Food market and trade risks

Prepared for the Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata
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CHAPTER 1

Introduction

This report is part of a wider study undertaken by the Office of the Parliamentary Commissioner for the Environment (PCE) into the environmental sustainability of New Zealand agriculture. The aim of this report is to address the effects of markets due to trade policy, changing supply trends, market access and commodity prices on past and future primary sector returns. The importance of providing products that consumers demand has never been clearer in New Zealand (NZ), and this requires the creation of new production and consumption systems, or at least innovation within the existing systems. As consumers increasingly express these changes, the signals to producers will also change.

The following chapter begins the report with a background on the NZ agricultural sector and the developments it has undergone in the last 50 years. International trade policy, with a particular emphasis on the policies of the European Union (EU), is then described. The chapter concludes with an outline of the components of farm gate prices and the effect of exchange rates on these.

Chapter 3 covers eco-labelling. It discusses and describes the role of eco-labels as environmental and policy tools as well as marketing communications. The chapter continues with an analysis of the market for eco-labelled products, including organic products, and the willingness of consumers to pay for these products.

Chapter 4 presents the results of quantitative studies investigating the costs and benefits of organic production to NZ producers. It also provides two simulations analysing the impact on NZ producer returns of consumer demand for eco-labelled products.

CHAPTER 2

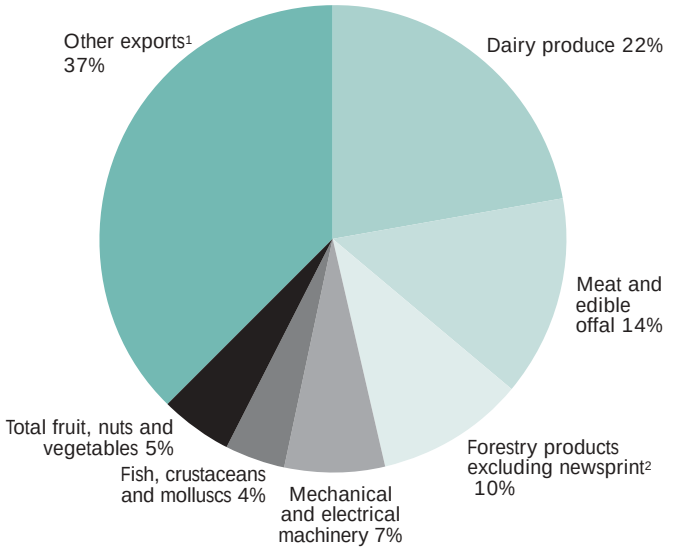
International trade and food production

2.1 Background

The objective of this chapter is to highlight the importance of agriculture and trade to the NZ economy. The chapter also notes some of the factors that have affected, and will continue to affect, the development of this sector and its potential future prosperity.

NZ is heavily dependent on trade for its prosperity. Agricultural commodities have historically dominated NZ's export trade. This trend continues to the present as illustrated in Figure 2.1.

Figure 2.1 Breakdown of New Zealand exports (Year ended 30 June 2002)



1 Excludes bird's eggs and honey, includes casein and caseinates
2 Export values exclude newsprint because of confidentiality

Source: Statistics NZ, 2003.

In dollar terms the value of agricultural exports for the year ended March 2000 was $10,064 million out of total merchandise exports valued at $24,542 million. This excludes exports from the forestry and fisheries sector (see Table 2.1). The success of the agricultural sector therefore appears to be an important determinant of the economic well-being of NZ.

Table 2.1 Exports of major commodities, 1999-2000[1]

Commodity	1999	2000[P]
	$(million)	
Milk powder, butter and cheese	4,006	3,766
Meat and edible offal	2,838	3,192
Wood and wood articles	1,413	1,836
Fish, crustaceans and molluscs	1,161	1,189
Mechanical machinery	1,049	1,078
Aluminium and articles thereof	974	1,015
Fruit and nuts	909	1,060
Wool	797	761
Casein and caseinates	784	769
Electrical machinery	698	770
Raw hides, skins, leather	560	516
Aircraft and parts	70	487
Iron and steel and articles	472	479
Mineral fuels	467	546
Textiles and textile articles[2]	469	516
Other commodities	5,911	6,560
All merchandise exports	22,579	24,542

Source: Statistics New Zealand, 2003.
1. Year ended March.
2. Excludes wool.
P = Provisional.

The contribution of the agricultural sector to NZ's prosperity is significant when compared to other developed countries. Moreover, primary producers in NZ are unusual amongst developed countries in that they are almost totally exposed to world market forces. They receive almost no Government subsidies and must compete with subsidised production in other countries.

2.1.1 History of New Zealand agricultural trade

NZ agriculture developed to service the United Kingdom (UK) market. This was enhanced by preferential agreements with the UK, beginning with the Ottawa agreement in 1933 and followed by bulk purchase agreements during and immediately after the Second World War where the UK agreed to take all NZ agricultural exports. It is not surprising then that around 90 percent of exports from NZ went to the UK and the agricultural sector developed to service that market. During the late 1950s and early 1960s there were some threats to NZ imports into the UK from other competitors but the response of the UK was again to offer preferential access to NZ.

However, during the 1960s it became clearer that the UK would enter the European Community (EC) and that NZ trade would be seriously affected. In response NZ started to diversify and by the time the UK entered the EC in 1973 exports to the UK had dropped from over 90 percent after the Second World War to under 40 percent. However, the UK remained an important market for NZ, especially for dairy and sheep meat exports.

When the UK joined the EC and adopted the Common Agricultural Policy (CAP) after a transitional period of five years, the threat to NZ trade was acute. The CAP was based on fixed support prices with barriers to entry of third country imports. The European Union (EU), then called the European Community, was established on 25 March 1957 when the Treaty of Rome was signed. The CAP was established in 1963, which effectively set internal minimum prices well above world market levels.

The importance of the UK to NZ as an export market was reflected in a report written by the Monetary and Economic Council in 1970. This report estimated that if the EC's common agricultural policy for dairy products was applied to the UK, NZ would have lost $150 million in butter and cheese export earnings (Statistics New Zealand, 2002). In response to the findings of this report, the NZ government sought a special arrangement with the European Commission to allow continued access into Britain at negotiated prices for NZ exports of butter, cheese and sheep meat. This agreement was called Protocol 18 under which NZ could export limited amounts of butter and cheese and later under a different regulation, sheep meat, in return for higher prices. This led to the earning of quota rents from these exports, that is, the difference between what NZ would have been willing to supply the market at, and the higher prices it obtained on

the EC market. These quota rents have gone some way to compensate for the loss in market access.

Access for NZ exports to the EU has continued to the present although it has been somewhat reduced. However, it is still significant and may be under threat given EU policy and WTO trade negotiations.

2.1.2 Deregulation of the New Zealand industry

An important factor that has affected NZ agriculture is the deregulation of the industry. Prior to 1984, NZ had a relatively high degree of regulation throughout the economy. In 1984, with a change in government and a looming financial crisis, NZ undertook widespread liberalisation. This is often referred to as being '...faster, further and across a broader front than in any other country' (Bale, 1998). In summary, NZ removed all financial controls, floated its exchange rate, undertook major privatisation of state enterprises, relaxed labour market controls and removed most import tariffs and regulations.

In the agricultural sector there had only been a low level of support until the mid 1970s. The level of support was dramatically increased during the mid 1970s in response to falling prices at the farm gate. The introduction of Supplementary Minimum Payments (SMPs), a form of deficiency payment, followed swiftly by a raft of other measures marked a rapid escalation in support levels. The other measures included: incentives for land development; concessionary livestock valuation schemes; preferential credit for farm purchase; tax concessions; and fertiliser subsidies. One of the effects of this support was a continuation of the traditional forms of agricultural land use when changing market conditions may have suggested better economic options.

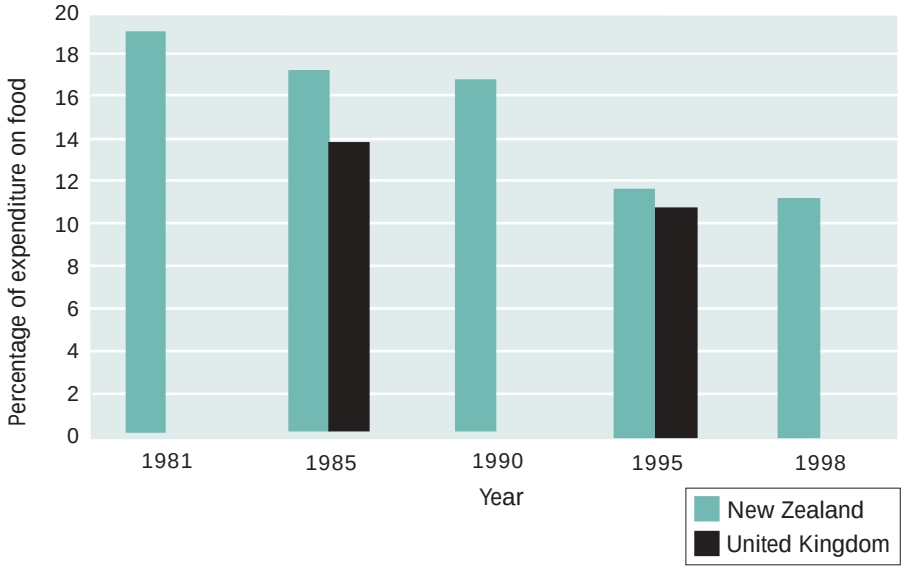
The advent of the Labour Government in 1984 brought a newfound faith that market forces were the best solution for efficient outcomes for the economy. One aspect of this philosophy was a vastly reduced role for Government in the economy. For the agricultural sector this entailed the removal of Government support. One of the effects of deregulation has been that agricultural producers have sought to maximise the use of available resources. In some cases this has seen a diversification of the means of production, the development of new products and an overall rationalisation of the agricultural sector.

2.1.3 Changing consumer behaviour

The other factor influencing recent developments in agriculture is a change in consumer behaviour. Some of these are introduced here but the potential future impact of these will be described in more detail later on. The proportion of consumer expenditure on food has fallen from 19 percent of total

expenditure in 1981 to 11 percent in 1998 (Figure 2.2). Figure 2.2 also shows that the proportion of expenditure on food in the UK is lower than in NZ. The proportion of this expenditure that goes to the farmer has fallen as well, due both to a rise in expenditure on ready-prepared meals and catering expenditure outside the home. Thus in NZ, 22 percent of food expenditure is on food consumed and/or prepared outside the home and the average time taken to prepare meals is under 10 minutes (Statistics NZ, 1998). This is consistent with an earlier UK study which found that over 94 percent of meals required under 10 minutes preparation time and 51 percent of meals no preparation time at all (Gofton and Marshall, 1989). Thus the proportion of income spent on basic commodities has fallen, and is likely to continue to fall, as incomes rise and consumer behaviour continues to change.

Figure 2.2 The proportion of household expenditure on food



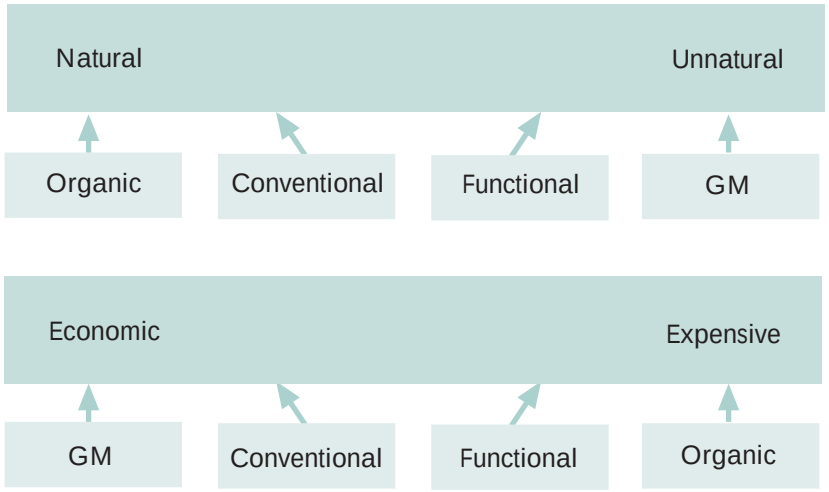
Source: Statistics New Zealand 1998; NFS and MAFF, 1998.

Accompanying the decline in relative income spent on food has been a change in consumer preference as to the type of food consumed. Over the course of the last century food went from being a scarce resource to one of overabundance in the developed world. This has resulted in consumers' preferences moving away from the nutritional aspects of food toward other attributes (Sijtsema *et al*., 2002). An example of this trend has been the growth of the organic movement, fuelled by consumer demand for food products that are perceived to be healthy, safe and environmentally friendly (O'Donovan and McCarthy, 2002).

The development of 'new' food products such as organic, functional and genetically modified (GM) foods has altered the way in which some consumers

act. Greater attention is required in the purchase of these items when compared to conventional food, as a range of different attributes of the food must be considered. Additional information processing and evaluation by consumers is a likely consequence. As such, motivators for the purchase of 'new' foods are likely to differ from those that apply to conventional foods. The perception that consumers generally have of these 'new' food products is illustrated in Figure 2.3.

Figure 2.3 Consumer perception positioning for innovative and non-innovative foods



Source: Jonas and Beckman, cited in Von Alvensleben, 2001.

These changes in consumer behaviour have important implications for New Zealand as will be discussed in more detail later in this report.

The greening of business

The landscape has also changed for non-agricultural businesses as a result of changing consumer preferences. Historically there has been a tendency for businesses to put a priority on production costs over environmental costs in order to ensure they remain competitive. Business opinion has, however, gravitated towards a greater concern for the environment. This has been motivated by the growth of green consumerism and higher standards set by environmental legislation (Roarty, 1997). The trend towards environmental protection is not confined to specific industries but affects business generally. A recent UK survey conducted by the Department for Environment, Food and Rural Affairs (DEFRA) shows that environmental spending is not limited to any particular industry.

Table 2.2 Environmental spending by major UK industry sectors in 2000

Chemicals and chemical products	Food products, beverages and tobacco	Mining and quarrying	Power Industries	Machinery and equipment
£628 million	£497 million	£494 million	£416 million	£370 million

Source: DEFRA, 2002.

The nature of environmental capital spending is also being transformed with an increased focus on new or modified production facilities that incorporate environmental protection as an integrated part of the production process. In the UK, this has increased 266 percent during the period 1997-2000 (DEFRA, 2002). In contrast the capital spending on 'end of pipe' solutions has decreased by 25 percent in the same period.

Growing worldwide concern over environmental issues has driven the movement towards environmentally-sensitive practice by industry. It has been claimed that it is no longer possible for industry to ignore the impact of their business activities on both society and environment, regardless of how an organisation wishes to be perceived by the public (Prothero and McDonagh, 1992). Indeed, there are numerous examples of organisations and industries that have suffered immensely by continuing with what are perceived by the public to be unsustainable practices. One such industry is tourism, where unsustainable development may destroy a pristine environment or culture that provided the appeal for the tourist in the first place.

In contrast, there is evidence to suggest that organisations that give priority to sustainability tend to outperform those that do not. For example the Dow Jones Sustainability Index (DJSI) that includes the top 10 percent of sustainable organisations in a category based on economic, environmental and social indicators has consistently outperformed the mainstream market since its inception in 1999 (Dow Jones, 2003). Multinationals in the DJSI that are active in New Zealand include Westpac, BP, Unilever, and Toyota.

2.1.4 New Zealand agriculture

New Zealand's agricultural sector has diversified as a result of several factors, including diminished access to the UK market, changing consumer behaviour worldwide, and deregulation of the NZ industry, as outlined above. This has led to changes in land use as illustrated in Table 2.3. This shows that the area of pasture and arable land has fallen by 12 percent from 1994 to 2002, whereas the area of horticultural land increased by 6 percent. The area of plantation forest has increased by 25 percent over the same period.

Table 2.3 Change in land use in New Zealand, 1994-2002 ('000 hectares)

Grazing, arable, fodder & fallow land			Horticultural land			Planted production forest			Other land		
1994	2002	%change	1994	2002	%change	1994	2002	%change	1994	2002	%change
13,536	11,967	-12	104	110	6	1,489	1,879	26	1,479	1,685	14

Source: Statistics New Zealand, 2003.

The numbers and type of livestock have also changed from 1994 to 2002 as illustrated in Table 2.4. The largest change has been the fall in numbers of sheep and beef at 20 and 11 percent respectively, with an increase in dairy cow and deer numbers of 34 percent each. This may have important implications for the environmental quality of NZ given the different impacts of these livestock production systems.

Table 2.4 Change in livestock numbers in New Zealand 1994-2002 ('000s)

Sheep			Dairy			Beef			Deer		
1994	2002	%change	1994	2002	%change	1994	2002	%change	1994	2002	%change
49,446	39,546	-20	3,839	5,162	34	5,048	4,495	-11	1,231	1,644	34

Source: Statistics New Zealand, 2003.

The increase in horticultural area reported in Table 2.3 has been broken down into changes in fruit and vegetable area in Tables 2.5 and 2.6. Table 2.5 shows that the area of apples has dropped by nearly a quarter from 1994 to 2002, whereas kiwifruit area has remained fairly constant and the area of avocados has increased substantially, albeit from a low base.

Table 2.5 Change in net area planted in fruit in New Zealand 1994-2002 (hectares)

Apples			Kiwifruit			Avocados			Olives		
1994	2002	%change	1994	2002	%change	1994	2002	%change	1994	2002	%change
15,300	11,700	-24	12,200	12,000	-2	1,400	3,100	121	*	2,600	*

Source: Statistics New Zealand, 2003.

* The net area planted in olives was not included in earlier agricultural production surveys.

The area of vegetables has increased, with a 12 percent increase in the area of potatoes and onions as shown in Table 2.6. The area of squash has fallen, as has the area of tomatoes.

Table 2.6 Change in area harvested of selected vegetable crops in New Zealand 1994-2002 (hectares)

Onions			Potatoes			Squash			Tomatoes (grown outdoors)		
1994	2002	%change	1994	2002	%change	1994	2002	%change	1994	2002	%change
4,900	5,500	12	9,500	10,600	12	7,500	6,600	-12	2,400	600	-75

Source: Statistics New Zealand, 2003.

Another sector experiencing rapid growth over the last decade is the wine industry as illustrated in Table 2.7. Between 1997 and 2001 the number of wineries increased by 45 percent and the area under cultivation increased by 52 percent. Whilst production does not yet reflect this growth in area, it certainly will over the next few years.

Table 2.7 New Zealand wine industry production 1997-2001

	1997	1998	1999	2000	2001
Number of wineries	262	293	334	358	382
Producing area (hectares)	7,410	7,580	9,000	10,197	11,275
Average yield (tonnes per hectare)	8.1	10.3	8.9	7.8	6.3
Crushed (tonnes)	60,000	78,300	79,700	80,100	71,000
Total production (million litres)	45.8	60.6	60.2	60.2	53.3
Domestic sales (million litres)	38.8	38.2	38.4	41.3	37.4

Source: New Zealand Winegrowers, 2002; Statistics New Zealand, 2002.

