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## International Trade Implications for Consumer Attitudes to New Zealand Food Attributes

John T Saunders  
Tim Driver

Research Report No. 340  
September 2016



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## Chapter 1

### Introduction

This research report aims to test the value of price premiums in international markets to New Zealand agricultural producers, specifically for agri-food products certified for credence attributes. This is achieved using partial equilibrium trade modelling to evaluate the impact on producer returns from world markets.

This work builds on previous studies by the Agribusiness and Economics Research Unit (AERU) at Lincoln University (2016A:C) assessing consumer's willingness to pay for credence attributes in agri-food products. This work was centred on key export markets (both current and potential) for New Zealand agri-food exporters, the included countries were: China, India, Indonesia, Japan and the United Kingdom (UK).

This paper concludes a three-year research effort as part of the Maximising Export Returns (MER) research programme, by the AERU funded by the New Zealand Ministry for Business, Innovation and Employment (MBIE). This project aimed at valuing the potential of credence attributes in foreign market as a method for adding value to New Zealand exports.

The format of this paper, begins by giving a profile of each of the focus export markets, including their agricultural production and consumption profiles, and the countries trading profile, both generically and with New Zealand. These agricultural profiles are the data used to inform the modelling exercise. The second chapter outlines the structure and coverage of the Lincoln Trade and Environment Model (LTEM), used for the modelling analysis. This chapter then explains the modelling approach used to estimate the impact of consumer preferences for credence attributes. Chapter 3 presents the results from the modelling exercise, and finally Chapter 4 summarises conclusions from the modelling.



## Chapter 2 Country Profiles

### 2.1 China

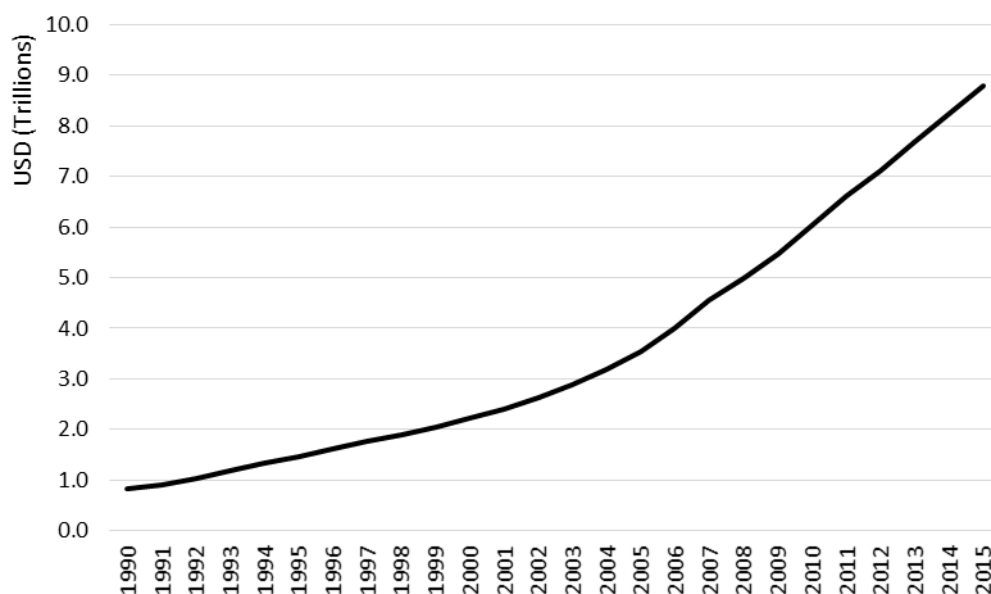
#### 2.1.1 Introduction

China is currently the most important market for New Zealand exporters, facilitated by New Zealand being the first OECD country to sign a Free Trade Agreement with China. In 2014 China was the world’s most populous country, with the second-largest economy internationally. It has been experiencing increasing rates of urbanisation and rising income levels, which has led to increases in consumption, particularly of dairy and meat products. This is reflected in China’s trade, with increasing quantity and value of imports of dairy and meat products. There have also been substantial increases in the value of New Zealand’s agricultural exports to China.

China was the world’s most populous country in 2014, with a population of 1.39 billion people. The urban population of China was 758.3 million in 2014, representing 54.4 per cent of total population (United Nations, 2014b). China’s population is projected to increase to a total of 1.4 billion by 2024 (World Bank, 2015b).

The Gross Domestic Product (GDP) of China in 2013 was approximately US\$8.8 trillion (total), representing 11.8 per cent of total global GDP, the second largest economy internationally (World Bank, 2016b). China’s economic growth has risen significantly in recent years, as shown in Figure 2.1. Between 1990 and 2013, China’s GDP has increased significantly (from approximately US\$824 billion in 1990 to US\$8.8 trillion in 2013) (World Bank, 2016b).

Figure 2.1: China, GDP (constant 2010 USD), 1990-2015



Source: World Bank 2016b.

Similarly to China's overall economic growth, GDP per capita has risen in China. Similarly, GDP per capita has increased between 1990 and 2015 by approximately 8-fold to US\$5,690 per capita in 2015. This has been particularly pronounced in recent years, with per capita GDP increasing by 2.8 times between 2003 and 2015 (World Bank, 2016c). The growth rate of GDP per capita has slightly decreased in recent years, from 10.6 (2001-2007) to 8.7 per cent per annum between 2007 and 2012 (OECD.Stat, 2015).

### 2.1.2 Production

China was the world's largest producer of agricultural products in 2014, with agriculture accounting for an estimated 10 per cent of China's total Gross Domestic Product (GDP) in 2013 (World Bank, 2015f). Specifically, as shown in Table 2.1, China has experienced growth in its production in particular apples, wine, meat and dairy products.

Table 2.1: China, food production by product (000 t), 1991-2011

	1991	1996	2001	2006	2011	1990 to 2011 (abs.change)	1991 to 2011 (% change)
Wheat	95,950	110,569	93,876	108,466	117,401	21,451	22%
Coarse grains	116,332	145,601	124,935	162,747	201,324	84,992	73%
Rice	123,857	131,421	119,596	122,245	135,179	11,322	9%
Beef and veal	1,556	3,569	5,496	5,772	6,465	4,909	316%
Sheepmeat	1,182	1,811	2,927	3,643	3,937	2,755	233%
Milk	7,382	9,844	14,144	36,130	41,480	34,098	462%
Fresh dairy products	6,620	8,972	8,646	26,723	31,550	24,930	377%
Butter	67	75	84	103	107	40	60%
Cheese	162	185	217	275	266	104	64%
Skim milk powder	..	..	..	55	56	..	..
Whole milk powder	..	..	610	1,030	1,100	..	..
Apples	4,557	17,061	20,023	26,065	35,987	31,429	690%
Kiwifruit	..	..	950	1,150	1,255	..	..
Wine	300	750	1,080	1,400	1,600	1,300	433%

Source: FAOSTAT 2015b.

Note: .. = data unavailable.

Table 2.1 also shows percentage changes in agricultural production in China between 1991 and 2011. Within this time period, the largest increase in Chinese food production was recorded for apples, which showed an almost seven-fold increase in volume between 1991 and 2011. Similarly high growth was shown for fresh dairy products (+376 per cent) and beef and veal (+316 per cent). Wine also had large growth (+433 per cent), but from a comparatively low level in 1991.

### 2.1.3 Consumption

China's food consumption has steadily increased from 1991 to 2011, driven by population growth and changing diets. In 2011 the total volume of agricultural products consumed in China was the largest of any market. Table 2.2 shows consumption of major agricultural products in China between 1991 and 2011.

Coarse grains were the highest consumed agricultural product in China, followed by wheat, apples and fresh dairy products. The consumption of meat products in China rose significantly from 1991 to 2011.

Table 2.2: China, food consumption by product (000 t), 1991-2011

	1991	1996	2001	2006	2011	1990 to 2011 (abs.change)	1991 to 2011 (% change)
Wheat	108,500	107,300	108,300	102,380	130,690	22,190	20%
Coarse grains	102,948	125,284	129,390	157,975	201,858	98,910	96%
Rice	111,650	124,872	130,903	124,895	135,701	24,051	22%
Beef and veal	1,279	3,477	5,454	5,647	6,427	5,148	403%
Sheepmeat	1,178	1,812	2,950	3,646	4,012	2,834	241%
Fresh dairy products	6,620	8,972	8,646	26,723	31,550	24,930	377%
Butter	70	76	86	115	140	69	98%
Cheese	162	185	219	284	295	132	81%
Skim milk powder	16	5	17	116	186	170	1,077%
Whole milk powder	9	10	646	1,083	1,411	1,401	14,888%
Apples	4,621	17,075	19,651	24,415	34,403	29,782	644%
Kiwifruit	4	19	974	1,185	1,339	1,335	30,767%
Wine	306	767	1,123	1,545	2,018	1,712	560%

Source: FAOSTAT 2015b.

In addition, Table 2.2 shows percentage changes in consumption for agricultural products in China between 1991 and 2011. The largest increases in consumption in China were recorded for meat and dairy products, which could indicate a significant shift from traditional Chinese dietary preferences (Mendez et al., 2004). In particular for whole milk powder where China has become the biggest consumer internationally since 2000, skim milk powder which has increased almost 11 fold, and beef and veal products increasing four-fold. In addition, kiwifruit consumption increased by almost 308-fold compared with consumption in 1991 – by far the largest proportional change of all food products – from 4.34 kilotonnes consumed in 1991 to 1,339 kilotonnes consumed in 2011. Consumption increases were also shown for apples (+644 per cent) and wine (+560 per cent) over this period.

#### 2.1.4 Trade

China is one of the largest markets for agricultural commodities internationally, especially for grain commodity imports (wheat and other coarse grains). Shifts in meat and dairy consumption have also been significant in China in recent years, with China increasing imports and decreasing exports of these commodities between 1990 and 2012. In addition, significant shifts in fruit and wine trade have occurred in China in recent years.

The total quantity of Chinese exports between 1991 and 2011 is shown in Table 2.3. Apple, rice, wheat and coarse grains were recorded to have the largest export volumes. Wheat export have fluctuated while exports of other coarse grain commodities have dropped significantly (-96 per cent). China has gone from being a net exporter of coarse grains to a net importer, with exports dropping steeply, as internal production has serviced growing consumption in the domestic sector.

Similarly, China's exports of beef have declined recently (-65 per cent). 2012 trade data showed that China has shifted from being a net exporter of beef and veal commodities to being a net importer in recent years - this is due to rising consumer demand for meat and dairy commodities, reflecting China's changing dietary patterns, which are shifting from a traditionally plant-based diet to a higher consumption of meat and dairy commodities (Guenther, 2014; Mendez et al., 2004). The Chinese apple market has also grown considerably in recent years, changing from being primarily a net importer of apples between 1991 and 1999 to a net exporter, with significant export growth shown between 2000 and 2011 (FAOSTAT, 2015b).

Table 2.3: China, food exports by commodity (000 t), 1991-2011

	1991	1996	2001	2006	2011
Wheat	10	802	1,201	2,351	425
Coarse grains	10,338	4,026	8,781	5,678	435
Rice	922	403	2,061	1,305	556
Beef and veal	277	96	60	130	97
Sheepmeat	5	2	3	35	8
Milk	..	..	..	..	..
Fresh dairy products	25	35	32	41	30
Butter	0	0	0	0	3
Cheese	0	0	1	1	0
Skim milk powder	0	0	1	1	0
Whole milk powder	1	4	5	20	9
Apples	33	190	344	828	1,108
Kiwifruit	..	1	1	9	12
Wine	2	6	4	8	22

Source: FAOSTAT 2015b. Note: .. = data unavailable.

Table 2.4 shows China's imports between 1991 and 2011. It can be seen that distinct shifts in food commodity imports have occurred during this period, most notably in meat, dairy and fruit commodities. Specifically, Chinese imports of dairy commodities have grown significantly to meet internal demand between 1991 and 2011, particularly whole milk powder (from 10.10 kilotonnes in 1991 to 319.75 kilotonnes in 2011) and skim milk powder (from 15.82 kilotonnes in 1991 to 129.78 kilotonnes in 2011). The import of other dairy commodities have also grown, including fresh dairy commodities, butter and cheese. Similarly, an increase in imports of meat commodities has occurred in China in recent years, including beef and veal (from 0.7 kilotonnes in 1991 to 59.44 kilotonnes in 2011) and sheep meat commodities (from 0.08 kilotonnes in 1991 to 82.7 kilotonnes in 2011). Chinese imports of fruit commodities and wine have also grown in recent years. This is seen most strongly with regards to wine, which recorded an almost six-fold increase in imports between 1991 and 2011 (from 7.33 kilotonnes in 1991 to 439.34 kilotonnes in 2011) with a similar trend recorded for kiwifruit (from 4.34 kilotonnes in 1991 to 95.88 kilotonnes in 2011).

