total household spend) but for deciles 2–9 we found mixed results.

This is set out in Appendix A.

Potentially this result is only a partial picture given the niche high-end agricultural and horticultural products being consumed in food services and restaurant trade.

Below we set out the changes in food prices for five groups of foods since 2008. These groups are weighted together for an overall FPI.

Table 2 Changes in the Food Price Index by group

June 2017 = 1000

(January)	Fruit & vegetables	Meat, poultry, & fish	Grocery food	Non-alcoholic beverages	Restaurant meals ready to eat food	Index	% change from same month in the previous year
2008	682	828	866	801	790	807	4.4%
2009	773	925	953	857	838	884	9.5%
2010	765	953	969	910	861	904	2.2%
2011	828	968	1007	920	896	938	3.8%
2012	791	970	1031	940	916	948	1.0%
2013	838	988	1015	959	922	956	0.8%
2014	827	991	1024	981	937	964	0.9%
2015	885	1019	1007	991	953	975	1.2%
2016	874	1008	986	994	972	971	-0.5%
2017	901	997	1003	1002	990	983	1.2%
2018	885	1006	1013	1000	1014	991	0.8%
2019	852	1025	1022	991	1044	999	0.8%

Source: Stats NZ

² The highest income decile.

...fruit and vegetable prices are volatile

Easily the most volatile component of the FPI has been fruit and vegetables prices. Changes from January to January have been as high as 14% (2009) or as low as -4.0% (2004, 2012, and 2019).

Stats NZ report that prices of fruit and vegetables tend to show a seasonal pattern due to seasonal changes in temperature, weather, and availability. In the summer months vegetable prices tend to be lowest while fresh fruit (apples and kiwifruit crops) tends to be cheaper during the winter (since they have just been picked).

Spring and autumn can also be volatile. Fresh fruit prices can rise rapidly during spring and peak in summer. They then tend to drop in the autumn as the harvest arrives. Vegetable prices tend to increase during autumn and winter and decrease during late spring and summer.

This 'normal' pattern can be disrupted by droughts or abnormally wet weather. There is a lot of supply and price variation due to weather conditions.

Price rises led by vegetables...

The biggest price rises are led by vegetables. Lettuce, broccoli, cabbage, and carrots all have increased in price by over 50% in the last eleven years. Other products that have increased by over 50% are lamb chops and minced beef. At the other end of the spectrum prices for tomatoes, white bread, chicken, and cheddar have fallen slightly.

Table 3 Prices of particular foods

January 2008 – 2019. \$ per kg unless specified, supermarket sales

Farm output	Supermarket Product	2008	2012	2016	2019
Apples	Apples	3.37	3.39	5.04	3.98
Kiwifruit	Kiwifruit	3.85	4.03	4.90	5.32
Peaches	Peaches – canned 410g	1.49	1.75	1.65	1.58
Lettuce	Lettuce	1.91	2.93	2.83	3.72
Broccoli	Broccoli	3.18	4.53	6.23	7.89
Cabbage	Cabbage	1.08	1.36	2.16	1.64
Tomatoes	Tomatoes	3.23	3.61	3.35	2.79
Carrots	Carrots	1.61	1.99	3.42	2.49
Mushrooms	Mushrooms	9.23	10.90	11.52	12.11
Potatoes	Potatoes	1.49	1.80	2.25	2.09
Peas	Peas – frozen (supermarket only)	2.32	2.89	2.46	2.44
Beef	Beef – mince	9.01	12.21	14.11	15.04
Pork	Pork – loin chops	14.10	16.87	16.15	16.31
Lamb	Lamb – chops	10.23	14.34	14.61	15.82
Chicken	Chicken - breasts	Not recorded	Not recorded	14.51	13.02
Wheat	Bread – white sliced loaf 600g	1.24	2.02	1.09	1.10
Milk	Milk – standard homogenised 2 litres	3.13	3.67	3.47	3.49
Milk	Cheddar	10.47	9.22	8.64	9.43
Eggs	Eggs dozen	3.26	3.44	3.80	4.19

Source: Stats NZ

Care needs to be taken when interpreting these prices. Prices for different foods change at different rates for reasons associated with individual businesses/industries. Prices do not change in a uniform manner and they don't always increase. There has also been a proliferation of varieties in some product lines e.g. the number of different types of tomatoes. Also, the farm share of the final retail price varies by product and region. Generally, food costs are higher in rural areas relative to large urban areas.