The change in the area of crops and number of livestock is of course reflected in the composition of NZ exports. These are illustrated in Table 2.8 for 1998 to 2002. This shows the increase in exports of dairy products, again reflecting the increase in dairy cow numbers. Interestingly, nearly the greatest increase in dairy products exports (at 80 percent) is of casein and caseinates, a potentially higher value product than more traditional dairy exports. Cheese exports have also risen by 58 percent, while butter exports have been static reflecting difficulties relating to market access overseas for butter and changing consumer behaviour. Exports of milk and cream have almost doubled over the period reflecting the success of the dairy industry in expanding exports of milk powder.

Exports of meat have also increased in value by between 40 and 60 percent (surprising given the fall in area and sheep and beef numbers), reflecting more targeted marketing and overseas markets trends, as well as the exchange rate, depending upon the product. Exports of fruit and vegetables have increased by just under a third, whereas the value of exports of wool has fallen.

Table 2.8 Exports of agricultural commodities (NZ$000 free on board price)

Years ending June	1998	1999	2000	2001	2002	% change (1998 - 2002)
Beef, fresh, chilled	126,286	132,687	151,268	178,378	179,831	42.3
Beef, frozen	1,048,324	954,538	1,252,566	1,499,336	1,634,839	55.9
Sheep meat	1,486,398	1,503,730	1,698,765	2,125,829	2,251,778	51.5
Milk and cream, condensed	1,620,415	1,698,567	1,793,053	3,129,498	3,122,744	92.7
Butter	1,028,820	990,006	923,153	1,102,593	1,083,551	0.5
Cheese and curd	897,745	983,288	990,503	1,272,818	1,417,763	57.9
Casein and caseinates	651,659	762,892	805,603	1,213,324	1,172,547	79.9
Wool	1,101,971	950,046	928,008	1,007,240	942,239	-14.5
Hides, skin and leather	672,535	614,154	559,250	846,232	743,904	10.6
Fruit and vegetables	1,348,829	1,547,273	1,448,329	1,673,494	1,769,410	31.2
Other agriculture	-	-	1,215,499	1,498,838	1,623,829	33.6 (2000-2002)

Source: MFAT NZ External Trade Statistics, 2002.

Table 2.9 shows the percentage of exports by major export markets for the main agricultural products. This shows that for fresh chilled beef, the United States (US) and Japan are NZ's main markets. Both these markets however, as stated later on, have restricted entry for imports. The US is by far the most important market for frozen beef, accounting for over 60 percent of NZ exports in 2002. The EU is the main market for NZ sheep meat with the UK the most important, although that is declining as other EU markets increase their imports, particularly since restrictions on NZ exports of chilled lamb have been removed.

Table 2.9 The percentage of exports to the top three export destinations for New Zealand's main agricultural exports 2002

Country rank and percent	1	2	3
Beef, fresh, chilled `	United States (2)* 26.7%	Japan (1)* 17.4%	Canada (3)* 14%
Beef, frozen	United States (1)* 60.5%	Canada (4) * 14.5%	South Korea (5) * 5.1%
Sheep meat	United Kingdom (1)* 22.7%	Germany (2)* 13.5%	France (5)* 10.8%
Milk and cream, condensed	Malaysia (1)* 9.3%	Indonesia (4)* 8.6%	Philippines (3)* 8.4%
Butter	Belgium (2)* 13.8%	United Kingdom (1)* 12%	Latvia (6)* 8.3%
Cheese and curd	Japan (1)* 18.8%	United States (2)* 18%	Australia (3)* 11.7%
Casein and caseinates	United States (1)* 48.2%	Germany (3)* 11.8%	Japan (2)* 9.9%
Wool	China (2)* 23.3%	Australia (1)* 13.4%	United Kingdom (3)* 11%
Hides, skin and leather	Italy (1)* 28.2%	South Korea (2)* 22.4%	China (4)* 14.9%
Fruit and vegetables	Japan 21.9%	European Union 16.5%	Australia 12.2%
Total	United States 16.4%	Japan 9.2%	United Kingdom 7.2%

* 2000 Rank where available.

The destination for dairy products varies over time and by product. Malaysia was the most important market for milk powder in 2002, followed by other South East Asian countries. The most important market for casein is the US, while the most important market for butter has changed from the UK to Belgium (however, given that NZ has a processing factory in Belgium this may be entrepot trade). The main market for cheese is Japan then followed by the US.

The most important market for wool is China, which is also the third most important market for hides, skin and leather (following Italy and South Korea). In both sectors, China's relative importance has increased in the 2000-2002 period. The most important market for fruit and vegetables is Japan followed by the EU and Australia.

As discussed above, the wine industry has experienced rapid growth, which has seen an increase in the volume of exports and the scale of production. By 2002 the export value of wine had reached $246 million and is expected to grow to $736 million by 2006 as shown in Table 2.10.

Table 2.10 New Zealand's wine exports 1997-2006 by destination (year ending June)

Country	Million	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
United	Litres	8.135	7.997	9.041	10.464	9.918	11.858	16.683	21.508	26.333	31.158
Kingdom	$	47.149	50.59	68.135	84.673	92.728	117.981	176.610	235.240	293.869	352.498
United	Litres	0.508	0.979	1.494	2.51	3.132	3.776	5.312	6.849	8.385	9.922
States	$	4.256	8.974	14.357	26.53	40.185	48.225	72.190	96.155	120.120	144.084
Australia	Litres	1.635	2.414	2.291	2.402	2.373	3.569	5.021	6.473	7.926	9.378
	$	9.211	14.412	16.186	23.857	26.059	38.132	57.081	76.030	94.980	113.929
Netherlands	Litres	0.205	0.474	0.331	0.683	0.903	0.801	1.127	1.453	1.779	2.105
	$	1.755	3.53	2.622	5.281	7.656	7.119	10.657	14.194	17.732	21.270
Canada	Litres	0.275	0.415	0.039	0.648	0.612	0.713	1.003	1.293	1.583	1.873
	$	1.506	3.001	3.014	5.641	6.312	7.687	11.507	15.327	19.147	22.967
Japan	Litres	0.373	0.625	0.767	0.365	0.391	0.268	0.377	0.486	0.595	0.704
	$	1.077	3.857	4.761	3.98	5.038	4.486	6.715	8.945	11.174	13.403
Germany	Litres	0.82	0.414	0.283	0.226	0.377	0.155	0.218	0.281	0.344	0.407
	$	3.148	2.473	2.45	2.423	3.324	1.965	2.941	3.918	4.894	5.871
Ireland	Litres	0.185	0.138	0.212	0.3	0.278	0.318	0.447	0.577	0.706	0.836
	$	0.956	1.015	1.595	2.173	2.151	2.893	4.331	5.768	7.206	8.644
Others	Litres	0.936	1.697	1.813	1.572	1.261	1.513	2.129	2.744	3.360	3.976
	$	6.828	9.781	12.221	14.076	14.021	17.925	26.833	35.740	44.648	53.555
Total	Litres	13.072	15.153	16.271	19.17	19.245	22.971	32.318	41.665	51.011	60.358
	$	75.886	97.633	125.341	168.634	197.474	246.413	368.865	491.317	613.769	736.221

Source: based on Wine and Grape Industry Statistical Annual.

Assumptions:

1. 2006 projections are based on Wine Sector Profile
2. Country percentage of exports is based on 2002 figures
3. A constant rate of growth is assumed for 2003-2006

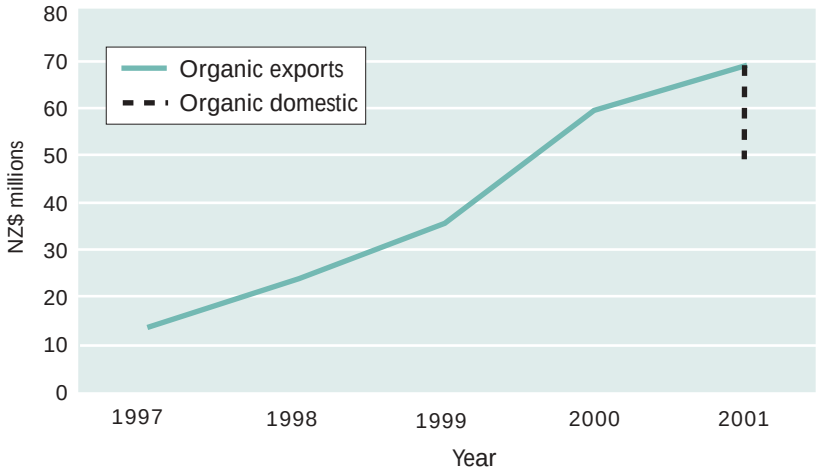
Currently the bulk of NZ's wine exports are destined for the UK market. However, other markets such as the US and Australia are expected to see significant growth in the 2002-2006 period.

2.1.5 Sustainable agriculture

Another area of diversification within the agricultural sector has been a movement towards 'sustainable agriculture'. This movement has been prompted by the price premiums that environmentally-friendly products can obtain in key markets, consumer concerns regarding food safety, and philosophical support from some sectors of the farming community. This is discussed in more detail later on, although it is difficult due to the lack of data to obtain estimates of the size of this market. A manifestation of this movement has been the development of the trade in organic commodities, for which some data is available and used here to illustrate the growth in this sector.

Organic exports have grown considerably from NZ$12 million in 1997 to NZ$70 million in 2001, but this is still insignificant compared to total NZ exports. In 2001, domestic sales are estimated to be between NZ$50 to 70 million (see Figure 2.4) (BioGro, 2002b). This implies that around half of the NZ organic production is sold on the domestic market. Organic Products Exporters of New Zealand Inc (OPENZ) predicts organic export sales will rise to NZ$500 million by 2005 (OPENZ, 2002c).

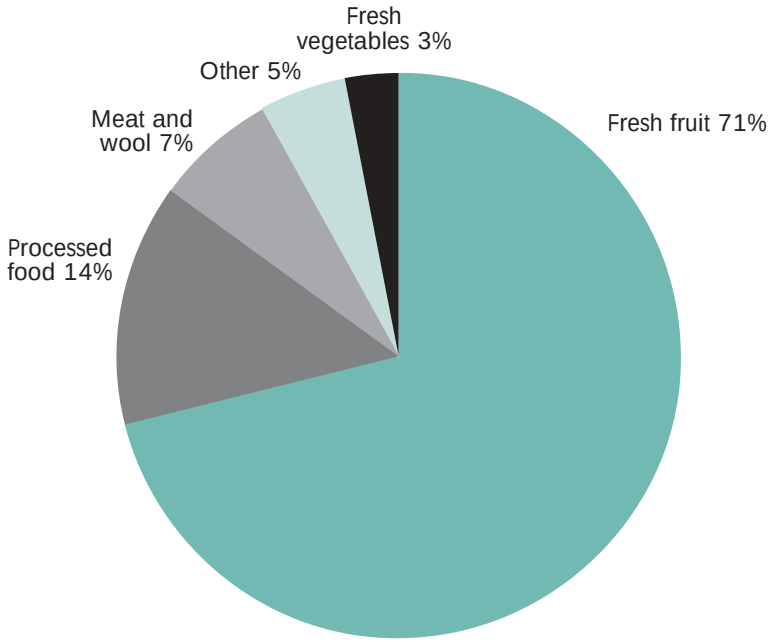
Figure 2.4 New Zealand organic exports and domestic sales



Source: BioGro, 2002b.

In 2000/01, fresh fruit (kiwifruit, apples etc.) accounted for 71 percent of total NZ organic exports, processed food for 14 percent, and meat/wool for 7 percent (Figure 2.5).

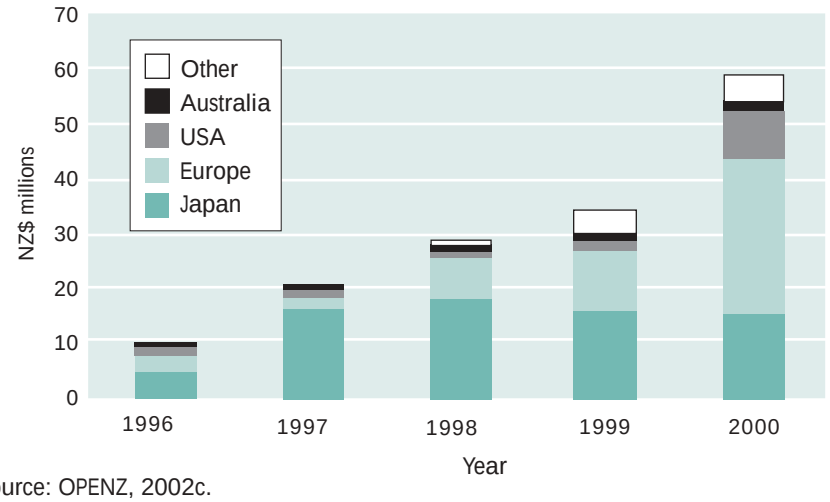
Figure 2.5 New Zealand organic exports by products 2000/01



Source: OPENZ, 2002b.

The main export markets for NZ organic products are Europe and Japan, with the US and Australian markets developing quickly (Figure 2.6). The main processors behind the export of organic produce are Heinz-Wattie NZ, for products such as peas, potatoes, sweet corn, beans and carrots, and Zespri International Ltd for kiwifruit.

Figure 2.6 New Zealand organic exports by market



Source: OPENZ, 2002c.

Demand for organic products on the Japanese market increased at an annual rate of 20 percent from the mid 1980s, and Japan is one of the important organic exports markets for NZ. Domestic Japanese organic production is small, creating opportunities for NZ organic exporters. However, Japanese customers are very concerned with food safety and the origin of the products, thus emphasising the importance of supply chain management.

Europe is one of NZ's traditional export markets for agricultural products in general, and has also become an important organic export market. However, development of organic farming in Europe is rapid and mainly driven by policy rather than market signals, making Europe a potential competitor of New Zealand in the organic sector.

The US is a big potential organic export market. There is an increased awareness of food safety and quality amongst American consumers and a consequent interest in organic products. Australia is another large potential export market (and a competitor). However, Australian organic production is not yet highly developed and export targeting has not been as aggressive as in NZ (Saunders, 1997; OPENZ, 2002b; OPENZ, 2002c).

2.2 International trade policy and New Zealand agriculture

2.2.1 International trade policy

As stated earlier, agriculture is the sector that has suffered the most in terms of restricted access and government intervention, especially in developed countries. This has had important implications for NZ agriculture.

After the Second World War there was considerable success in the reduction of tariffs in the international trade of manufactured goods. This was mainly through the General Agreement on Tariffs and Trade (GATT) and a series of 'rounds' of negotiations, which succeeded in reducing tariffs. However, agriculture was effectively excluded from the reform process until the Uruguay Round in 1994. Therefore until this time, access to agricultural markets has remained restricted.

Trade restrictions include not only tariffs but domestic policies (particularly in the agricultural sector), such as production quotas, domestic price support and direct payments, which may or may not be coupled with production. They also include quotas and export subsidy policies, such as tariff quotas and limits on export quantities. Export subsidies are possibly the most trade-distorting support mechanism (MAF and MFAT, 2002).

The Uruguay Round 1986-1994 was the first round of international trade negotiations that included agriculture. Moreover, it attempted to include not

just tariffs but many non-tariff barriers, which had been significantly distorting agricultural sectors in developed countries. The growth in non-tariff barriers had increasingly affected NZ's trade, particularly the existence of import quotas into developed country markets. Whilst these still exist, under the Uruguay Round they were expanded and secured. For example, the NZ butter quota to the EU increased by 25 thousand tonnes, sheep meat quota by 25 thousand tonnes, and access to the Korean beef market to 225 thousand tonnes (Saunders and Cagatay, 2001).

The level of restrictions on agriculture is illustrated in Tables 2.11 and 2.12, which show the level of restriction using Producer Support Estimates (PSEs), a measure of trade and policy intervention in agriculture, for the main countries and commodities which affect NZ.

Table 2.11 Percentage Producer Support Estimates (PSEs) by OECD countries from 1986-2000

	1986-88	1998-2000	1998	1999	2000
Australia	9	6	7	5	6
Canada	33	18	17	17	19
EU	44	40	39	43	38
Japan	67	63	62	64	64
Mexico	-1	16	14	15	18
New Zealand	11	1	1	1	1
Switzerland	73	71	70	72	71
United States	25	23	23	25	22
OECD	39	35	34	37	34

Source: OECD, 2001.

Table 2.11 shows that PSEs fell in most countries between the periods 1986-1988 and 1998-2000. Since the reform of the agricultural sector, NZ clearly has had next to no PSEs, whereas countries such as the US and Japan, and the EU, still have significant support. These also happen to be NZ's major markets.

Table 2.12 shows the percentages of PSEs by commodity between 1986 and 2000. All of the commodities shown have lower percentages of PSEs in 2000 than they did between 1986 and 1988, although some commodities, such as beef and veal, have only decreased by one percent. Beef and veal do have the lowest PSE percentage of the commodities shown, while milk retains the highest PSE at 48 percent in 2000. The average percentage of all commodities has decreased by five percent over the period 1986 to 2000, from 39 to 34 percent.

Table 2.12 Percentage Producer Support Estimates (PSEs) by commodity between 1986 and 2000 for OECD countries

	1986-88	1998-2000	1998	1999	2000
Wheat	48	42	40	45	40
Milk	58	52	56	52	48
Beef and veal	33	35	37	37	32
Sheep meat	55	44	45	47	40
All commodities	39	35	34	37	34

Source: OECD, 2001.

A study prepared by MAF and MFAT (2002) estimated that the Uruguay Round Agreement to lower tariff barriers could potentially benefit all NZ exporters (both agricultural and non-agricultural) by NZ$3.1 billion over the period 1995-2004. The study focuses on tariff reductions, tariff quota increases and export subsidy reductions, so the total gains to NZ are likely to be underestimated (MAF and MFAT, 2002).

The Uruguay Round established the World Trade Organization (WTO) to replace the GATT with a greater remit, which includes a role in trade and the environment. This reflects the changing attitudes around the world towards considering the wider impact of trade and its consequences. This change in attitude is reflected in changes in policy in many countries, not least the EU, and these changes are discussed in more detail for the EU and their potential impact on NZ below.

The Seattle Round of negotiations under the WTO was initiated in November 1999. This was restarted with the Doha Round in 2001, and whilst countries are committed to further reduction in market support, negotiations continue.

By 2000, many OECD countries, including the EU and Japan, had moved away from focusing on market support to focusing on issues such as structural change, rural development, and environmental quality (OECD, 2001). Support prices rose in nominal terms for some Eastern European countries, as well as Iceland, Korea, Mexico and Turkey, while Japan and Norway made decisions to lower support prices for most commodities. The most important new policy developments have taken place in the dairy sector, which is not surprising as this sector currently receives the greatest level of support. The most significant changes were in Australia, with the removal of regulations governing marketing and pricing of milk. The dairy reforms in the US and the EU were put on hold. Many OECD countries continued the trend of introducing agri-environment policy measures, including focusing on such things as improving water quality and promoting organic agriculture. Food safety policy issues were introduced in recent years in a number of OECD countries, including food-labelling requirements, particularly for GM food.

