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The New Zealand Sustainability Dashboard

Sustainability Trends in Key Overseas Markets to New Zealand and the KPI identification database

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New Zealand's specialist land-based university

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Executive Summary

This report examines trends in consumer concerns regarding sustainability in key overseas markets for New Zealand. These trends affect what consumers buy and the premiums they will pay. The implications of these for New Zealand are explored in this report. The report also extends to other issues that may have potential to impact on our exports. This report is part of a series of research reports¹ concerning these issues. Each report focuses on slightly different issues. This report concentrates on consumer attitudes towards sustainability attributes such as carbon emissions, biodiversity and animal welfare in traditional export markets to New Zealand including the UK, Japan, the US but also in emerging export markets such as China and India. In addition, a database reporting on key performance measures included in key market assurance and good practice schemes, as well as regulatory frameworks, was developed in this report.

Of interest to New Zealand is the development of agri-environmental policies. In the EU the introduction of the Single Farm Payment increasingly requires farmers to meet social and environmental criteria. In addition, the EU subsidises farmers to meet more stringent environmental standards. The US also has working land conservation programmes which reward farmers who incorporate sustainable practices in production.

However, much of the move towards sustainability in markets is being driven by the private sector and retailers. This is seen with the development of GlobalG.A.P. - a compliance regime developed by retailers which now incorporates around 130,000 producers in over 120 countries. Also, many retailers have developed their own schemes to attract market share. These include the Red Tractor Scheme, major international retailers acting as “gatekeepers” for sustainable goods, retailer ‘sustainability promotion’ schemes (such as Tesco’s Fresh & Easy, Marks & Spencer’s Eco-Plan A), and other schemes.

Similarly, consumer attitudes and behaviours are changing, particularly within premium segments. Many consumers are reacting to the associated environmental and social impacts of the products they are purchasing, and seeking out products that promote sustainable practices in production and consumption. This can be seen with the rise of the LOHAS (“Lifestyles of Health and Sustainability”) movement, which includes consumers within USA, UK, China, France, Japan, and many others. Related to these trends is the growth in ethical food and fair trade. These markets have continued to grow and stress the importance of social issues as well as environmental concerns.

The issues which, and have the potential to, influence markets include those relating to climate change, such as carbon footprinting and /or reduction in carbon emissions. Tesco took the lead in the application of carbon footprinting and despite moving away from this, it has been taken up in many countries. The actual calculations and use of footprints has been reduced or held back due to the difficulty of measurement. Some retailers have moved away from footprinting such as Tesco, deciding to reduce their own footprints.

Another growing issue is around water quality and quantity. There is the potential for the introduction of “water footprinting” schemes to show consumers the associated water used to produce an item with water footprint calculators available. This has potential to affect New Zealand as, firstly, meat has a relatively high water footprint to other products, but also New Zealand, with its relative abundance of water, has a high water usage to other countries which

¹ See Saunders et al. (2010); Driver et al. (2012).

do not, such as parts of Australia. Of more relevance to New Zealand is water quality. The rapid change in land use in New Zealand has led to increase in nitrates discharged and, whilst this has been from a much lower base than other countries, does have the potential to reduce the perception of New Zealand as clean and green.

Many countries overseas have policies towards protecting biodiversity and wildlife on farms. This reflects the multi-functionality of land use in some countries. In New Zealand, due to its large conservation areas, there has not been the same imperative or priority to protecting biodiversity and wildlife on farms. However, more and more overseas market access schemes for premium segments of the market are requiring this. This is reinforced by subsidies for wildlife and biodiversity protection and enhancement.

Animal welfare is stated by some as the most important concern of consumers in some markets at present. There is a growth in concern from intensive farming systems which does not affect New Zealand as much as other countries. However, concerns still exist, such as tail docking of lambs; castration without anaesthetic; abortion of cows, and winter shearing of sheep.

Concern about the environment has also led to demand for lower meat and dairy consumption. This is due to the relatively high level of emissions from livestock, among other issues such as water use and efficiency of calorie production. Thus, various schemes are in place internationally encouraging lower meat consumption, as well as major government procurement agencies reducing meat purchasing. In contrast, in developing countries such as China and India there is currently a shift in dietary patterns towards more livestock products and vegetable oils mainly due to urbanisation and rising incomes. Thus, impacts on climate change from increased livestock consumption and production are expected to grow in the future.

A growing trend is the campaign to buy local food, arising out of environmental concerns, as well as concerns about the recession, with the aim to support local communities. The issues for New Zealand are that local foods are not necessarily better for the environment (such as shown by Food Miles (Saunders et al., 2006), and also not an option for feeding large populations but just niche markets. Thus, there has been an increase in farmers' markets (marketplaces in which farmers sell their products directly to the public), community-supported agriculture (community-based procurement of food products from a communally owned/operated farm), food box schemes (in which sellers take produce from the farmer and deliver these directly to the consumer). For New Zealand, the challenge is to effectively market its food based upon the social and community values in New Zealand.

It is also important for producers, growers and industry bodies to assess consumer trends and the tools that are being used by government and retailers to communicate with consumers. The selectivity of this information is inherently variable, and requires adjustment to sector- and industry-specific trends. This necessity is a driving factor in the development of assessment tools for industry and related groups to measure the impact of their own practices. In 2012, ARGOS has initiated the '*NZ Sustainability Dashboard*' programme that aims the development of a "sustainability assessment and reporting tool in partnership with five primary industry sectors in New Zealand". In order to inform the selection of key performance indicators (KPI) for inclusion in the Sustainability Dashboard, the concept of a database reporting on measures included in key market assurance and good practice schemes, as well as regulatory frameworks, was developed in this report. This database (the KPI Identification Database) was to contain specific indicators by which economic, social, environmental and governance-based regulation, best practice and market assurance principles have been measured by various product and company schemes internationally. Currently, the database includes 41 assurance schemes; examples of such schemes include certification and accreditation body schemes such as FairTrade, GLOBALG.A.P. and ISO standards.

1 Introduction

This report examines trends in consumer concerns regarding food in key overseas markets for New Zealand. These trends are affecting and will continue to affect what consumers buy and the premiums they will pay. The implications of these for New Zealand are explored in this report. This report is part of a series of research reports² of these issues. Each report focuses on slightly different issues. This report concentrates on consumer attitudes towards sustainability attributes such as carbon emissions, biodiversity and animal welfare in traditional export markets to New Zealand including the UK, Japan, the US but also in emerging export markets such as China and India. As this report is on sustainability trends in overseas markets, the issues of sustainable/ low carbon diets are included here. These have the potential to impact markets particularly in the US and EU and of course are counteracted by growth in Asia.

For consumers sustainability can have very varied meanings and be interpreted in different ways, and the focus and drive for sustainability can be seen from a number of angles. In some cases, the market is leading this drive with retailers vying for high-value premium market share and thus increasing and specialising their market assurance schemes. Behind this are various groups of NGOs, both business and non-profit organisations, which provide standards, labels and organisational support for producers and retailers. Further, governments are tending to follow in this area with regulation and mandatory labelling being behind voluntary or market assurance schemes. However, there are areas where government intervention is much more proactive, and this is in sectors where there is a history of government intervention, such as in agriculture or in areas where they have more traditionally been interventionist, such as health with nutritional labelling. This report will explore these issues.

For New Zealand producers, growers and industry bodies it is important to assess consumer trends and the tools that are being used by government and retailers to communicate with consumers. The selectivity of this information varies, and requires adjustment to sector- and industry-specific trends. This necessity is a driving factor in the development of assessment tools for New Zealand's agricultural sector and related groups to measure the impact of their own practices. In 2012, ARGOS has initiated the '*NZ Sustainability Dashboard*' programme that aims the development of a "sustainability assessment and reporting tool in partnership with five primary industry sectors in New Zealand". In order to inform the selection of key performance indicators (KPI) for inclusion in the Sustainability Dashboard, the concept of a database reporting on measures included in key market assurance and good practice schemes, as well as regulatory frameworks, was developed in this report. This database (the KPI Identification Database) was to contain specific indicators by which economic, social, environmental and governance-based regulation, best practice and market assurance principles have been measured by various product and company schemes internationally. Currently, the database includes 41 schemes; examples of such schemes include certification and accreditation body schemes such as FairTrade, GLOBALG.A.P. and ISO standards.

The report is structured as follows. After the introduction to the report in Chapter 1, regulatory changes in export markets and the context in which they might affect consumer behaviour will be reviewed in Chapter 2. Chapter 3 and 4 will then focus on the current and future changes in behaviour and will present existing market schemes for different product attributes. In Chapter 5 the KPI Identification Database will be described. The report will finish with a conclusion in Chapter 6.

² See Saunders et al. (2010); Driver et al. (2012).

2 The Changing International Environment

2.1 Introduction

Agricultural products are New Zealand's main export, and it is in this sector that some of the greatest changes in demands for environmental attributes of production and processing are being seen. These are both consumer- and retailer-driven, but also from government support to this sector. This chapter will discuss the development of government and retailer policy regarding sustainable sourcing and production methods.

2.2 Agricultural and environmental policy

Historically, market access was the biggest impediment to NZ exports and this still exists. However, changes in key policies overseas have meant increasing relaxation of trade-restricting policies. Policy focus in some overseas markets continues to shift towards environmental protection and enhancements with associated subsidies. This has the potential to impact on NZ exporters as these may become requirements for New Zealand to access these markets (Saunders et al., 2010).

This can be seen most clearly in the EU Common Agricultural Policy (CAP) which for decades paid its farmers a minimum price for products. The basic system of support in the CAP was, and to some extent still is, based upon the fixing of institutional prices. However, this has switched with the CAP reforms of 2003 to a Single Farm Payment (SFP) scheme. The requirements for these payments have become more stringent and include environmental criteria. Under EU Council Regulation 73/2009, Member States of the EU must "ensure that all agricultural land, especially land which is no longer used for production purposes, is maintained in a good agricultural and environmental condition." In this sense, the SFP aims to improve both the competitiveness and sustainability of European agricultural production, and incentivize good environmental stewardship for farmers (EU Regulation 73/2009).

The CAP is currently undergoing a reform process, to be implemented in 2014, with proposed changes indicating a further shift towards ethical and environmental outcomes. In particular, three "greening measures" have been identified, including the establishment of new 'ecological focus areas', crop diversification and the maintenance of permanent pastures. If proposed reforms are set in motion, farmers will be required to set aside 7 per cent of their total land for conversion to ecological focus areas, in the form of fallow land, landscape structures, forest cover and agricultural buffer strips. This has been suggested by the EU Commission as a measure to mitigate greenhouse gas emissions on agricultural land, as well as improvement in general environmental quality. The 2014 CAP Reform would require crop growers to diversify their production to at least three main crops, with the largest crop comprising under 70 per cent of total production area and the smallest crop comprising more than 5 per cent of total production area. Farmers will also be required to conserve at least 95 per cent of permanent grasslands. This measure is suggested to assist in the mitigation of greenhouse gas emissions in arable production (Westhoek et al., 2012). Budgets for the 2014 CAP Reform have also been recently released by the EU Commission, pending approval. Funding for the implementation of CAP proposals between 2014 and 2020 has been set at a total limit of €277.87 billion (AgraEurope, 2013). This equates to an average CAP funding investment of €39.7 billion annually between 2014 and 2020, compared with a historical average of €44.1 billion of CAP funding investment in agriculture between 2000 and 2008 (European Commission, 2008).

Propositions have also been made within the 2014 CAP Reform with regards to livestock production. These proposals have been suggested to create a more sustainable European livestock sector, with special regard to animal health and welfare, as well as improvements in

the economic and environmental sustainability of the sector. Specifically, livestock producers would be required to significantly reduce their antibiotic use, make improvements in animal welfare standards (particularly with regards to animal housing and management practices), improve resource efficiency, and reduce use of phosphate and nitrogen compounds. It is hoped that these proposed practice changes will improve the environmental efficiency of European livestock production (Westhoek et al., 2012).