Table 2.4: China, food imports by commodity (000 t), 1991-2011

	1991	1996	2001	2006	2011
Wheat	15,255	5,840	1,022	372	2,900
Coarse grains	904	1,960	2,523	1,497	7,710
Rice	604	1,213	692	1,227	1,078
Beef and veal	1	5	18	4	59
Sheepmeat	0	3	25	37	83
Milk	..	..	..	..	..
Fresh dairy products	43	57	56	68	103
Butter	3	1	2	13	36
Cheese	0	0	2	10	29
Skim milk powder	16	6	18	62	130
Whole milk powder	10	14	41	73	320
Apples	151	218	259	233	351
Kiwifruit	4	20	25	44	96
Wine	7	22	48	153	439

Source: FAOSTAT 2015b.

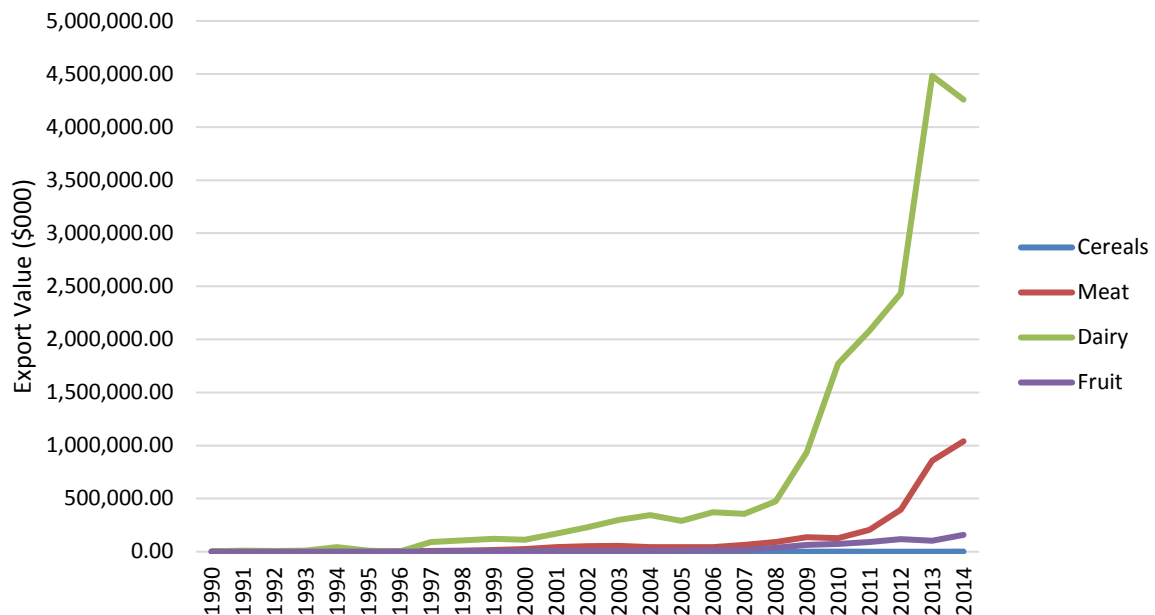
### 2.1.5 Trade with New Zealand

Trade between China and New Zealand has grown significantly since 2008. China is currently New Zealand's largest export market (especially for agricultural commodities), with a total value of NZ\$8.37 billion generated through exports of agricultural commodities to China in 2014, representing a 64.3 per cent increase from the previous year (Statistics New Zealand, 2014).

As China is currently New Zealand's main trade partner for agricultural commodities, it is important to examine which of New Zealand's export commodities have generated the most value. Figure 2.2 shows total trade value of New Zealand agricultural exports to China between 1990 and 2014. Specifically, New Zealand dairy exports to China have been significantly higher than all other commodities. While the total value of New Zealand dairy exports to China has grown steadily from 1997, 2008 saw a significant shift due to the signing of a Free Trade Agreement between China and New Zealand. Between 2008 and 2014, the value of New Zealand dairy exports to China grew almost eight-fold – from approximately NZ\$474 million in 2008 to over NZ\$4 billion in 2014.

Other commodities have also undergone significant growth in total export value, particularly meat. Similarly to dairy, the value of New Zealand meat exports to China has grown significantly since 2008. The value of New Zealand meat exports to China (beef, veal and sheep meat) has increased over 10-fold in this period, with a total value of NZ\$1 billion in 2014. In addition, the export value of New Zealand fruit commodities to China has also increased in recent years, representing a total value of NZ\$159 million in 2014.

Figure 2.2: Value of New Zealand agricultural exports to China, 1990-2014



Source: Statistics New Zealand 2015.

Table 2.5 shows the total value of agricultural export commodities from New Zealand to China in 2014, as well as their percentage of the total trade and overall rank of such commodities. As previously mentioned, agricultural exports to China comprise approximately 26.23 per cent of New Zealand’s total agricultural exports by value. China is New Zealand’s largest export market for agricultural commodities, particularly sheep meat, butter and concentrated milk and cream commodities. Furthermore, concentrated milk and cream exported to China represented just over half of all exports of such commodities from New Zealand, with a total export value of NZ\$5.3 billion in 2014. Similarly high percentages of commodity exports were shown for sheep meat (for which China represents 27 per cent of total New Zealand sheep meat exports by value) and butter (for which China represents 16 per cent of total New Zealand butter exports by value). China was also New Zealand’s third-largest export market by value for cheese and curd, and kiwifruit in 2014.

Table 2.5: Proportion of total New Zealand Agricultural commodity exports by total trade to China, 2014

	Total value (NZ\$000)	Percentage (%)	Rank
Beef and veal	207,871.91	9.45%	..
Sheepmeat	809,347.02	27.21%	1
Milk and cream (concentrated)	5,309,407.56	50.57%	1
Butter	419,471.41	15.53%	1
Cheese and curd	150,916.11	10.18%	3
Apples, pears and quinces	8,256.43	1.51%	16
Kiwifruit, fruit nec	123,550.80	12.70%	3
Wine	24,803.15	1.87%	6
<b>Agricultural commodities</b>	<b>8,367,444.96</b>	<b>26.23%</b>	<b>1</b>

Source: Statistics New Zealand 2014.

Note: .. = data unavailable.

Increases in the export value of New Zealand's primary industry commodities to China was made possible by the development of a unique trade relationship between the two markets. As previously mentioned, a Free Trade Agreement between China and New Zealand came into effect in October 2008, allowing a freer interchange of goods and services between the two markets (MFAT, 2015a). This shows in the trade data, which shows significant increases in the size and value of trade flows between the countries following this.

## 2.2 India

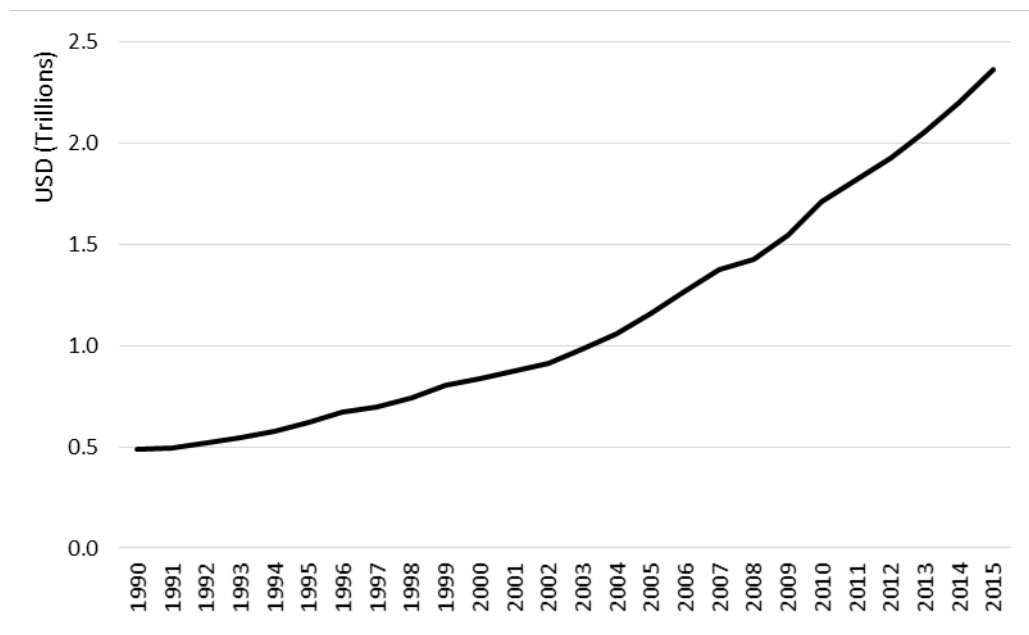
### 2.2.1 Introduction

India is an opportunity for New Zealand's agricultural exporters. With a rapidly increasing population, a high rate of economic growth and diversification of consumption habits, the evolving market of India is a potential growth market for exports of New Zealand's agricultural commodities. Similar to China, India is currently one of the world's largest food producers, and changing dietary patterns are leading to a more diverse range of consumed commodities in this market. While India is usually self-sufficient for agricultural produce, New Zealand's trade relationship with India has also grown in recent years, with a free trade agreement between the two countries currently under negotiation, making India a potential target for export growth.

India was the world's second-most populous country in 2014, with a population of approximately 1.27 billion. The urban population of India was 410.2 million in 2014, representing 32.4 per cent of total population (United Nations, 2014b). Moreover, India's total population projected to increase to approximately 1.44 billion by 2024 (World Bank, 2015b). In particular, India is projected to overtake China as the world's most populous country by 2028, with a projected annual population growth rate of 1.24 per cent per annum (United Nations, 2014a).

The annual GDP of India was approximately US\$2.4 trillion in 2015, representing 3.2 per cent of total global GDP (World Bank, 2016b). India's economic growth has remained steady in recent years, with overall GDP value peaking in 2011, as shown in Figure 2.3. Between 1990 and 2015, India's GDP has increased by almost 5-fold (from US\$486 billion in 1990 to US\$2.48 trillion in 2015) (World Bank, 2016b).

Figure 2.3: India, GDP (constant 2010 USD), 1990-2015



Source: World Bank 2015b.

GDP per capita has risen alongside overall GDP growth in India between 1990 and 2013, with Indian GDP per capita increasing in this period (+223 per cent), representing a total of US\$1,247 per capita in 2015 (World Bank, 2016c). Overall, the growth rate of GDP per capita has slightly decreased in recent years, from 6.5 (2001-2007) to 5.4 per cent per annum between 2007 and 2012 (OECD.Stat, 2015).

### 2.2.2 Production

Along with China, India was one of the largest agricultural producers internationally in 2014, with agricultural production accounting for an estimated 18.0 per cent of India's total GDP in 2013 (World Bank, 2015f). India was the world's largest wheat producer, as well as the second-largest producer of cow's milk in 2014 (FAOSTAT, 2015a).

The quantity of Indian food production by product between 1991 and 2011 is shown in Table 2.6. Of all Indian agricultural production, fresh dairy was the largest by volume, with overall fresh dairy production increasing between 1991 and 2011 (+105 per cent). The production of other dairy products also increased, most notably butter and skim milk powder. Indian wheat production increased between 1991 and 2011 (+58 per cent), as well as other coarse grains (+64 per cent). The production of other food products also increased during this period, most notably meat products (such as beef and sheep meat) and apples.

Table 2.6: India, food production by product (000 t), 1991-2011

	1991	1996	2001	2006	2011	1990 to 2011 (abs.change)	1991 to 2011 (% change)
Wheat	55,135	62,097	69,681	69,350	86,870	31,735	58%
Coarse grains	25,924	34,153	33,383	33,808	42,450	16,526	64%
Rice	74,732	81,708	93,313	92,804	105,319	30,587	41%
Beef and veal	2,140	2,209	2,243	2,384	2,587	447	21%
Sheepmeat	617	672	699	777	893	276	45%
Milk	54,061	68,355	83,419	100,266	127,300	73,239	135%
Fresh dairy products	73,127	91,782	98,918	115,763	149,554	76,427	105%
Butter	1,073	1,460	2,330	2,925	3,383	2,311	215%
Cheese	..	..	..	12	2	..	..
Skim milk powder	40	98	129	151	133	93	232%
Whole milk powder	1	0	3	3	0	-1	-99%
Apples	1,175	1,211	1,230	1,814	2,891	1,716	146%
Kiwifruit	..	..	..	..	..	..	..
Wine	..	..	..	..	..	..	..