2.2.2 European Union trade policy

This report focuses on the trade policies of the European Union (EU) for two main reasons: the importance of the EU market for NZ; and the fact that EU policy is significant in influencing WTO negotiations.

The European Community was founded by the Treaty of Rome in 1957. Article 39 was concerned with the development of a common market and policy for agriculture, which was seen as essential for the Community's formation. The specific original objectives of the Common Agricultural Policy (CAP) of the EC were to:

- increase agricultural productivity
- ensure fair standard of living for those engaged in agriculture
- stabilise markets
- ensure availability of supplies
- allow quality food production at reasonable prices.

The basic system of trade policies was originally based on the fixing of target prices, that is, providing a guaranteed ideal price for producers. This provides the basis for intervention and threshold prices, which are generally set well above world market prices and often have the effect of prohibiting imports. This leads to increases in production within the country imposing the restrictions, and a disruption of world markets, particularly for traditional food exporters such as NZ (Saunders and Cagatay, 2001).

These policies, particularly in the EU, have led to a number of well-documented problems, not least the inability to meet most of the initial objectives outlined above. Additional problems include the rising cost of financing the support policies, the deterioration of international relations, and environmental degradation. Other negative consequences of these trade restrictions include high consumer prices, inequitable distribution, and poor transmission of support to farmers. For agricultural exporting countries such as NZ, the major problems with these policies restricting trade are the distortions to the market, resulting in lower world prices and restricted access to markets.

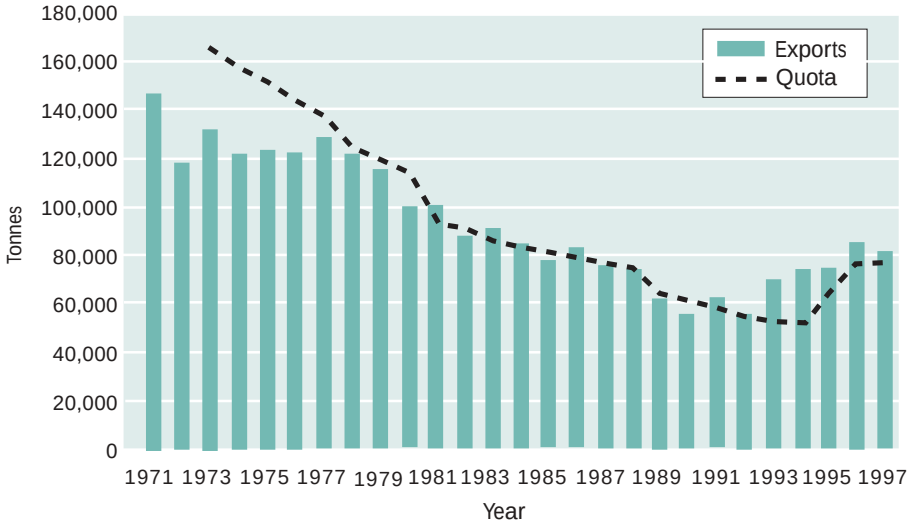
Access for New Zealand exports into the European Union

As stated earlier in this report, the consequence for NZ of UK entry into the EC was the loss of its main export market. NZ negotiated successfully, however, for some access to the UK market, under Protocol 18, for butter and cheese. Initially preferential access was to the UK market alone but gradually this has been relaxed to include all of the EU. This preferential access is described in more detail below by commodity.

Butter

Figure 2.7 shows the maximum amount of butter imports allowed under Protocol 18 and subsequent arrangements to the actual level of butter imports, initially into the UK and then into the EU. During the UK's transitional period to the CAP the import levels provided by Protocol 18 did not limit the amount of butter sent to the UK. Protocol 18 had provision for the extension of NZ's exports to the UK after the UK's five-year transition period was completed.

Figure 2.7 New Zealand butter access and exports to the European Union



NB: 1978 includes 8800 tonnes of butter claimed under 1977 levy arrangements but recorded as January 1978 shipment by customs (National Dairy Council, 2001).

Negotiations for the extension of NZ's access into the UK post 1978 culminated in 1976 with the passing of European Council Regulation 1655/76 which laid down the quantities of NZ butter that the UK could import for the years 1978 to 1980. In addition, if NZ provided over 25 percent of the UK's butter consumption, then NZ was liable to pay a levy on the residual. The minimum c.i.f[1] price paid to NZ was calculated from NZ's production costs, the cost of transporting butter to the UK, developments in world and domestic supply and demand for dairy products, and the EC prices including the intervention price (National Dairy Council, 2001).

By the beginning of 1978, the UK had completed its five-year task of lifting support prices to full EC levels. In 1977 to 1980 the increase in UK prices increased UK dairy production and reduced domestic demand, resulting in a

1 The price received in markets overseas, including the costs of insurance and freight.

build up of butter stocks. As a consequence, NZ butter sales to the UK fluctuated in 1979 and 1980 and 19,000 tonnes of NZ butter was not sold in 1979 (Amor & Saunders, 1999). During 1980, NZ had difficulties in meeting its butter quota. As a result NZ voluntarily reduced its butter import quota by 20,000 tonnes in 1981 in return for an increase in the minimum c.i.f price to 75 percent of the EC intervention price. This arrangement was to continue only until the end of 1983, although in 1984 the UK's authorisation to import butter from NZ was extended to 31 December, 1989.

The commission of the EC proposed that the 1984 quota should be set at 83,000 tonnes reducing by 2,000 tonnes per annum to 75,000 tonnes in 1988. The butter quota was successively reduced until the completion of the Uruguay Round of GATT talks in 1994, when NZ's country specific butter access was increased to 76,667 tonnes per annum.

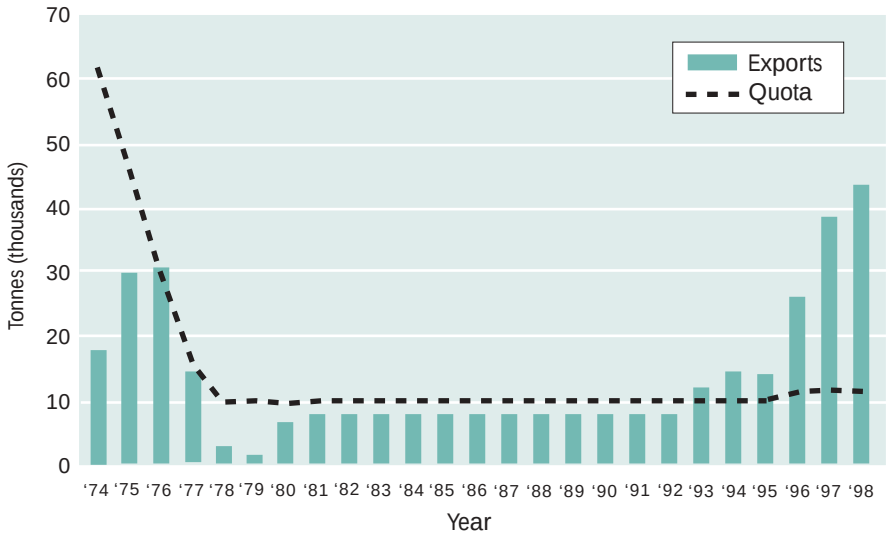
Cheese

Provisions for NZ to export cheese into the UK were also covered under Protocol 18. Figure 2.8 shows the maximum quota and the actual level of UK and then EU imports of NZ cheese. Under Protocol 18, maximum cheese quota levels were to decline from 68,580 tonnes in 1973 to 15,400 tonnes in 1977. Unlike butter, Protocol 18 did not allow for an extension for NZ to provide cheese to the UK market after the transitional period was up in 1978. However, at the Dublin Summit (March 1975) the European Council approved, in principle, an extension for NZ cheese imports. NZ was then successful in negotiating an agreement with the EC of an annual quota for cheese of 9,500 tonnes. This comprised of 6,500 of cheddar for retail and 3,000 for processing. This level of access continued until the Uruguay Round finished in 1995, when negotiations resulted in cheese access remaining at 9,500 tonnes at a tariff of $340 per tonne.

In addition, the Uruguay agreement under the GATT resulted in the EU providing a most favoured nation clause (MFN) for cheese of 18,000 tonnes in 1995 rising to 104,000 tonnes in 2000, of which NZ has access to in competition with other countries. The impact of this is seen in Figure 2.8 where actual exports to the EU are above the access arrangements.

Since 1993, the European Commission allowed NZ to export butter and cheese into the rest of the European Union. From 1996 the EU increased NZ's country specific access to 11,000 tonnes as compensation for the accession of Austria, Finland and Sweden into the EU. This increase comprises an extra 1,000 tonnes of processing cheese and an extra 500 tonnes of cheddar cheese for direct consumption.

Figure 2.8 New Zealand cheese access and exports to the European Union



NB: 1978 includes 2076 tonnes of cheese claimed under 1977 levy arrangements but recorded as January 1978 shipment by customs (National Dairy Council, 2001).

Table 2.13, below, summarises the current EU import quotas for butter and cheese for Canada, Australia and NZ.

Table 2.13 European Union country specific dairy market access 1998-2001 import commitments: 'Current Access' quotas

Product `	Country of origin (tonnes)	Quota	Tariff* (ECUs per 100kg)
Cheddar	NZ	7,000	17.06
	Australia	3,250	17.06
Mature cheddar	Canada	4,000	13.75
Cheese for processing	NZ	4,000	17.06
	Australia	500	17.06
Butter	NZ	76,667	86.88

Source: National Dairy Council, 2001.

*Reduced, in-quota tariff rate.

Sheep meat

Sheep meat exports to the UK/EC were not covered by Protocol 18 and therefore initially had no special arrangements. When the UK entered the EU a common external tariff (CET) of 20 percent was to be applied to imports of sheep meat after the transitional period, from 1973 to 1977. In the period 1977 to 1980 NZ had no arrangements for special access of exports of sheep meat into the UK/EC. In 1980 a voluntary export restraint was introduced

whereby NZ agreed to limit the supply of sheep meat to the UK to 245,000 tonnes in exchange for a lowering of the CET to 10 percent. In 1984 a sensitive market access was agreed which allowed 3500 tonnes into France that could be expanded by 10 percent per year. In 1989 the preferential access was reduced to 205,000 tonnes in return for a zero CET. Access increased in 1994 to 205,600 when the Canary Islands entered the customs union. A quota of 6,000 tonnes was given for chilled lamb within the overall quota in 1989 and this was to be increased by 1,500 tonnes per year, reaching a possible quota of 13,500 in 1994, although this was not always met. In 1993 and 1994 the agreements were rolled over awaiting the outcome of the Uruguay Round of the WTO.

Under the Uruguay Round the preferential access was increased to 225,000 tonnes rising to its current level with the last enlargement of the EU at 226,700 tonnes. There is in theory no limit for chilled exports from NZ to the EU (which in 2000 were 27,000 tonnes). Any imports in excess of this amount above have to pay out a quota tariff of between 80 and 100 percent, which is clearly prohibitive.

Beef

In the case of beef there is no preferential access into the EU for NZ, the exception being a couple of hundred tonnes of high quality beef. When the UK entered the EU, NZ, as others, found their beef exports were effectively banned. The only access into the EU is a general import quota negotiated under the Uruguay agreement of 53,000 tonnes. However, this is administered by EU importers who source imports. Thus NZ does not obtain the quota rent and, in addition, only generally obtains a small amount of this quota.

The EU is a net exporter of beef thus the main policy is the intervention price and surplus disposal of stocks on world markets with the aid of export subsidies. A main pressure for further reform of the beef regime is the commitment to reduce export subsidies under the Uruguay Round. Under the Uruguay agreement the EU agreed to restrict its export refunds. The reduction was to be 38 percent over six years, based on expenditure between 1986-90, to 817,000 tonnes by 2000. If the EU surplus (given allowance for imports as well) is above this amount then clearly the EU internal support price is not sustainable in the medium term. Prior to recent problems in the EU this looked likely. However, after the BSE and foot and mouth outbreaks and the consequential mass slaughter programmes, the pressure for reform may have been reduced.

2.2.3 European Union policy reform

There have been various reforms to the CAP, on a piecemeal basis, since the 1980s. However, it was not until the McSharry reforms in 1992, which reduced fixed prices to – or closer to – world market levels, and compensated producers with direct payments based on past production patterns, that serious changes in the underlying CAP policy could be seen. These reforms also increased the amount of funds available for structural policies which included agri-environmental schemes as well as allowing member states to supplement funding for these schemes.

The impact of those reforms, and changes elsewhere in the EU, reduced the importance of the CAP in the EU. The level of support given to agricultural commodities is still considerable, at 43.77 ECU in 2003 (Agra Europe, 2003).

The EU has also introduced measures to promote the development and continuation of policies to encourage low input (including organic) farming. These measures are specific to member states and generally relate to designated areas (Environmentally Sensitive Areas or ESAs). They were first recognised in EU policy in 1987 with regulation 760/87 and were strengthened in the 1992 reforms.

Agenda 2000 was the next major review of the CAP and was agreed on in March 1999 in Berlin. The agricultural policy reforms under Agenda 2000 were cautious and built on the McSharry reforms, with further cuts in price and increases in direct payments. The most radical of the Agenda 2000 reforms was the removal of the objectives of agricultural policy established in the Treaty of Rome and their replacement with objectives for a rural policy.

The new objectives for rural policy under Agenda 2000 are as follows:

- increased competitiveness internally and externally
- food safety and food quality are a fundamental obligation towards consumers
- integration of environmental goals into the CAP
- creation of alternative job and income opportunities for farmers and families
- simplification of EU legislation
- ensuring fair standard of living for the agricultural community and contributing to the stability of farm incomes.

These differ from the original objectives of agricultural policy and show the change in emphasis from the EU. They also illustrate areas that may cause tension in the next WTO round of negotiations, such as the emphasis on food

quality and environmental objectives. The change in emphasis in these objectives is a radical shift as is the very existence of a rural policy. It is this that bodes well for the future reform of the CAP and finally movement away from market-based support.

The Agenda 2000 reforms were then followed by the Mid-Term Review of the CAP in 2002. Under the Mid-Term Review it is proposed to cut cereal and dairy prices further, with a corresponding increase in direct payments, building again upon the principle of the McSharry reforms. However, the Mid-Term Review also includes more radical changes such as direct payments being conditional upon cross compliance. The Mid-Term Review also strengthens the policies encouraging food quality and animal welfare.

2.2.4 WTO requirements

The agricultural policy reforms may be a further step in the direction of trade liberalisation but they may not meet demands of the current WTO round, as seen with the recent breakdown of talks. This round of negotiations was launched at Doha in November 2001. It achieved a number of important commitments, especially in relation to the reduction of market-distorting domestic support policies, increasing market access, and a commitment to phase out all export subsidies. The agreement does allow for discussion of environmental factors relating to the changes.

The main areas are the reduction in export subsidies, the improving of market access, and the rules for domestic subsidies, as well as the technical grounds for restricting trade. The further removal/reduction in export subsides and improving market access will not be without controversy and negotiation. However, as both the EU and the US have agreed to this in principle and started the process under the last round and subsequent policy changes, it will not perhaps be the main area of debate. It is, as stated above, the rules governing compensation payments as well as the technical barriers to trade which are expected to be the most controversial between the EU and the US.

The definition of rules for compensation payments, and whether the blue box subsidies will be allowed to continue or not, will be vital. The EU is moving to make these direct payments more acceptable through national envelopes tied to social and environmental criteria and, more hopefully, in the long run through the development of a rural policy. It is doubtful whether these are enough to meet US demands for domestic support. The EU as a result may argue for trade restrictions on the method of production.

The other main area of contention between the EU and the US is the existence of trade restrictions based on types of production whether defined under sanitary and phytosanitary (SPS) or technical barriers to trade. The former has

been seen under EU bans on imports of beef produced with hormones and the EU attitude to genetically modified organisms (GMOs), all belying a fundamental difference between the two blocks on attitudes towards agriculture and food. This has been fuelled by differences in consumer attitudes towards food and science, with consumers more skeptical in the EU (possibly due to the BSE debacle). The EU is also raising the importance of the multifunctionality of EU agriculture, something more important in the EU which depends upon agricultural land for its wildlife and recreation, compared to NZ and the US who have wilderness for the latter. Thus, the feasibility of restricting trade due to the method of production is likely to become a major issue, and whether this can be based on consumer attitudes again is important. There are indications that the reasons above may be used to further restrict agricultural trade.

However, under current rules, restricting trade purely on production and process methods is limited. A WTO member therefore cannot unilaterally restrict trade because of the environmental effects of its production in the exporting country. Some argue, however, that this is contrary to Principle 2 of the Rio Declaration which is "to ensure that activities within their jurisdiction do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction."

US agriculture policy has also been criticised by WTO members as being not only a demonstration of poor trade policy (going in the opposite direction to freer farm trade), but also for the negative effects it has on the direction and pace of agriculture reforms being negotiated in the WTO (MAF, 2002). The commitment of the US to continue the process of agriculture trade reform is not clear, given the move away from market-oriented farm policy established in the Federal Agricultural Improvement and Reform (FAIR) Act of 1996. This FAIR Act made significant changes to the traditional US Farm Bill Legislation, bringing in a new system of income support (*ibid*).

The Farm Security and Rural Investment (FSRI) Act of 2002-2007 is the latest piece of US agricultural legislation. Critics within the US have observed that the FSRI Act is poor domestic policy that is badly targeted, with the bulk of the payments going to the large farms and corporate owners, and does nothing to help farmers make the necessary adjustments to become more competitive and market-orientated in a global economy (*ibid*).

There is a threat to NZ that although market access may be improved, in terms of the removal of tariffs and other import barriers, exports may be constrained based on production method. The aim of the next section of this paper is to model the impact of these policy changes and the potential impact of environmental restrictions on trade in the EU and NZ.

2.2.5 The impact of trade policies on New Zealand

In this analysis the Lincoln Trade and Environmental Model (LTEM) was used to simulate four different policy scenarios relating to current and proposed changes to EU policy. The first scenario was the simulation of reforms under Agenda 2000 with the prices of milk and milk products in the EU adjusted to the prices under Agenda 2000, and an increase in production quota. In the second scenario, the proposed prices under the Mid-Term Review were used in the model as well as the proposed increases in EU production quota. In both scenarios the NZ preferential quota and quota tariff were assumed to remain at pre Agenda 2000 levels, as was the constraint on subsidised exports of dairy products from the EU. The third and fourth scenarios simulate the application of agri-environmental policies across the EU, which restrict production through stocking rate limits and constraints on input use such as fertiliser application.

As stated earlier, a series of agri-environmental policies apply across the EU, most of which are voluntary and vary considerably both by type, effect and uptake. However, these policies are likely to become the main justification for supporting agriculture in the EU and therefore likely to increase in importance. It is difficult to estimate the impact of these policies on production across the EU, due to their complexity. However, there are similar policies with restrictions on stocking rates and fertiliser use most common.