EU agricultural and food procurement policy also includes a high degree of stipulations for animal welfare. The Treaty of Lisbon (2009), an amendment to upper echelon EU policy, placed animal welfare on equal footing with other key principles, such as gender equality, social protection, human health and sustainable development, among others. The EU has also passed a number of specific directives. These include the 1999 directive whereby conventional cages for hens would be phased out by 2012. (Many supermarkets in the EU have pre-empted this legislation and banned sales of products from battery hens). Further the Council Directive 2007/43/CE required that, from June 2007, in order to reduce overcrowding of chicken holdings, a maximum stocking density of 33kg/m², or 39kg/m² if stricter standards are met, would be used. Other conditions in this directive included better standards for lighting, litter, feeding and ventilation requirements (Saunders, 2012).

Within recent communications of the European Commission, a clearer set of animal welfare policy criteria is being sought by policy-makers, to be set in motion from 2015. The European Union Strategy for the Protection and Welfare of Animals 2012-2015 requires for a simplified legislative framework for animal welfare standards (with the inclusion of science-based welfare standards, as well as specific standards for personnel handling of animals). Additionally the strategy outlines intentions to assist EU Member States to improve compliance with animal welfare legislation, increase cohesion with international cooperation on animal welfare, communicate animal welfare standards in production to consumers, and improving links between these policies and the CAP (European Commission, 2012).

Agricultural policy in the US was previously governed by the US Farm Bill (Food, Conservation and Energy Act of 2008). Introduced in 2008, the Farm Bill included extensive provisions for the conservation of land, with a Conservation Stewardship Program aimed to reward producers for good stewardship and resource management as well as incentivising new conservation initiatives. This bill has been extended by the 2012 US Farm Bill, also known as the Agriculture Reform, Food, and Jobs Act of 2012, which continues many of the incentive programmes previously established. However, this legislation has also removed the direct payment of subsidies to farmers, replacing this with a revenue loss subsidy (Agriculture Reform, Food, and Jobs Act of 2012).

There is growing evidence of environmental policies in emerging countries. In the case of India and China agricultural policies that deal with broader issues tend to part of wider environmental policies. Government action reflecting global movements to mitigate the negative effects of climate change are being undertaken in China.

In China, policy emphasis is on the issues of economic development and environmental protection, with stipulations made within the nation's 12th Five Year Plan to improve human adaptation to the environment. Specifically, the Plan states "In transforming the economic development mode, the importance of building a resource-saving and environment-friendly society should be stressed to save energy, reduce greenhouse emissions and actively tackle global climate change" (APCO, 2011).

The 12th Five Year Plan also outlines multiple targets in mitigating climate change and encouraging good environmental stewardship. These include the reduction of water consumption per unit of value-added industrial output (30 per cent), the increase of non-fossil fuel usage in primary energy consumption (3.1 per cent), the reduction of energy consumption per unit of GDP (16 per cent), decreases in CO₂ emissions per unit of GDP (16 per cent), and

an increase in forestry stock across the nation (6 per cent). The 12th Five Year Plan also states intended targets of reduction of carbon emissions set at between 40 to 45 per cent of carbon emissions per unit of GDP by 2020. In addition to this, Chinese government officials announced in 2011 that consideration was being given to the introduction of a carbon tax to be implemented by 2013, as well as a carbon trading scheme by 2015 (APCO, 2011).

In early 2011, the Chinese government announced an investment of RMB 4 trillion to improve water-based systems to advance water-related sustainability practices. This investment includes improvements in access to water resources, and sustainability measures to improve China's approach to food, economic and ecological security through improvements in efficiency and use (Yu, 2011). There is currently a wide divide between rates of growth and agricultural production in China. In 2011, only 12 per cent of total Chinese land area (932.7 million hectares) was arable (111.6 million hectares), and this is rapidly being overrun by urbanization as the country develops at a swift pace (FAO, 2013). The total area of agricultural land in China in 2011 was 0.08 hectares per capita, equating to 40 per cent of the world average (World Bank, 2013).

2.3 Retailer policy

Retailers are also adjusting their policies to reflect current and potential consumer concerns and to differentiate their markets. A traditional market for New Zealand is the UK a market dominated by a few retailers. These retailers do vie among teach other to differentiate product through various methods including market assurance schemes. Their behaviour is also important as they have dominance in world food supply chains both directly through operating in other countries but also indirectly through setting standards that are mimicked elsewhere. As shown in Table 1 below, in May 2013, Tesco had the greatest shares for the UK (30.2 per cent) (GroceryNews, 2013). This is partly due to Tesco's investment in new stores between 2011 and 2013, which saw the number of UK-based Tesco retailers increase by 13.5 per cent (2,715 UK-based stores in 2011; 3,146 UK-based stores in 2013) (Tesco, 2013b). Tesco was followed in market shares by Asda (17.2 per cent), Sainsbury's (16.8 per cent), Morrisons (11.6 per cent), Waitrose (4.9 per cent), Aldi (3.5 per cent) and Lidl (3.0 per cent) (GroceryNews, 2013). UK discount retailer Aldi, whilst still having a relatively low market share, has recently achieved record sales growth at 31.5 per cent (Kantar Worldpanel, 2013). This was partially due to Aldi's recent expansion of market presence, in which the retailer doubled the number of its UK-based outlets, following an upsurge of consumers choosing discount retailers as their preferred location for grocery shopping. The retailer also hopes to increase the number of UK-based outlets to 500 by the end of 2013 (Sparkes, 2012).

Table 1: Grocery Market Share and Growth by UK Food Retailers (May 2013)

	Tesco	Asda	Sainsbury's	Morrisons	Waitrose	Aldi	Lidl
Market Share	30.2%	17.2%	16.8%	11.6%	4.9%	3.5%	3.0%
Sales Growth from previous month	+1.7%	+1.3%	+5.6%	+1.2%	+12.0%	+31.5%	+8.9%

Source: GroceryNews, 2013.

Tesco lists "three big ambitions" as part of their ongoing business goals, which include creating opportunities for young people in the UK, improving the personal health of their shoppers, and reducing food waste in all global outlets. Tesco policy also outlines major commitments to reduction in carbon emissions across their entire operation, with provisions outlined for energy

and water efficiency; the ultimate goal of which is to become a zero-carbon business by 2050 (Tesco, 2013a).

Asda, a UK division of US retailer Walmart, has also outlined commitments to sustainability in retail. Asda has the second largest market share of supermarkets in the UK. In 2010, Asda released their second round of sustainability commitments called "Sustainability 2.0", outlining an agenda to reduce Greenhouse gas (GHG) emissions and other operational environmental impacts across their supply chain. Specifically this includes a commitment to reduce carbon emissions by 35 per cent before 2015, improve carbon efficiency across all stores by 60 per cent (before 2015), reduce 30 per cent of water use in buildings and facilities and reduce 60 per cent of transport-related GHG emissions (Asda, 2010).

Walmart, the largest US retailer, outlines their environmental and ethical policy-based objectives in their 2013 Global Responsibility Report. As an international retailer that currently supports over 10,000 retail units and deals with 100,000 suppliers. Walmart has outlined a commitment to reduce all waste across their supply chains and retail outlets, use 100 per cent renewable energy and promote and enhance social and ethical elements in business. In addition, the retailer aims to reduce 20 million metric tonnes of GHG emissions across supply chains by 2015 (WalMart, 2013).

Major retailers also have adopted market assurance schemes internationally. Market assurance schemes seek to provide a set of guidelines for producers and corporate entities to improve their own sustainability practices while communicating these improvements to consumers. Adherence of products and businesses to these schemes is typically communicated to consumers and other parties in the form of affixed label on a product or outlet. The growth in market assurance schemes is an important development, with most major retailers involved with schemes not just for agricultural production, but all products across the entire supply chain.

These schemes include LEAF Marque. The standards set by this scheme include guidelines for improvements in community engagement, landscape and nature conservation, water management, energy efficiency, animal husbandry, pollution control and by-product management, crop health and protection, soil management and fertility, and organization and planning elements of production (LEAF Marque, 2012). The LEAF Marque Standard is currently supported by a number of major UK retailers, including Waitrose, ASDA, Marks and Spencer, Sainsbury's and The Co-operative. In addition, they claim the LEAF Marque Standard is consistently updated and revised to reflect new production processes and/or consumer/social concerns (LEAF Marque, 2013).

The Red Tractor market assurance scheme (managed by Assured Food Standards UK), is also supported by the UK's top seven retailers (Tesco, Morrisons, ASDA, Lidl, Aldi, Waitrose, The Co-operative and Sainsbury's). Red Tractor standards provide assurance of best practice on- and off-farm for production, processing and transport of food products. Within the standards, emphasis is placed particularly on enhanced animal welfare standards, with standards in place to ensure best practice with regards to land, water and crop management, social responsibility, food safety and traceability, and similar elements. There are currently 58,466 farm enterprises involved with the Red Tractor market assurance scheme, with sales of Red Tractor-labelled products comprising GBP 12 billion of net sales volumes in 2012. In addition, 60 per cent of consumers now recognize the Red Tractor logo – a 5 per cent increase from 2011 (Red Tractor, 2012).

There is also evidence for the adoption of sustainability practices for retailers in emerging markets. Foreign retailers in China have implemented various sustainability schemes. UK-based retailer Tesco was recently granted the "Green Supply Chain Award" for the establishment of its self-owned distribution center in Jiashan, Zhejiang Province – the first of its kind in South China. The proviso of this award recognises improvements in energy-efficiency standards, environmental protection and green concept in operation (CCFA, 2011c). Similarly, French retailer Carrefour is involved in sourcing local foods for sale in their Chinese outlets,

such as their sourcing of local grapes in Xinjiang for sale at the retailer's Gubei Branch in Shanghai (CCFA, 2011).

The closest local competitor to Wal-Mart in China is Beijing-based Chinese retail chain, Wumart. This chain currently holds more than 469 outlets in the form of hypermarkets, supermarkets and convenience stores across China, with revenue of around US\$2 billion annually. While Wumart does not explicitly state environmental stewardship as part of their mission statement, the group's corporate responsibilities include the provision of "social responsibility" in "providing stable employment opportunities, creating a harmonic shopping environment and introducing community concept" (Wumart, 2011).

In contrast, India has very few foreign retailers. However, this is potentially set to change within the recent passing of laws allowing a higher degree of foreign direct investment in multi-brand retailers in India. This legislation dictates that 30 per cent of manufactured or processed goods must be acquired from "local" Indian sources, with foreign investors not engaging in any other form of distribution. In addition, foreign companies operating multi-brand retailers must finance 50 per cent of new investment for back-end infrastructure, with wholesale trade not included as back-end investment. However, FDI policy is still being developed, with Indian states still to give consideration to the specifics of the legislation, with New Delhi considering imposing restrictions on sourcing, requiring retailers to source 30 per cent of products from small industries (Askew, 2013).

Retailer policy in India is developing to include commitments relating to sustainability best practice. Major retailers across India now include sustainability principles in their operational guidelines, potentially reflecting, or capitalising on, the Indian middle-class's new approach to environmental stewardship (Sinha, R., 2011).

India's leading retailer group, Future Group, have included various sustainability guidelines in their mission statements and strategy documents, stating these to be "at the heart of Future Group's ethos". Their Environmental Stewardship statements assert the promotion of eco-friendly products, and a raising of awareness on environmental issues both internally and externally. Their listed activities in encouraging good environmental stewardship include: Reducing the environmental impact of store construction and operations; improving energy efficiency for important environmental benefits and reducing operating costs; strengthening environmental considerations in the design of green products and packaging; developing green product lines that respect environmental concerns, and; reinforcing environmental considerations in logistics (Future Group, 2011). This represents a relatively new approach to the environment by major Indian retailers, and potentially reflects demands held by the growing middle class of India. The chain stores that Future Group own and operate include some of India's major retail players, including Pantaloons (fashion), Big Bazaar (hypermarket) and eZone (electronics) (NZTE, 2011).

Another of India's major retail operations, Bharti-Walmart – a merger between India's Bharti Enterprises and US superstore Walmart, also lists environmental initiatives as one of their key values in retail. This is aligned with the US company's major goals to improve supply chain efficiency in an effort to reduce waste and improve the value for their consumers (Walmart, 2011).