Source: FAOSTAT 2015b.

Note: .. = data unavailable.

Regarding percentage changes in agricultural production in India between 1991 and 2011, the largest percentage increase in Indian food production was for skim milk powder, which increased over two-fold between 1991 and 2011. Similarly high changes were shown for butter (+215 per cent) and apples (+146 per cent).

### 2.2.3 Consumption

The consumption of agricultural products in India has increased greatly over time, due to population growth. This is complemented by a diversification of agricultural products consumed, particularly a shift from traditional Indian culinary habits to a growth in meat and dairy consumption (Smil, 2002).

The total quantity of Indian food consumption by product between 1991 and 2011 is shown in Table 2.7. Of all products, Indian consumption of fresh dairy showed the largest overall volume increases over time of all products (+105 per cent), India is currently the world's largest consumer of fresh dairy products. Other dairy products have also seen increases in consumption, particularly butter and skim milk powder. Following this the growth of grain consumption was similarly high, particularly wheat (+57 per cent). Sheep meat (+44 per cent) and apples (+164 per cent) also grew significantly. Interestingly the consumption of beef and veal has declined despite population growth (however consumption of sheepmeat has increased). With a 79.8 per cent Hindu population in India (India government 2011) low-levels of meat consumption are expected, especially for the consumption of beef.

Table 2.7: India, food consumption by product (000 t), 1991-2011

	1991	1996	2001	2006	2011	1990 to 2011 (abs.change)	1991 to 2011 (% change)
Wheat	52,554	61,965	71,087	75,118	82,300	29,746	57%
Coarse grains	28,749	34,108	32,162	33,337	37,296	8,546	30%
Rice	74,152	79,220	81,697	88,062	95,287	21,135	29%
Beef and veal	2,059	2,053	2,000	1,761	1,380	-679	-33%
Sheepmeat	611	663	696	767	879	268	44%
Fresh dairy products	73,127	91,782	98,918	115,763	149,554	76,427	105%
Butter	1,035	1,513	2,218	2,895	3,460	2,425	234%
Cheese	..	0	2	4	2	..	..
Skim milk powder	49	95	129	131	115	67	137%
Whole milk powder	1	0	1	1	2	0	30%
Apples	1,164	1,197	1,227	1,870	3,074	1,910	164%
Kiwifruit	..	..	..	..	..	..	..
Wine	0	0	0	1	3	3	..

Source: FAOSTAT 2015b.

Note: .. = data unavailable.

In addition, Table 2.7 shows the percentage changes in consumption volume for agricultural products in India between 1991 and 2011. The largest proportionate increases in consumption in India in this period were for dairy products. Similarly to China, this represents a significant shift from traditional dietary preferences (Guenther, 2014; Smil, 2002), although with smaller shifts in meat consumption. The largest overall percentage increase in consumption was for wine, which increased almost 164-fold between 1991 and 2011. However, the overall volume of wine consumed was small in relation to other products.

#### 2.2.4 Trade

India has a restrictive trade policies for agricultural goods, with an average applied tariff rate of 36.4 per cent for WTO agricultural goods. The total quantity of Indian food exports between 1991 and 2011 is shown in Table 2.8. In 2011 India was a net exporter of grain commodities, with coarse grains representing the largest of all included export commodities by volume. India's exports of grain commodities have increased over time, especially for coarse grains other than wheat (3,901 kilotonnes total exported coarse grains in 2011). However, similar growth has occurred for wheat, although India's trade balance for wheat has fluctuated over time. In addition, Indian exports of beef and veal and rice have increased in recent years (+1,346 per cent, & +642 per cent). India has also become an exporter of most other agricultural commodities, including sheep meat, fresh dairy and cheese (FAOSTAT, 2015b).

Table 2.8: India, food exports by commodity (000 t), 1991-2011

	1991	1996	2001	2006	2011
Wheat	700	1,966	2,649	47	871
Coarse grains	0	20	114	645	3,901
Rice	680	2,520	2,220	4,773	5,045
Beef and veal	84	158	244	624	1,210
Sheepmeat	8	9	4	10	14
Milk	..	..	..	..	..
Fresh dairy products	..	..	..	5	9
Butter	0	0	2	4	10
Cheese	0	0	0	1	2
Skim milk powder	1	1	18	30	3
Whole milk powder	2	0	3	3	1
Apples	11	13	19	26	26
Kiwifruit	..	..	..	..	0
Wine	0	0	0	1	1

Source: FAOSTAT 2015b.

Note: .. = data unavailable.

The total quantity of Indian food imports between 1991 and 2011 is shown in Table 2.9. Indian apple imports increased sharply in recent years, where no imports were recorded in 1991 to 179.02 kilotonnes imported in 2011. Similar increases in imports on a smaller scale occurred during this period for kiwifruit (4 kilotonnes in 2011), wine (4.4 kilotonnes in 2011) and skim milk powder (4.6 kilotonnes in 2011).

Table 2.9: India, food imports by commodity (000 t), 1991-2011

	1991	1996	2001	2006	2011
Wheat	119	1,834	55	6,115	2
Coarse grains	195	175	163	4	4
Rice	100	33	28	31	12
Beef and veal	3	2	0	0	3
Sheepmeat	2	0	0	0	0
Milk	..	..	..	..	..
Fresh dairy products	0	0	0	0	0
Butter	3	0	3	9	1
Cheese	0	0	0	1	1
Skim milk powder	0	0	0	0	32
Whole milk powder	1	0	0	0	5
Apples	0	0	17	49	179
Kiwifruit	0	0	0	1	4
Wine	0	0	1	2	4

Source: FAOSTAT 2015b.

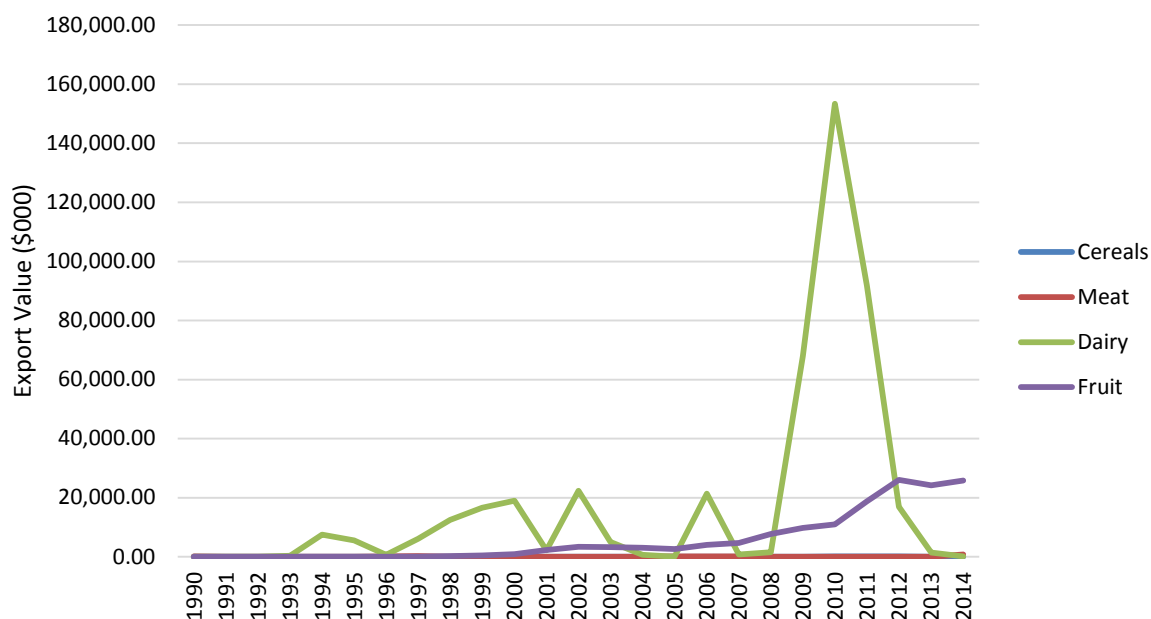
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### 2.2.5 Trade with New Zealand

Trade between India and New Zealand has grown in recent years, with India currently ranking as New Zealand's 19<sup>th</sup> largest trade partner overall. However, a relatively small share of New Zealand total export value is from agricultural commodity exports to India (approximately NZ\$110 million in 2014), with India ranking as New Zealand's 36<sup>th</sup>-largest export market for agricultural commodities (Statistics New Zealand, 2014). While New Zealand's trade with India is not currently on the same scale as that of China, its overall economic standing internationally, as well as subsequent initiatives to improve trade relations, make India of primary consideration for the promotion of trade growth.

Figure 2.4 shows total trade value of New Zealand agricultural exports to India between 1990 and 2014. New Zealand's exports of fruit commodities to India have grown, with exports increasing between 2001 and 2014. The total value of New Zealand fruit exports to India was approximately NZ\$25.83 million in 2014. In addition, New Zealand exports of dairy commodities to India, while historically inconsistent, have shown significant potential. In 2009, India experienced a shortage of butter from primary suppliers on the basis on an unproductive milking season brought on by shifting weather patterns, for which additional imports assisted in mitigating the shortage (Khanna, 2009; Viju, 2009). Outside of such extreme events, the value of New Zealand's dairy exports to India between 1990 and 2014 has fluctuated, ranging between NZ\$5,000 at the lowest and NZ\$22,359 million at the highest. For the remaining commodity categories, cereals and meat, trade growth has remained low, with the exception of apples which had a total trade value of NZ\$23 million in 2015. The total value of the export of New Zealand cereals to India has not increased beyond NZ\$111,000 between 1990 and 2015. The total value of meat exports to India totalling NZ\$819,000 in 2015.

Figure 2.4: Value of New Zealand agricultural exports to India, 1990-2014



Source: Statistics New Zealand 2015.

Table 2.10 shows the total value of the export of particular agricultural commodities from New Zealand to India in 2014, as well as their percentage of the total trade and overall rank of such commodities. Agricultural exports to India comprised approximately 0.34 per cent of New Zealand's total agricultural exports by value in 2014, with India ranking comparatively low (36<sup>th</sup>-largest) overall as an export market for agricultural commodities in this year. However, some agricultural exports accounted for a relatively significant share of New Zealand's agricultural export value, such as apples, pears and quinces, for which India was New Zealand's ninth-largest export market by value, accounting for approximately NZ\$18.8 million in 2014, comprising 3.44 per cent of total export value for these commodities.

Table 2.10: Proportion of total New Zealand exports by commodity to India, 2014

	Total value (NZ\$000)	Percentage (%)	Rank
Beef and veal	0.00	0.00%	..
Sheepmeat	776.00	0.03%	..
Milk and cream (concentrated)	0.00	0.00%	..
Butter	134.00	0.005%	..
Cheese and curd	0.00	0.00%	..
Apples, pears and quinces	18,842.99	3.44%	9
Kiwifruit, fruit nec	5,214.67	0.54%	15
Wine	408.87	0.03%	40
<b>Agricultural commodities</b>	<b>109,592.01</b>	<b>0.34%</b>	<b>36</b>

Source: Statistics New Zealand 2014.

Note: .. = data unavailable.

The strengthening of New Zealand's overall political and economic relations with India have been set into the NZ Inc India Strategy. This strategy, launched in 2011, aims to grow merchandise exports with India to NZ\$2 billion each year by 2015, as well as promote growth in services trade, bilateral investment and skilled migrant transfer (MFAT, 2014b). Negotiations are also currently underway towards the

development of a New Zealand-India Free Trade Agreement. The ninth round of negotiations occurred in Wellington in July 2013 (MFAT, 2015b).