To estimate the impact of the agri-environmental policies, the yield per dairy cow was compared across countries that have a high and low proportion of their land under agri-environmental schemes. Austria is a good example of the application of these policies as it has the greatest area covered by agri-environmental policies at 91 percent. Thus comparisons were made between the high yields from the more important dairy countries, such as Denmark, the Netherlands, the UK and France (all of which have low areas of dairy land under agri-environmental policies) with the Austrian yield. In addition, the EU average yield and that of the countries above was also compared with the relatively lower yield in Ireland. Finally, yields at different production types and stocking rates derived from Farm Management data sources were reviewed as well (Nix, 2002). The result of these comparisons was a change in yield from 10 to 60 percent depending upon the stocking rate used. In this study, it was decided to run two scenarios simulating the impact of the adoption of an agri-environmental scheme for dairy, which led to a shift in the supply curve of 15 and then 30 percent. Whilst these are estimates they do give a feel for the potential impact of this kind of policy in the EU.

The implications of the Agenda 2000 policy reforms in the EU on the dairy sector are a fall in milk prices of 8 percent over the period 1998 to 2010. The internal production quota for milk in the EU still binds, even though it increases by 2.5 percent over the period. The minimum price for butter also continues to

bind although it also falls from US$3,159 to US$2,685 per tonne from 1998 to 2010. However, the minimum price for skimmed milk powder does not bind.

Table 2.14 The estimated impact of changes in European Union policy on New Zealand and the European Union

	Agenda 2000	Mid term review	Agri-enviroment 15% reduction in yield	Agri-enviroment 30% reduction in yield
Milk: producer price US$/tonne				
EU	$283	$279	$303	$338
NZ	$225	$222	$239	$261
Butter: trade price US$/tonne				
NZ	$2,030	$2,024	$2,132	$2,301
Milk: production '000 tonnes				
EU	120,324	122,743	109,546	95,329
NZ	12,276	12,156	12,923	13,876
Producer returns US$				
EU	$34,052	$34,245	$33,192	$32,221
NZ	$2,762	$2,699	$3,089	$3,622

The results of the simulations are presented in Table 2.14. This shows the impact of the various policy changes on key variables for NZ and the EU in 2010, when all changes have been implemented. The impact of the Mid-Term Review on EU prices for milk is an increase, as expected. However, the level of production in the EU actually rises with the Mid-Term Review. This is at first sight contrary to theory, but it reflects the increase in the internal EU production quota, which even at the lower intervention price still binds. This has a negative impact on NZ for two reasons. Firstly the lower internal prices in the EU cause the returns to NZ from its preferential access to fall. Secondly, the higher production in the EU has a negative impact on world prices causing returns to NZ from other markets to fall also. As a consequence EU producer returns rise marginally and NZ producer returns fall.

The introduction of agri-environmental policies has the opposite impact. These cause internal EU prices to rise as the level of production is constrained by production practice, by 7 and 19 percent respectively, depending upon whether a constraint in production of 15 or 30 percent is assumed, and EU production would fall by 9 percent or 26 percent respectively. NZ prices for raw milk would rise by 6 and 14 percent respectively, with increases in NZ production of 5 and 13 percent. The impact on producer returns in the EU however is relatively small, falling nearly 3 percent if an initial 15 percent constraint on production is

assumed, and falling 5 percent if a constraint of production of 30 percent is assumed. However, it must be emphasised that these do not reflect real returns to the EU producers as they exclude the direct payments, which are assumed to be decoupled. In NZ, producer returns rise by 12 and 31 percent respectively, a significant increase. Therefore future developments in EU policy can have large impacts on New Zealand.

2.3 Components of farm gate prices

Commodity prices are generally separated into three separate definitions of price: The c.i.f. price (i.e. the price received in markets overseas, including the costs of insurance and freight), the f.o.b. price (free on board – the border price before any transport costs or tariffs have been added to it), and the farm gate or schedule price, the price the producer actually receives. These prices are subject to various influences that determine their final level and the schedule price is determined to a large extent by the f.o.b. price, which in turn is influenced greatly by the c.i.f. price.

For livestock products such as beef and sheep, the farm gate price is influenced to the greatest extent by the f.o.b. price, prices of secondary products such as hides, pelts and wool, and possibly seasonal and/or climatic influences (Wreford and Saunders, 2003).

2.3.1 The effect of exchange rates

The f.o.b. price is generally determined by the international price for that commodity (e.g. the US price for beef and the UK price for sheep meat) and the exchange rate between the NZ dollar and the relevant currency (e.g. the US dollar for beef and the UK pound for sheep meat). Therefore exchange rates do play an important role in determining the price received at the farm gate, through the f.o.b. price. In a recent study it was found that the coefficient on the exchange rate in explaining the f.o.b. price of beef and sheep was negative and statistically significant (Wreford and Saunders, 2003). Clearly, the exchange rate plays a significant role (most markedly in the beef price).

The two charts below show historical values for Beef and Sheep Schedule Prices, alongside the relative exchange rates (i.e. the US and UK respectively). It is clear that although there are other influencing factors, there is a reasonably strong negative relationship between these two variables. As the exchange rate increases, the prices generally fall, although this may have a lagged effect. Appendix One shows historical values for farm gate prices of other selected commodities (apples, kiwifruit and butter).

Figure 2.9 Beef schedule price against US exchange rate

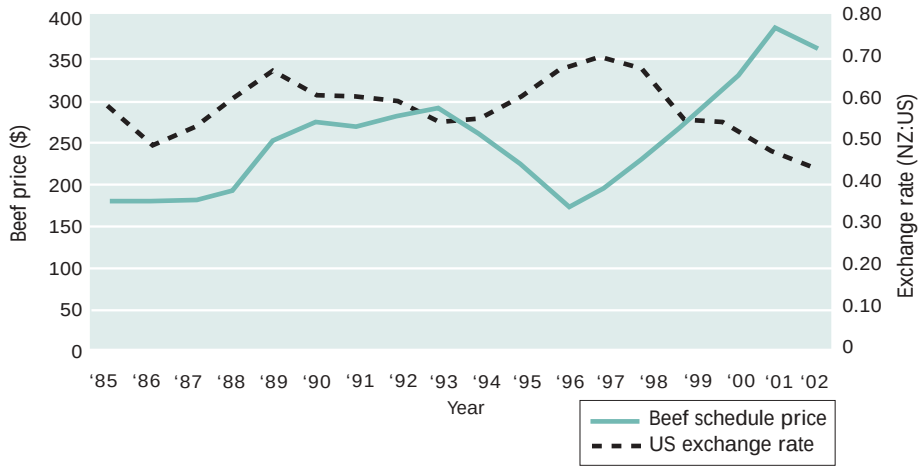
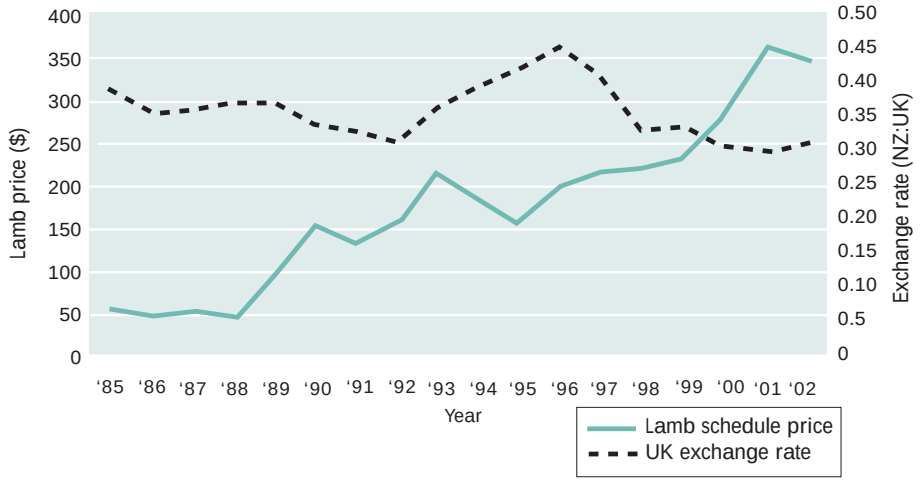


Figure 2.10 Sheep schedule price against UK exchange rate



CHAPTER 3

Trends in food consumption

3.1 Factors affecting demand

This chapter reviews in more detail earlier analysis of changes in food consumption. Clearly this is of vital importance to NZ given the importance of food exports for NZ's trade.

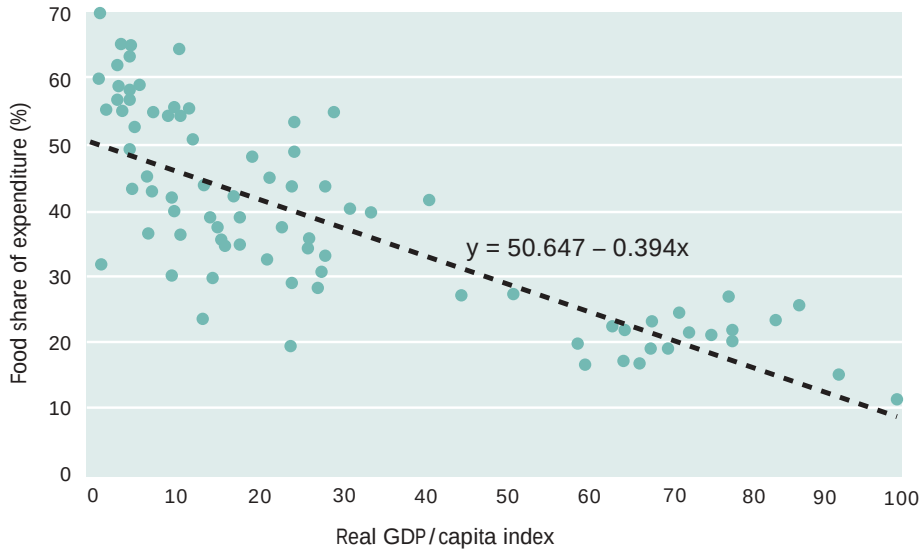
3.1.1 Income elasticity

The change in income, which illustrates changes in consumer expenditure, can be used to further predict medium to long-term changes in the market using the concept of income elasticity of demand. This shows how consumption changes relative to changes in income, known as Engel's law (Samuelson and Nordhaus, 1995).

The economic theory of income elasticity suggests that there will be a change in quantity demanded of a product as incomes change (Varian, 1996). High-income elasticity tends to be a characteristic of luxury items. That is the demand for luxury goods increases as incomes increase.

In developed countries' markets the income elasticity of demand for basic food commodities is either negative or very low, thus indicating that as income rises we actually spend either less in total, or at best very little more, on basic food commodities (Figure 3.1).

Figure 3.1 Relationship between real GDP/capita and share of food total expenditures for 85 countries



Source: Steenkamp, 1996.

This explains part of the reason for NZ's relatively poor economic performance in comparison with other OECD countries. However, there are ways by which NZ could target exports of those products for which there is a high-income elasticity of demand.

It has been argued that consumers do not value products *per se* but the attributes or characteristics of a product (Lancaster, 1971). Each product should be considered as comprising several different attributes that provide utility rather than considering the product as a single entity (Griffiths and Wall, 1996).

Lancaster theory posits that consumers do not choose a product simply on the basis of price comparison. They also factor in the perceived benefits to themselves that are derived from the purchase (consumption) of different product attributes (Dalgleish, 2003). In this manner, an apple will vary from other varieties of apple not only in terms of core product attributes such as taste and quality, but also in terms of the additional benefits that are claimed for the product. Thus an apple may also possess attributes such as greenness, status and safety. In this sense consumption can be seen as an activity that extracts characteristics from goods (Gravelle and Rees, 1992).

The income elasticity for attributes of food, which stress quality, especially in terms of food safety, and environmental factors, have high and even greater than unitary income elasticity, indicating that as we get richer we are actually willing to spend more on commodities with these attributes. Therefore if NZ wishes to continue to target the developed countries' high-value markets it is important to give attention to the attributes of food these markets demand.

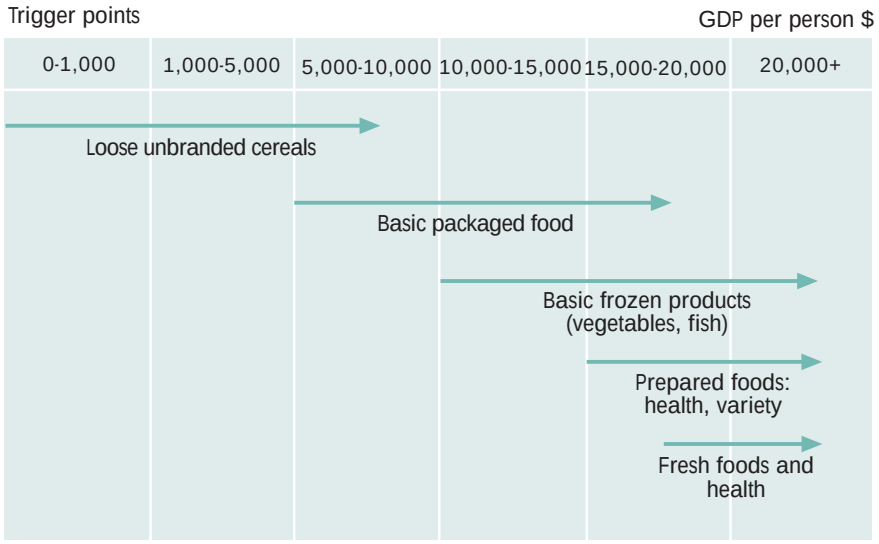
Table 3.1 Attributes as income elasticities of demand

Calories	Close to zero; negative for many
Fat and cholesterol	Low; strongly negative for many, (low fat: 42 percent)
Nutritional/health value	Positive; high for many (69 percent)
Food safety	High
Greenness and sustainability	High; especially for some
Natural	High for some
Taste	Very high for practically everyone (97 percent)
Experience	High; especially for some
Status and prestige	High; especially for some
Value (quality/price)	Desired even at high incomes (cost/price: 74 percent)

Source: Saunders and Mayrhofer, 2003

This implies that whilst agricultural commodities may have a certain value to the consumer, due to their taste or nutritional content, their value might be increased if they can be shown to have additional attributes. This is particularly true of developed countries with their high comparative incomes. Figure 3.2 shows that as income increases the nature of food consumption changes from basic sustenance foods such as cereal towards convenience foods. At higher levels of income other food attributes such as the variety and the healthiness of the product assume greater importance.

Figure 3.2 Change in food consumption with change in income



Source: Unilever, cited in Steenkamp, 1996.

3.1.2 Maslow's hierarchy of needs

The characteristic of environmental friendliness is often perceived to be a luxury. That is, it can be additional to the basic physiological need of sustenance. As income increases the consumption of food can be motivated by reasons other than hunger. Maslow's hierarchy of needs pyramid has been applied to food consumption as illustrated in Figure 3.3.

Figure 3.3 Maslow's hierarchy of needs for food as a source of satisfaction

Source: Adapted from Senauer, 2001.

The suggestion is that individuals with limited incomes will seek to satisfy the basic physiological needs for food. More affluent individuals may seek to satisfy higher order needs in their food consumption (Dalgleish, 2003). Thus an individual motivated by status may consume foods such as caviar and lobster that are often associated with wealth and power. An individual that pursues self-actualisation might consume environmentally-friendly products due to the esoteric benefits they may receive. It should be noted, however, that not all 'green' consumers could be considered wealthy by Western standards. Therefore, the assumption that only affluent individuals will have higher order motivations pertaining to their food consumption is suspect. Despite this reservation, Maslow's hierarchy does provide some insight into why the demand for food products that satisfy a higher order need increases as income increases.

3.1.3 Search, experience and credence attributes

There are several agricultural product attributes with relatively high-income elasticity that are related to the way in which commodities are produced. It is important to understand that these attributes are perceived to exist by the consumer and are often derived from the means of production. These include healthiness, food safety, greenness and sustainability, naturalness and taste. The motivation for purchasing food products with low input production methods may be derived from either ethical or environmental concerns. However, most studies have identified that perceived health benefits are more likely to motivate purchase (Wier and Calverley, 2002). These attributes are not readily apparent to the consumer at the point of purchase. As such they are considered to be credence attributes.

Credence attributes are one aspect of a tri-partite typology of product attributes that consumers may value in a product (Nelson, 1970; Darby and Karni, 1973). Search attributes are generally available to the consumer at the time of purchase and include attributes such as price and the quality and condition of the product. Experience attributes are those that are not realised until the point of preparation and/or consumption and may include attributes such as taste, crispness, ripeness and moisture content in the context of fresh produce. Credence attributes are product attributes that cannot be easily detected by the consumer and may include the absence of pesticides and herbicides, the presence or otherwise of genetically modified organisms, and the level of ecological sensitivity involved in the production process.

As consumers are unable to discern the presence of credence attributes at the point of purchase it is necessary that they be informed about them. The literature frequently advocates eco-labelling as a market-linked tool that addresses the asymmetrical information problem by conveying information to consumers about the environmental impact of goods (Bougherara and Grolleau, 2002). Thus eco-labels, in an ideal world, provide a mechanism whereby consumers are informed of attributes for which they may be prepared to pay a premium. These attributes may be either environmental in character or perceived benefits such as food safety that are viewed as collateral to the means of production.

3.2 Eco-labels and eco-certification

In short, an eco-label is a claim that the production and/or consumption of a product have a minimal level of negative environmental impact (Blend and Van Ravenswaay, 1999). An eco-label can take a variety of different forms. The International Organization for Standardization (ISO) identifies three types of eco-labels based on the presence or absence of third-party certification and the types of characteristics certified.

Table 3.2 A classification of eco-labels (ISO 14020, 1998)

Type of Eco-label	Definition by the ISO
Type I: Environmental labelling programme	Voluntary, multiple-criteria-based third-party programme that awards a license which authorises the use of environmental labels on products indicating overall environmental preferability within a particular product category based on life cycle considerations.
Type II: Self-declared environmental claims	Environmental claim that is made, without independent third-party certification, by manufacturers, importers, distributors, retailers or anyone else likely to benefit from such a claim.
Type III: Environmental declaration.	Quantified environmental data of a product under pre-set categories of parameters determined by a qualified third party.

A more descriptive typology of the different types of eco-labels is provided by Woodward-Clyde (1999):

- Mandatory labelling: Different jurisdictions have mandatory product information that needs to either be affixed to the product or its packaging. An example of mandatory labelling might be a warning that a consumer product contains hazardous poisons.
- Single-attribute environmental claims: The label claims that the product has one particular environmental attribute. Examples of single-attribute environmental claims include ‘GE Free’, ‘Dolphin-Safe’, ‘Recyclable’ and ‘Biodegradable’.
- Resource-based labels: This type of label communicates to the consumer the particular environmental impacts that are mitigated or avoided during the production process. Examples include ‘chlorine-free paper’, and ‘pesticide-free’.
- Report card labels: This type of eco-label is similar to the nutritional food label found on many products in that it lists the environmental attributes of a product and assigns a value to each.
- Superior overall environmental performance labels: This type of label is otherwise referred to as a ‘seal of approval’. The label claims to certify the products overall environmental worthiness. Certified products are generally entitled to display a logo on the product or it’s packaging. Third-party organisations or governments usually sponsor these schemes. Examples include the Scandinavian ‘Nordic Swan’ or the German ‘Blue Angel’.

Eco-labels, despite the variety of form, have two main objectives: to act as a market-based environmental policy instrument and to act as a marketing communication.