3 Consumer Trends in Overseas Markets

3.1 Introduction

Attributes of food are important to consumers, these include basic attributes such as food safety and quality but also credence attributes which are not discernible by the product itself. The value that consumers place on different food attributes is likely to vary across different market segments, countries and commodities. These values, attitudes and preferences towards different food attributes have been investigated in several studies as reviewed in Saunders et al, (2010), Driver et al., (2012) and Guenther et al., (2012). However, the literature has tended to concentrate on consumer preferences in markets of developed countries such as the United Kingdom (UK), and only a few studies have been published on how consumers in emerging markets such as India and China evaluate different attributes of food products. However, in recent years emerging countries such as China and India have gained in importance for New Zealand. Particularly, the increase in trade flows between New Zealand and China was facilitated by the Free Trade Agreement (FTA) between the two countries which came into force in 2008. New Zealand was the first OECD economy to sign a FTA with China.

In developing countries such as China and India food consumption increases and is mainly driven by a growing population, urbanisation and rising incomes. This growth in food consumption is accompanied by a shift in dietary patterns towards more livestock products and vegetable oils mainly due to urbanisation and rising incomes (FAO, 2009). In contrast, in some industrialised countries there are movements directed to reducing the consumption of meat and dairy products for health and environmental reasons.

An example of the growing importance of attributes, especially credence ones such as environmental impact and social responsibility, is the rise of the LOHAS movement. The LOHAS market ("Lifestyles of Health and Sustainability") is growing substantially in developed countries (where it originates from) but also in emerging countries of Asia. LOHAS started in the US in 2000 as a market-research acronym to describe a new environmentally-aware consumer whose purchases predict mass-market trends (lifestyles of health and sustainability). The LOHAS market gained in value since then. In 2006, the market has been estimated at US \$209b. It has since become a business movement in the USA, but the trend has spread through the Asia-Pacific region, including Japan, China and Taiwan. LOHAS is a brand in China, for example, one of the biggest magazine launches in Shanghai in 2008 was LOHAS (lehuo) magazine while in Taiwan a LOHAS magazine was already published for 6 years. In 2010, Asia-Pacific LOHAS partnered with The Natural Marketing Institute in pioneering LOHAS Consumer Research in Asia-Pacific, conducting an online survey of LOHAS consumers across 10 countries in Asia-Pacific. More than 18,000 consumers were surveyed. Results showed that there is a high demand for environmentally friendly products, especially among the biggest consumer markets of China, India and Indonesia (Hortler, 2011).

3.2 Consumer attitudes towards basic food attributes

Consumer preferences towards fundamental food attributes such as food quality, price, food safety, country of origin etc. have been the subject in a number of studies. In particular food safety is an important attribute for many consumers in emerging countries such as China and India. This is also due to several food scandals that have occurred. For example, in China in 2008 milk products were contaminated with melamine creating an international health scare as melamine is extremely harmful or fatal if consumed (Chan et al., 2008).

A survey undertaken by the European Commission in 2009 (Eurobarometer, 2009) investigated the European's attitudes towards different attributes in food products. Results showed that the

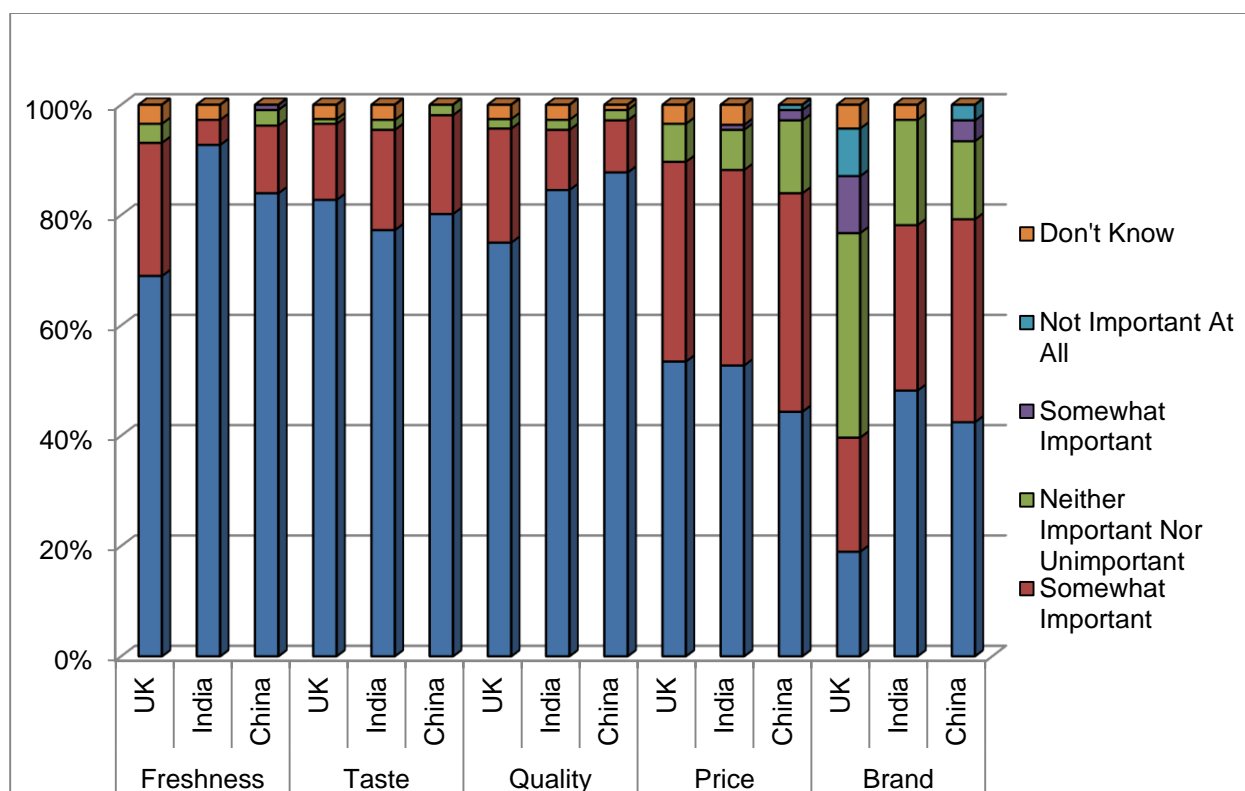
products quality is the most important aspect in a product with 97 per cent of respondents indicating that this is an important element when buying a product. This is followed by the product's price with 89 per cent of respondents indicating this is *very important* or *important*. The product's brand was the least important product attribute for the respondents with 39 per cent of respondents finding it very important or important in a product.

Similarly, in their study Gadema & Oglethorpe (2011) assessed consumers' attitudes towards food attributes in the UK. The study included a survey with a sample size of 428 consumers in the UK. Participants were asked on a four-point Likert scale the importance of different food attributes in a product. Attributes included fundamental food attributes such as quality, nutrition and price but also environmental food attributes such as sustainable packaging and carbon emissions. Results showed clearly that quality, nutrition and price of a food product dominated what consumers' value as important in a product compared to the more environmental related food attributes.

In a more recent study, Saunders et al. (2013) assessed preferences and attitudes towards a number of attributes in NZ food products in China, India and the UK, being three important export markets for New Zealand. The study included a structured and self-administered web-based survey with a sample size of 100 consumers in each of UK, China and India. Participants were asked about the importance of basic attributes in New Zealand food products based on a five-point Likert scale varying from *very important* to *not important at all*. The attributes were: Freshness; Taste; Quality; Price; and Brand.

The majority of consumers in all countries rated freshness, taste and quality as *very important* as shown in Figure 1. Interestingly, Indian and Chinese participants rated freshness and quality greater than the respondents from the UK, however this may not be surprising given that the UK has a well-established, generally safe, supply chain and therefore consumers are at less risk of obtaining poor quality produce. Participants in all countries rated taste similarly, with an average of 80 per cent of participants across all countries indicating that taste is *very important* in a New Zealand food product. Most respondents rated the product's price as *important* or *very important* (an average of 87 per cent across all countries selected *important* or *very important* for the price) but fewer selected price as *very important* compared with the importance of other attributes. The brand was the least important attribute in New Zealand food products compared with the other attributes. UK consumers rated this lower (19 per cent indicating the brand is *very important*) than consumers from India and China with 48 per cent and 42 per cent, respectively, indicating the brand is *very important*. Results further showed that respondents in India and China rated food safety certification as more important than respondents from the UK, with 75 per cent of Chinese and 65 per cent of Indians stating food safety is *very important* while only 41 per cent of UK respondents find this attribute *very important* in New Zealand food products. Again this is not surprising given the relatively safe value chain in the UK and recent food scares in China. Similarly, country of origin was rated more important in China (54 per cent indicating *very important*) and India (40 per cent indicating *very important*) than in the UK (29 per cent indicating *very important*) which may be for similar reasons (Saunders et al., 2013).

Figure 1: Importance of attributes in New Zealand food products



Source: Saunders et al., 2013.

In a follow-on survey, Saunders et al. (2013) estimated consumer's willingness to pay (WTP) for food safety certification and different origins of dairy and lamb products in China, India and the UK using choice experiments. The choice experiment had a sample size of 2,067 participants which was comprised of 686 participants in China, 695 participants in India and 686 participants in the UK. Results showed that UK participants were less willing to pay extra for product certification than Chinese or Indian respondents, as shown in Table 2. This again may be due to current standards already in place in the food available to UK consumers. Chinese and Indian consumers were willing to pay the most for food safety certification in lamb and dairy products with Chinese willing to pay 74 per cent more than the normal price and Indians showed highest willingness to pay for food safety certification in lamb products for which they would be willing to pay an extra 77 per cent. Chinese respondents were willing to pay more for foreign sourced produce (by 26 per cent for dairy and 10 per cent for lamb) and were willing to pay even more for produce sourced from New Zealand (by 49 and 24 per cent, respectively for dairy and lamb. Whereas Indian respondent were willing to pay less for foreign dairy produce (20 per cent but willing to pay more for food from New Zealand by 10 per cent for dairy and 21 per cent for lamb. The UK respondents were willing to pay less for foreign food but again willing to pay slightly more for food from New Zealand.

Table 2: Food attribute willingness to pay as a percentage of product price in China, India and the UK

	China		India		UK	
	Dairy	Lamb	Dairy	Lamb	Dairy	Lamb
Food Safety	74%	44%	73%	77%	16%	18%
Foreign Origin	26%	10%	-20%	-	-4%	-5%
NZ Origin	49%	24%	10%	21%	3%	6%
Notes:	WTP derived using Krinsky and Robb (1986; 1990) method.					

These results are compatible with Ortega et al., (2010) who assessed Chinese consumers' WTP for food safety attributes in pork in a series of choice experiments. Results showed that Chinese consumers were willing to pay more for food safety certified pork. They were willing to pay double the price for government certified pork, 70 per cent more for privately certified pork and 50 per cent more for pork certified by assurance schemes (Ortega et al., 2010). Birol et al. (2009) assessed Indians WTP for food safety and organics in grapes and found that the price did not influence the participants' choice of grapes. However, more than half of the respondents agreed that food safety is 'the first most important food characteristic' (Birol et al., 2009).

3.3 Consumer attitudes towards sustainability attributes of food products

With concerns about the environment, there is a growing preference that products meet certain sustainability standards, and that these can be verified. Consumers in different markets and segments react differently towards different sustainability attributes therefore it is important to understand which of the attributes appeal to consumers. There have been a range of studies assessing the importance of sustainability attributes of products and services for consumers in different countries.

A study in Europe on sustainable consumption and production showed that the information on the environmental impact of a product is likely to influence consumption habits of European citizens (Eurobarometer, 2009). The majority of participants stated that a product's impact on the environment is an important variable when deciding which product to buy (49 per cent stated rather important and 34 per cent very important); only 4 per cent responded this is not important at all. Results showed that recycling and reusability was the most desired environmental attribute a product label could offer. The proportion saying this is important ranged from 57 per cent in Finland to 18 per cent in Latvia. The display of the product's GHG emissions was selected as the least important by all participants compared to the other environmental product attributes (recycling/reusability, environmentally friendly packaging, eco-friendly sources). However, interestingly, many survey participants favoured mandatory carbon footprint labelling. Ninety per cent of respondents in Croatia and Greece were in favour of such labelling, compared to 47 per cent of participants from the Czech Republic. This was the only country where less than half of respondents favoured such labelling (Eurobarometer, 2009).