## 2.3 Indonesia

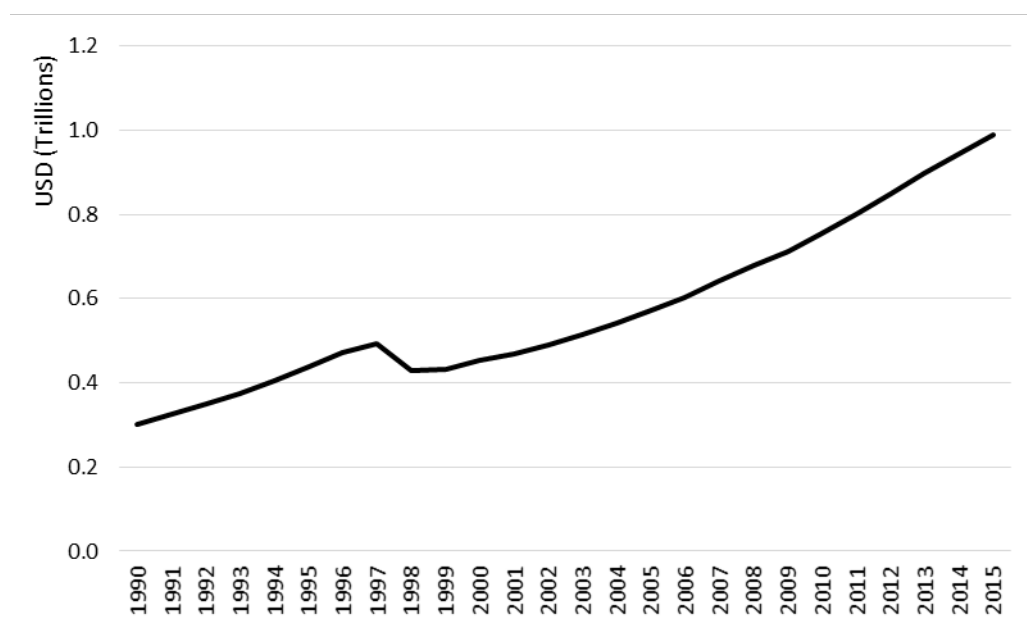
### 2.3.1 Introduction

As a net importer of agricultural commodities with rapidly rising economic growth, Indonesia is an important market for food exporters. Indonesia is currently a strong trade partner for New Zealand, with significant value generated for New Zealand’s export commodities. In addition, rising GDP per capita, increasing consumption of meat and dairy products, as well as strengthened trade relations highlights Indonesia’s potential for export growth and diversification.

Indonesia’s population in 2014 comprised approximately 252.8 million people – the fourth most populous country internationally. This included an urban population of 133.9 million, representing 53.0 per cent of total population (United Nations, 2014b). In addition, in Indonesia’s total population is projected to increase to approximately 289.7 million by 2024 (World Bank, 2015b).

The annual GDP of Indonesia was approximately US\$1.0 trillion in 2013, representing 1.3 per cent of total global GDP and the largest economy in Southeast Asia (World Bank, 2016b). Overall, Indonesia’s economic growth remained relatively constant between 1998 and 2015, as shown in Figure 2.5. Between 1990 and 2015, Indonesia’s GDP has increased almost over eight-fold (from US\$300 billion in 1990 to US\$1.0 trillion in 2015) (World Bank, 2016b).

Figure 2.5: Indonesia, GDP (constant 2010 USD), 1990-2015



Source: World Bank 2015b.

GDP per capita has risen with overall GDP growth in Indonesia in recent years. Indonesian GDP per capita has increased between 1990 and 2015 by 132 per cent, representing a total of US\$2,181 per capita in 2013 (World Bank, 2016c). Overall, the growth rate of GDP per capita has slightly increased in recent years, from 3.9 (2001-2007) to 4.0 per cent per annum between 2007 and 2012 (OECD.Stat, 2015).

### 2.3.2 Production

Agriculture is an important sector for the Indonesian economy. Similarly to India, agriculture accounted for an estimated 14.4 per cent of total GDP in 2013 (World Bank, 2015f). Approximately 31.2 per cent of Indonesia's land area is utilised for arable production (World Bank, 2015a). Indonesia was the world's largest palm oil producer, as well as the third-largest rice producer in 2014 (FAOSTAT, 2015a).

Total Indonesian food production between 1991 and 2011 is shown in Table 2.11. However data for many products is either insignificant or unavailable. Coarse grain production was the largest by volume in Indonesia in 2011, increasing from 6,256 kilotonnes in 1991 to 17,643 kilotonnes in 2011. This may be due to Indonesia's status as the third-largest rice producer internationally, as well as the sixth-largest maize producer in 2014 (FAOSTAT, 2015a).

Table 2.11: Indonesia, food production by product (000 t), 1991-2011

	1991	1996	2001	2006	2011	1990 to 2011 (abs.change)	1991 to 2011 (% change)
Wheat	..	..	..	..	..	..	..
Coarse grains	6256	9307	9347	11610	17643	11387	182%
Rice	29807	34085	33657	36321	43860	14053	47%
Beef and veal	308	316	344	368	411	103	33%
Sheepmeat	94	99	94	143	117	22	24%
Milk	621	754	765	944	1329	709	114%
Fresh dairy products	717	871	883	728	1023	306	43%
Butter	..	..	..	..	..	..	..
Cheese	..	..	..	..	..	..	..
Skim milk powder	..	..	..	..	..	..	..
Whole milk powder	..	..	..	48	66	..	..
Apples	..	..	..	..	..	..	..
Kiwifruit	..	..	..	..	..	..	..
Wine	..	..	..	..	..	..	..

Source: FAOSTAT 2015b.

Note: .. = data unavailable.

Coarse grains have shown an almost three-fold increase in production between 1991 and 2011. Moderate increases were also been shown for beef and veal, sheep meat and fresh dairy.

### 2.3.3 Consumption

Indonesian consumption patterns have changed substantially between 1991 and 2011. The total quantity of Indonesian food consumption by product between 1991 and 2011 is shown in Table 2.12.

Table 2.12: Indonesia, food consumption by product (000 t), 1991-2011

	1991	1996	2001	2006	2011	1990 to 2011 (abs.change)	1991 to 2011 (% change)
Wheat	2,344	3,668	3,780	4,843	6,230	3,886	166%
Coarse grains	6,257	10,016	10,705	13,289	19,950	13,693	219%
Rice	30,008	35,154	34,915	36,781	44,804	14,795	49%
Beef and veal	313	417	408	474	587	273	87%
Sheepmeat	95	99	94	141	117	22	23%
Fresh dairy products	717	871	883	728	1,023	306	43%
Butter	9	9	11	13	15	6	69%
Cheese	4	5	7	11	17	14	388%
Skim milk powder	29	44	65	89	125	96	333%
Whole milk powder	1	3	23	67	111	110	18,005%
Apples	6	39	92	132	225	218	3387%
Kiwifruit	43	47	40	55	66	23	54%
Wine	0	1	1	0	0	0	-57%

Source: FAOSTAT 2015b.

In terms of percentage changes in consumption, the most significant increases between 1991 and 2011 were for dairy (particularly milk powder), fruit and cereals. Apple consumption has increased over 30 times over this period, the second-most significant consumption increase overall. Consumption of all other products increased.

#### 2.3.4 Trade

Trade flows in Indonesia are diverse, with an emphasis on industrial and manufactured commodity exports. These are mainly fuels such as coal and petroleum, as well as palm oil and rubber, which together comprise approximately 39.6 per cent of total exports (OEC, 2015). For agricultural commodities, exports have been relatively low.

The total quantity of agricultural exports between 1991 and 2011 is shown in Table 2.13. By comparison with other markets in this report, the volume of Indonesian exports is minor. The main export agricultural commodity groups in Indonesian trade in 2011 were cereals and dairy. Wheat had the largest overall volume exported (47 kilotonnes in 2011). This was followed by coarse grains (20 kilotonnes exported in 2011) and fresh dairy (17 kilotonnes exported in 2011) (FAOSTAT, 2015b).

Table 2.13: Indonesia, food exports by commodity (000 t), 1991-2011

	1991	1996	2001	2006	2011
Wheat	..	24	20	6	47
Coarse grains	0	27	91	23	20
Rice	2	1	13	5	16
Beef and veal	0	1	0	0	1
Sheepmeat	0	0	0	3	1
Milk	..	..	..	..	..
Fresh dairy products	1	..	5	8	17
Butter	0	0	0	0	1
Cheese	0	0	0	1	1
Skim milk powder	15	4	12	1	1
Whole milk powder	0	1	17	24	10
Apples	0	0	0	0	..
Kiwifruit	..	1	..	..	..
Wine	..	0	0	0	1

Source: FAOSTAT 2015b.

Note: .. = data unavailable.

The total quantity of Indonesian food imports between 1991 and 2011 is shown in Table 2.14. Cereals were the most imported type of agricultural commodity, particularly wheat (approximately 6,567 kilotonnes imported in 2011) followed by coarse grains and rice. Comparatively, the volume of all other agricultural commodities imported was low. Again, wine imports have not grown during this period, unlike other examined developing countries due to the large Muslim population of Indonesia.

Table 2.14: Indonesia, food imports by commodity (000 t), 1991-2011

	1991	1996	2001	2006	2011
Wheat	2,498	4,192	3,800	4,649	6,567
Coarse grains	1	936	1,080	2,300	3,126
Rice	203	2,202	655	468	2,826
Beef and veal	5	102	65	106	177
Sheepmeat	0	1	1	1	1
Milk	..	..	..	..	..
Fresh dairy products	1	1	5	7	1
Butter	10	9	8	12	15
Cheese	3	6	6	11	18
Skim milk powder	38	46	74	86	128
Whole milk powder	3	3	35	85	68
Apples	6	38	82	122	213
Kiwifruit	0	1	0	1	4
Wine	0	1	1	0	0

Source: FAOSTAT 2015b.

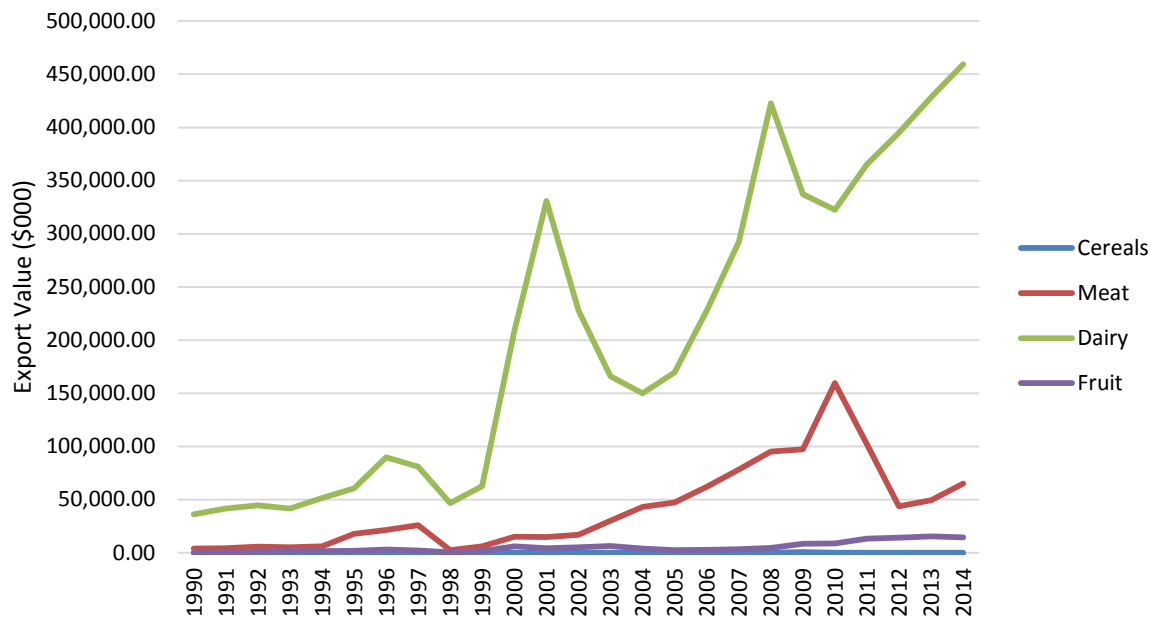
Note: .. = data unavailable.

### 2.3.5 Trade with New Zealand

Indonesia is an export market for New Zealand, with a potential for increased trade. Agricultural exports to Indonesia are valued at approximately NZ\$730 million and representing New Zealand's ninth-largest export market for agricultural commodities (Statistics New Zealand, 2014).

Figure 2.6 shows total trade value of New Zealand agricultural exports to Indonesia between 1990 and 2014. Overall, the highest value received for New Zealand agricultural exports to Indonesia was for dairy commodities, the historical value of which has fluctuated over time. In 2014, the total value of New Zealand's dairy exports to Indonesia was approximately NZ\$459.6 million. All other agricultural exports were of comparatively lower value, with New Zealand meat exports ranking as the second-most valuable agricultural export. Exports of New Zealand meat commodities to Indonesia was valued at approximately NZ\$64.9 million in 2014 at approximately NZ\$159.7 million.