3.2.1 International voluntary certification schemes

There is no one eco-label or eco-label scheme that is recognised internationally as the sole certifier of sustainable development. There are, however, a number of voluntary labels that operate on a global scale. These include the following:

International Federation of Organic Agriculture Movements (IFOAM): The worldwide umbrella organisation for the organic agriculture movement, with 750 member organisations in 100 countries. Whilst there is no single worldwide organic label, IFOAM operates a basic standard and provides an accreditation scheme for non-governmental organic certifying organisations. In New Zealand BioGro is recognised by IFOAM (www.ifoam.org).

Forest Stewardship Council (FSC): This organisation operates a worldwide eco-label that certifies that forest products are derived from a forest that is managed according to sustainability principles. FSC provides an accreditation scheme for certifying organisations (www.fscoax.org).

Marine Stewardship Council (MSC): This organisation is in the process of developing a worldwide eco-label that will certify that fish products come from a sustainable fishery. There are a number of NZ fishing companies that have achieved certification in respect of some products (www.msc.org).

There are other worldwide organisations that certify sustainability at the global level, however, these are not related to primary production or are not relevant in the NZ context. These include Social Accountability Limited (www.sa-intl.org), Fair Trade Labelling Organisations International (www.fairtrade.net), Sustainable Agriculture Network (www.rainforest-alliance.org/programs/cap), and Green Globe 21 (www.greenglobe21.com).

There are numerous other voluntary labelling schemes that operate at either the regional or national level.

3.2.2 New Zealand certification schemes

In New Zealand there are a variety of eco-certification schemes. Perhaps the most widely recognised are those relating to the labelling of organic produce.

The Organic Products Exporters of NZ requires that it members' products are certified to international standards. There are currently three certifying agencies associated with OPENZ: AgriQuality NZ Ltd, BioGro NZ and Bio Dynamic Farming and Gardening Association (Demeter). A brief description of each of these certification schemes follows:

AgriQuality: AgriQuality is a state-owned enterprise (formerly part of MAF Quality Management) that has been providing certification through its certification business Certenz since 2000. Certenz is based on Codex Alinorm 99/22, EU Regulations and Australian National Standard. It has ISO 65 accreditation and is currently under approval for the IFOAM standards (AgriQuality, 2002). It takes two years to convert production systems (same time horizon as within the EU).

BioGro: Formed in 1983, BioGro is one of 17 IFOAM accredited certifiers. It takes three years to convert under the BioGro system. The majority of NZ exporters (under OPENZ) have chosen to use BioGro standards for certification of their organic products (BioGro, 2002b). BioGro is primarily concerned with organic production and does not certify other environmental attributes. BioGro certifies over 700 producers across a range of industry sectors and $100 million worth of product annually, of which $60 million is exported.

Demeter: Demeter is a worldwide certification system, used to verify to the consumer that the product has been produced by biodynamic methods. The Bio Dynamic Association is the certifier in NZ. Biodynamics is a holistic approach to organic agriculture (OPENZ, 2002a).

Table 3.3 shows the division between BioGro, Certenz and Demeter of the total certified organic land in NZ.

Table 3.3 Division of certified organic land (hectares)

	2001	1999 est.	1998	1997
BioGro	31,185	14,000	10,694	7,359
CERTENZ	13,184	0	0	0
Demeter	2,155	2,500	0	0
Total	46,524	16,500	10,694	7,359

Source: AgriQuality, 2002; Saunders, 1997.

A summary of certification schemes that are available for NZ-based organic producers is contained in Table 3.4. In addition to the NZ-based schemes it is possible for NZ producers to gain certification under the internationally-recognised Blue Eco Angel scheme.

Table 3.4 Types of accredited eco-labels available for organics in New Zealand

Type of eco-label	Acceptance	Verification	Type of product/ services	Lead in time for full accreditation	Expense	Size/type of business suitable for
AgriQuality	NZ	Yes-through the state owned subsidiary from MAF	Plant/ animal	1 year	Auditing cost, soil/water testing	Small to medium size businesses into agriculture/ horticulture/ food stuffs
BioGro	NZ (inter-nationally through IFOAM)	Yes-through BioGro Ltd (accredited by IFOAM)	Plant/ animal, processes	3 years	Auditing cost, soil/water testing, farmers need to be able to finance themselves up until accreditation	Small to medium size businesses into agriculture/ horticulture/ food stuffs
Demeter	International	Yes-through Bio-Dynamics Organisation	Plant/ animal, processes	7 years	Auditing cost, soil/water testing, farmers need to be able to finance themselves up until accreditation	Small to medium size businesses into agriculture/ horticulture/ food stuffs
Blue Eco Angel	Europe, USA, NZ	Yes-through the German Federal Environ-mental Agency	Everything depending on the product or service	Varies	Auditing cost, residue testing	Small, medium and large businesses

Source: Iremonger, 2000.

Recently a national standard (NZS 8410:2003) for organic production was introduced by Standards NZ. This is a voluntary document that is proposed as a benchmark for industry certification (New Zealand Herald, 10 November, 2003).

A range of other quality assurance and sustainable management system programmes have been developed at an industry/organisation level within the NZ agricultural sector. These programs have been driven by a variety of reasons including marketing advantages, market access and environmental concern. The bulk of these schemes have been developed in response to actual or potential market demands. A brief synopsis of some of the major industry programmes is contained in Table 3.5.

Table 3.5 New Zealand industry/organisation level quality assurance and sustainable management schemes

Programme and lead organisation	Established	Type of programme	Driver(s) for establishment	Adoption level
Deer QA (Game Industry Board, Deer Industry NZ)	1991	Voluntary, Quality Assurance Programme	Marketing, variations in animal and meat quality	62% of deer farmers (2700/4300). Most venison processing companies
Fresh Produce Approved Supplier (Vegfed)	1999	Voluntary, HACCP based food safety programme	Market - food safety issues To minimise regulatory controls being imposed	80% of vegetable production, lower in fruit sector due to industry specific programmes
KiwiGreen (NZ Kiwifruit Marketing Board)	1993	Compulsory, Integrated Pest & Residue Management Programme	Market access, residues	100% of kiwifruit growers
EUREPGAP (Zespri™ Int Ltd)	2002	Voluntary Sustainable Management System	Market access	Not established
Sustainable Winegrowing NZ	1995	Voluntary Sustainable Management Programme	Environmental protection	60% of grape production area

Source: Wharfe *et al*., 2003.

E-mail and telephone contact with key people within these industries confirmed the belief that these schemes are important for market access and credibility. However, they were unable to place an actual value on the worth of the schemes or the premium that can be obtained.

3.3 Market access

This section reviews market access issues surrounding environmentally-friendly or green produce and reviews the potential for New Zealand exports.

An area that is currently of interest to the agricultural sector is that of sustainable agriculture. What practices actually constitute sustainability is a debatable question from both an academic and practical viewpoint. The approach taken in this section as to what constitutes sustainable agriculture has been to cast the net as wide as possible and incorporate any claims that may be regarded by consumers as constituting sustainable practice. The bulk of the research and the literature have focused on the organic sector, as it has a relatively long history and is most readily recognised by the consumer.

Prior to a review of the organic sector it is important to define what organics is. Organic foods can be distinguished from non-organic by methods of

production and processing. However, being credence goods, organic food items usually do not have any observable or testable characteristics. This makes a credible third-party certification and labelling system – that consumers are familiar with and trust – crucial for organic suppliers.

There is a large range of standards that define organics, generally accepted organic rules are (Lohr, 2001):

- no use of synthetic fertilisers, pesticides, growth regulators and livestock feed additives
- no use of genetically modified stock, no application of sludge to organic acreage and no food irradiation.

Attempts to harmonise definitions of what is 'organic' are currently taking place among the major markets as the exchange of organic products internationally increases (Lohr, 2001). Several markets have recently developed their own national standard as to what constitutes organic production.

As the consumption of organic products has increased in recent years so have concerns that the labelling of some products as organic may in fact be misleading. As a consequence various countries have developed or are in the process of developing national standards for the production of organic products. These standards are also applicable to imported products. In some instances eco-certification by third-party organisations will be sufficient for market access. A summary of these standards is contained in Table 3.6.

The NZ Food Safety Authority (NZFSA) has established the Official Organic Assurance Programme (OOAP). The purpose of this programme is to provide official assurance to the EU that organic products exported to the EU are in fact organic in line with the requirements of EU Regulation 2902/91 (NZFSA, 2003). The United States Department of Agriculture has accepted the NZFSA's programme for recognising organic certifying bodies. The NZ organisations currently certified under this scheme are BioGro and Certenz (AgriQuality).

Table 3.6 Summary of international standards for organics

Country	Relevant Standards
Australia	National Standard for Organic and BioDynamic Produce adopted by the Organic Produce Advisory Committee March 1997 (outlines minimum standards that have to be achieved before produce can be classified as organic). Australian Organic Production and Processing Standards have been developed to ensure verification and validity of organic products.
United States	The United States Department of Agriculture (USDA) recently completed the development of their National Organic Programme (NOP), fully implemented in October 2002. Under the NOP, imported products must be certified by a certification body approved by the USDA or be from a country recognised by the USDA as operating an equivalent organic programme.
Europe	European Union Regulation 2902/91 for production, processing and labelling of organic produce (currently standards are limited to crops and vegetables). This regulation was amended in 1995 and places organic produce into different categories depending on the percentage of ingredients that are organic. Article 11 of this regulation states organic food can be imported from countries administering legislation that is equivalent to the European Union. There is an approved free access list. For other suppliers an individual authorisation process has to be followed. Standards are currently being developed for livestock production.
Japan	Japan MAFF has recently completed the development of a national organic standard based on the Codex Guidelines. These currently only apply to plant products. New Zealand Food Safety Authority has prioritised equivalent negotiating for NZ standards in Japan.

Source: Adapted from URS, 2001.

3.3.1 Eco-labels as an environmental policy tool

This section reviews issues relating to the effectiveness of eco-labels as a means of enhancing the environment.

An eco-label can be thought of as an informational policy tool when placed in the context of environmental protection. Informational mechanisms that operate in market conditions are only one of several policy instruments that are available for environmental protection. A typology of policy instruments, that focuses upon choice constraint, is illustrated in Table 3.7.

Table 3.7 Typology of economic policy instruments

Regulation	Economic instruments	Information
Sticks:	Carrots:	Sermons:
Highly choice	Moderately choice	Facilitates and informs
constraining	constraining	free choice

Source: based on Bemelmans-Videc *et al.*, 1998.

Eco-labels and eco-certification offer a mechanism for the market to provide a degree of protection for the environment without government intervention. It

can be hypothesised that consumers are willing to pay a premium in order to obtain the additional utility of environmental well-being, as well as associated benefits. Consumers will be willing to pay a premium for environmentally-sensitive commodities until the marginal benefits of the environmental attributes equal the marginal cost, represented by the price premium (Moon *et al*., 2002). The higher price that can be obtained for these commodities should in turn send a price signal to producers that care for the environment is economically beneficial. As a result, producers should switch to methods of production with low environmental impacts.

The effectiveness of eco-labels as a policy tool for environmental protection has been questioned. It has been identified that the use of eco-labels faces two issues that disrupt the market mechanism: consumers' limited ability to process information and the public good characteristic of the environment (Bougherara and Grolleau, 2002).

A significant number of consumers view the environment as a public good and do not perceive that they should take individual responsibility for its protection through higher prices for 'green' commodities (Svedsater, 2003). Public goods are those that when used by one person are not 'consumed', but are available for the enjoyment of all others. It is therefore difficult to exclude people who do not pay (St John and Stewart, 2000). This implies that the purchase of eco-labelled goods does not provide the consumer with exclusive utility from the environmental well-being that results from their purchase (Bougherara and Grolleau, 2002). It is also not possible to stop free-rider behaviour, that is consumers who are not willing to pay for the environmental benefit, as they believe that others will pay even if they do not. If all consumers act in this manner the environmentally-friendly goods will not be produced (St John and Stewart, 2000).

As a public good eco-labels also suffer an assurance problem. This means that a consumer may not contribute to the production of a public good if they do not believe that the good will be produced. The production of a public good, such as environmental well-being, requires a minimum public contribution. The individual will think that their contribution is meaningless if they do not believe the minimum contribution will be obtained and will be unlikely to contribute (Schmidtz, 1991). In contrast to the free-riding situation, the assurance problem does not occur as a result of the consumers' self-interest, rather it occurs because the consumer does not feel their contribution will make a difference.

The adverse effect of free-riding and assurance is mitigated if an eco-labelled food product is considered not merely as a public good but as a set of attributes. An eco-labelled food product can be thought of as possessing both public and private attributes (Brougherara and Grolleau, 2002). The public attributes relate to the enhancement of the environment, the private attributes

relate to characteristics such as taste, safety and nutrition. Whilst a consumer may not be motivated to purchase an eco-labelled product for its public attributes they may nevertheless be motivated to purchase the product for its private attributes.

One of the frequently cited benefits of eco-labels is that they provide a means of overcoming the market failure of asymmetrical information between consumer and producer (Moon *et al*., 2002). However, the provision of information can be an additional cause of market failure. There are limits as to how much information a consumer can process (Miller, 1956). As consumers become overloaded with information their attention becomes a scarce resource (Bougherara and Grolleau, 2002).

It is possible for producers to cheat by providing false information to consumers (Akerlof, 1970). This is more likely to occur when environmental claims are made directly by the producer or another party that stands to benefit from the claim and the claim is unsubstantiated by a third party. This can lead to a situation where consumers do not trust environmental claims that are made by producers seeking to capture the premium that consumers are willing to pay for eco-friendly produce. The recent nitrogen scandal in Germany provides an example of how consumers can develop a lack of trust in eco-labels. (FAS, 2002) This might lead to a reduction in the willingness of consumers to pay for supposed environmental benefits.

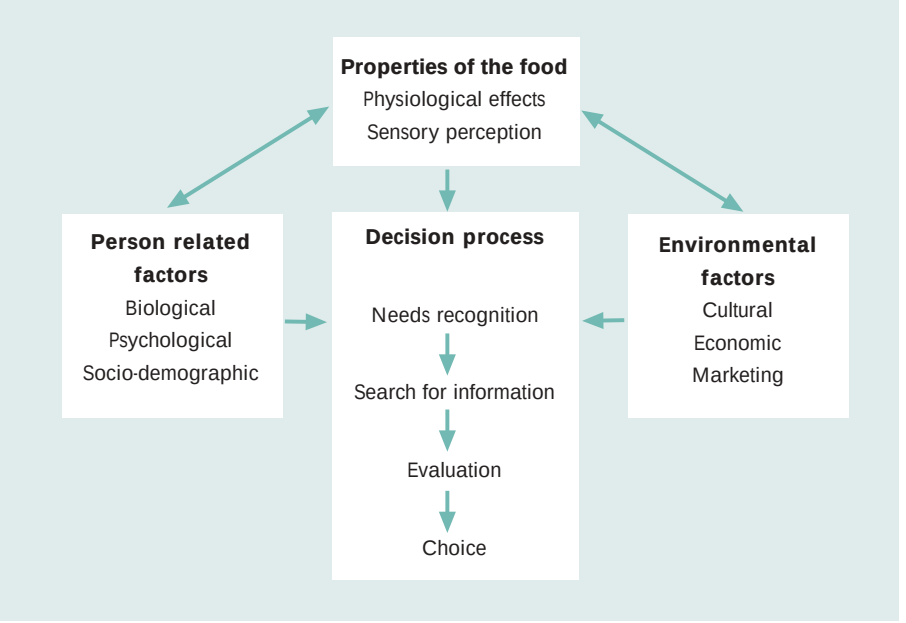
However, despite concerns about the efficacy of market-based environmental policy instruments when they are used in isolation, they still have an impact on decisions regarding land use that may affect the environment. If the price signals sent to producers indicate that environmentally-friendly means of production are more likely to be profitable then this increases the likelihood that production will be modified towards this end.

3.3.2 Eco-labels as marketing communications

In addition to providing a market-based means of enhancing environmental well-being, eco-labels also have the objective of attempting to increase the attractiveness of products for consumers. As a marketing tool, eco-labels leverage several consumer characteristics to enhance the appeal of the product.

A multi-disciplinary model of consumer behaviour as it pertains to food consumption is shown in Figure 3.4. From a marketing perspective an eco-label can be seen as a tool for assisting the consumer in their search for information.

Figure 3.4 Conceptual model for consumer behaviour with respect to food



Source: Traill, 1999.

The purchase of conventional food is generally a low involvement process performed out of habit and convenience. As food is a low involvement purchase item, consumers will tend to process information through a peripheral route rather than a central route. As such, familiar cues, such as a brand or a label, serve as a purchase trigger rather than more in-depth communication messages. A consumer is more likely to process a recognised eco-label than in-depth information regarding the means of production.

As consumers are unwilling to spend a great deal of time analysing product information a demand is created for someone else to ensure that their food is safe. For example, why should a consumer learn about the 'safe' levels of a range of chemical contaminants when this can be delegated to governments or certification organisations (Traill, 1999)? The eco-label acts as a communication to consumers that a product possesses certain attributes that would be excessively time consuming to assess or beyond the expertise of the consumer.

The attributes that are often identified by eco-labels can be physiological or sensory (taste, safety or nutrition) or psychological (ethics, attitudes to technology, etc). As discussed earlier, these are attributes that may possess a relatively high income elasticity of demand. As such, they are attributes for which consumers are often willing to pay a premium over and above what they would pay for similar products not possessing these attributes. It is possible for any producer to claim that their product possesses these attributes. Certified and recognised eco-labels introduce an element of trust into the consumers processing of the information.

3.3.3 The market for eco-labelled food products

The market for eco-certified food products currently only comprises a small percentage of total food consumption in developed countries. There appears to be a paucity of information as to the size of the global market for all forms of eco-labelled products. There is, however, information available as to the size of the organic market in developed countries. This may provide an indication regarding the market for eco-labelled goods generally. This information indicates that the organic market in developed countries is generally only 1-2 percent of the total, but that significant rates of growth are occurring (see Table 3.8).

Table 3.8 Forecast of world market for organic food and beverages

Markets	Retail sales 2003 (million US$)	% of total food sales - estimate	Annual growth 2003-2005 (%)	Import share of organic sales* (%)	Retail sales 2005 (million US$)
Germany	2,800 - 3,100	1.7 - 2.2	5 - 10	40	-
UK	1,550 - 1,750	1.5 - 2.0	10 - 15	70	-
Italy	1,250 - 1,400	1.0 - 1.5	5 - 15	40	-
France	1,200 - 1,300	1.0 - 1.5	5 - 10	10	-
Switzerland	725 - 775	3.2 - 3.7	5 - 15	-	-
Netherlands	425 - 475	1.0 - 1.5	5 - 10	60	-
Sweden	350 - 400	1.5 - 2.0	10 - 15	30	-
Denmark	325 - 375	2.2 - 2.7	0 - 5	25	-
Austria	325 - 375	2.0 - 2.5	5 - 10	30	-
Belgium	200 - 250	1.0 - 1.5	5 - 10	50	-
Ireland	40 - 50	<0.5	10 - 20	-	-
Other Europe**	750 - 850	-	-	-	-
Total (Europe)	10,000 - 11,000	-	-	-	-
U.S.A.	11,000 - 13,000	2.0 - 2.5	15 - 20	-	-
Canada	850 - 1,000	1.5 - 2.0	10 - 20	80	-
Japan	350 - 450	<0.5	-	-	-
Oceania	75 - 100	<0.5	-	-	-
Total	23,000 - 25,000	-	-	-	29,000 - 31,000

Source: International Trade Centre UNCTAD/WTO, 2002 from www.ifoam.org

* Lohr, 2001.