Factors such as competition, distribution costs, scale, all tend to favour large urban areas. The weather and overseas events can also play a major role in price determination.

Typically, as one interviewee remarked:

the prices are highest when farmers are least able to supply.

2. What is the farm share?

There is no one size fits all farm share...

You can think of what each value chain participant receives as one cost that goes into making up the domestic retail price. The costs of marketing, processing, transportation, warehousing, and retail mark-ups also can contribute to the retail price.

For food, particularly perishable food, rising prices do not necessarily reflect farmers receiving increasing returns. As an example, higher prices can reflect increasing input costs such as transport costs being passed on to consumers.

To estimate the farm share of retail prices we compare the retail price of a basket of food (that consumers typically purchase, as measured by Stats NZ) with the returns received by farmers for the contents of a corresponding agricultural basket (the farm production that corresponds to the retail basket).³

Each product has a different marketing chain. Some farm goods are more perishable than others, so the fine details of that marketing chain differ for each product. Our approach is to detail the farm share for each product e.g. a kilo of kiwifruit, a kilo of carrots, a kilo of lamb chops etc.

...all the value is not typically created on the farm

It is also important to note that product attributes consumers desire are not all created on the farm. The marketing chain beyond the farm gate also creates value, in sometimes subtle transformative ways that make consumers want to purchase e.g. retail margins on meat products are often quite high. Along with wastage from butchering, meat products tend to go on special at the end of their shelf life (given the other option that it is not sold). One interviewee commented that:

On average the [high] margin is needed to stay in business. Farmers who have bought butcher shops to stop being 'ripped off' soon discover this market reality.

Marketing initiatives, transport, R&D, and storage can also be important in delivering the product to the market at the time that consumers want to buy it.

The market power of supermarkets may also play a role in retail markets. Supermarket pulling power means they negotiate hard on prices and determine what products are stocked in their stores.

The food basket conforms to the FPI

We have constructed a consumer food basket on the FPI broadly in line with the expenditure weights set out in the FPI.

Applying the expenditure weights allows us to show the relative importance of particular foods in the overall consumer food basket. They are derived from Stats NZ's

³ We have not taken into account the impact of the cooperative structure and its ability to return more of the value to farmers.

Household Economic Survey (HES) and updated once every three years (the current weights come from the 2017 HES).

The expenditure weights are set out in Table 4. The table shows that meat, fish and poultry are roughly 16% of total expenditure on food by the typical family.

Note that a number of food items are excluded. These items are grouped in the non-alcoholic beverages and restaurant meals, and ready-to-eat sections. These items are left out because of the difficulty of calculating conversion factors for them (these are highly processed combinations of more than one farm product).⁴

The exclusion of these three groups will overstate the farm share.

The rationale for this is based on logic set out by Whitehall and Associates for the Australian Department of Agriculture, Fisheries, and Forestry (2004). Their view was that the greater retail price of these more highly processed items is extracted from the primary food, allowing for larger margins to be collected by the processor for value added activities, e.g. the exclusion of non-alcoholic beverages impacts on fruit and vegetable, since a significant proportion of the crops are processed into juice.

Table 4 Food Price Index expenditure weights

	Stats NZ weightings	Alternative weightings
Fruit and vegetables	13.70	
Fruit	5.19	10.20
Vegetables	8.51	16.73
Meat, Poultry and Fish	16.15	
Meat and poultry	13.71	26.95
Fish other seafood	2.44	4.80
Grocery Food Group	37.09	
Bread and cereals	10.37	20.38
Milk, eggs, and cheese	10.66	20.95
Oils and fats	1.82	
Non-Alcoholic Beverages	10.20	
Coffee, Tea, and other hot drinks	1.93	
Soft drinks, Waters and Juices	8.27	
Restaurant meals and Ready-to-eat food	22.86	
Restaurant meals	7.30	
Ready-to-eat food	15.56	

Source: Stats NZ

To correct the exclusion and provide a better proxy of the farm share we have used a set of alternative weightings. These alternative weightings have been used to calculate

⁴ They might also have been sold as seconds. Not good enough for the fresh market.

the proportion of the food consumption of households of these commodity groupings (fruit and vegetables, meat, poultry and fish, and grocery food).

Stewart (2006) points out that while not all the food is included in the basket, the use of the re-weighting proxy helps us account for the money spent on similar omitted foods.