Figure 2.6: Value of New Zealand agricultural exports to Indonesia, 1990-2014



Source: Statistics New Zealand 2015.

Table 2.15 shows the total value of New Zealand’s agricultural exports to Indonesia in 2014, as well as their percentage of the total trade and overall rank of such commodities. As previously mentioned, agricultural exports to Indonesia comprise approximately 2.29 per cent of New Zealand’s total agricultural exports by value, with Indonesia ranking as New Zealand’s ninth-largest export market for agricultural commodities. This is particularly true of concentrated milk and cream commodity exports, which were valued at approximately NZ\$322.4 million in 2014, with Indonesia ranking as New Zealand’s fourth-largest export market for these commodities. Similarly, exports of beef and veal to Indonesia represented approximately 3.47 of all beef and veal exports by value in 2014, with 3.39 per cent of value generated from New Zealand’s butter exports attributed to Indonesian trade.

Table 2.15: Proportion of total New Zealand commodity exports by commodity to Indonesia, 2014

	Total value (NZ\$000)	Percentage (%)	Rank
Beef and veal	76,311.59	3.47%	..
Sheepmeat	145.00	0.005%	..
Milk and cream (concentrated)	322,353.51	3.07%	4
Butter	91,499.26	3.39%	11
Cheese and curd	42,881.52	2.89%	8
Apples, pears and quinces	5,618.91	1.03%	18
Kiwifruit, fruit nec	6,913.64	0.71%	14
Wine	617.01	0.05%	33
<b>Agricultural commodities</b>	<b>730,068.64</b>	<b>2.29%</b>	<b>9</b>

Source: Statistics New Zealand 2014.

Note: .. = data unavailable.

New Zealand’s trade relations with Indonesia was strengthened in 2010 with the signing of the NZ-ASEAN Free Trade Agreement. This allowed for the “eventual removal of tariffs on 99 per cent of New Zealand’s current exports to the four key ASEAN markets of Indonesia, Malaysia, the Phillipines and Viet Nam”, as

well as improvements in business flows, liberalised trade in services, and increased investment protection between these markets (MFAT, 2012).

## 2.4 Japan

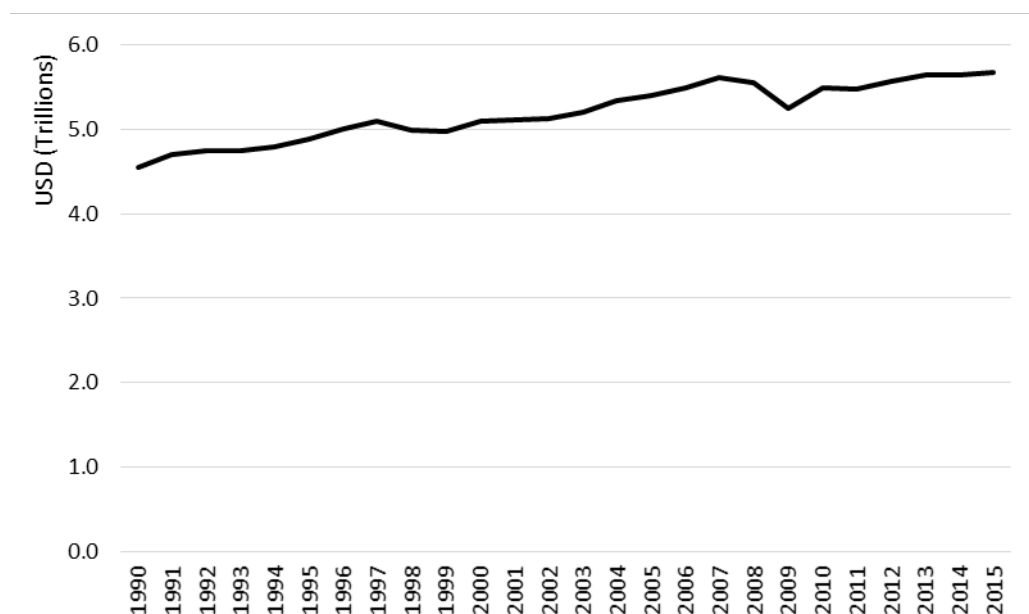
### 2.4.1 Introduction

Japan is an important market for New Zealand’s primary product exports. As a highly developed and populous market with the third largest world economy, Japan also relies heavily on food imports due to a small agriculture sector. Japan has been a top export market in recent years for many of New Zealand’s agricultural export commodities, particularly apples and kiwifruit.

The population of Japan comprised approximately 127 million people in 2014, including an urban population of 118 million, representing 93 per cent of total population (United Nations, 2014b). Japan’s total population is projected to decrease to approximately 121.5 million by 2024 (World Bank, 2015b), with birth rates declining 20 per cent since 1990 (World Bank, 2016).

The annual GDP of Japan in 2015 was approximately US\$5.7 trillion, representing 7.6 per cent of total global GDP (World Bank, 2016b). Japan’s economic growth is shown in Figure 2.7. Between 1990 and 2016, Japan’s GDP has fluctuated, with an overall increase of 58.5 per cent between 1991 and 2016 (from US\$4.6 trillion in 1990 to US\$5.7 trillion in 2016) (World Bank, 2016b).

Figure 2.7: Japan, GDP (constant 2010 USD), 1990-2015



Source: World Bank 2016b.

GDP per capita has shifted in parallel with overall GDP growth in Japan, with an overall growth of approximately 21 per cent between 1990 and 2015, representing a total of approximately US\$7,800 per capita in 2015 (World Bank, 2016c). Overall, the growth rate of GDP per capita has decreased slightly in recent years, from 1.5 (2001-2007) to -0.1 per cent per annum between 2007 and 2012 (OECD.Stat, 2015).

## 2.4.2 Production

The importance of agriculture to the Japanese economy has been in decline since the Second World War, but it does have a high level of producer support (OECD, 2009). Agriculture accounted for an estimated 1.2 per cent of Japan's total GDP (value added) in 2012 (World Bank, 2015f). Japan produces agricultural products, mainly rice and cereals but also fresh dairy, as well as fruit and meat products (FAOSTAT, 2015b).

The total quantity of Japanese food production by product between 1991 and 2011 is shown in Table 2.16. Of all Japanese agricultural products, fresh dairy was the largest by volume, with 4,345 kilotonnes produced in 2011. However, production of fresh dairy decreased by approximately 17 per cent over this period.

Table 2.16: Japan, food production by product (000 t), 1991-2011

	1991	1996	2001	2006	2011	1990 to 2011 (abs.change)	1991 to 2011 (% change)
Wheat	759	478	700	837	746	-13	-2%
Coarse grains	312	262	235	211	207	-105	-34%
Rice	6,358	6,855	6,004	5,707	5,714	-645	-10%
Beef and veal	575	555	459	497	500	-75	-13%
Sheepmeat	..	..	..	..	..	..	..
Milk	8,259	8,658	8,301	8,134	7,474	-785	-10%
Fresh dairy products	5,207	5,350	5,163	4,893	4,345	-862	-17%
Butter	76	86	80	78	63	-13	-17%
Cheese	27	33	34	40	45	18	68%
Skim milk powder	181	200	175	181	137	-44	-24%
Whole milk powder	91	22	18	14	14	-77	-84%
Apples	760	899	931	832	655	-105	-14%
Kiwifruit	46	44	42	33	26	-20	-43%
Wine	57	68	111	90	79	22	39%

Source: FAOSTAT 2015b.

Note: .. = data unavailable.

As for the percentage changes over this period, most products have declined in production between 1991 and 2011. Whole milk powder production decreased the most, showing an 84.3 per cent decrease in this period. This was followed by decreases in production of kiwifruit (-43 per cent) and coarse grains (-34 per cent) between 1991 and 2011. The only agricultural products showing increases in production during this period were cheese (+68 per cent) and wine (+39 per cent).

## 2.4.3 Consumption

The total quantity of Japanese food consumption by product between 1991 and 2011 is shown in Table 2.17. While the consumption of some agricultural products has gradually decreased in recent years, many have remained relatively constant. Cereals were the largest consumed agricultural product category by

volume in Japan in this period, particularly coarse grains (18,476 kilotonnes consumed in 2011), followed by wheat (6,701 kilotonnes consumed in 2011), and rice (6,069 kilotonnes).

Table 2.17: Japan, food consumption by product (000 t), 1991-2011

	1991	1996	2001	2006	2011	1990 to 2011 (abs.change)	1991 to 2011 ( % change)
Wheat	6,340	6,401	6,227	6,228	6,701	361	6%
Coarse grains	23,060	21,707	20,775	20,374	18,476	-4,584	-20%
Rice	6,946	6,846	6,572	6,336	6,069	-877	-13%
Beef and veal	1,142	1,441	1,381	1,123	1,232	90	8%
Sheepmeat	108	72	45	54	32	-76	-70%
Fresh dairy products	5,207	5,350	5,163	4,893	4,345	-862	-17%
Butter	89	91	92	89	84	-5	-6%
Cheese	154	202	236	239	257	103	67%
Skim milk powder	278	271	214	226	180	-98	-35%
Whole milk powder	91	22	18	14	14	-77	-84%
Apples	871	1,688	1,867	2,575	2,094	1,223	140%
Kiwifruit	88	91	81	87	90	1	1%
Wine	0	0	0	0	0	0	117%

Source: FAOSTAT 2015b.

Note: .. = data unavailable.

Table 2.1 also shows percentage changes in the consumption of agricultural products in Japan between 1991 and 2011. Of all products consumed, apples showed the largest increase in consumption between 1991 and 2011 (+140 per cent), followed by cheese (+67 per cent), wine is also increasing albeit from a much smaller base. All other products showed either relatively small increases in this period (possibly due to variations in consumption volumes), or decreases in overall consumption. All dairy products (except for cheese) have declined, especially skim and whole milk powder (-35 per cent and -84 per cent respectively).

#### 2.4.4 Trade

The total quantity of Japanese food exports between 1991 and 2011 is shown in Table 2.18. Apples were the largest Japanese export commodity by volume, with 18.21 kilotonnes exported in 2011. However, many Japanese export commodities showed comparatively low volumes.

Table 2.18: Japan, food exports by commodity (000 t), 1991-2011

	1991	1996	2001	2006	2011
Wheat	..	..	..	..	..
Coarse grains	..	..	..	..	..
Rice	0	0	437	18	20
Beef and veal	..	0	1	0	1
Sheepmeat	..	..	..	..	..
Milk	..	..	..	..	..
Fresh dairy products	0	0	0	0	2
Butter	..	..	..	..	..
Cheese	..	0	0	0	..
Skim milk powder	..	..	..	..	..
Whole milk powder	..	..	..	..	..
Apples	1	3	2	19	18
Kiwifruit	..	..	0	..	0
Wine	0	0	1	1	0

Source: FAOSTAT 2015b.

Note: .. = data unavailable.

The total quantity of Japanese food imports between 1991 and 2011 is shown in Table 2.19. In 2011 the main imports were cereals, coarse grains (18,635 kt imported in 2011), and wheat (6,480 kt imported in 2011). While the overall volume of imported wheat to Japan has increase from 1991 to 2011 (+20 per cent), the imports of coarse grains has decreased (-20 per cent). Other imports include beef and veal (740 kt 2011), as well as cheese (212 kt 2011) and wine (208 kt 2011) (FAOSTAT, 2015b).

Table 2.19: Japan, food imports by commodity (000 t), 1991-2011

	1991	1996	2001	2006	2011
Wheat	5,413	5,907	5,624	5,464	6,480
Coarse grains	23,212	21,915	20,912	20,654	18,635
Rice	16	353	507	484	592
Beef and veal	508	899	964	642	740
Sheepmeat	108	72	45	54	32
Milk	..	..	..	..	..
Fresh dairy products	0	0	0	0	0
Butter	21	0	0	6	17
Cheese	124	168	202	204	212
Skim milk powder	117	75	53	32	27
Whole milk powder	0	0	0	0	0
Apples	0	1	2	0	0
Kiwifruit	43	47	40	55	66
Wine	75	107	169	166	208

Source: FAOSTAT 2015b.