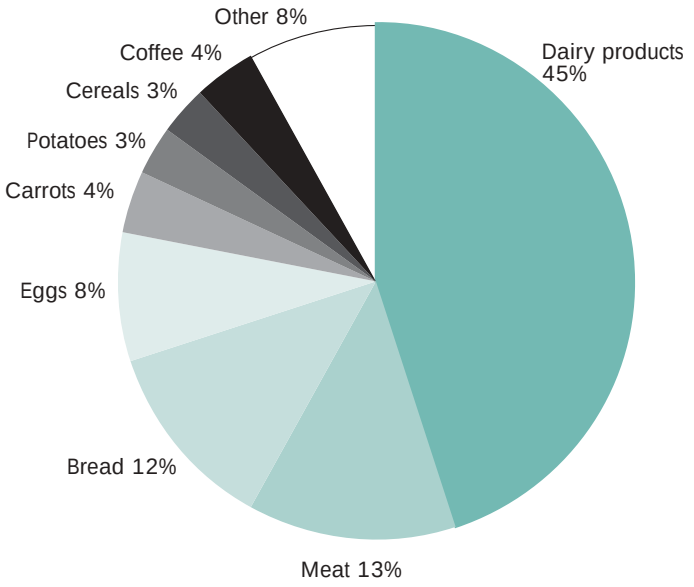
** Finland, Greece, Portugal, Spain, Norway, Poland, Hungary, Czech Republic, Estonia, Latvia, Lithuania.

Note: Official trade statistics are not available. Compilations are based on rough estimates. Sales figures are based on an exchange rate of US$1.00 = 1 euro.

It is difficult to obtain consistent data on the development of the organic market. This information is of importance to the producers, as there is a two to three year lead-time in the conversion of production to organic and the marketing of produce.

One of the most developed organic markets is the Danish market for dairy products. Overall, Denmark has one of the highest consumption rates of organic products in the world (Christensen and Frandsen, 2001). Dairy products are dominant in the Danish organic retail sector accounting for 45 percent of total organic sales followed by meat (13 percent), bread (12 percent) and eggs (8 percent) (see Figure 3.5).

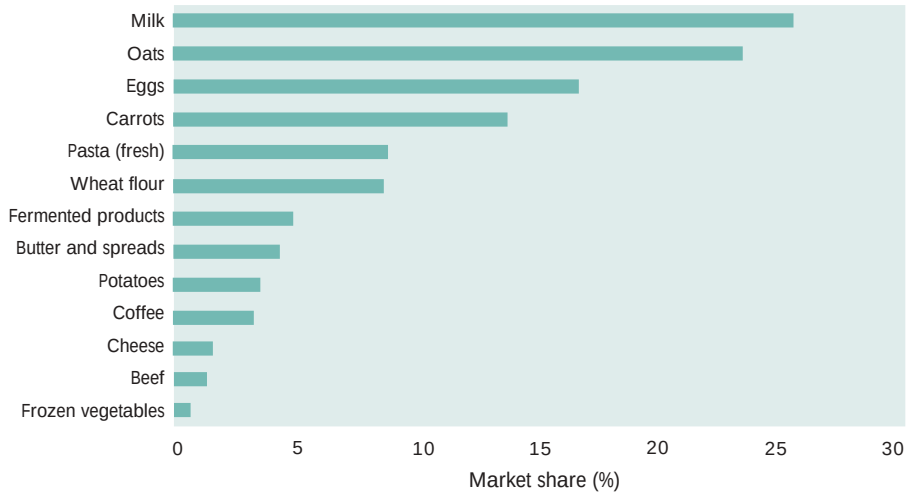
Figure 3.5 Breakdown of Danish organic retail sales (%)



Source: Arla Foods, 2002.

The domestic market share for organic products is shown in Figure 3.6. This shows how a quarter of all liquid milk consumed in Denmark is organic, which is quite extraordinary. Furthermore, organic oats, eggs and carrots have relatively large market share.

Figure 3.6 Domestic market share for organic products in Denmark



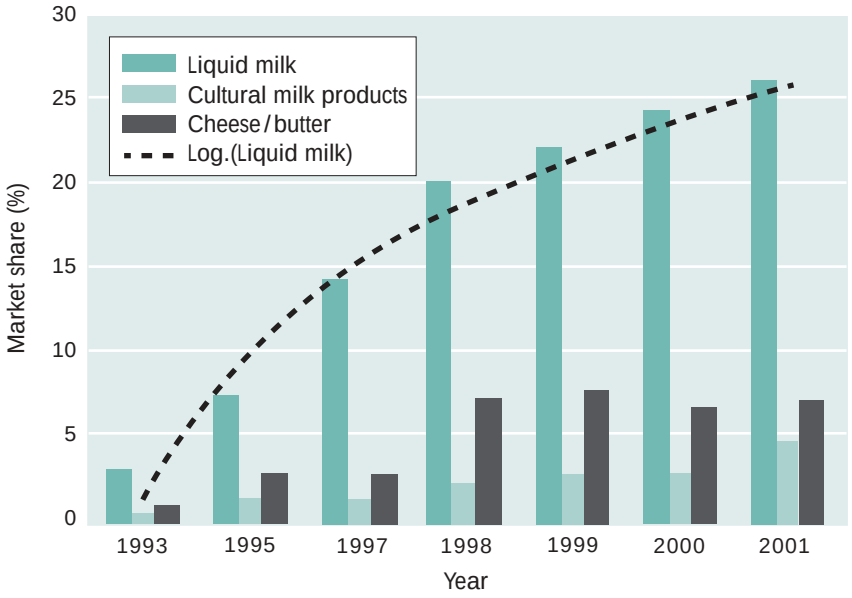
Source: OrganicDenmark, 2002.

The market for organic liquid milk has grown rapidly from 3 percent of consumption in 1993 to nearly 26 percent in 2001. Markets for processed organic dairy products such as cheese and butter are also developing, but at a slower pace (Figure 3.7).

The Danish retail price premium of organic liquid milk is between 18 and 20 percent. Even so, a large share of Danish consumers still buy organic instead of conventional liquid milk. This shows that is possible to have both a considerable organic premium (18-20 percent) and a large market share (above 25 percent). There are several explanations for the occurrence of such a market situation. The difference in conventional and organic liquid milk price may be insignificant when considering the proportion of liquid milk in relation to the total household expenditure. Another reason may be that organic liquid milk is easily accessible in the retail-chain stores, making it convenient for the Danish consumers to buy it. In addition, Danish retail-chain stores and dairies have continuously run marketing campaigns to promote organic products in general, and organic dairy products specifically.

Altogether this has meant that the market has expanded rapidly and only just recently does the trend line in Figure 3.7 indicate a possible maturing trend of the market. If future demand in other markets behaves similar to that in Denmark, there will be enormous potential within organic dairy sales, even if markets start maturing before reaching a 25 percent market share.

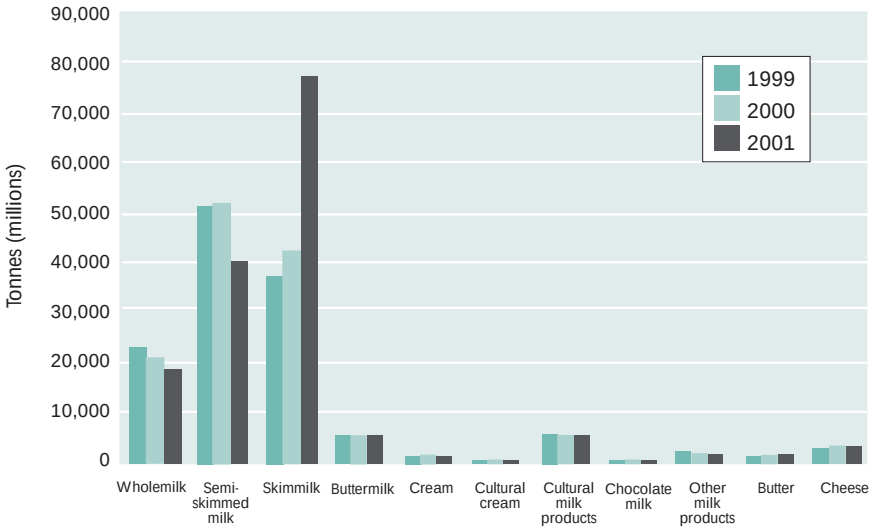
Figure 3.7 Danish domestic market share of organic dairy products



Source: Own production, 2002; Host, 2002.

The total range of processed organic milk products is shown in Figure 3.8. Production increased in the 1990s in response to development in the domestic market and also, very importantly, export markets. In 1999 the total amount of processed dairy products was 131,716 tonnes. This increased to 155,620 tonnes in 2001 – an increase of slightly more than 18 percent (Danish Dairy Board, 2002).

Figure 3.8 Processed organic dairy products in 1999, 2000 and 2001



Source: Own production, 2002; Danish Dairy Board, 2002.

From the Danish experience it can be seen that there is potential for growth in the organic sector which could be applied to the eco-label market. Moreover, this market does seem to be sustainable with premiums.

3.3.4 Consumers' willingness to pay a premium for eco-labelled products

It is generally accepted that there are consumers who are willing to pay a premium for food that is 'green' in origin. The willingness to pay a premium is not uniform as there are consumers that are indifferent towards 'green' produce or in some cases in favour of non-organic produce (VanWechel and Wachenheim, 2002). Whilst there are some consumers who are willing to pay a premium for 'green' produce the willingness to pay the premium varies from country to country and commodity to commodity (Dalgleish, 2003). The willingness of consumers to pay a premium also varies within countries and individual markets can be segmented on this basis.

A consensus as to the size of the premium that consumers are willing to pay for eco-labelled produce has not emerged in the literature. In part this is due to the different methodologies employed to assess the willingness of consumers to pay a premium. There are four main streams of research: attitudinal studies, contingent valuation studies, real market studies and reporting of actual premiums obtained for green products. Regardless of the methodology employed the research has consistently shown that there is a consumer segment that is willing to pay a premium for eco-labelled or green products.

The majority of research conducted into consumers' willingness to pay for 'green' labelled goods has used questionnaires that have asked how consumers would act when faced with a choice between labelled and unlabelled goods (Moon *et al*., 2002; Donath *et al*., 2000; Loureiro *et al*., 2002; Roe *et al*., 2001a and 2001b; Ethier *et al*., 2000; Jaffry *et al*., 2000; Tiilikainen and Huddleston, 2000; Blend and Van Ravenswaay, 1999; Forsyth *et al*., 1999). This approach is similar to the contingent valuation method of ascertaining the economic value of the environment. It is estimated that there are over 2000 publications of this nature (Chapman, 2000). By and large this body of research indicates that consumers are willing to pay a significant premium for eco-labelled produce. A summary of some of this research is presented in Table 3.9.

Table 3.9 'Intentional studies': Consumers' willingness to pay a premium for eco-labelled products

Reference	Method /data	Market	Country	Type of label or environmental characteristic	Will label have an effect	Premium willing to pay
Forsyth *et al.*, 1999	Attitudinal willingness to pay (WTP)	Wood products	Canada	Sustainable certified wood products	Yes	67.3% WTP 5%; 28.3% WTP 10%; 13% WTP >10%
Ethier *et al.*, 2000	Telephone survey	Electricity	America	Green electricity	Yes	30.6% WTP US $6 extra per month
Moon *et al.*, 2002	Attitudinal willingness to pay	Food	Germany	Nitrogen & chemical residues/Quality assurance and Govt controlled schemes	Yes	83% WTP a premium; 17% WTP >30%; mean WTP = 18%
Donath *et al.*, 2000	Contingent choice	Seafood	Norway & America	Certified as sustainable fishing - existing label	Yes	Norway 50% WTP 22%; US 72% WTP 12%
Conner, 2002	Survey (contingent valuation) & second price auction	Food	America	GMOs, biosolids, and irradiation	Yes	15-95%

There is only a small body of research that empirically measures consumer responses to environmental information (Bjorner, Hansen and Russell, 2002; Durham, McFetridge and Johnson, 2002; VanWeschel and Wachenseim, 2002; Roe *et al*., 2001a; Blamey and Bennett, 2001; Blamey *et al*., 2001; Thompson and Kidwell, 1998; Henion, 1972). The research generally does not investigate commodities that are widely traded by NZ. A summary of this work is shown in Table 3.10. The research is also inconsistent in terms of the type of label or certification utilised, the environmental attributes that are claimed, and the methodology used to assess the willingness to pay. The research does, however, provide support for the results of the 'intentional' studies: consumers are willing to pay a premium for eco-certified and labelled products.

Table 3.10 Empirical research: Consumers' willingness to pay a premium for eco-labelled products

Reference	Method /data	Market	Country	Type of label or environmental characteristic	Did label have an effect	Premium willing to pay
Henion (1972)	Real market experiment in four stores	Detergents	America	Content of phosphate	Yes	Not specified
Teisl *et al.* (2002)	Real market behaviour using aggregate monthly time series data (using an 'almost ideal demand system' specification)	Canned seafood and substitute meat products	America	Dolphin-safe label	Yes	Significant but not specified
Blamey and Bennett (2001)	Real market behaviour in discrete choice models (also combined with stated preference data)	Toilet paper	Australia	Unbleached Recycled	No Yes	A$0.66 extra per roll (base price not mentioned)
Nimon and Beghin (1999)	Hedonic regression using catalogue prices	Apparels	America	Environmentally friendly dyes Organic cotton	No Yes	33.8% for organic cottons, minimal for environmentally friendly dyes
Roe *et al.*. (2001), Teisl *et al.* (1999)	Hypothetical market (validated with hedonic regression based on electricity prices)	Electricity	America	Certified green electricity	Yes	Not specified
Bjorner, Hansen and Russell (2002)	Real market behaviour using weekly purchase diary data	Toilet paper, paper towels and detergents	Denmark	Hybrid environmental label certified by third party	Yes	10-17% for toilet paper & detergents/ minimal for paper towels

(Source: Adapted from Bjorner, Hansen and Russell, 2002)

The willingness to pay a premium for 'green' produce is reflected in the actual prices paid for 'green' produce. Price premiums vary across commodities and also vary according to what 'green' attributes are claimed for a commodity. Information regarding actual price premiums paid is most readily available for organic produce. Table 3.11 illustrates the price premium paid for organics in key markets. From this information it is evident that organic produce commands a premium between 10 and 100 percent above conventional products. A price premium between 10 and 30 percent is the most common.

Table 3.11 Price premium for organics in key demand centres

Market	Price premium (percent above conventional price)
Austria	25-30
Denmark	20-30
France	25-35
Italy	35-100
Germany	20-50
Netherlands	15-20
Sweden	20-40
Switzerland	10-40
United Kingdom	30-50
Japan	10-20
United States	10-30

Source: Lohr, 2001.

The variance in the price premium available for organic produce not only varies by market but also by commodity as illustrated in Table 3.12.

Table 3.12 Consumer price premiums (%) for selected organic products 1997/1998

Country	Vegetables	Cereals	Milk	Potatoes	Fruit
Sweden	30-100	10-100	15-20	30-100	100
Denmark	20-50	0-20	20-30	20-50	50-100
Finland	94	64	31	78	n/a
Austria	40-80	40-50	10	50	50-60
Switzerland	n/a	20-30	25-30	50-100	n/a
Germany	20-100	20-150	25-80	50-100	20-150

Source: Michelsen, 2001.

The willingness to pay a premium for organic produce is also apparent in the NZ market. One area where data is available is the dairy sector. The retail price premium within NZ for organic dairy products is considerable – especially for organic liquid milk. Table 3.13 shows a mark-up in 2001 of 51 percent on organic liquid milk in retail stores.

Table 3.13 Retail premiums for some New Zealand organic dairy products in 2001

Product	Certification	Organic retail price	Conventional retail price	% premium
BIO Farm Organic Milk (1litre)	BioGro	NZ$2.65	NZ$1.75	51
BIO Farm Natural Yoghurt (500 gm)	BioGro	NZ$3.91	NZ$3.16	23
Cyclops Sour Cream (250 gm)	BioGro	NZ$2.18	NZ$1.76	23

Source: BioGro, 2002a.

Regardless of the methodology used, it emerges that consumers are willing to pay extra for 'green' products. The difficulty lies in quantifying the premium. There is a wide divergence of results for different markets and commodities. This suggests that although there is a generic willingness to pay a premium for 'green' products, it is impossible to assess a generic size of premium that consumers will pay.

For some commodities, the premium is likely to be inflated by the characteristics of consumers of the product. Health conscious single females dominate the market for tuna, as tuna is high in protein and low in fats (D'Souza, 2000). Health conscious consumers comprise a sizeable segment of the market for organic produce (Chinnici *et al*., 2002). There is also a strong possibility that consumers in this demographic also hold strong views about the environment. This may account for the significant relationship between the 'dolphin-safe' label and market share for tuna (Teisl *et al*., 2002). The widespread adoption of the dolphin-safe label by the leading brands in the tuna market may have also influenced customer perceptions. Other market variables including communication strategies may also contribute to an organisation's market share (D'Souza, 2000).

The type of commodity was also found to influence the impact of an eco-label on the market price in a Danish study. The eco-labelling of paper towels was found to have a negligible effect on market prices whereas eco-labelled toilet paper and detergents commanded a significant premium. The reason advanced for this discrepancy was that green consumers were unlikely to purchase paper towels preferring reusable dishcloths as a commodity (Bjorner *et al*., 2002).

3.3.5 Maturity of the 'organic market'

The market for 'green' produce in different countries generally passes through different levels of maturity as illustrated in Table 3.14.

Table 3.14 Change in organic markets over time

	Niche market	Upscale production	Mainstream production
Suppliers	Very small number Low competition	Increased number	Many: competitive supply
Availability	Poor: difficult to obtain	Limited	Strong: easy to obtain organic products
Market Outlet	Producer direct	Specialty stores	Supermarkets

Increasing market maturity

Adapted from Christensen and Saunders, 2003.

There appears to be a relationship between the maturity of the market for organics and the structure of the organic market. Mature organic markets tend to have a high percentage of their sales through supermarkets (Christensen and Saunders, 2003). This can be shown by the dominance of supermarkets as a distribution channel for organic produce in Europe as illustrated in Table 3.15.

Table 3.15 Percentage share of organic retail market by distribution channel

Market	Supermarkets[1]	Speciality stores[2]	Producer direct[3]
Austria	77	13	10
Denmark	70	15	15
France	45	45	10
Italy	25-33	33	33-42
Germany	25	45	20
Netherlands	20	75	5
Sweden	90	5	5
Switzerland	60	30	10
United Kingdom	65	17.5	17.5
Japan[4]	High-end stores	Widely available	Widely available
United States	31	62	7

1. Includes supermarkets and hypermarkets that offer conveniently grown foods
2. Includes organic supermarkets, natural products and health food stores, cooperatives and others
3. Includes on-farm sales, farmer markets, box schemes, CSAs, teikei and other
4. Share data not available for Japan, but qualitative data suggests relative availability of product

Source: Lohr, 2001.