In a more recent study, Guenther et al (2012) assessed consumer preferences towards sustainability attributes on food products in two key export markets of New Zealand – the UK and Japan. Overall, the results of this study find evidence that consumers in the UK and Japan desire labels that display sustainability credentials. In addition, perceived knowledge about specific environmental and social issues showed similarities and differences between the

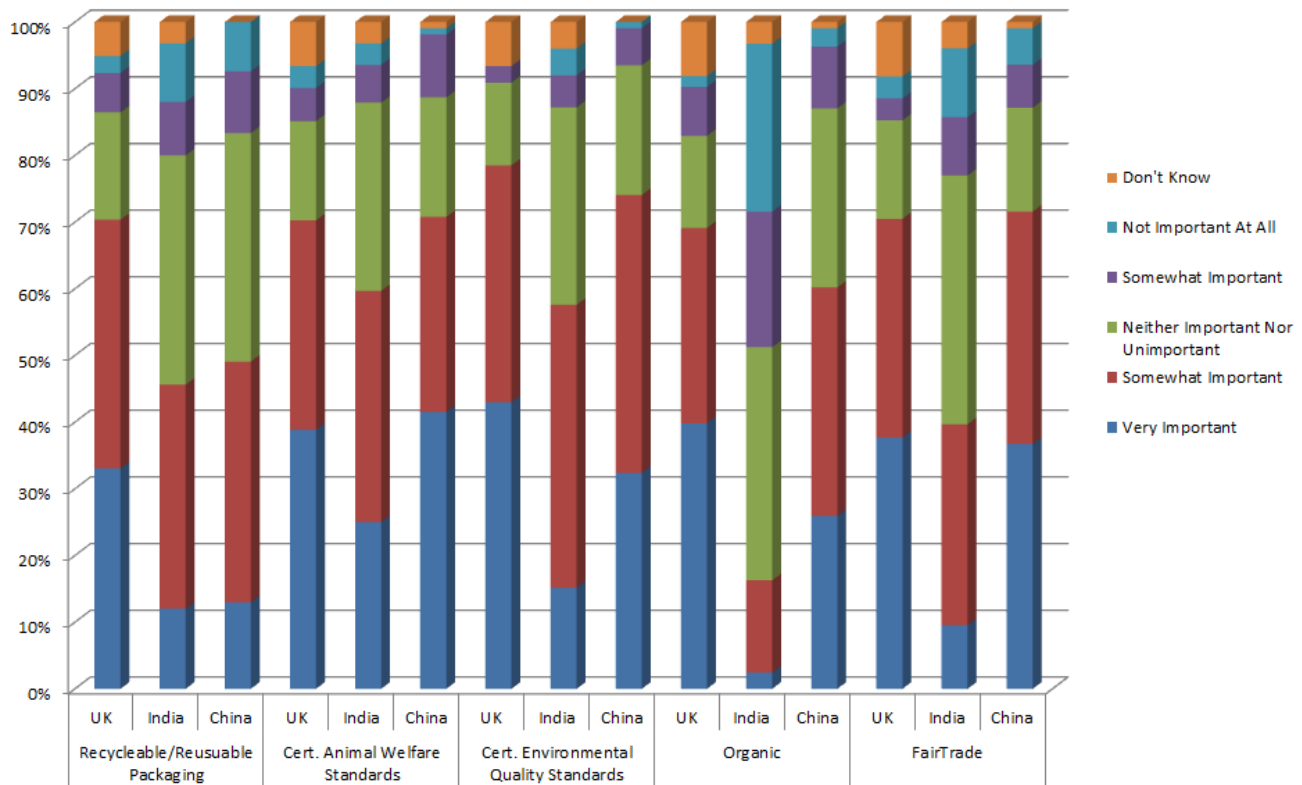
countries with Sustainability and Carbon footprint not well known by Japanese participants and well known by their UK fellows. Water footprint was not known well by respondents from both countries. Another interesting finding is that almost 50 per cent of Japanese respondents stated to have not heard about the term Carbon Footprint, considering their perceived knowledge about other carbon-related terms such CO₂-emissions and Carbon off-setting. The researchers suggest that the good knowledge of Carbon footprint in the UK may be because the Carbon footprint is one of the major supermarket chains in the UK. Similarly, the good knowledge of CO₂ –emissions, Global warming and Climate change in Japan may be generated by the government initiatives towards climate change and carbon labelling (Guenther et al., 2012).

Consumers in emerging countries such as China and India have concerns about sustainability of production systems. A 2013 survey from the Union for Ethical BioTrade (UEBT) with 31,000 participants across 11 countries examined consumers' knowledge, awareness and attitudes towards sustainability. Results showed that over 90 per cent of Chinese consumers have heard of the terms deforestation (98 per cent), preservation of natural ecosystems (98 per cent), endangered species (97 per cent), sustainable development (97 per cent), conservation of biodiversity (96 per cent), fair trade (95 per cent) and respect and protection of traditional knowledge (94 per cent). In addition, the concept of 'naturalness' is highly important in China, with 98 per cent of consumers stating regular purchasing of cosmetic products that use natural ingredients, and a further 94 per cent paying close attention to the source of ingredients in food products (UEBT, 2013).

Saunders et al. (2013) examined consumers' attitudes towards ethical, environmental and other attributes in New Zealand food products. These attributes included: Recyclable/re-usable packaging; Certified for animal welfare standards; Certified for environmental quality standards; Organic; and Fair Trade. As shown in Figure 2 both Indian and Chinese respondents rated the product's recyclability much more important than the UK with 27 per cent of Chinese and 45 per cent of Indian respondents rating it very important compared with only 22 per cent from the UK. More surprising is the rating for animal welfare and environmental quality certification with UK respondents reporting this was less important than those from India and China. For animal welfare and environmental quality, in the UK 34 per cent and 29 per cent of respondents, respectively rated them as *very important*; these numbers were much higher for China and India, with 42 per cent and 58 per cent in China, and 50 per cent and 55 per cent in India rated them as *very important*. The results for environmental quality were perhaps the least expected with twice as many respondents in India and China finding this *very important* than in the UK.

The survey did ask about the interpretation of the terms used in the description of the attributes, especially animal welfare and environmental quality and what represented good and bad practice. Most respondents did state they understood the terms especially those from India and China. When describing good environmental quality related to food production respondents in all countries described it predominantly as an activity that does not harm the environment. In 'not harming the environment', Indian respondents frequently referred to *environmentally-friendly*, *eco-friendly* and *pollution-free* production methods. Similarly, Chinese respondents commonly commented that the activity should be *non-polluting*, and they made more references to *organic* as indicator for good environmental quality than India or UK respondents. With regards to describing good animal welfare Indian and Chinese respondents mainly referred to good quality of life for the animals including not being mistreated and being well cared for. Indian respondents also commented on animals being well fed as indicator for good animal welfare. In contrast, UK respondents predominantly described good farm animal welfare as free and natural treatment meaning animals are entitled to behave naturally, and *free range* was a term commonly used in this regard. Organic in particular was the lowest rated of all attributes in the UK, with only 16 per cent of respondents indicating it is *very important* in a food product, and two thirds of respondents not thinking of it as *important*. In contrast, 56 per cent of Indians and 45 per cent of Chinese stated organic was *very important* in a New Zealand food product. Fair trade was seen as *very important* by 50 per cent of Indian respondents, 42 per cent of Chinese and 21 per cent of UK respondents (Saunders et al., 2013).

Figure 2: Importance of ethical and environmental attributes in New Zealand food products



These results are similar to those of Betts et al. (2010) who assessed Chinese attitudes towards sustainability attributes of New Zealand kiwifruit. Results showed that Chinese consumers' value sustainability attributes in fruit products, and have an increasing interest in sustainable practices and purchases. Participants valued most products that have 'no chemical residue at point of sale', 'coming from pollution-free production area' and from 'environmentally-friendly production'. There was indifference towards products indicating 'low carbon emissions' during production and products with 'biodegradable packaging'. Information on the product's water efficiency was selected as the least important by all participants. The study showed further that consumers valued country of origin information on fruit products but concern was noted over a lack of trust in the validity of product labels (Betts et al., 2010).

In the following section consumer attitudes towards individual sustainability credentials of food products will be described. Furthermore, the development of market schemes for these specific attributes will be outlined.

3.3.1 Carbon footprinting

One attribute of food that has been subject of interest is the amount of carbon emissions from the production of food. This has also been shown on a carbon label. There are several schemes of carbon labels under development worldwide (Guenther et al., 2012). Most carbon labels inform the consumer of the amount of carbon dioxide embedded in a product. These are typically presented in numerical form and may include information about emissions reductions being achieved in the product's distribution (Upham et al., 2011). A carbon label aids consumers to make an informed choice and to understand the carbon footprints of products or services they purchase (Carbon Trust, 2010). However, the methodology used to calculate these emissions vary between labels.

Table 3 shows 25 carbon labelling schemes, the methodology used (where available), the country in which they apply, the year in which the scheme was launched and the number of products covered by the scheme.

Figure 3: Carbon labels and characteristics, 2013

Name of scheme/ Certifier	Operator, Public/ Private	Launch	Nation of Origin	Accounting Method	Companies	Products & services
Approved by Climatop/ Climatop	Private	2008	Switzerland	ISO 14040	11	65
Hop Cube Ecological Barometer/ Hop ³	Private	2012	France	unspecified LCA	unknown	35,000
Bilan CO ₂ / E. Leclerc	Private	2008	France	ISO 14040 ISO 14044	1	20,000 price tags
Carbon Connect/ CarbonCounted™ Standards	Private	2007	Canada	unspecified LCA	unknown	22
Carbonlabels.org/ Brands	Conscious Private	2008	Canada	unspecified LCA	unknown	unknown
Carbon Reduction label/ Carbon Trust	Public	2008	U.K.	PAS 2050	20	3,829
carbonZero ^{Cert} ™ programme, CEMARS™ / CarbonZero	Private	2008	New Zealand	PAS 2050 ISO 14064	87	approx. 246
Certified CarbonFree/ Carbon Fund	Private	2007	U.S.	PAS 2050 ISO 14044 ⁽¹⁾	16	77
Climate Conscious Carbon Label/ The Climate Conservancy	Private	2007	U.S.	unspecified LCA	unknown	unknown
Climate Certification for the Food Chain/ KRAV, Svenskt Sigill, Kvalitetssystem AB	Private	2010	Sweden	ISO 14040	7	61
Cool CO ₂ label/ KEITI	Public	2009	South Korea	PAS 2050	unknown	>360
Eosta climate Neutral/ TUV Nord	Private	2008	Holland	ISO 14040, ISO 14044 ⁽¹⁾	unknown	unknown
German Product Carbon Footprint Project/ Carbon Footprint Project	Public	2008	Germany	unspecified LCA	8	10
Green Index Rating/ Timberland	Private	2007	U.S.	unspecified LCA	unknown	8
Indice carbone casino/ Casino France	Private	2008	France	Methode Carbone®	Bilan 1	629
METI Carbon Footprint System/ METI	Public	2009	Japan	ISO 14040,14044 ⁽¹⁾ ISO 14067	unknown	460
Pilot Californian carbon label/ California State Senate Carbon Labeling Act 2008	Public	2009	U.S.	unspecified LCA	unknown	unknown
Product Carbon Footprint Pilot Project Quebec	public	2011	Canada	unspecified LCA	unknown	unknown
SGS Carbon neutrality/ SGS	Private	2007	Switzerland	GHG protocol ISO 14064	unknown	unknown
SIKIG/ SIKIG	Private	2011	France	PAS2050 BP X 30-323-0	1	unknown
Stop Climate Change/ AGRA-TEG	Private	2007	Germany	PAS 2050 GHG Protocol	11	unknown
Taiwan BSI Product Carbon Footprint/ British Standard Institute	Public	2010	Taiwan	PAS 2050 ISO 14001 ⁽²⁾	unknown	unknown
Thailand Carbon Reduction Label/ Thailand Greenhouse Gas Management Organization	Public	2009	Thailand	PAS 2050	100	458
TUV Nord Cert/ TUV Nord	Private	2008	Germany	ISO 14001 ⁽²⁾ EMAS ⁽³⁾	Unknown	unknown
Zurueck zum Ursprung/ Hofer	Private	2009	Austria	unspecified LCA	unknown	79

Notes: (1) The ISO 14044 standard provides the requirements and guidelines for an LCA.