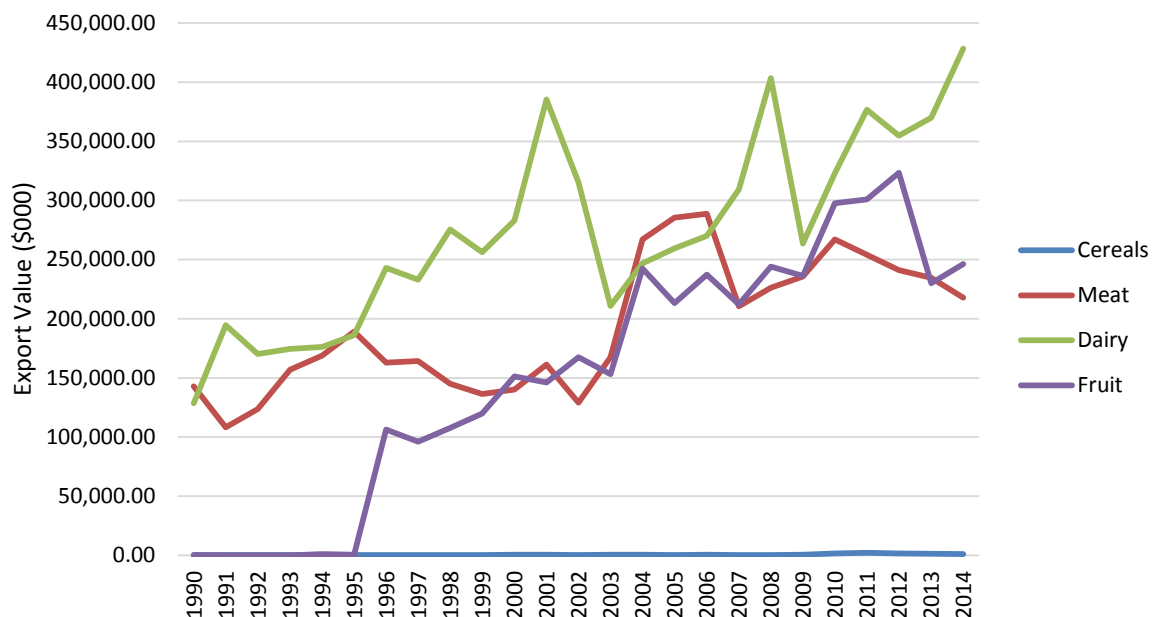
Note: .. = data unavailable.

#### 2.4.5 Trade with New Zealand

Japan was New Zealand's fourth-largest trade partner in 2014. Total agricultural exports to Japan were valued at approximately NZ\$1.56 billion in 2014 (Statistics New Zealand, 2014).

Figure 2.8 shows the value of New Zealand agricultural exports to Japan between 1990 and 2014. For all commodities, agricultural exports to Japan have increased. Overall, dairy exports to Japan had the highest export value in 2014, with a total value of NZ\$428.5 million. This was followed by fruit commodities, with a total value of NZ\$246,195 in 2014. This is significant as New Zealand is currently the only market from which Japan accepts apples. A close third is the export meat commodities to Japan, valued at a total of NZ\$217.9 million in 2014.

Figure 2.8: Value of New Zealand agricultural exports to Japan, 1990-2014



Source: Statistics New Zealand 2015.

Table 2.20 shows the total value of exports of key commodities from New Zealand to Japan in 2014, as well as their percentage of the total trade and overall rank of such commodities. In 2014, agricultural exports to Japan were 4.9 per cent of New Zealand's total agricultural exports by value, with Japan ranking as New Zealand's 4<sup>th</sup> largest export market for agricultural commodities. In particular, Japan was New Zealand's largest export market by value for cheese and curd (worth NZ\$320 million) and kiwifruit (worth NZ\$239 million) in 2014. Kiwifruit exports to Japan are a quarter of all New Zealand kiwifruit exports by value in 2014.

Table 2.20: Proportion of total New Zealand commodity exports by commodity to Japan, 2014

	Total value (NZ\$000)	Percentage (%)	Rank
Beef and veal	157,409.00	7.16%	..
Sheepmeat	52,459.05	1.76%	11
Milk and cream (concentrated)	46,236.57	0.44%	26
Butter	19,629.22	0.73%	29
Cheese and curd	319,724.75	21.57%	1
Apples, pears and quinces	6,693.77	1.22%	17
Kiwifruit, fruit nec	238,727.82	24.54%	1
Wine	13,879.64	1.05%	11
<b>Agricultural commodities</b>	<b>1,563,272.72</b>	<b>4.90%</b>	<b>4</b>

Source: Statistics New Zealand 2014.

Note: .. = data unavailable.

There has long been interest in the development of a Free Trade Agreement (FTA) between Japan and New Zealand. At present, these negotiations have not been initiated due to Japan's entering into the Trans-Pacific Partnership (TPP). However, Japan's inclusion in negotiations for the Regional Comprehensive Economic Partnership (RCEP) could see Free Trade open between Japan and New Zealand in the future (MFAT, 2014a).

## 2.5 United Kingdom

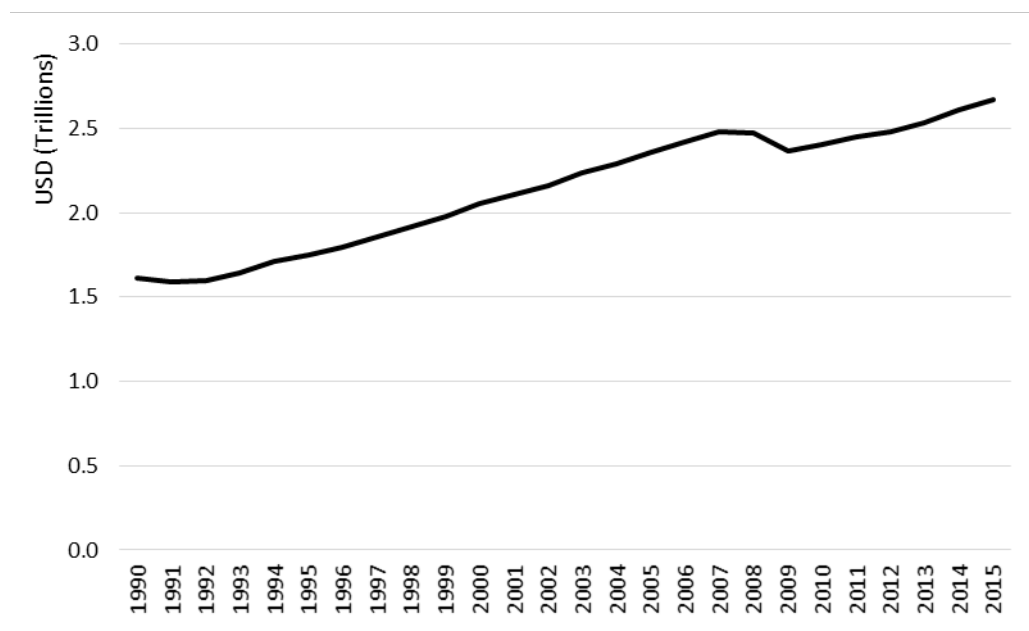
### 2.5.1 Introduction

The United Kingdom (UK) was a traditionally strong export market for New Zealand’s agricultural commodities. This is true for several reasons, including its mostly urban, affluent population, as well as a historical trade relationship and proximity to other major markets, particularly the European Union. While the UK’s agriculture sector is highly productive (providing over half of the market’s total domestic consumption needs), it still relies heavily on trade to satisfy consumer demand. Furthermore, while the UK’s historical position as New Zealand’s top trade partner has diminished in recent years, it remains an important market for New Zealand exporters, and retains a position as New Zealand’s fifth-largest trade partner by total export value. Furthermore, the UK leaving the EU could work to strengthen the trading relationship with NZ depending on the UK’s access to the EU’s single market.

The United Kingdom’s population was 63.5 million people in 2014. This included an urban population of 52.3 million, representing 82.3 per cent of the total (United Nations, 2014b). The United Kingdom’s total population is projected to increase to approximately 67.2 million by 2024 (World Bank, 2015b).

The GDP of the United Kingdom was approximately US\$2.7 trillion in 2016, representing 3.6 per cent of total global GDP (World Bank, 2016b). The UK’s economic growth has been somewhat consistent in recent years, as shown in Figure 2.9. Between 1990 and 2016, the UK’s GDP has increased (despite the significant economic impact of the 2008 recession), with an almost three-fold increase observed between 1991 and 2016 (from approximately US\$1.6 trillion in 1990 to US\$2.7 trillion in 2015) (World Bank, 2016b). However growth has stalled recently with the UK’s decision to separate from the EU. The medium- and long-term effects of this is uncertain.

Figure 2.9: United Kingdom, GDP (constant 2010 USD), 1990-2015



Source: World Bank 2016b.

GDP per capita increased by approximately 45 per cent between 1990 and 2016, representing a total of approximately US\$12,749 per capita in 2015 (World Bank, 2016c). Overall, the growth rate of GDP per

capita has decreased in recent years, from 2.3 (2001-2007) to 0.9 per cent per annum between 2007 and 2012 (OECD.Stat, 2015).

## 2.5.2 Production

The total quantity of UK food production by product between 1991 and 2011 is shown in Table 2.21. There has been some variation production. Wheat is the largest agricultural product with 15,257 kilotonnes of wheat produced in 2011. This was closely followed by fresh dairy (13,849 kilotonnes produced in 2011) and coarse grains (6,227 kilotonnes produced in 2011) (FAOSTAT 2015b).

Table 2.21: United Kingdom, food production by product (000 t), 1991-2011

	1991	1996	2001	2006	2011	1990 to 2011 (abs.change)	1991 to 2011 (% change)
Wheat	14,363	16,100	11,580	14,747	15,257	894	6%
Coarse grains	8,272	8,476	7,379	6,085	6,228	-2,045	-25%
Rice	..	..	..	..	..	..	..
Beef and veal	1,020	710	645	847	936	-84	-8%
Sheepmeat	386	373	267	334	301	-85	-22%
Milk	..	..	..	..	..	..	..
Fresh dairy products	14,763	14,808	14,707	14,316	13,849	-914	-6%
Butter	112	120	126	117	130	18	16%
Cheese	298	369	395	393	390	92	31%
Skim milk powder	133	108	71	65	67	-67	-50%
Whole milk powder	73	83	87	49	45	-28	-38%
Apples	323	224	212	269	240	-83	-26%
Kiwifruit	..	..	..	..	..	..	..
Wine	2	1	2	1	2	0	6%

Source: FAOSTAT 2015b.

Note: .. = data unavailable.

Table 2.21 also shows percentage changes in agricultural production in the United Kingdom between 1991 and 2011. UK milk powder production has decreased by approximately 46 per cent, followed by apples (-26%), coarse grains (-25 per cent) and sheep meat (-22 per cent). Cheese showed the largest increase in production by volume over this period, increasing by 30.85 per cent between 1991 and 2011, followed by butter (+16 per cent).

## 2.5.3 Consumption

The total quantity of UK food consumption by product between 1991 and 2011 is shown in Table 2.22. Of all shown commodities, fresh dairy was the most consumed, with approximately 16,756 kt consumed in 2011. This was followed by grain products, most notably wheat (13,902 kt in 2011) and other coarse grains (7,233 kt consumed in 2011). Similarly large consumption volumes were shown for apples (1,739 kt in 2011), wine (1,268 kt in 2011) and beef and veal products (1,176 kt in 2011).

Table 2.22: United Kingdom, food consumption by product (000 t), 1991-2011

	1991	1996	2001	2006	2011	1990 to 2011 (abs.change)	1991 to 2011 ( % change)
Wheat	10,862	12,391	13,519	13,926	13,902	3,041	28%
Coarse grains	7,885	7,870	7,772	7,006	7,233	-652	-8%
Rice	187	196	289	360	483	296	158%
Beef and veal	1,216	892	1,035	1,323	1,176	-41	-3%
Sheepmeat	407	397	330	362	293	-114	-28%
Fresh dairy products	16,524	17,274	17,396	16,706	16,756	232	1%
Butter	177	181	198	226	196	19	11%
Cheese	479	571	597	660	672	193	40%
Milk powders	95	92	69	75	99	4	4%
Apples	1,017	873	1,139	1,963	1,739	722	71%
Kiwifruit	12	21	33	39	31	19	154%
Wine	655	711	993	1,158	1,268	612	93%

Source: FAOSTAT 2015b.