2.1. Agricultural basket

Farm share estimates are a comparison of the retail price of a consumer basket with the revenue received by farmers from an equivalent agricultural basket. We estimate the amount of farm/orchard produce needed to produce the consumer basket.

We have derived prices received by farmers from Citrus New Zealand, Value of Plants (2016), Beef + Lamb, advice from Vegetables New Zealand, and the FAO. Data quality varies depending on the time of year and the sector.

Retail prices are drawn from New Zealand’s FPI (Stats NZ).

Conversion factors are used to illustrate how specific agricultural goods are converted into retail foods. Examples are set out in Table 5. Conversion factors for meat are difficult and depend upon type of equipment used, skill of operators, cost structures, market conditions, etc.

Care needs to be taken since meat processing is a major activity in New Zealand. We have used a conversion fact of 1 for bone in product and 0.7 for boneless. However, we realise these figures are approximates only (see Table 5).

Table 5 Conversion factors

Agricultural product	Conversion factor	Consumer product
Lamb (1 kg)	1.0	Lamb Chops (1kg)
Beef (1 kg)	0.7	Blade Steak (1 kg)
Milk (1 litre)	0.1	Cheddar cheese (1kg)

Source: Economic Research Service, US Department of Agriculture and FAO

2.2. Farm share over time

After deciding on the contents of the food basket the specific prices are determined by the following formula. Farm share (FS) at time t is calculated as:

$$FS_t = (Q_{ft} P_{ft}) / (Q_{rt} P_{rt})$$

Q_{rt} is the food quantity bought at time t

P_{rt} is the unit retail price for this food

Q_{ft} is the quantity of agricultural goods

P_{ft} is the price received by farmers.

This formula allows us to set up the farm shares calculated for specific goods.

Table 6 shows that when adjusted for the quantity bought, the shares do not change much over time. This does not mean however that there is no price (and quantity) volatility from month to month and year to year. You would expect that these monthly figures will rise and fall depending on the specific demand and supply conditions for that product in the month reported in any given year.

The farm share is calculated for a typical food basket. This typical basket has been defined to have a pattern of food expenditure consistent with the expenditure weights in Table 4. The farm share over the typical food basket has been between 20% and 23% between 2008 and 2019.

Table 6 The farm share

Weighed by food basket

	Farm share			
	2008	2012	2016	2019
Meat	30%	30%	29%	31%
Dairy	19%	20%	20%	19%
Grains	22%	21%	22%	22%
Fruit	10%	10%	10%	10%
Vegetables	18%	18%	17%	16%
Eggs	2%	2%	2%	2%
Farmers share of total basket	21.41%	22.53%	20.00%	20.32%

Source: NZIER

Comparing and contrasting these numbers with those in other countries is difficult. In vegetables and fruit, it is highly dependent on the scale effects and labour rates e.g. in the United States the scale of production is much higher, and the labour rates are almost half those of New Zealand.

Major factors are the small size of the New Zealand market and the globalised exposure of the New Zealand market. Any price comparisons must be treated with caution. In Britain, for example, milk and wheat farm share is similar to New Zealand but farm share for meat is close to 50% in Britain. In each of these cases (milk, wheat, and meat) different factors are likely to contribute to the reasons for the size of the farm share.

3. Globalisation is here...

New Zealand's economic performance has always been dependent on international commodity prices. One of the major trends driving price setting has been the gradual move of New Zealand's markets from the United States and European Union towards Asia, particularly China.

This has been driven by globalisation and is illustrated in Table 7. The following illustration shows at a broad level why we are in 'new times'.

As an example, the growth in two-way trade (goods and services) between New Zealand and China has tripled between 2007 and 2019 from \$8.6 billion to \$26.1 billion.⁵

Table 7 The growth of globalisation

Exports as a percentage of World GDP

1850	1880	1913	1950	1973	1985	1993	2005	2012	2018
5.1	9.8	11.9	7.1	11.7	14.5	17.1	28.1	30.7	31.3

Source: Krugman (1995) WTO various years

The double dividend

The entry of China into the world trading system over the past 20 years has resulted in a double dividend for New Zealand and particularly its producers.

- Demand for specific commodities and products has increased. This has increased returns for many producers (although not all) and had a beneficial impact on the New Zealand economy
- Imports of cheaper goods has reduced inflationary pressures in the New Zealand economy.⁶

Changes in world markets can bring opportunities and constraints...