Willingness to pay a premium for green products is thought to vary according to the sales channel. In Germany, where consumers appear willing to pay a high premium for organic produce (Fricke, 1996), the dominant sales channel for organic produce is specialty stores. In contrast, in Scandinavia and the UK where the dominant sales channel for organic produce is supermarkets, the premium consumers are willing to pay is substantially lower. This has been attributed to price being one of the most important competition parameters in the supermarket context (Wier and Calverley, 2002). Indeed, in the German context consumers are willing to pay a higher premium in specialty stores rather than in supermarkets.

The level of organic market maturity may affect the importance that consumers attach to eco-labelling and eco-certification schemes. It can be assumed that consumers in the more mature organic markets will have a higher level of sophistication as regards their assessment of credence attributes such as

production methods. In this regard it is likely that they will have a higher level of awareness of eco-labels and eco-certification schemes as a means of advertising the greenness of a product. The consumer is likely to become more reliant on third-party verification of the credence attributes of a product as the act of consumption becomes further removed from the source of production.

Eco-labels have been viewed as being more effective in markets or market segments where green consumerism is strong (Jordan *et al*., 2003). In mature 'green' markets, producers may be at a competitive disadvantage if they are not eco-certified *vis-à-vis* eco-certified competitors. In markets where the 'green' consumer does not wield great influence the presence of an eco-label is unlikely to make a material difference (*ibid*, 2003).

There is some evidence that there has been a slowdown in the rate of growth in the most mature organic markets. In Denmark, which has long been considered a leader in organic consumption, the market stagnated in 2001 and as a whole declined in 2002 (Kortbech-Oleson, 2003). By way of contrast several transition European economies, such as the Czech Republic, Poland and the Baltic States, are seen as promising growth markets for organic products (*ibid*).

3.3.6 Market segmentation

In order to maximise the price premium that can be obtained for 'green' produce, it is necessary to first segment the market according to levels of pro-environmental purchase behaviour and then target marketing efforts towards the greener segments (Schlegelmilch *et al*., 1994; Forsyth *et al*., 1999).

Research dating back over a decade has indicated that the appeal of green foods varies according to market segments (Grunert, 1993). This suggests that the willingness to pay a premium for organic produce will also vary across market segments. As illustrated in Table 3.16 some consumers are willing to pay a far higher premium for organic produce than others. For instance, Grunert (1993) found that 10 percent of the most environmentally-conscious segment of Danish society were willing to pay more than 30 percent extra for organic produce whilst only 2 percent of the least environmentally-conscious segment were willing to pay this premium. Similarly in the UK 44 percent of the population is willing to pay a premium of 10 to 18 percent for 'ethical' products whilst the remainder of the population is less enthusiastic (Bird and Hughes, 1997).

Table 3.16 Willingness of consumers to pay a premium for organic produce at different price premiums

		Price premium for organic foods (%)							
		5-10%	10-20%	20%	20-30%	30-40%	40%	40-50%	50-60%
Study	**Country and survey year**	**Proportion of consumers that will buy organic foods (%)**							
Drake and Holm, 1989	Sweden, 1987	45%	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Beharrel and MacFie, 1991	UK, 1989	50-80%	25-50%	n.a.	15-20%	18-20%	n.a.	16-18%	15-16%
Coopers and Lybrand Deloitte, 1992	UK, 1989	50-65%	25-50%	n.a.	20-25%	15-20%	n.a.	13-15%	11-13%
Bugge and Wandel, 1995	Norway, 1993	70	40	n.a.	10	n.a.	n.a.	3-5%	n.a.
Bjerke, 1992	Denmark, 1990	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	15%	n.a.
Grunert and Kristensen, 1995	Denmark, 1991	n.a.	n.a.	54%	n.a.	5%	n.a.	n.a.	n.a.
Scan-Ad, 1998	Denmark, 1998	65%	20%	n.a.	11%	n.a.	n.a.	n.a.	n.a.
Hack, 1995	Netherlands, 1991	95%	90%	n.a.	85%	n.a.	80%	n.a.	60%
Kramer *et al*., 1998	Germany, n.a.	n.a.	31%	n.a.	n.a.	n.a.	52%	n.a.	9%
Fricke, 1996	Germany, 1994	30%	26%	n.a.	n.a.	n.a.	25%	n.a.	4%
CMA, 1996	Germany, 1996	29%	28%	n.a.	n.a.	30%	n.a.	n.a.	3%

Source: Wier and Calverley, 1999.

However, until very recently there have been relatively few attempts to segment markets based on an actual preference for 'green' products. The more common approach has been to segment markets on traditional approaches such as socio-demographics (Schlegelmilch *et al*., 1994) or personality measures (Balderjahn, 1988) and then profile segments in terms of their environmental consciousness.

Recently there have been several attempts to segment individual markets based on the consumer's inclination towards either organic or GE Free produce. An example of this approach was a study done in Belgium that segmented the market into four categories based on attitude towards genetically-modified produce. Twenty-four percent of consumers were found to have positive attitudes towards GE products (Enthusiasts), while 16 percent were strongly opposed to GM (Green Opponents). The remainder of the market was either neutral or slightly negative in their attitude towards GM (Verdurme and Viaene, 2003). This suggests that there is a sizeable segment of the Belgian population

that places a priority on the consumption of organic produce. There is an even larger segment that may consume organic produce if they are presented with the right marketing mix. Although the size of the segments may vary this pattern can be generalised to other countries.

The segmentation described above is reinforced by research indicating that a significant group of consumers (some 20-30 percent) would stop purchasing NZ produce if genetically modified organisms are released in NZ. The bulk of consumers (40-70 percent) indicated that they would not alter their purchasing habits. The remainder indicated that they are price sensitive (Sanderson *et al*., 2003). In terms of the consumers' willingness to pay more for eco-labelled and eco-certified goods, it is the segment that is diametrically opposed to genetic modification that is of most interest. These consumers do not appear to be price sensitive and are likely to pay a premium to ensure that they consumer 'green' commodities (Sanderson *et al*., 2003).

There is a large amount of heterogeneity amongst consumers of organic produce. A recent Italian study identified four clusters of organic consumers: Pioneers, Pragmatists, Nostalgic and Health Conscious (Chinnici *et al*., 2002).

Pioneers are characterised by occasional consumption of organic produce that is mainly motivated by curiosity. The bulk of this segment's food purchases are made at the supermarket. There is a preponderance of women in this group and they are largely aged 24 to 44. Household income is moderate.

Pragmatists are consumers who have a preference for organic foods due to perceptions of better taste and nutrition. However, they often forego organic produce (20-30 percent premium) as they are largely motivated by price. The definable characteristics of this segment are similar to the characteristics of Pioneers.

Nostalgic consumers of organic produce are characterised by a tendency to associate the consumption of organics with the genuineness and tastes of the past. This segment largely consists of male pensioners who are in possession of a modest income.

Health conscious consumers are primarily motivated to consume organic produce by perceived health benefits. These consumers are willing to pay and expect to pay a premium of 20-30 percent for organic produce. This tends to be reflective of a high family income. This consumer group consists of both males and females and is generally in possession of a high level of education.

In France, consumers of organic products have been classified under three categories: politically/ideologically motivated, health conscious and switchers (FAS, 2001).

Politically and ideologically motivated consumers are motivated by concerns over the environment, animal rights and personal health. Typically they display little concern for price and accessibility. Demographically they are middle aged and well educated with mid-high levels of income.

Health conscious consumers are primarily motivated by perceived health benefits of organic produce. Price and convenience are factored into their purchase decision. Demographically they are professionals aged over 25.

Switchers are consumers who are highly susceptible to media influence. Food scares such as BSE tend to influence their purchase decision as do price and convenience. For this segment, price premiums must be justified by taste and health benefits.

The segments identified above are limited to Sicily and France, however, it is reasonable to assume that the market for green products in other countries can also be broken down into diverse components. These studies illustrate that different segments of the green market possess different motivations for consumption and differing levels of price sensitivity. It follows that the willingness to pay a premium for organic produce is not a uniform characteristic of green consumers. The marketing mix for green consumers should reflect this diversity.

An understanding of the organic market segments in key markets may assist in ascertaining what eco-labels and environmental attributes will be able to obtain the greatest premiums and why. This is an area where an integrated marketing and economics approach could yield significant benefits. The marketing research has tended to concentrate on the characteristics and size of the green segment, whereas, economic research has assessed consumers' willingness to pay. What is lacking in the literature is an understanding of what environmental attributes consumers are willing to pay for, which consumers are willing to pay for these attributes and why. Such an understanding would enable targeted marketing of different eco-labels in order to maximise the premium that could be obtained.

One clear trait that emerges from the literature is that a large number of 'green' food consumers are not motivated by environmental concerns, rather they are motivated by product attributes such as taste, nutrition, and perceived health benefits (Chinnici *et al*., 2002; FAS, 2001; Lohr, 2001). It follows that producers of 'green' agricultural commodities need to maintain a focus on quality, and not just the greenness, of their produce in order to receive any price premium that may be available (Campbell and Fairweather, 1998).

CHAPTER 4

Empirical analysis

This chapter presents results from a number of projections made using the LTEM (introduced in Section 2.2.5). The LTEM is a multi-country, multi-commodity, partial equilibrium trade model which focuses on the agricultural sector. The framework is used to analyse the impact of various shifts in demand or supply on the country and commodity based price and net trade levels. The model is calibrated with 1997 as the base year, and simulates out to 2010.

Results analysing the costs and benefits of organic production across a number of commodities are shown first. This is followed by a detailed analysis of organic production in the dairy sector, comparing the NZ situation to other countries, particularly Denmark which has a very established organic sector. To conclude this chapter on quantitative results, an analysis of producer returns from eco-labelled products is presented.

4.1 Costs and benefits of organic production

The simulations shown below estimate trends in the organic market trade. These trends are gleaned through literature reviews, which document the past, present and potential realities of world trade. Through gathering information on demand and supply along with national policies, a perspective of trade can be established. The study of consumer wants and willingness to pay for those wants indicates market direction and suggests areas for producer development. Policy intervention such as subsidies and tariffs are also included in the model.

The simulations presented here are separated into three base scenarios:

1. Where organic is one percent of the world's total production and consumption.
2. Where organic comprises one percent of total world production and consumption, excepting NZ whose organic production and consumption is seven percent of total production and consumption.
3. Where world production and consumption of organic commodities is seven percent of total production and consumption.

Within each base scenario grouping, four differing simulations were processed:

1. The base scenario simulation, which is applied in analysis as the control.
2. A simulation where higher costs of production for organic produce occur. The example chooses 10 percent higher production costs for organic commodities in comparison to conventional.
3. A simulation observing an increased preference for organics, where consumers are willing to pay a price premium. The price premium for organics is set at 35 percent above the price of their conventional counterparts.
4. A simulation where organic commodities receive a price premium of 35 percent above their conventional counterparts, but have 10 percent higher production costs.

The shocks chosen were taken from current literature. They are based as follows:

- 10 percent higher production costs for organic compared to conventional is a figure incorporating the variances in production costs across the two systems. Higher production costs are another method of representing lower comparative yields. Some commodities such as dairy exhibit no or little difference in levels of production, others such as cereals may range from 5 percent to 20 percent.
- The 35 percent price premium for organic commodities is based on Ritchie *et al*.'s paper (2000) that indicates an average premium of this amount across a bundle of 21 countries.
- The 1 percent base for production and consumption of organic produce in the world is derived as follows: Lampkin and Padel (1994) cite the organic sector as being under half a percent of the total agricultural sector, excepting Germany and Austria at 2 percent and 3 percent respectively. Willer & Yussefi (2000) in a more recent publication lists Austria at 8

percent, Liechtenstein at 17 percent, and Denmark at 6 percent, and larger production areas such as the US at 0.22 percent, Australia at 1.12 percent, and Argentina at 0.22 percent. The base of 1 percent has been chosen as an average incorporating the large variances existing in the world, and also being a figure significantly large enough to allow the model to simulate.

- The figure of organic production and consumption being 7 percent of the world's agricultural total is a derived figure initiated from Ritchie *et al* (2000), who has cited annual average growth rates of 35 percent for organic across a sample of 21 countries. The model simulates a period of 13 years from the base year. Using the 35 percent per annum rate, organic production from a starting base of 1 percent of total agricultural production would project out to 49.5 percent of total agricultural production in 13 years. Choosing a more conservative figure, which allows for variations in the growth rate, an annual growth rate of 16 percent per annum was chosen, which across 13 years gives organic agriculture 7 percent of total agricultural production.

Modelling results/analysis

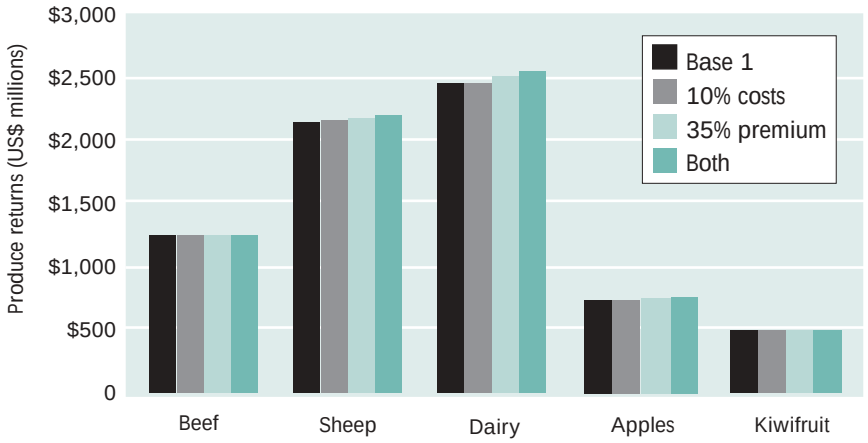
The modelling results are presented in three groupings, representing the three base scenarios of a 1 percent (organic) world; a 1 percent world with NZ at 7 percent; and a 7 percent (organic) world. The results show total producer returns, being the combined organic and conventional sectors. Finally total producer returns are illustrated across all model simulations. The returns to wheat, coarse grains and maize are difficult to trace when put alongside the larger volumes associated with the other commodities. For this reason, they have been excluded from the graphs.

Scenario 1

Scenario 1 is a trading environment where world consumption and production of organic commodities (including NZ) is 1 percent of total agricultural produce. The base solution is simulated with no extra production costs or price premium for organic products.

Figure 4.1 illustrates the situation for total producer returns – both conventional and organic producers, in a trading environment where all nations produce and consume organic produce at 1 percent of their total. It illustrates that for each of the applied shocks, the degree of change is small. Large increases in the organic sector are heavily reduced in significance once combined with the much larger conventional sector – which comprises 99 percent of the total. Although not evident in the graph, commodities such as beef experience a $10,150,000 increase from base 1 to both – where a price premium and increased production costs are applied.

Figure 4.1 New Zealand total producer returns: 1 percent of world consumption is organic (Values in $US000s)



Scenario 2

In Scenario 2, 7 percent of NZ production and consumption is organic. The rest of the world is only consuming and producing 1 percent organic. Shocks applied in Scenario 2 differ from the other two scenarios in that increased production costs (10 percent) and price premiums (35 percent) were only applied to the NZ domestic market, the rest of the world remaining constant. Scenario 2 represents a worst case scenario for NZ, in which NZ goes organic by increasing organic production, but demand in the rest of the world does not increase. The scenario is especially unfavourable, as price premiums do not exist in markets external to NZ, and NZ is the only nation to experience increased costs of production for its organic commodities.

Figure 4.2 New Zealand total producer returns: 1 percent of world consumption is organic, New Zealand consumption and production is 7 percent (Values in $US000s)

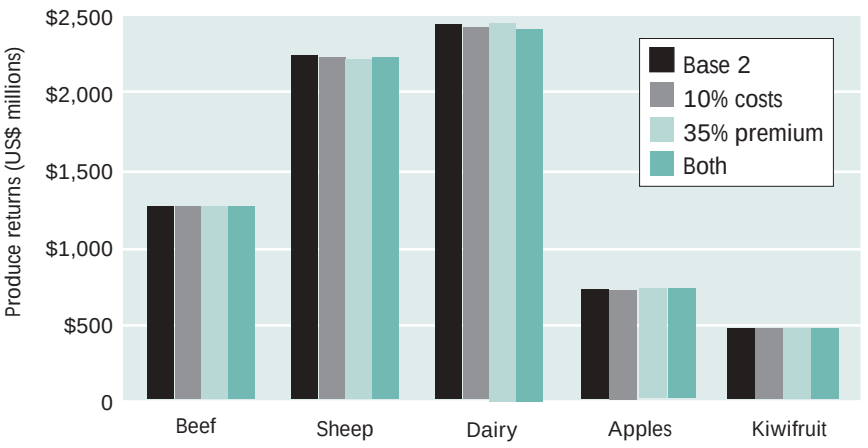


Figure 4.2 illustrates that a very slight loss to no loss is realised to total producer returns from this scenario, from the application of shocks to the base simulation. The inference is that with international producers not incurring higher production costs, or receiving price premiums, the NZ agricultural industry is in a weak competitive position. But even given this worst case scenario, the negative effect to total producer returns is insignificant with producer returns remaining relatively constant.

The NZ situation suggests that domestic demand for organic commodities is not sufficiently large to support price premiums. It could even result in cheaper imports taking from domestic production's market share. In addition, as much of NZ produce is sent offshore, the higher price of NZ produce compared to world supply means less demand for it overseas.

Also, in contrast to Scenario 1, the higher production costs have resulted in a lowering of NZ producer returns. An explanation for this is that producers operating with higher production costs will receive greater returns if all producers are operating with such higher costs. In this instance, a large proportion of producers are able to produce at a lower cost, placing those producers operating at higher costs at a competitive disadvantage. The second shock of a price premium, once again only applied to NZ (on the demand side this time), reveals very little in the way of change to producer returns.

Scenario 3

NZ's position in a trading environment where world consumption and production of organic commodities is 7 percent of their total.