(2) The ISO 14001 standard provides the general requirements for an environmental system.

(3) EMAS stands for the European eco-management and audit scheme.

All other accounting methods have been described in more detail in section 3.3.1.

Source: adapted from Guenther et al., (2012).

A UK quasi non-governmental organization (quango), the Carbon Trust took the lead in the development of carbon-labelling goods and introduced the Carbon Reduction Label in 2006. Products bearing this label are required to reduce emissions by 20 per cent within two years following certification or they lose the right to use the label (Carbon Trust, 2010). In January 2007, Tesco announced it would carbon footprint 70,000 of its products investing £500 million using the Carbon Reduction Label. However, Tesco announced recently that it would review the use of its Carbon Reduction Label partly as a consequence of customer feedback showing they had difficulties in understanding the label (Russel, 2012).

A carbon labelling scheme was introduced in Japan in 2009, with retailers voluntarily attaching the Carbon Footprint Label to their products. The label includes an image of a lead weight with the letters CO₂ in the centre, with the attached carbon weight of the product in bold letters above. The attached carbon weight value is an approximation of the amount of carbon released across the entire lifecycle of the product (METI, 2009; 2010). The label is currently applied to more than 550 products (PCF World Forum, 2012).

Other countries have followed suit. In 2009, South Korea initiated a programme to certify carbon content in consumer goods. That voluntary labelling scheme involves two types of labels: the Greenhouse Gas Emission Certificate, which states the product's carbon footprint (by GHG in grams), illustrated by a CO₂ image; and the CO₂ low label, which verifies that low levels of carbon have been emitted in the production of the product, with the product's carbon footprint displayed (Korean Environmental Industry and Technology Institute, 2008). Two basic sets of criteria underlie the CO₂ low label, the Minimum Carbon Emission Amount Criteria and Minimum Carbon Reduction Criteria. The former varies between different product categories, while the latter is fixed at a basic reduction rate of 4.24 per cent across the entire life cycle of a product within three years. By 2011, a number of 111 products carried the Greenhouse Gas Emission Certificate label (Kyang-Hwan, 2011).

Other initiatives include a climate certification scheme in Sweden which aims to reduce the negative impact on the climate from food production but also to increase the competitiveness of food producers (Klimatmarkningen, 2012). In Switzerland, products are being labelled Climatop if their production emits less CO₂ than similar products (Climatop, 2011). In France, one retailer applies a carbon label to 3,000 of its food products and another is already labelling all its home-brand products (Groupe Casino, 2010; Eleclerc, 2009); furthermore an ecological barometer was launched by the French company Hop³ which offers the display of environmental product information including GHG emissions to consumers either online, on-pack or on mobile phones. In Thailand, a labelling scheme was launched in 2009 and by the end of 2012, more than 450 products from 100 companies carried the carbon label (PCF World Forum, 2012).

In 2011, the French government launched the Grenelle 2 Environmental Law, which postulates that consumers should be provided with environmental information about products and services from July 1st 2011 to July 2012. The labels can be placed either on the product packaging or on a website that can be viewed later by consumers. The law also aims, through promoting the quantification and communication of environmental impacts, to improve product stewardship of companies on environmental issues. In order to examine the capability of French businesses to adopt environmental labelling for products, a 1-year pilot trial was started, with 168 companies participating across different sectors and approximately 70 per cent of the firms selected operated within the food sector. Among those, Sikig - a kiwifruit producer - has been selected to participate to assess the environmental impacts of their goods. The three main environmental indicators are: impact on climate change (measured in GHG emissions); Water footprint; and impact on biodiversity. Sikig has pledged to show the carbon, water, and biodiversity footprints displayed on the package of the kiwifruit. For the impact on climate change the study revealed that 51.2 g CO₂e (carbon dioxide equivalents), and 4.21 of water and 0.06 m² per 100 g of kiwifruit for GHG, water consumption, and biodiversity footprint respectively. Parliament will then decide on the basis of a report whether to maintain the voluntary nature of the scheme or to make it mandatory, and whether to implement this immediately or progressively (Fruittoday Euromagazine, 2012).

The labels and schemes above have used a variety of standards and an initial criticism was the absence of a uniform standard to measure carbon emissions (PCF, 2009). Criticism was mainly directed at the need for overarching product carbon footprinting standards for the comparability of product carbon footprints. Draucker et al., (2011) argued that without consensus on best practices and methodologies, there is an risk of division between stakeholders, confusion in the market place, and delay in the collection of information that can help improve standards and accelerate the reduction of carbon emissions (Draucker et al., 2011). Several initiatives contribute to the establishment of a uniform assessment. The Carbon Trust, the UK Department for the Environment, Food and Rural Affairs (Defra), and the British Standard Institute (BSI) have developed the Publicly Available Specification (PAS) 2050 which is an independent GHG emissions quantification standard for products and services and its methodology draws on both the World Business Council for Sustainable Development's GHG protocol (WRI/WBCSD, 2004) and the ISO standard 14064 on GHG quantification and reporting (Defra, 2007). The upcoming ISO standard 14067 '*Carbon footprint of products*' is currently being developed to increase transparency in quantifying and reporting the carbon footprint of a product based on International Standards on life cycle assessment (ISO 14040 and ISO 14044) for quantification and on environmental labels and declarations (ISO 14020, ISO 14024 and ISO 14025). The document is expected to be finalised for publication in March 2014 (Hirner, 2012).

However, there is still debate about the methodologies used and their complexity as well as the argument that the science behind their measurement is uncertain (PCF, 2009; Zhao et al., 2012). For example, whether this should be a full LCA approach that takes into account associated carbon release through processes involved in raw material procurement, production, distribution and sale, utilization and maintenance, and disposal and recycling (METI, 2009; 2010). The issue with LCA relates to the volume of data required and its availability and accessibility (Wang et al., 2011).

Despite those acknowledged issues, the use of carbon labels is continuing, therefore it is important to understand how consumers evaluate the display of those carbon emissions by themselves and alongside other sustainability labels for food products. Therefore, the following section will review relevant literature on consumer attitudes towards carbon emissions display on food labels.

Consumers attitudes towards carbon labels

Only a few studies exist that have examined consumer attitudes towards carbon labels (Upham et al., 2011). The study by Berry et al (2008) used expert interviews, focus groups and a survey (which included a subset of questions on carbon footprinting) to assess the role carbon labelling could play in stimulating low carbon purchase behaviour. Results showed that nearly 40 per cent of respondents find the information on existing carbon labels very helpful but almost 60 per cent of the respondents desired more information about the climate change impacts of the products they purchase. The researchers argued, however, that it is too early to evaluate if on-pack carbon labelling affects consumers purchase decisions (Berry et al., 2008). Similarly, Gadema & Oglethorpe (2011) showed that food consumers in the UK do not feel well informed enough to make purchasing decisions based on carbon footprint labels. However, there is evidence that consumers are increasingly interested in the environmental impact of food, although traditional factors such as quality, taste and price are still dominating purchase decisions (Gadema & Oglethorpe, 2011). Likewise, Upham et al (2011) demonstrated that consumers' willingness to use carbon labels for product selection is very low, particularly because the public found it very difficult to make sense of labeled GHG emissions without additional information (Upham et al., 2011). Roos & Tjarnemo (2011) used results from studies on labelling of organic products to explore how these might apply to the area of carbon labelling food. They speculated that there are a number of reasons why organic labelling does not increase premiums or purchases which might apply to carbon labelling of food. The reasons are "... perceived high price, strong habits for governing food purchases, perceived low availability, lack of marketing and information, lack of trust in the labelling system, and low perceived customer effectiveness" (Roos & Tjarnemo, 2011). The researchers argued that some of these

reasons are even greater obstacles for the sale of carbon labeled food products than for organic products as these do not bring any direct personal benefits to the consumer (Roos & Tjarnemo, 2011).

Guenther et al (2012) examined the attitudes of consumers in two key New Zealand export markets - the UK and Japan – towards carbon emissions information alongside other sustainability credentials. Based on a five-point Likert scale varying from *strongly agree* to *strongly disagree*, participants were asked if they would like to see the display of the following included on a label: Recyclability/ reusability; Made from environmentally friendly sources; Eco-friendly packaging; and GHG emissions. Results showed that information on a package's recycling and reusability was the most desired label claim in both countries with high proportions of people selecting strongly agree or agree (UK 89 per cent, Japan 74 per cent). Interestingly, over half of the participants in the UK strongly agreed that this information should be included on a label compared to only one in five people in Japan. The second most desired label claim was whether a package is eco-friendly with 79 per cent of UK respondents and 65 per cent of Japanese respondents selecting strongly agree or agree to the display of this attribute on a product label. This was followed relatively closely by the claim made from environmentally friendly sources with 72 per cent of UK respondents and 61 per cent of Japanese respondents selecting strongly agree or agree to the display of this attribute on a product label. In both countries, the display of GHG emissions on a label was the least desired information compared to the other environmental label attributes, although 46 per cent of UK respondents and 39 per cent of Japanese participants did at least agree to include the GHG emissions in a label. These results for the display of GHG emissions on a label are comparable with the Eurobarometer study presented above (Eurobarometer, 2009), in which survey participants in Europe rated the display of GHG emissions on an environmental label lower than the other listed alternatives (recycling/ reusability, environmentally friendly packaging, eco-friendly sources). Similarly, Gadema & Oglethorpe (2011) showed that the display of carbon emissions is ranked lower than other product attributes. In their study, survey participants rated the display of carbon emissions as the second lowest attribute out of fourteen. Consumers were primarily concerned with the traditional factors of quality, taste and price.

In order to assess consumers' willingness to pay for the certification of reduced GHG emissions in both, lamb and dairy products in the UK, China and India, several choice experiments were conducted by Saunders et al (2013). Results showed that UK participants were less willing to pay extra for carbon certification on food products than Chinese or Indian respondents. They would pay 7 per cent more than the normal price for certified dairy and lamb products, respectively. India respondents' showed highest willingness to pay for GHG emissions reduction certification in lamb products. Respondents were willing to pay 39 per cent more than the normal price. In contrast, Chinese respondents were willing to pay an additional 14 per cent for such certification.

3.3.2 Water footprinting

Water scarcity is recognised as a major threat to sustainable development. While water stress is often a direct result of population growth and economic development, changing consumption patterns may potentially become a cause of water scarcity as per capita water requirement for food has increased significantly. Almost 90 per cent of an individual's water requirement is needed for food production (Liu & Savenije, 2008).

According the UN's World Water Assessment Programme, population growth of the last 50 years has caused water use to triple, and as the world human population is projected to increase from six to nine billion between 2000 and 2050, water usage is expected to grow significantly. The possibly largest uncertainty is the impacts of climate change on the world's freshwater resources. However, several countries have sought already to revise their long-term plans on water. For example, the Mediterranean Action Plan is examining potential future effects of climate change on water footprints, and "... *exploring possible futures for agriculture-*

based economies that are most vulnerable to anticipated climate change effects” (United Nations, 2009).

Water quantity is becoming an issue for both agricultural policy and market-access schemes. An OECD report, published in 2010, outlines the issues surrounding global water usage. Their report, “Sustainable Management of Water Resources in Agriculture”, outlines the growing need for water, especially within developing countries, and calls for policy makers to “recognise the complexity and diversity of water resource management in agriculture and the wide range of issues at stake”. As well as this, OECD outlines recommendations to countries in terms of what must be done to ensure sustainable water supplies into the future (OECD, 2010).

International trade in food and other products implies international flows of virtual water. Virtual water is the water that is virtually embedded in traded commodities. It refers to the water footprint of a commodity in the place of production. The virtual water content (VWC) can be defined as the volume of water that would have been required to produce the product in the place where the product is consumed (Chapagain & Hoekstra, 2004).

During the period 1996-2005 the global volume of international virtual water flows averaged 2,320b m³ annually. In this period, the major gross virtual water exporters were the USA, China, India, Brazil, Argentina, Canada, Australia, Indonesia, France Southern Asia (India, Pakistan, Indonesia, Thailand) and Australia. The major gross virtual water importers were the USA, Japan, Germany, China, Italy, Mexico, France, the UK and the Netherlands (Mekonnen & Hoekstra, 2011).