New Zealand is a price taker on world markets. Prices rise and fall as changes occur in the international market. A good example of this is the recent outbreak of African swine fever in China. The disease which is not harmful to humans is fatal for pigs. The disease has spread to nearly all parts of China and now is in North Korea.

China has responded by culling its pig population. Since Chinese supply and demand determine world prices, international pork prices have increased as China seeks to secure its protein needs. International beef prices (a substitute for pork) have also risen, improving returns to New Zealand farmers and also domestic pork prices. How long this effect will persist is unknown.

Increased production of milk by the subsidy controlled European Union tended to have a depressing impact on New Zealand farmer milk returns. Since the domestic price

⁵ <https://www.stats.govt.nz/news/new-zealands-two-way-trade-with-china-more-than-triples-over-the-decade>

⁶ Although the Trump tariffs may end this situation.

received follows the international price, the farm share is determined beyond New Zealand's borders.

More food is being exported and imported

The significance of international prices on farm returns is underpinned by the large amount of agricultural goods and services sold in overseas markets by New Zealand. In the 2019 (May year) approximately 47% of New Zealand's exports were related to food exports.

The vast bulk of New Zealand agricultural product is exported (see Table 8).

Table 8: Commodity Export Exposure

Commodity grouping	Exported (%)	Source
Milk products	95%	https://www.dcanz.com/about-the-nz-dairy-industry/
Lamb	94%	Beef + Lamb New Zealand
Mutton	97%	Beef + Lamb New Zealand
Beef & veal	88%	Beef + Lamb New Zealand
Kiwifruit	95%	NZIER estimate
Apples	83%	NZIER estimate
Vegetables	32%	Value of Plants Study (NZIER, 2015)

Source: DECANZ, Beef + Lamb, NZIER, NZIER (2015)

Import penetration of food has also increased. As many New Zealanders have improved their economic situation, they have demanded a much higher variety of food products. Of the roughly \$20.3 billion spent on food per annum, \$6.5 billion is spent on imported food.

One of the main reasons for this is that New Zealand has a temperate climate and many exotic fruits do not grow in New Zealand.⁷ Another factor is the small size of the domestic market which does not support processing plants.

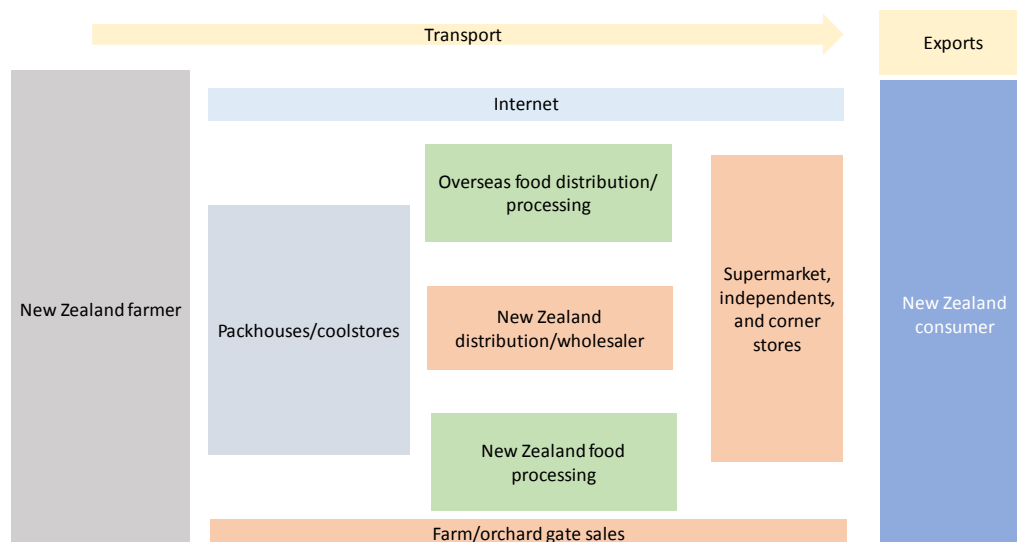
Consumers have more choice and information

Small changes in the international commodity market have significant consequences for New Zealand, further the distribution channels are many and varied and can include direct importing, processing, farmgate sales, wholesaling and distribution, internet sales, and supermarket, corner store, or independent retailer sales. Figure 3 sets out the different ways that consumers buy their food.