Table 2.22 also shows percentage changes in the consumption of agricultural products in the UK between 1991 and 2011. While most agricultural products showed consumption growth during this period, some also showed minor decreases. Consumption of sheepmeat has decreased by almost 30 per cent, with decreases in consumption also shown for coarse grains (-8 per cent) and beef and veal (-3 per cent). The largest increase in consumption during this period was of kiwifruit, which, while overall consumption is still relatively small, doubled between 1991 and 2011. Consumption of wine (+93 per cent), apples (+71 per cent) and cheese products (+40 per cent) also increased.

#### 2.5.4 Trade

The United Kingdom's economy relies heavily on trade, with total merchandise trade comprising roughly 44.7 per cent of GDP in 2013 (World Bank, 2015e). Furthermore, the UK relies on imports of food products approximately 47 per cent of total consumed food imported from other markets, primarily the European Union (DEFRA, 2014).

The total quantity of UK food exports between 1991 and 2011 is shown in Table 2.23. Wheat was the largest agricultural export product from the UK, with 2,287 kilotonnes exported in 2011. This is closely followed by coarse grains (1,110 kilotonnes exported in 2011) and fresh dairy (562 kilotonnes exported in 2011). The UK is a net exporter of wheat, fresh dairy products and whole milk powder.

Table 2.23: United Kingdom, food exports by product (000 t), 1991-2011

	1991	1996	2001	2006	2011
Wheat	4,024	3,675	1,626	2,117	2,287
Coarse grains	2,082	1,895	894	759	1,110
Rice	63	141	177	191	187
Beef and veal	121	58	5	46	143
Sheepmeat	80	109	30	86	96
Milk	..	..	..	..	..
Fresh dairy products	68	25	63	652	562
Butter	39	50	41	36	36
Cheese	51	57	50	83	104
Skim milk powder	71	19	30	38	24
Whole milk powder	67	78	87	58	55
Apples	42	32	17	44	30
Kiwifruit	0	0	1	1	1
Wine	5	22	16	43	68

Source: FAOSTAT 2015b.

The total quantity of UK food imports between 1991 and 2011 is shown in Table 2.24. As with the UK's agricultural exports, imports fluctuated over this period, with growth in cheese, beef and veal, and wine. Of all imported agricultural products, wine was the largest, with 1,321.4 kilotonnes of wine imported to the UK in 2011, a two-fold increase between 1991 and 2011. Cereals were also important, with 1,235 kilotonnes of coarse grains and 902 kilotonnes of wheat imported in 2011.

Table 2.24: United Kingdom, food imports by product (000 t), 1991-2011

	1991	1996	2001	2006	2011
Wheat	743	668	1,300	1,019	902
Coarse grains	1,783	1,526	1,759	1,370	1,235
Rice	250	336	466	551	670
Beef and veal	159	109	190	233	234
Sheepmeat	102	133	93	114	88
Milk	..	..	..	..	..
Fresh dairy products	19	42	80	56	122
Butter	104	112	113	144	102
Cheese	190	256	230	323	361
Skim milk powder	8	12	23	29	44
Whole milk powder	3	11	8	22	21
Apples	463	422	466	532	459
Kiwifruit	13	21	33	40	32
Wine	620	701	994	1,185	1,321

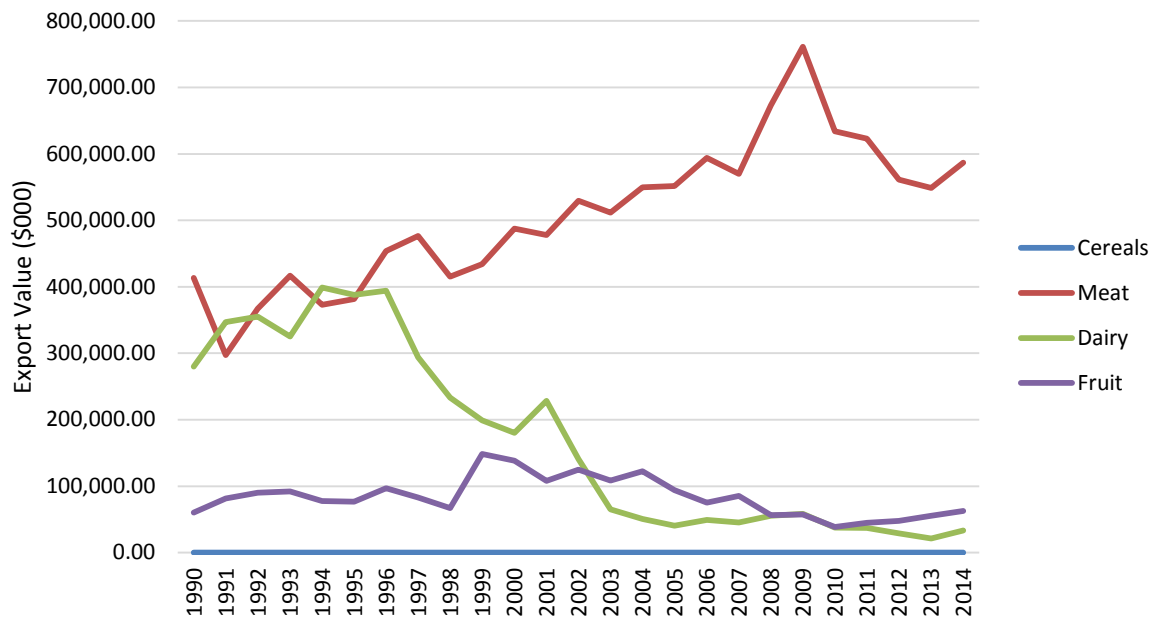
Source: FAOSTAT 2015b.

### 2.5.5 Trade with New Zealand

Historically the UK was New Zealand's largest trade partner. While this is no longer the case, the United Kingdom continues to be a strong trade partner for New Zealand, ranking as New Zealand's ninth-largest in merchandise trade in 2014. Agricultural exports to the UK had a total export value of NZ\$1.19 billion in 2014 – an increase of 10.5 per cent of total agricultural export value from the previous year (Statistics New Zealand, 2014).

Figure 2.10 shows total trade value of New Zealand agricultural exports to the UK between 1990 and 2014. Meat products were the highest-valued export product category in New Zealand trade with the UK, valued at a total of NZ\$586.6 million in 2014. The total export value of New Zealand meat products to the UK has increase, peaking at NZ\$761.1 million in 2009. However, the total trade value of all other products has decreased during this period. This is particularly true of dairy products, which generated a total export value of NZ\$33.2 million in 2014 after a gradual decline in value from its peak in 1994 (NZ\$399 million). A similar trend, although not as extreme, is shown for New Zealand fruit products, which generated NZ\$62.8 million export value in 2014, compared with its peak value of NZ\$148.2 million in 1999.

Figure 2.10: Value of New Zealand agricultural exports to the United Kingdom, 1990-2014



Source: Statistics New Zealand 2015.

Table 2.25 shows the total value of the export of key commodities from New Zealand to the United Kingdom in 2014, as well as their percentage of the total trade and overall rank of such commodities. The value of New Zealand agricultural exports to the United Kingdom was approximately NZ\$1.19 billion in 2014, comprising approximately 3.74 per cent of New Zealand’s agricultural exports by value and representing New Zealand’s fifth-largest export market for agricultural commodities. In particular, the UK was New Zealand’s second-largest export market for sheep meat in 2014, valued at NZ\$551.1 million (19 per cent of total sheep meat exports by value), as well as apples, pears and quinces, valued at NZ\$63.8 million (12 per cent of total apple, pear and quince exports by value). The UK was also New Zealand’s third-largest export market for wine, valued at NZ\$318.6 million in 2014 and accounting for almost a quarter of all wine exports by value.

Table 2.25: Proportion of total New Zealand commodity exports by commodity to the United Kingdom, 2014

	Total value (NZ\$000)	Percentage (%)	Rank
Beef and veal	31,808.81	1.45%	..
Sheepmeat	551,119.70	18.53%	2
Milk and cream (concentrated)	548.00	0.005%	..
Butter	4,124.95	0.15%	45
Cheese and curd	38,939.90	2.63%	12
Apples, pears and quinces	63,831.31	11.66%	2
Kiwifruit, fruit nec	21.27	0.002%	42
Wine	318,611.30	23.99%	3
<b>Agricultural commodities</b>	<b>1,194,631.45</b>	<b>3.74%</b>	<b>5</b>

Source: Statistics New Zealand 2014.

Note: .. = data unavailable.



## Chapter 3

### The Lincoln Trade & Environment Model (LTEM)

#### 3.1 Introduction

The WTP results express in-market consumer preferences for changes in the standards of credence attributes. However, in order to assess the outcomes of obtaining these premiums for New Zealand producers, the results have been incorporated into a trade modelling exercise.

The model allows the dynamics between trading partners in the global market to be included in our analysis. From this exercise elements such as the size of the consumer base in each country, differing trade policies, and the extent of New Zealand exports into each market, can be considered. The modelling exercise also informs the consequent returns to New Zealand producers from changes in consumer behaviour. This approach is valuable for assessing the potential impact for these WTPs as while a consumers in one nation may have high WTP for a particular attribute, if that nation has high tariff barriers, or other issues for market access the resulting impact of obtaining that premium in-market may not be significant for New Zealand producers.

Table 3.1: General Characteristics of the LTEM

<i>Model</i>	LTEM
<i>Modelling Approach</i>	Partial equilibrium
<i>Temporal Properties</i>	Comparative static & can also provide short term dynamics (via sequential simulation)
<i>Solution Type</i>	Non-spatial, net trade
<i>Solution Algorithm</i>	Newton's global algorithm
<i>Parameters</i>	Synthetic
<i>Commodity Coverage</i>	23 (Appendix A.1)
<i>Country Coverage</i>	23 (Appendix A.2)
<i>Behavioural Equations (per commodity, country)</i>	Domestic supply Domestic Demand (food, feed, processed) Stocks Producer price Consumer price Trade price
<i>Economic Identity</i>	Net trade
<i>Approach Used to Incorporate Price Differential</i>	Preference changes
<i>Induced Shocks</i>	Varying levels of trade quotas Varying conditional import tariffs

#### 3.2 Model background

The model, LTEM, is based upon VORSIM which has evolved from SWOPSIM and associated trade-database used to conduct analyses during the Uruguay Round (Roningen, 1986; Roningen *et al.*, 1991). LTEM is a multi-country, multi-commodity PE framework which focuses on the agricultural sector i.e. the linkages of the agricultural sector with the rest of the economy not considered. LTEM is used to quantify the price, supply, demand and net trade effects of trade and domestic agricultural support policies. The

model is used to derive the long-term policy impact in a comparative static fashion. The included products are treated as homogenous and therefore perfectly substitutable in international markets. It is a non-spatial model in which the framework derives the net trade of each region, however, the supply and demand shares of countries in trade can also be traced. It allows the application of various domestic and border policies explicitly such as production quotas, set-aside policies, input and/or output related producer subsidies/taxes, consumer subsidies/taxes, minimum prices, import tariffs and export subsidies. The economic welfare implications of policy changes are also calculated in the LTEM framework by using the producer and consumer surplus measures. The structure of the LTEM is expanded in Table 3.1.

The LTEM framework includes 23 commodities and 23 countries. These are presented in Appendix Tables A1 & A2. The dairy sector is modelled as five commodities. Raw milk is defined as the farm gate product and then is allocated to either the liquid milk, butter, cheese, whole milk powder or skim milk powder markets depending upon their relative prices subject to physical constraints. The meat sector is disaggregated into sheepmeat, beef, and pig meat in the current version of LTEM. Six crop products (wheat, maize, rice, sugar, coarse grains, oilseeds, oil meals, oil, apples and kiwifruit) as well as the poultry sector (poultry meat and eggs) and wool are also explicitly modelled in LTEM framework.

### 3.3 Results

All results are presented in total producer returns for New Zealand in million USD in 2024. This is the final year projected in the LTEM, and is used for reporting as it allows for several years of transition effects to occur after scenario changes are applied. Furthermore percentage changes are shown for each independent scenario. These changes are comparative to the same year (2024) in the baseline scenario, representing the projected changes from the assumed 'business-as-usual' scenario.

The results from the modelling are presented in Tables 3.2 and 3.3. Table 3.2 displays the first set of results which detail the change in producer returns from (the increased value of) exports where the WTP data from raising standards from minimum to improved. The modelling shows that overall the total impact of increasing the standard of any attribute from 'minimum' to 'improved' is positive for New Zealand producer returns. The total producer returns for agriculture in the baseline are \$USD33.8 billion USD, this increases between \$365 and \$867 million between scenarios. The highest total increases from these results come from raising 'animal welfare/bio-diversity' to 'improved' with a total 2.6 per cent increase in total producer returns.