The water footprint is an indicator of freshwater use that considers direct and indirect water use of a consumer or producer. Thus, the water footprint is a comprehensive indicator of freshwater resources appropriation, next to the traditional and restricted measure of water use. The water footprint of a product is the volume of freshwater used to produce the product, measured over the full supply chain. In their study, Mekonnen & Hoekstra (2012) identified the water footprint of several food products. Results showed that the water footprint of meat from beef cattle (15,400 m³/ton as a global average) is much larger than the footprints of sheepmeat (10,400 m³/ton), pig (6,000 m³/ton), goat (5,500 m³/ton) or chicken (4,300 m³/ton). The global average water footprint of chicken egg amounts to 3,300 m³/ton, while the water footprint of cow milk is 1,000 m³/ton. The projected increase in consumption of livestock products is therefore likely to put further pressure on the world’s water supply.

Several case studies exist that measured the water footprint of selected countries. Hoekstra & Chapagain (2008) estimated that the average water footprint of Chinese consumption was about 700 m³/yr per person in the period between 1997 to 2001. Only 7 per cent of this footprint lay outside China, thus China still had a relatively high degree of water self-sufficiency. The water footprint of Indian consumption was 987 billion m³/yr between 1997 and 2001. Almost the entire footprint lay within the country, only 2 per cent of the water footprint of Indian consumers lies outside the country (Hoekstra & Chapagain, 2008). Sonnenburg et al. (2009) estimated the water footprint of German consumers as 160 km³ per year which means each citizen consumed 5,288 litres of water each day (Sonnenburg et al., 2009). Similarly, the water footprint of UK citizens was estimated as 4,645 litres per day. However, only 38 per cent of this comes from domestic water resources and approximately 62 per cent of the total national water footprint comes from water resources from other countries (Chapagain & Orr, 2008).

A shared standard on definitions and calculation methods as a basis for formulating sustainable water strategies and policies is being developed. The Water Footprint Network developed global water footprinting standards in 2011 in a collaboration of the Water Footprint Network, its partners, and scientists of the University of Twente in the Netherlands. They were published in the Water Footprint Assessment Manual which presents assessment methods for water footprint accounting for individual processes and products, as well as for consumers, nations and businesses. It further outlines methods for water footprint sustainability assessment and a library of water footprint response options (Water Footprint Network, 2012).

Consumer attitudes towards water footprint

Consumers' knowledge and awareness of water footprint is still relatively low, and only a few studies exist that assessed consumers' attitudes towards water footprint in food products. For example, Guenther et al., 2012 showed that the term Water footprint was not known well by consumers in the UK and Japan, with only 11 per cent of UK participants claiming to know about 'Water footprinting' and over a third (37 per cent) of participants had never heard of this. Similarly, Japanese consumers 59 per cent of the consumers had never heard of this term.

3.3.3 Biodiversity and wildlife

Over the last few decades there has been growing concern about the impact of agriculture on terrestrial biodiversity and wildlife. Thus, in April 2002, the Conference of the Parties of the Convention on Biological Diversity (CBD) adopted the target to "achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional, and national level as a contribution to poverty alleviation and to the benefit of all life on earth" (CBD Decision VI/26). In 2004, the Conference of the Parties adopted a framework for evaluation, and a set of indicators that will be used in assessing progress.

In 2010, the International Scientific Symposium "Biodiversity and Sustainable Diets: United Against Hunger" which was jointly organised by the FAO and Biodiversity International. The Symposium was part of the official World Food Day/Week programme, and included one of the many activities in celebration of International Year of Biodiversity, 2010. The Symposium addressed the linkages among agriculture, biodiversity, nutrition, food production, food consumption and the environment. Previous actions in support of biodiversity have generally focused on addressing the direct pressures causing its loss and on intervening directly to improve the state of biodiversity, for example in programmes to protect particular endangered species. An estimated 80 per cent of Parties reported in their fourth national reports to the CBD that biodiversity was important for human well-being in their country including, amongst other things, as a source of food. However, there has been limited action to address the underlying causes or the indirect drivers of biodiversity loss, such as demographic change, consumption patterns or the impacts of increased trade. Therefore, the parties to the CBD adopted a new ten-year Strategic Plan for Biodiversity to guide international and national efforts. The vision of this Strategic Plan is a world "*living in harmony with nature*" where "*by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people*". The Strategic Plan includes 20 headline targets, known as the "Aichi Biodiversity Targets", which are organized under five strategic goals of 1) addressing the underlying causes of biodiversity loss 2) reducing the pressures on biodiversity 3) safeguarding biodiversity at all levels 4) enhancing the benefits for all provided by biodiversity, and 5) enhancing implementation including by providing for capacity-building (FAO, 2012).

Market assurance schemes

Several market assurance schemes include standards for biodiversity and wildlife management. For example, GlobalG.A.P. and many of the supermarket schemes include aspects of biodiversity and wildlife protection. The Nature's Choice label of Tesco, for example, includes wildlife and landscape conservation and enhancement plans. Other market assurance schemes that include biodiversity and wildlife elements are such as Sustainable Forestry Initiative; Organic Farmers and Growers; Marine Stewardship Council: Fishery Standard; Leaf Marque; Sustainable Agriculture Standard (see KPI identification database). Some sectors in New Zealand are well aware of this and have adopted these plans. This is especially true in the kiwifruit sector; dairy and sheep meat are not so well prepared.

Retailers are also taking on the biodiversity enhancement discussion. For example, the Wal-Mart foundation reported an annual investment of US\$38 million for marine conservation initiatives, and \$1.3 million supporting the Marine Stewardship Council's (MSC) eco-labelling

program for sustainable and well-managed fisheries in 2012. Through its marine conservation initiative, the Wal-Mart-related foundation focuses on globally important marine areas and works with grantees and other partners to create economic incentives for ocean conservation. It supports MSC, which works with seafood buyers and retailers to create a market for sustainably-caught seafood, preserving the livelihoods of fishermen while protecting depleted fish populations (The Walton Family Foundation, 2012).

Biodiversity footprinting

While there is increased interest in biodiversity from the market side, the challenges lie within the methods of measuring biodiversity – also called – biodiversity footprinting. Biodiversity footprint is also sometimes described as ecological footprinting (EF). EF methods have recently been refined to allow the application of EF to a final product (Global Footprint Network 2009). However, the application of EF to agricultural systems is still rare (Cerutti et al. 2010). The Global Footprint Network has released the Ecological Footprint Standards 2009 and has begun the 2012 Standards update process. The 2009 standards build on the first set of internationally recognized Ecological Footprint Standards, released in 2006, and include key updates – such as, for the first time, providing standards and guidelines for product and organizational Footprint assessments. The Ecological Footprint Standards 2009 are designed to ensure that Footprint assessments are produced consistently and according to community-proposed best practices. They aim to ensure that assessments are conducted and communicated in a way that is accurate and transparent, by providing standards and guidelines on such issues as use of source data, derivation of conversion factors, establishment of study boundaries, and communication of findings. The standards are applicable to all Footprint studies, including sub-national populations, products, and organizations. The standards have been developed through a consensus, committee-based process by a Standards Committee drawn from representatives of academia, government, NGOs, and consulting firms. As a Community Affiliate of the ISEAL Alliance, Global Footprint Network developed a standard-setting process aimed to comply with the ISEAL Standard-Setting Code of Ethics and Good Practice. In order to promote the quality and integrity of Ecological Footprint Accounting, Global Footprint Network asks that all partners comply with the most recent Ecological Footprint Standards (Global Footprint Network, 2009). Retailers are following. First, the Sustainability Consortium backed by Walmart and many other retailers (<http://www.sustainabilityconsortium.org/members/>) has stated they intend to find a way of providing a biodiversity assessment for their products. Also, the French kiwifruit producer Sikig has launched a label on its produce to communicate the biodiversity footprint. However, Sikig is only using the land occupation measure for its biodiversity footprint.

Consumer attitudes towards biodiversity

There is evidence that Consumers are concerned about biodiversity. These issues are of interest in emerging markets, such as China and Brazil, in which consumers have indicated a high level of awareness of biodiversity (UEBT, 2013). A 2013 survey, with 31,000 participants across 11 countries assessed consumers' knowledge, awareness and attitudes towards biodiversity. Results showed that 67 per cent of respondents have heard about biodiversity with highest awareness in Brazil (96 per cent), France (95 per cent) and China (94 per cent). In contrast, only 64 per cent of respondents in the UK have heard about biodiversity, and Indian respondents showed the lowest awareness with only 19 per cent indicating to have heard about the term biodiversity. The study further showed that younger people were more aware about biodiversity than older people, and men tend to be slightly more aware than women. In addition, income and education influence biodiversity awareness rates and other sustainability notions (UEBT, 2013).

Consumers in emerging markets have indicated high levels of willingness-to-pay for the enhancement of biodiversity values in food products as shown in Table 4. In the above mentioned study from Saunders et al. (2013) which assessed consumers WTP for different certifications in lamb and dairy products using choice experiments, it was shown that consumers in the UK, China and India would pay a premium for products which production

enhances biodiversity. Indians would pay 42 per cent more to the normal price of a lamb product that is certified for biodiversity enhancement. In contrast, Consumers from the UK would only pay an additional 6 per cent to the normal selling price of lamb and dairy produces.

Table 3: Food attribute willingness to pay as a percentage of product price in China, India and the UK

	China		India		UK	
	Dairy	Lamb	Dairy	Lamb	Dairy	Lamb
Animal Welfare	26%	13%	42%	41%	17%	22%
GHG	25%	14%	38%	39%	7%	7%
Biodiversity⁽¹⁾	22%	15%	27%	42%	6%	6%

Notes: WTP derived using Krinsky and Robb (1986; 1990) method#

(1) Biodiversity enhancement systems in production was defined as the cow's milk product/ lamb product being officially certified by an Environmental Agency who guarantees that the production of this product employs a management system that enhances biodiversity

3.3.4 Animal welfare

As well as concern over agriculture's effect on biodiversity and wildlife attributes, many consumers are now showing great concern over the welfare of animals used in the production of their food. This is based on the conditions in which an animal is kept, its access to food, water and sunlight, and many other attributes.

The EU introduced animal welfare as a policy in 1974 with the 1978 directive outlining basic standards for animal welfare in particular for intensively farmed animals. In 1998, the EU passed the directive basing its animal welfare on five freedoms: freedom from discomfort; hunger and thirst; fear and distress; pain injury and disease; and to express natural behaviour. The EU then developed an action plan regarding animal welfare from 2006 to 2010. This has been reviewed in 2009 by outside consultants the (EUPAW, EU Policy on Animal Welfare (www.eupaw.eu)). This found that:

“EU Animal Welfare legislation has improved the welfare of many of Europe's farm and experimental animals, but more could be achieved with stronger and more consistent enforcement of existing rules.”

The key messages from the report include:

- EU legislation to protect animals has, in general, helped to reduce competitive distortions in the internal market.
- EU funding for research and scientific advice on animal welfare, totalling about €15million annually, has made a positive contribution to policy.
- The EU's international initiatives have helped to raise awareness and create a shared international understanding of animal welfare issues and standards.
- EU animal welfare policy appears to have succeeded in striking a balance between the varied needs and expectations of citizens, industry and other groups.

- EU welfare standards have imposed additional costs on the livestock and experimental sectors, with 2 per cent of the overall value of livestock output and a similar proportion to experiments using animals, with no evidence that this has so far threatened the economic sustainability of these sectors.

The Treaty of Lisbon of 2009 put animal welfare on equal footing with other key principles that is; gender equality, social protection, human health, sustainable development among others.

The EU has also passed a number of specific directives. These include the 1999 directive whereby conventional cages for hens are phased out by 2012. (Many supermarkets in the EU have pre-empted this legislation and banned sales of products from battery hens). Further, the Council Directive 2007/43/CE required that, from June 2007, in order to reduce overcrowding of chicken holdings, a maximum stocking density of 33kg/m², or 39kg/m² if stricter standards are met, would be used. Other conditions in this directive included better standards on lighting, litter, feeding and ventilation requirements.