Many of these channels to consumers are connected. The product information on the internet means that consumers are much more informed about their food purchases to the point that they are more informed than those selling the food to them. This also gives them more buying power in the marketing chain (relative to ten years ago).

⁷ Although climate change may change this, particularly in the Far North.

Figure 3 The supply chain has become more complex and varied over time



Source: NZIER

New Zealand consumers (both households and the retail sector) not only purchase food directly from farmers in New Zealand, but also from New Zealand food processors and food processors and farmers overseas. The direct trade between farmers and consumers has also received a boost through internet trading.

Further, New Zealand food processors not only source their farm products from New Zealand, but also from producers and farmers overseas (e.g. the import composition of domestic food production).

Changing power relationships in the marketing chain

The reach of supermarkets both in New Zealand and overseas has also changed the power relationships within the distribution chain. This can in certain circumstances tip the balance of negotiating power toward the retailer and against the producer. Although a nimble producer with the right product and quality can develop strong and lucrative revenue streams from niche markets.

Growers do react to incentives

Given the significance of these international factors, addressing increasing domestic food prices requires a response broader than simply targeting the returns to New Zealand farmers. Lowering domestic farmers' returns may depress the domestic supply of food, and simply increase both dependence on imported foods and increase food prices further.⁸

Lowering prices may also push producers into more innovative production e.g. unless you are a big producer you are unlikely to grow lettuce for sale outside of your immediate region. Transport costs mean that it is uneconomic.

⁸ There is a bit of price stickiness around increased food prices. Marketers have realised that reducing volume rather than increasing prices maintains sales e.g. reducing the 1kg block of cheese to 900g while maintaining the same price.

However, with the rise in tourism numbers (and the change in consumer preferences), niche vegetable operators have cultivated relationships with chefs growing micro greens and other difficult to grow vegetables. In this way they can take advantage of the tourism boom and create a whole business around high-end restaurants while at the same time supplying the local market with easier to grow products.

4. Conclusion

The farm share of the retail price is only one of the costs that consumers pay at the check-out.

The farm share of a representative basket of food has not changed markedly between 2008 and 2019 (**between 20% and 23%**). However, the channels which they can sell their products have increased.

Three other features are important:

- The specific impact of inflation on farm operating costs. Costs such as animal health, grazing, cultivation, harvest, animal feed, fertiliser, seed, livestock purchases etc. have grown slowly over the past ten years, although we have seen much stronger price growth in the last two years as the exchange rate has depreciated against the US dollar
- General price changes in the economy, particularly the cost of petrol can have a major impact. Also, general inflation. The benign nature of inflation in the economy has been a positive impact for farmers
- The impact of agricultural price trends overseas. Major droughts, floods, outbreaks of animal diseases, production surges can all have positive and negative impacts on returns to New Zealand farmers.

5. References

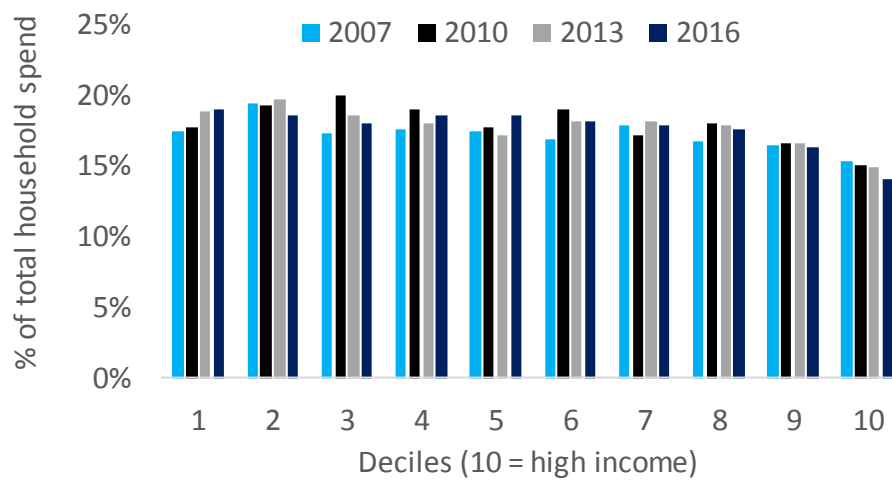
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Appendix A Food expenditure by income deciles

Figure 4 Food expenditure by income decile



Source: Statistics NZ