Of changes for individual commodities, all changes are positive with the exception of whole milk powder (WMP) which has no change in the 'health' scenario, and under the 'social responsibility' scenario. These are due to the increases in WTP for 'health' and 'social responsibility' in dairy being concentrated in the EU, a net exporter of WMP, rather than in key dairy importing countries for those attributes. The largest increases in percentage terms are experienced for wine, which has up to over 15 per cent increases in returns, with 'health' and 'social responsibility', and over 10 per cent increased returns under the 'animal welfare/bio-diversity' scenario.

Table 3.2: New Zealand producer returns for improved accreditation for credence attributes in 2024 (mil USD)

	Baseline	Health	Environment	Animal Welfare/Bio-diversity	Food Safety	Social Responsibility	Percentage change from Baseline				
							Health	Environment	Animal Welfare/Bio-diversity	Food Safety	Social Responsibility
Wheat	219	220	220	220	220	220	0.4%	0.4%	0.5%	0.4%	0.5%
Other Grains	176	177	178	178	178	178	0.7%	0.9%	1.1%	0.9%	1.1%
Maize	102	103	103	103	103	103	0.7%	0.9%	1.1%	0.9%	1.1%
Cereals	497	499	500	501	500	501	0.6%	0.7%	0.8%	0.7%	0.9%
Beef	2,474	2,531	2,563	2,599	2,591	2,612	2.3%	3.6%	5.0%	4.7%	5.6%
Pigmeat	211	222	218	220	216	218	4.8%	3.3%	4.2%	2.3%	3.0%
Sheep	2,669	2,800	2,741	2,919	2,954	2,918	4.9%	2.7%	9.3%	10.7%	9.3%
Poultry	636	654	659	672	672	674	2.9%	3.7%	5.8%	5.7%	6.0%
Raw Milk	11,657	11,690	11,726	11,755	11,729	11,725	0.3%	0.6%	0.8%	0.6%	0.6%
Butter	2,720	2,735	2,755	2,835	2,813	2,751	0.6%	1.3%	4.2%	3.4%	1.1%
Cheese	2,107	2,180	2,261	2,197	2,171	2,267	3.5%	7.3%	4.3%	3.1%	7.6%
WMP	5,835	5,834	5,860	5,966	5,909	5,830	0.0%	0.4%	2.3%	1.3%	-0.1%
SMP	2,688	2,744	2,860	2,839	2,799	2,777	2.1%	6.4%	5.6%	4.1%	3.3%
Apples	428	446	430	445	437	450	4.3%	0.6%	4.1%	2.1%	5.2%
Kiwifruit	655	671	659	684	661	677	2.4%	0.6%	4.4%	0.9%	3.3%
Wine	600	691	626	661	611	691	15.3%	4.4%	10.2%	1.9%	15.3%
<b>Total Agriculture</b>	<b>33,781</b>	<b>34,146</b>	<b>34,294</b>	<b>34,648</b>	<b>34,503</b>	<b>34,495</b>	<b>1.1%</b>	<b>1.5%</b>	<b>2.6%</b>	<b>2.1%</b>	<b>2.1%</b>

NB:

'Total Agriculture' represents the aggregate of 23 modelled commodities some of which that are not presented individually

WMP: whole milk powder

SMP: skim milk powder

Cheese and sheepmeat also have the potential for large increases in producer returns with increases over seven percent for cheese with the 'environment' and 'social responsibility' attributes, and increases over nine percent for sheepmeat with the 'animal welfare/bio-diversity', 'food safety' and 'social responsibility' attributes. Sheepmeat shows the largest changes in absolute terms with an increase of \$285 million with an increase in 'food safety' from 'minimum' to 'improved'. Increases associated with 'animal welfare/bio-diversity' and 'social responsibility' are almost 250 million USD. Other significant increases in absolute terms include cheese and beef under 'social responsibility' (\$160 and \$137 mil. respectively), and SMP under 'environment' and 'animal welfare/bio-diversity' (\$171 and \$151 mil. respectively).

The second set of results, showing producer returns from the scenarios using the increases in WTP associated with raising the levels of credence attributes from 'improved to high'. Here increases are first increased to the WTP shown above for the 'improved' level, then increased again to the level for 'high' attributes. These cumulative 'minimum to high' results are shown in Table 3.3.

Overall all attribute scenarios have a total net benefit to agriculture, as expected. Again 'animal welfare/bio-diversity' brings the highest total benefit with an increase of \$1.6 billion, or a 4.9 per cent total increase in producer returns. All individual commodities experienced increases, with the exception of WMP under the 'health' scenario, for which there was no increase in WTP.

In relative terms, the returns for wine has the potential for the greatest increase, with up to a 23.5 per cent increase with high levels for social responsibility, representing a \$141 million increase in producer returns. 'Health' and 'animal welfare/bio-diversity' would also net increases of over 15 per cent for wine producers at the 'high' level. Increases in producer returns for sheepmeat are also possible under the 'animal welfare' (+15.1 per cent), 'food safety' (+14.7 per cent) and 'social responsibility' (+17.1 per cent) scenarios. Cheese, poultry and SMP all also achieve over 10 per cent increases under different attributes.

In absolute terms, sheepmeat again has the highest change in returns of up to \$457 million (for 'social responsibility'). After those for sheepmeat, the absolute increase in returns is highest for skim milk powder under the 'animal welfare/bio-diversity' scenario with returns of \$306 million. Producer returns for beef increased by \$239 million under the 'social responsibility' attribute scenario, and while the percentage changes for WMP have been relatively small compared to some other commodities the absolute change under the 'animal welfare/bio-diversity' scenario are \$249 million.

Impacts on cereal returns are flow-on impacts from production changes to other commodities.

Table 3.3: New Zealand producer returns for high accreditation for credence attributes in 2024 (mil USD)

	Baseline	Health	Environment	Animal Welfare	Food Safety	Social Responsibility	Percentage change from Baseline				
							Health	Environment	Animal Welfare	Food Safety	Social Responsibility
Wheat	219	220	220	221	220	221	0.5%	0.6%	0.9%	0.6%	0.8%
Other Grain	176	178	178	179	178	179	1.1%	1.3%	1.9%	1.3%	1.8%
Maize	102	103	103	104	103	104	1.1%	1.2%	1.9%	1.3%	1.9%
Cereals	497	501	501	504	501	504	0.9%	1.0%	1.5%	1.0%	1.4%
Beef	2,474	2,612	2,595	2,685	2,638	2,713	5.6%	4.9%	8.5%	6.6%	9.6%
Pigmeat	211	218	221	227	218	221	3.0%	4.7%	7.6%	2.9%	4.7%
Sheep	2,669	2,918	2,778	3,071	3,061	3,126	9.3%	4.1%	15.1%	14.7%	17.1%
Poultry	636	674	668	698	687	704	6.0%	5.1%	9.8%	8.1%	10.7%
Raw Milk	11,657	11,725	11,788	11,832	11,749	11,781	0.6%	1.1%	1.5%	0.8%	1.1%
Butter	2,720	2,751	2,827	2,904	2,822	2,840	1.1%	3.9%	6.7%	3.8%	4.4%
Cheese	2,107	2,267	2,330	2,297	2,215	2,313	7.6%	10.6%	9.0%	5.1%	9.8%
WMP	5,835	5,830	5,920	6,084	5,919	5,858	-0.1%	1.5%	4.3%	1.4%	0.4%
SMP	2,688	2,777	2,918	2,995	2,854	2,869	3.3%	8.6%	11.4%	6.2%	6.7%
Apples	428	450	446	466	444	463	5.2%	4.1%	8.8%	3.6%	8.1%
Kiwifruit	655	677	687	719	666	683	3.3%	4.8%	9.8%	1.7%	4.2%
Wine	600	691	653	695	629	740	15.3%	9.0%	15.8%	4.9%	23.5%
Total	33,781	34,495	34,683	35,422	34,789	35,083	2.1%	2.7%	4.9%	3.0%	3.9%

NB:

'Total Agriculture' represents the aggregate of 23 modelled commodities some of which that are not presented individually

WMP: whole milk powder

SMP: skim milk powder



## Chapter 4

### Conclusion

The results of this modelling exercise indicate that if New Zealand agri-food products were able to capture price premiums in these key export markets, returns could be increased by up to 23.5 percent, depending on the targeted commodity and attribute. This result is under the assumption that New Zealand isn't the sole exporting country gaining price premiums in-market. If New Zealand were the sole recipient of premiums for attributes we would expect higher returns than those presented in this report.

One shortcoming of the presented results, is that they are based on the projected 'business-as-usual' trade profile of New Zealand. Thus any potential changes in market access within the projected model period are not accounted for. Similarly all increases in producer returns are dependant on the trading profile between New Zealand and the five examined countries/regions, explaining some of the variance in returns between commodities in the same product group. Furthermore, as the modelling exercise applied the willingness to pay to all of New Zealand's exports from the four examined product groups into the examined countries, the levels of absolute changes in producer returns, would vary depending on the share of exports able to achieve these levels for the assessed attributes.

Ultimately, this research is a smaller part of a wider research objective, this exercise merely shows that under certain conditions, and in the context of dynamic international markets, achieving price premiums would increase for returns for New Zealand agricultural producers. Furthermore that the opportunities for returns are not homogenous between specific commodity groups and selected attributes. In practice there are of course costs associated with gaining price premiums in markets, be they through securing value-chains, assisting producers in raising standards, or in communicating these attributes to consumers. As these costs have not been incorporated into this modelling exercise, the potential viability of securing these price premiums is unknown, especially as the cost may differ between specific commodities and markets. This research however, has helped quantify the potential returns for targeted premiums in-market between commodities, for future research to expand upon.

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## Appendix

**Table A1: Commodities in the LTEM**

Category	Commodity
<b>Crop</b>	Wheat
	Maize
	Other Grain
	Rice
	Sugar
<b>Oilseeds</b>	Oilseeds
	Oilseed Meals
	Oils
<b>Meat</b>	Beef
	Sheepmeat
	Pig meat
<b>Poultry</b>	Poultry meat
	Eggs
<b>Dairy</b>	Liquid milk
	Butter
	Cheese
	Skim Milk Powder
	Whole Milk Powder
<b>Fruit</b>	Apples
	Kiwifruit

**Table A2: Countries in the LTEM**

Code	Country	Code	Country
<b>ARG</b>	Argentina	<b>NOR</b>	Norway
<b>AUS</b>	Australia	<b>RUS</b>	Russian Federation
<b>BRA</b>	Brazil	<b>ZAF</b>	South Africa
<b>CAN</b>	Canada	<b>CHE</b>	Switzerland
<b>CHN</b>	China	<b>TUR</b>	Turkey
<b>EUR</b>	European Union (27)	<b>USA</b>	United States
<b>IND</b>	India	<b>CHL</b>	Chile
<b>JPN</b>	Japan	<b>PRY</b>	Paraguay
<b>KOR</b>	South Korea	<b>URY</b>	Uruguay
<b>MEX</b>	Mexico	<b>ROW</b>	Rest of the World
<b>NZL</b>	New Zealand		

**Table A3: Median willingness to pay for credence attributes by level, country and product**

		Health		Environment		Animal welfare/ bio-diversity		Food safety		Social responsibility	
		min- improved	improved- high	min- improved	improved- high	min- improved	improved- high	min- improved	improved- high	min- improved	improved- high
China	Meat	8			1	4	3	2			
China	Dairy				3	7	6	3			
China	Vege				4	3	4				
China	Wine		7			5	11	2			
India	Meat					37	17	56	21	48	41
India	Dairy				14	22	12	18			19
India	Vege	23						16	10	17	25
India	Wine										14
Japan	Meat				5	11	9	3	3		4
Japan	Dairy	10	4	30		32	33	8	7		
Japan	Vege	30		22		25	27	12	9	30	
Japan	Wine					12	14	3			
Indonesia	Meat	12		16	11	13	10	16	13		8
Indonesia	Dairy		9	16		6	7	17	8		22
Indonesia	Vege	14	5			5	6	15	7	19	18
Indonesia	Wine							32		46	
UK	Meat		3	15	3	7	6	4	2	14	7
UK	Dairy	5		11	5	5	6	4	3	12	3
UK	Vege	10			3	6	5	4	3	16	6
UK	Wine	10		3	3	6	2	1	2	10	5

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