In the case of pigs the EU, in 2011 the European Commission outlined the following minimum standards for the protection of pigs:

- Ban the use of individual stalls for pregnant sows and gilts during a period starting from 4 weeks after service to 1 week before the expected time of farrowing and the use of tethers;
- Improve the quality of the flooring surfaces;
- Increase the living space available for sows and gilts;
- Allow the sows and gilts to have permanent access to materials for rooting;
- Introduce a higher level of training and competence on welfare issues for the stockmen and the personnel in charge of the animals; and
- Request new scientific advice in relation to certain issues of pig farming.

From 1st January 2003 these requirements were applicable to all holdings newly built or rebuilt, and from 1st January 2013 these requirements apply to all holdings.

Moreover, the European Union implemented a strategy plan, with the support of representatives of European farmers, meat industry, retailers, scientists, veterinarians and animal welfare NGOs, to voluntarily end surgical castration of pigs in Europe by 1st January 2018. Initially, since 1st January 2012, surgical castration of pigs are performed with prolonged analgesia and/or anaesthesia, if carried out.

Council Directive 2008/119/EC (as amended) prohibited the use of confined individual pens for calves after the age of eight weeks from 1st January 1998 onwards for all newly built or rebuilt holdings and from 1st January 2007 for all holdings. The calves must not be tethered (except under very specific circumstances) or muzzled, and must be fed according to their physiological needs (including sufficient iron and a minimum daily rotation of fibrous food).

As mentioned in Chapter 2.2, the European Commission has plans to implement a clearer set of animal welfare policy criteria which is to be set in motion from 2015. The European Union Strategy for the Protection and Welfare of Animals 2012-2015 requires for a simplified legislative framework for animal welfare standards (with the inclusion of science-based welfare standards, as well as specific standards for personnel handling of animals). Additionally, the strategy outlines intentions to assist EU Member States to improve compliance with animal welfare legislation, increase cohesion with international cooperation on animal welfare,

communicate animal welfare standards in production to consumers, and improving links between these policies and the CAP (European Commission, 2012).

In the United States, the rights of farm animals are currently protected by a recent bill - the Farm Animal Stewardship Purchasing Act, proposed at the 110th Congress, which requires animal producers supplying federal programs to comply with moderate animal welfare regulations. The terms of the act state that animals should be provided adequate space, daily access to adequate food and water and veterinary care. However, this Act only applies to suppliers to Federal programs, and does not provide a blanket law for all farm animals with the United States (Govtrack.us, 2006).

There are a few animal welfare policies within New Zealand at present, in 2010, the National Government has passed the Animal Welfare Amendment Bill , which ensures significant fines of up to NZ\$100,000 for an individual and NZ\$500,000 for a business for the willful mistreatment of an animal. Within this new policy, there will also be possible prosecution for those who abuse animals, with prison sentences of between three and five years for sentenced abusers (Saunders, 2012).

The Ministry of Primary Industries (MPI) is now phasing out the use of battery cages for layer hens in New Zealand poultry production. MPI's Animal Welfare (Layer Hens) Code of Welfare 2012 came into effect in December 2012 replacing the existing 2005 code of welfare for layer hens. The new code contains minimum standards and best practices that aim to encourage the highest standards of animal husbandry, care and handling. The biggest change in the new code is to require that the cages for housing layer hens will be phased out by 2022. Farmers will be able to house their hens in colony cages or barns. Colony cages are bigger, typically housing 40-60 birds, and include a secluded nesting area, perches and a scratching area (MPI, 2012; WorldPoultry, 2012). Also, in response to consumer pressure, the New Zealand Government is now outlawing the use of sow cages/stalls two years earlier than planned. After media and pressure group/NGO protest relating to this practice, a new code governing the welfare and treatment of pigs on New Zealand farms has demonstrated that gestation crates will be removed by December 2015 rather than 2017. Also, since 2012 the use of sow stalls is limited to four weeks after mating and will be prohibited by December 3rd 2015 (Saunders, 2012).

Market assurance schemes

Internationally, market assurance schemes provide information to consumers and businesses alike that goods have been processed or produced under a strict set of standards. These standards can range from food quality and safety criteria, to environmental and animal welfare stewardship criteria. Market assurance schemes are generally voluntary, and require the producer or company applying to have their operation audited, usually by a third-party inspector. Upon successful completion of the audit process, the producer or company is given certification that assures production is in line with the standards of the scheme, as well as the right to affix a label of that scheme to their products to communicate this compliance to consumers.

The Assured Food Standards (AFS) – also known as the Red Tractor scheme - is a scheme that encompasses animal welfare in an agricultural context. The scheme established standards for certain types of farming (pig, beef and lamb, chicken, turkey, dairy, combinable crops) as well as for fresh fruit, vegetable and salad growing. In addition, the scheme established an industry code of farm feeding. AFS (2008) assures that the standards for animal farming encompass animal health and welfare as well as farm procedures and safety. AFS aims to ensure that safety and hygiene is maintained throughout the supply chain. AFS (2008) argues that the standards determine full traceability of final products back to the farm of origin. The combinable crop standards require crop protection and food safety (Assured Food Standards, 2008). The Red Tractor Assurance Scheme has also recently launched its own one-stop website, detailing information relating to the details of the scheme, covering the whole food-supply chain (pre-Farm, Farm, post-Farm, and Checker and Services).

The Red Tractor scheme now incorporates supermarket chains Sainsbury's, Morrisons, Tesco, and ASDA, as well as producers McCain, Allinson, Dairy Crest, John Lewis, Silver Spoon, Cranberry Foods and Brakes, with the logo appearing on more than £10 billion worth of food and drink each year.

Red Tractor has also recently completed a review and update of their standards (based on an eighteen-month cycle). New standards, relating to animal welfare (that will be introduced with effect from 1st October 2011) include:

Lighting over feed areas for beef and lamb are either protected or have shatterproof bulbs put in when next replaced;

- Safe bedding must be provided for cattle and lamb;
- All milk sold for human consumption must come from healthy cows (i.e. free of TB and Brucellosis, with an action plan detailed for dealing with confirmed TB reactors)
- New milking machines must be installed and tested to the most up-to-date standards;
- Piglets must not be weaned from the sow at an age of less than 28 days unless the welfare or health of the dam or piglets would otherwise be adversely affected;
- Lambs or pigs with a traumatic injury must be provided with a dry well-bedded floor on which to lie;
- Pig tails are left long enough to cover the equivalent of the vulva and anus once the pig reaches slaughter weight;
- The maximum width openings for concrete slatted floors for pig housings must be 11mm for piglets, 14mm for weaners, 18mm for rearing pigs, with minimum slot widths of 50mm for piglets and weaners, and 80mm for rearing pigs;
- If dry sows are kept without access to straw bedding and are fed a standard dry meal or pellet ration (i.e. they are not liquid fed) they will require additional high fibre feed in order to avoid prolonged hunger and satisfy their welfare needs;
- Stocking density for pigs should not fall below around 215kg/m² otherwise animals may struggle to keep their balance.

The RSPCA UK launched a scheme in 2010 called the Freedom Food Assurance Scheme, the concept of which is to allow retailers to adopt sounder practices in relation to the welfare of animals used in the animal products they stock. A strong notion of this scheme is the assessment of welfare of chickens used to produce chicken-based products, including meat and eggs (www.rspca.org.uk). Several supermarkets within the UK have signed up to this programme, including Sainsbury's, Tesco, Morrisons, and the Co-op. Sainsbury's is currently leading as the highest stockist of Freedom Food-branded goods, with around 12 tonnes sold between March 2009 and March 2010 (Kantar World Panel, 2010).

United Kingdom retailers include animal welfare in their list of requirements from suppliers. The fact that major UK retailers have banned or are banning battery hens and eggs from battery hens shows the seriousness of this move (given the difference in cost of production of battery eggs compared to free range eggs). The Co-op, Waitrose, Sainsbury's and Marks & Spencer have therefore banned the sale of these products. Marks & Spencer has been a major player in their approach to animal welfare, being awarded the Compassionate Supermarket award in 2008 in recognition of their animal welfare policies (M&S, 2008). In 2011, the Co-operative has outlined a "radical" sustainability plan, incorporating environmental attributes, as well as many new animal welfare standards, including that all shell eggs and egg ingredients stocked must be

at least free-range, and establishing a dedicated supply chain for cows' milk, as well as "taking a lead on the issue of animal testing of cosmetic and household products" (just-food, 2011).

In April 2010, the Tubney Charitable Trust proposed a £2.7 million grant for a new project intended to improve farm animal welfare condition in the UK. This five-year research project will be conducted by the University of Bristol's Department of Clinical Veterinary Science in association with RSPCA and the Soil Association, and will focus on measuring the outcomes of farm animals' welfare under certain conditions. The goals of this project include promoting welfare assurance within the RSPCA Freedom Food and Soil Association certification schemes, and to forward the promotion of outcome-based animal welfare standards within UK and EU farm assurance schemes (WorldPoultry, 2010).

In October 2010, retailers Marks & Spencer, Sainsbury's, the Co-Operative and Waitrose were shortlisted for an RSPCA animal welfare award, decided by public vote and presented at the RSPCA's Good Business awards. Other awards include the 2010 implementation of the Compassion in World Farming's Good Farm Animal Welfare Award, which also includes other awards such as Most Compassionate Supermarket, Good Egg Awards (which has been in effect since 2007) and Good Chicken Awards, through which many major UK retailers have been featured as nominees.

These large chain stores are also rejecting suppliers that do not meet animal welfare standards. In November 2010, supermarkets Sainsbury's, Tesco, Marks & Spencer, Morrisons and Waitrose rejected plans to accept milk produced by Nocton Dairies, as their animal welfare policies were not aligned with that of Nocton. Similarly, UK supermarket Waitrose recently rejected supplies of poultry from one undisclosed supplier, stating that the behaviour exhibited by this retailer in response to animal welfare went against Waitrose's high welfare standards expected of farmers (Saunders, 2012).

In the US, in an attempt to meet rising consumer demand for food products with animal welfare attributes, Supermarket and Consumer Behaviour Analyst Phil Lempert has theorised that "Humane" may be the next big label on products in US supermarkets. In fact, such a label exists, created by the American Humane Association. This voluntary labelling scheme represents the first certification programme in the United States to ensure, and communicate, humane treatment of farm animals. Products displaying this label have been verified by independent third-party sources to have provided care and handling of farm animals meeting the science-based animal welfare standards set by the American Humane Association (Saunders, 2012). Another such label is now also available in the United States – the Certified Humane label, which also assures consumers that standards, including nutritious diet without antibiotics or hormones, shelter requirements, resting areas, sufficient space and the ability to engage in natural behaviours, have been met. The Humane Farm Animal care reported that the food label for meat, poultry, eggs, and dairy ensured the humane treatment of 77 million farm animals in 2012 (Humane Farm Animal care, 2013).

Reflecting this, three major supermarket chains – Whole Foods Market Inc., Supervalu Inc. and Safeway Inc. – have pledged to boost their animal welfare standards and to inform shoppers about their efforts with new labels or in-store signs. Supervalu, for example, now requires animal welfare and food safety inspection audits before stocking a particular product, and will reject products that do not meet stringent standards of animal welfare (Saunders, 2012).

Whole Foods is also launching a program developed by a group called the Global Animal Partnership that will rate products on a scale of 1 to 5 based on their animal welfare standards – for example, a steak would earn a "step 1" rating if the animal spent two-thirds of its life on pasture or rangeland, but a 5 if it spent its entire life on pasture or rangeland (Saunders, 2012).

NZ producers have already had to change behaviours relating to animal welfare such as no longer docking the tails of cows. There are currently calls for banning tail docking of lambs, which would have implications for farm management, as well as banning winter shearing of

sheep. These are generally to meet market access requirements. Tail docking of lambs is currently illegal in the UK if the lamb is over the age of one week old. There is also the wider issue that animal welfare concerns differ across countries and perceptions of consumers in markets overseas to practices in NZ may have potential to adversely affect our exports (Saunders, 2012).

The power of the media here cannot be underestimated. The impact of Jamie Oliver's television programme "Jamie's Fowl Dinners", showing the lifecycle of the chicken, had an impact on the chicken market, especially within the UK. New Zealand is more vulnerable to this given there is an alternative source of supply to our products. Also, it must be stressed that what affects one product can affect the generic NZ brand, and thus the economy as a whole (Saunders, 2012).