Figure 4.3 New Zealand total producer returns: 7 percent of world consumption is organic (Values in $US000s)

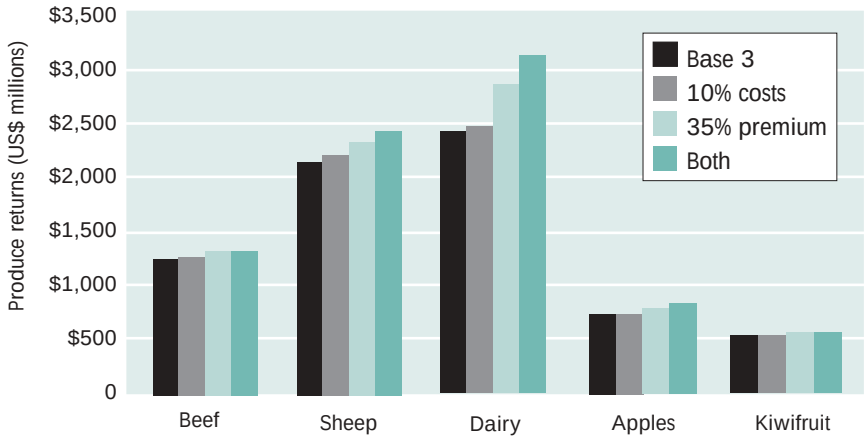


Figure 4.3 shows the situation for total producer returns (both conventional and organic producers) in a trading environment where all nations produce and consume organic produce at 7 percent of their total. In contrast to Scenario 1

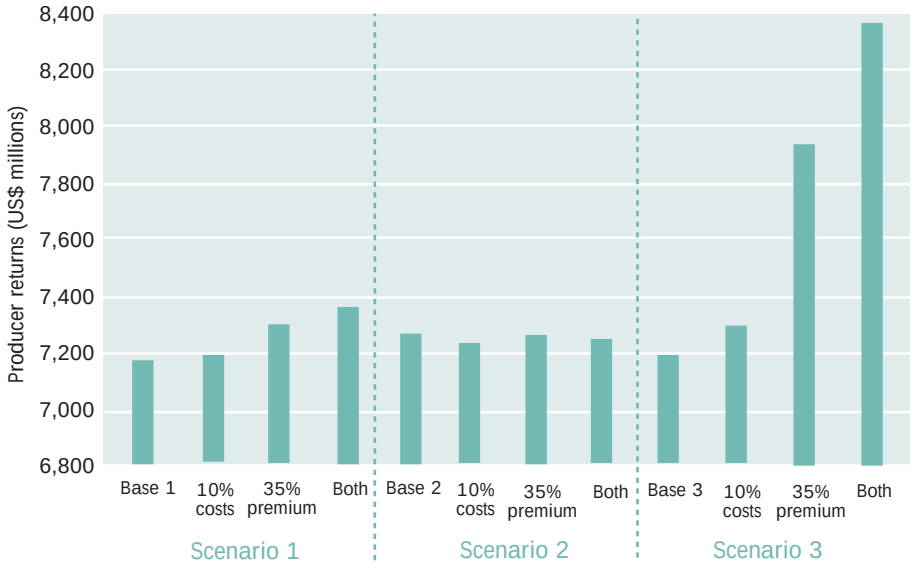
with only 1 percent production and consumption, Scenario 3 shows that the increase in volume of organics to 7 percent has significant appreciable effects to total producer returns. The degree of significance varies across commodities, with dairy indicating the greatest responsiveness. This result also shows that an increase by NZ producers into organics, aligned with the growth in demand of world markets, increased returns for higher production costs and the existence of price premiums, is very profitable for the agricultural industry in general.

Of the nations importing organic commodities, Japan was the largest net importer across the eight commodities. This is also of greatest relevance to NZ, as the simulations showed NZ to be in a position to supply those commodities, in particular, beef, sheep, cheese, skim milk powder, and kiwifruit.

The three scenarios collectively

Figure 4.4 shows total producer returns grouped from left to right in consecutive scenario simulations, with the applied shocks. It illustrates that the most responsive scenario to the NZ agricultural industry is when the world is at 7 percent organic and price premiums or both shocks are applied. The other two scenarios are relatively insignificant in their results for the total industry. This draws out the necessity that the organic industry needs to be sufficiently large to be able to affect results for the whole industry, in this instance, at 7 percent of the total.

Figure 4.4 Total producer returns from modelling simulations (8 commodities)



4.2 The New Zealand dairy sector

The LTEM shows the impact on trade, prices, output and thus producer returns for certain key agricultural commodities from running various scenarios in the model associated with conventional and organic products. The scenarios estimate the impact on NZ dairy producer returns given different assumptions relating to market developments for conventional and organic commodities. These include:

- Shifts in consumer preferences towards organic dairy produce revealed by consumer willingness to pay a premium for it. The shifts in preferences are incorporated through the use of exogenous shifts in intermediate and final demand.
- Shifts in supply curve incurred by increase in production costs as a consequence of reduction in the quantity of raw milk produced when increasing the share of organic dairy production.

This is tested against assumptions relating to the proportions of organic consumption and production share in NZ and its three most important trade partners within organics: the US, the EU and Japan. No changes in other countries in the LTEM model were simulated.

The scenarios were prepared to reflect expectations for developments in organic dairy production on basis of the Danish experience and within organics worldwide (as reviewed in earlier sections).

The results from the scenarios are intended to assess factors that may affect NZ farmers and, therefore, estimate the potential risks and benefits of converting to organic dairy production. These scenarios reflect the most likely outcomes of given market development but also some extremes to determine high risk and benefit possibilities.

The scenarios are based on four varying factors relating to the organic market as follows:

1. Shift in consumer preference towards organic dairy produce

Increased consumer preference towards organic food produce implies willingness to pay an organic food premium. As described in Section 4.1, price premiums on organic products in general vary a lot but a majority of the premiums are in the 10 to 30 percent range. Furthermore, Fonterra has announced a 10 percent producer premium for organic raw milk (Section 4.1).

Thus, four levels of price premiums were used in the model:

- 0 percent to reflect a situation where organic milk does not attract a premium

- 10 percent to reflect the Fonterra premium to producers
- 20 percent to reflect the premium in the Danish market
- 30 percent to reflect the higher premium, which is closer to current NZ market premium

2. Shifts in supply curve due to increase in production costs with organic milk production

In general, converting from conventional to organic dairy production results in a decrease in production which is equivalent to a shift in the supply curve. Danish dairy farming is comparable to other European countries, the US and Japan because of the type of production methods used and intensity of production. NZ dairy production, on the other hand, is more extensive.

Thus the most realistic scenario is:

- A 5 percent increase in production costs in NZ production and 10 percent increase in the EU, the US and Japan.

In addition, to assess the range of risks to NZ producers relative to those in other countries, three additional scenarios were assumed:

- A zero change in producer costs in NZ, the EU, the US and Japan
- 30 percent increase in NZ production costs relative to 10 percent increase in EU, US and Japan.
- An extreme scenario of 30 percent increases in production costs in NZ, the EU, the US and Japan.

3. Organic market share in New Zealand, the United States, the European Union and Japan

European markets such as the UK, Germany and Italy have organic retail shares between 0.3 percent and 1.2 percent (with higher shares in Austria, Sweden and Denmark). The US and Japan have a share of 1 percent. However, this data is for the period 1997-99 and since then organic markets have experienced rapid annual growth, implying higher organic consumption shares than stated above. The extent of organic consumption also varies significantly between different categories of organic produce. Figure 3.7 (Section 3.3.3) illustrates that the market share for organic liquid milk in Denmark was 25.9 percent in 2001 with the market share for cultural milk products being 7 percent and 4.5 percent for cheese/butter.

As discussed earlier, the NZ market for organic produce is not as developed as the markets in the US, the EU and Japan. No exact empirical data exists for percentage organic retail sales in NZ. However, it is assumed to be less than the

organic markets of the US, the EU and Japan.

Thus, the organic consumption rate was modelled at two levels:

- 1 percent in NZ and 2 percent in the US, the EU and Japan for the period 1997-2010
- 2 percent in NZ and 5 percent in the US, the EU and Japan for the period 1997-2010.

Taking the Danish experience with organic consumption into account, these levels are very low and set conservatively, implying that future development in organic consumption rate is most likely to increase above the levels modelled. Hence results of the modelling can be interpreted as a minimum achievable producer return for the NZ organic dairy sector.

4. Organic dairy production level in New Zealand, the United States, the European Union and Japan

According to Yussefi and Willer (2002), 2 percent of the total agricultural production in Europe is organic. The share of organic dairy production out of total production accounts for 12 percent in Austria, 10 percent in Denmark, 3.5 percent in Sweden and 1.2 percent in Germany. In modelling organic dairy production of total dairy production, it was conservatively assumed to be 2 percent for the EU.

US organic production is estimated to be above 1 percent of total production and experiencing rapid growth. Subsequently, the percentage of organic dairy production of total dairy production was set at 2 percent for the US.

The Asian Institute of Technology (2002) states that alternative agriculture in Japan accounts for 1 percent of total production. This includes different kinds of alternative agricultural production – not only 'mainstream' organic production. Japan's organic dairy production was set at 1 percent.

NZ organic dairy production is not significant. However, provided the current constraints to conversion discussed in section 4.2 are removed (e.g. organisational and industry commitment), it is expected that NZ organic dairy production can reach a level of 2 percent of total production relatively easily. However, learning from the Danish experience with organic dairy production, it is likely NZ organic dairy production will expand beyond that.

Thus, four percentage levels of NZ organic dairy production out of total NZ dairy production were used:

- 0.05 percent NZ organic dairy production
- 2 percent NZ organic dairy production

- 6 percent NZ organic dairy production
- 10 percent NZ organic dairy production.[2]

These levels of NZ organic dairy production are set conservatively, given the fact that Denmark is already producing 10 percent organic milk level and Austria 12 percent. Thus, results on NZ organic dairy producer returns presented below are seen as conservative estimates of possible future development.

In total, 32 different scenarios were run. The scenarios were modelled with the base year 1997, up till 2010. This report presents the 2010 model results by showing the overall effect on organic producer returns in NZ (unless otherwise stated). A 'benchmark scenario' was defined and used as a comparison with other scenarios. It was seen as a realistic definition of the organic dairy sector with regards to a shift in supply curve and extent of organic dairy production within the next couple of years. However, extremely conservative levels for organic consumer premium and market share are applied in the benchmark scenario. This means that this scenario indicates an absolute minimum for expected future organic producer returns in NZ.

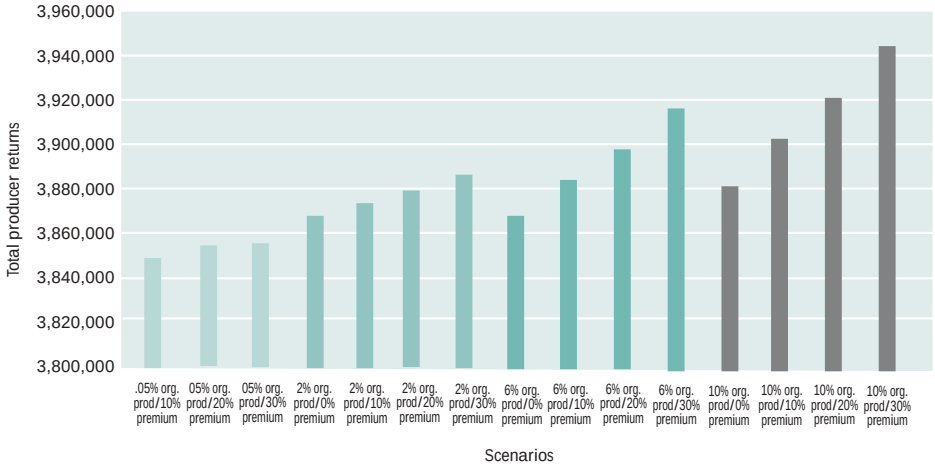
In the 'benchmark scenario':

1. 10 percent shift in consumer preference towards buying organic dairy produce in NZ, the US, the EU and Japan i.e. 10 percent premium
2. 5 percent shift in supply curve for organic dairy production in 5 percent for NZ. 10 percent shift for the US, the EU and Japan
3. Organic market share is 1 percent for NZ and 2 percent for the US, the EU and Japan
4. Organic dairy – and dairy feed – production accounts for 2 percent of total dairy production in NZ, the US and the EU and for 1 percent in Japan.

The results are shown in Figure 4.5. An increase in the percentage of organic dairy production results in an increase of total producer returns at all levels of consumer premium. The percentage increase in total producer returns varies from 0.03 percent (at zero premium level raising organic dairy production from 2 to 6 percent) to 0.78 percent (at 30 percent premium level raising organic dairy production from 0.05 percent to 2 percent of total production). This means that the dairy sector seen as a whole may actually benefit from conversion into organic farming, regardless of the consumer premium.

2 In the modelling, organic dairy feed production (such as grain and oilseed meals) was assumed to be produced at the same percentage share as organic dairy production in order to ensure sufficient organic feed supplies.

Figure 4.5 The influence of organic dairy production levels on total dairy producer returns in New Zealand



4.3 Eco-labelling

This section considers producer returns from eco-labelled products, not necessarily organic, but any product which is differentiated from the conventional product in some way and is labelled as such, with a premium of 20 percent. These results are again based on projections from the LTEM, with a base year of 1997 and simulated out to 2010.

Table 4.1 shows the estimated difference in producer returns received in NZ for an eco-labelled product in comparison with a base scenario which assumes no eco-labelling and no consumer preference for an eco-labelled product. These results show the percentage changes of producer returns in 2010.

Column two shows a scenario where the eco-labelled product has 50 percent of the market share, with a 50 percent increase in demand for the eco-labelled product (in the livestock sector only). This is extremely beneficial for NZ producers, with their returns increasing by an average of nearly 24 percent in comparison with the base scenario.

Column three shows projected changes in NZ producer returns following a 25 percent increase in production of non-labelled animal products, with a 20 percent increase in preference for the eco-labelled products. The net increase is almost the same as the previous scenario, at 23 percent. Beef and calves show the greatest increase in producer returns, at 30 percent, while raw milk shows a relatively modest increase of 16 percent.

Table 4.1 Percentage changes between a base scenario (which assumes no eco-labelling) and two scenarios with different consumer preferences for an eco-labelled product, in 2010

	50% eco-labelled production	
	50% preference for eco-labelled products	25% increase in production of non-labelled production/ 20% preference for labelled products
Beef and calves	33.8	30.5
Sheep and lamb	22.5	22.8
Raw milk	14.1	15.8
Net effect	23.5	23.0

CHAPTER 5

Conclusions

NZ agriculture has, over the last few decades, had to deal with a number of changes and pressures. These include the entry of the UK into the EU, the removal of subsidies and other forms of government support. This has required the sector to diversify its production and markets. Moreover NZ is unique among developed countries in its reliance on agricultural exports – these products suffer the greatest restrictions in world trade making it difficult for NZ to access high-value markets. In addition to these factors, the other major change has been the fall in expenditures on food in developed countries especially in commodity products. This has in no small part contributed to the relative decline in NZ's national income.

The agriculture sector has responded to these pressures in a number of ways. Firstly, farmers have increased productivity and the intensification of production. This can be seen most in those sectors where farmers do not have direct access to markets and market signals. This has led in some cases to concern about the consequences for the environment. A second response has been the diversification of production with an increase in dairy and deer production and a fall in sheep and beef production, again with environmental consequences. Where possible, however, sectors have responded by targeting niche and high-value markets to increase premium for their products such as the kiwifruit sector. It is this later response that holds the most potential for increasing the real value of output from agriculture in a sustainable manner.

Whilst overall expenditure on food has fallen, consumers, especially in developed markets, are willing to pay a premium for certain attributes of food. These attributes include food safely and quality, as well as the manner in which the food is produced and its impact on the environment. Therefore, by targeting these markets and emphasising these attributes of NZ food there is the potential to raise returns for the agricultural sector. This report has reviewed the markets for eco-labels. The growth in these markets seems positive despite the lack of coherent and consistent data. The LTEM was used to simulate various scenarios relating to the development of eco-label markets, including using the organic sector as an example. This shows clearly that even if productivity was lower the premiums earned on eco-labelled products was positive for NZ agricultural exports. Moreover, there are policy concerns and market access issues in international markets which may also stress this trend. Regions and countries such as the EU are moving increasingly towards environmentally-friendly agriculture and supporting their farmers do this. Thus, the potential for market demands to change and access to be restricted to those who do not produce to similar standards is important. This provides an opportunity for the NZ agricultural sector and its future sustainability. Targeting attributes of food which promote sustainable agriculture and better food safety and quality will lead to more secure market access and premiums on their products.

However, it is apparent from this report and review that further research into these 'eco' markets is important. This should include more information on the extent and premiums associated with these markets. More information is needed on which products attract the greatest premiums, and in which markets, and amongst which consumer segments. A final key bit of information needed is which markets will provide the greatest potential for growth.

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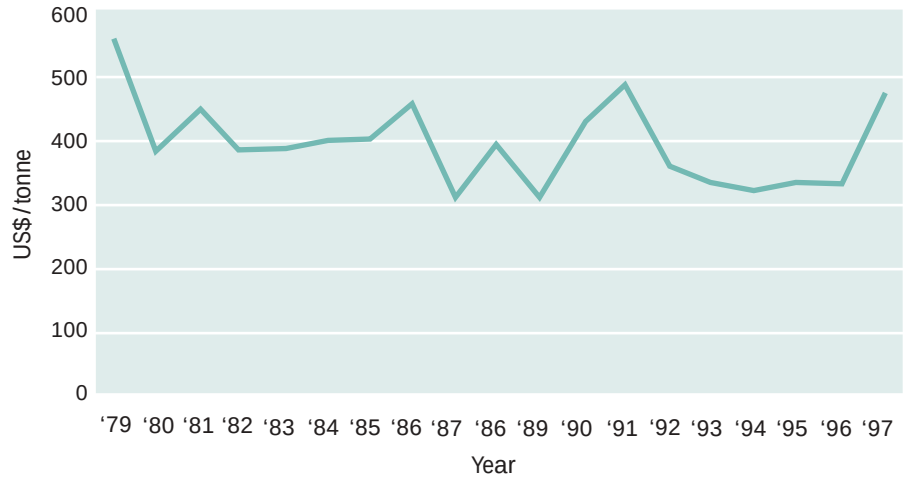
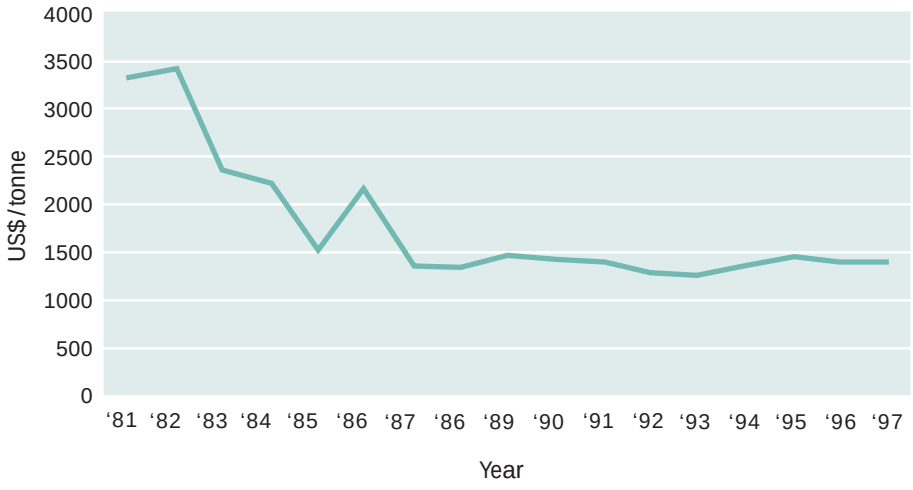
Appendix 1

Farm gate prices of selected commodities.

Historical farm gate price of apples



Historical farm gate price of kiwifruit



Historical farm gate price of butter