Consumer attitudes towards animal welfare

Animal welfare is a strong determinant of choices among consumers across countries and surveys conducted in the European Union have confirmed that most people are highly concerned about the welfare of animals processed in animal products, and that this will influence their purchasing decisions quite considerably (Passatino et al., 2008).

In the previously described study by Saunders et al. (2013) which examined consumer attitudes towards sustainability attributes in food products in China, India and the UK, it was shown that in the UK 34 per cent of respondents, rated animal welfare as *very important*; these numbers were much higher for China and India, with 42 per cent in China, and 50 per cent in India rated them as *very important*. When consumers were asked to describe 'good animal welfare' Indian and Chinese respondents mainly referred to good quality of life for the animals including not being mistreated and being well cared for. Indian respondents also commented on animals being well fed as indicator for good animal welfare. In contrast, UK respondents predominantly described good farm animal welfare as free and natural treatment meaning animals are entitled to behave naturally, and *free range* was a term commonly used in this regard. Furthermore, WTP results from the choice experiments showed that consumers in the UK, China and India would pay a premium for products certified for animal welfare as shown in Table 3 in the previous chapter. Indians and Chinese consumers would pay 42 per cent and 26 per cent, respectively more to the normal price of a dairy product that is certified for animal welfare while Chinese. In contrast, UK consumers would pay an extra of 22 per cent to the normal price this was the highest percentage of all certification schemes that UK consumers (Saunders et al., 2013).

In a US-based survey, participants were asked "*What would you like to know from farmers about food production that you currently do not know*". The majority of 68 per cent said that they would like to know what farmers are doing to ensure animal care. A survey carried out in the Araucania region of Chile showed that around 60 per cent of participants were aware of potentially inhumane livestock management practices, with 32.1 per cent of respondents changing their meat consumption habits due to this (Schnettler et al., 2008).

4 Current and Potential Changes in Market Drivers

4.1 Introduction

Increasing attention and concerns about the environment have led to a number of other potential issues that may affect New Zealand exports. Growing trends towards consumption of locally-produced foods and ethical consumption are included in this chapter. Also, the issues of sustainable and low carbon diets are included here. These have the potential to impact markets particularly in the US and EU and of course are counteracted by growth in Asia.

4.2 Buy local

There has been identified a small yet growing movement among certain consumer groups to the concept of purchasing locally produced foods. “Local food” is defined as food which is produced, processed and distributed within a geographic region or boundary. This movement is supported by the notion that purchasing foods at a closer proximity to their production location can produce benefits, such as a higher degree of freshness and quality, better taste, higher community cohesion, a lessened toll on the immediate environment, and support for local farmers and growers. Local foods can also be defined as those whose origin resides within a local community or region, or of the same national provenance as the consumer (Duram, 2010). Local food consumption is also associated with the notion of “seasonal consumption” in which consumers seek to purchase a substantial proportion of goods that are currently in their appropriate growing season within their own locality.

Consumption of locally produced goods has grown, particularly in developed countries. In addition, the number of registered farmers’ markets has grown significantly in the US – from 1,755 registered markets in 1994 to 4,685 registered farmers’ markets in 2008 (Adams & Salois, 2010). As of August 2012, there were 7,864 registered farmers’ markets in the US, signaling a 9.6 per cent increase from 2011 (USDA-AMS, 2012). The sales volumes associated with farmers’ markets in the US have also shown high increases, with USD\$404 million worth of sales in 1992 to USD\$1.2 billion in 2007 (Adams & Salois, 2010).

Recent purchasing trends in the UK also suggest for increased consumer awareness towards local food procurement. This has been seen in the creation of “food hubs” – central locations for local food commerce, often facilitated by online mechanisms, to allow for optimal location for the creation of supply chains, local job creation, and the promotion of food tourism. In response to this, many local government groups have shown a higher degree of support in programmes to enhance the promotion of local food consumption, particularly in rural areas which rely heavily on agriculture and food for the local economies. There are several key success factors for the effective establishment and maintenance of food hubs, including the setting up of an accessible and proximal location to producers and main distribution routes, the integrity of food processing, distribution and support mechanisms, sound research into demand for local foods (with special reference to applicable facilities, including retail, distribution and production facilities), and the successful communication of brand properties, such as product/service quality and reliability (Williams, 2013).

Local food systems, such as food hubs and farmers markets, have been shown to be both increasing in popularity among certain consumer groups, as well as creating added value for producers. The benefits derived from local food systems are often intangible, and based on the perceptions of consumers who regularly engage in shopping at local and regional markets. Some key assumptions include those of the reconnection of a direct relationship between the producer and consumer, and associated changes in the scale of production required to facilitate local food systems. In either case, local food systems offer an alternative network to

conventional food systems, in which the structure of conventional supply chains often disconnects the consumer from the product. This has often manifested in consumer concerns regarding the source, content and production methods of the food they purchase, with enhanced consumer perceptions of food safety, quality and sustainability rendered by local food systems (Mount, 2011).

Consumer preferences towards local produce

In the UK, the majority of food purchases still takes place in supermarkets, however local food purchases at for example farmers markets are increasing (Dowler, 2007; Gadema and Oglethorpe, 2011). The above mentioned study by Gadema and Oglethorpe (2011) showed that overall, only 26 per cent of the survey participants indicated to 'sometimes' shop locally, and another 15 per cent stated they shopped at farmers' markets and/or farm shops (Gadema and Oglethorpe, 2011).

This is reinforced by study of UK consumer preferences for local foods, which highlights a positive correlation in willingness-to-pay increases relating to the associated distance of transportation for apples and wine. Results showed that UK consumers are willing-to-pay an additional €0.35 for wine which has travelled 20km rather than 1000km, and €0.49 for apples which have travelled 20km rather than 1000km. This is also an indication of a higher willingness-to-pay for local perishable goods over non-perishable goods. Positive increases in willingness-to-pay for a food product were also noted for the inclusion of a "locally-produced" and/or "lower food miles" label attached to the product (Greibitus et al, 2012).

Similarly, a US study of preferences for value-added products revealed a preference among Kentucky- and Ohio-based consumers for "locally-produced" labelled blackberry jam. Results showed that consumers were willing to pay an additional US\$0.15 per jar with the additional presence of a State Proud label, with the presence of label identifying a jar as being produced in the Appalachian region an additional US\$0.31 per jar. Overall, consumers would be willing-to-pay an additional US\$0.45 per jar containing both of these product labels (Hu et al, 2010).

Other markets have also experienced a strong uptake of local foods consumption. This has been noted particularly in France. In studies conducted into the purchasing of locally-produced foods, 85 per cent of French consumers indicated a given priority to support companies with a local site. A higher awareness of local food procurement was also found, with 52 per cent of French consumers expecting to see a "place of origin" label on a food product, and an additional 49 per cent expecting to see some indication of the "place of manufacture" affixed to a food product (Ceci-Renaud & Khamsing, 2012).

The identification of this consumer trend has led to its uptake by food retailers in the form of "local procurement". This is a process by which retailers will seek to employ the services of the closest proximal producers and suppliers of particular food types for stocking in their outlets. This is evident in the stocking behaviour of Wal-Mart, the world's largest food retailer. In 2011, Wal-Mart increased its stock of produce grown within the same state as the retailer outlet by 97 per cent – a figure which signifies over 10 per cent of all retail produce in the USA. In addition, Wal-Mart aims to double its stocking of all locally-grown produce in the USA by the year 2015 (Walmart, 2012).

Similarly, UK grocery retailer Tesco and other UK retailers have initiated a programme called Local Sourcing, in which the retailer seeks to purchase a higher degree of goods produced within the UK. This programme has been created in response to consumer demands for local foods, with support for the local economy cited as a key driver for this trend. Between 2009 and 2010, Tesco experienced increased sales in locally-produced food products from approximately £850 million to £1 billion (Tesco, 2010). Sales of local and regional food at Tesco reached over £1 billion in 2011/12, with approximately 4,000 local produce lines stocked in stores connecting with a network of around 500 local suppliers of stock. Increased sales of local products at Tesco in 2012 is partly due to their support of the local foods movement Love British Food 2012 – a

local foods support movement encouraging consumers to purchase British-made food products (Tesco, 2012).

In France, current consumer trends indicate a switch from organic products to “made in France” or “local gastronomic” products. Consumers are displaying a preference for “local” products, which they perceive as being sustainable yet less expensive than organic products. Fifty-three per cent of French consumers considered the origin of food products when making purchase decisions (Ceci-Renaud & Khamsing, 2012).

In Hungary, recent policy changes have promoted the benefits of local food consumption. While adherence and loyalty to local food systems have always been strong amongst Hungarian consumers, including patronage of food box delivery systems, farmers’ markets and community gardens, it has been found that approximately 75 per cent of Hungarian consumers prefer to purchase locally-produced food. Conversely, approximately 50 per cent of Hungarian consumers regularly shop at both hypermarkets and farmers’ markets, while only 13 per cent directly purchase food products from farmers on a regular basis. However, around 75 per cent of consumers indicated the importance of assisting local farmers and economies in purchasing local foods, while 55 per cent considered it important to support overseas producers (Balazs, 2012).

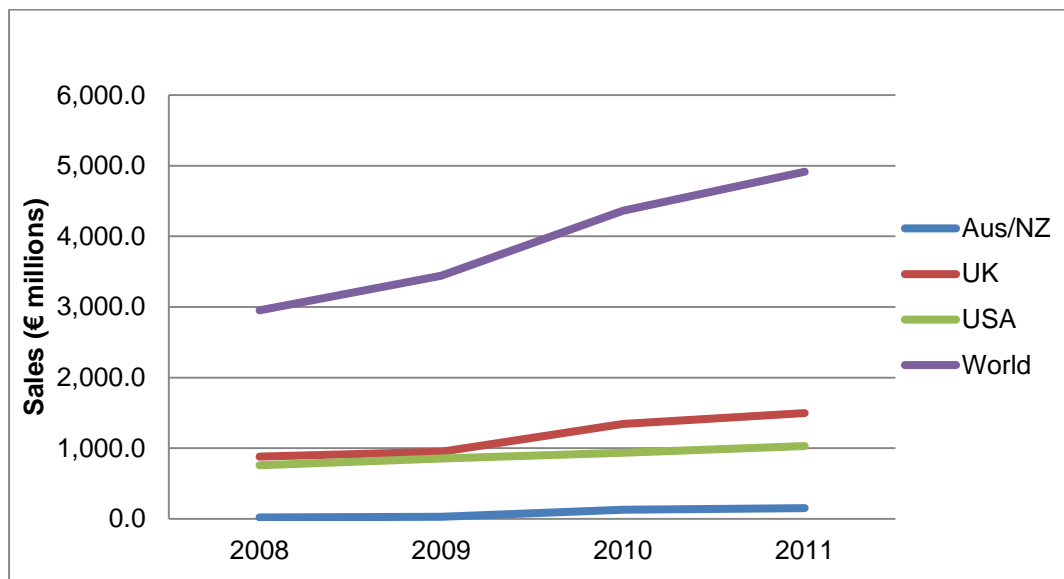
4.3 Ethical production

Ethical consumption has grown considerably over the last three decades. The term “ethical production” refers to goods which are produced, distributed and sold under conditions which do not harm or hinder human or animal quality of life. This is often with particular reference to the adoption of social responsibility principles in employment and production conditions, but can also include organic production practices. Ethical production schemes internationally typically relate to the adoption of social responsibility practices in employment and labour. However, ethical production can cover a multitude of issues, including the maintenance of ethical behaviour in sourcing and production towards biodiversity and ecosystem integrity.

Ethical standards in production are a growing requirement of food retailers internationally. While ethical standards are required to be enforced by law, many key food retailers in developed markets are making steps to uphold ethical standards beyond compliance. International US-based retailer Wal-Mart has outlined their ethical performance and corporate social responsibility goals, including a zero-tolerance policy towards unauthorized subcontracting, a requirement of new facilities to be prequalified by ethical sourcing audit prior to being made active, a requirement for the presence of an in-country company compliance inspector, and enhanced fire safety standards at all facilities (Wal-Mart, 2012). Similarly, UK retailer Marks and Spencer has reinforced commitments to ethical sourcing within their Eco-Plan A, including expansion of the ratio of FairTrade products stocked in-store, research efforts on the community impacts of their sourcing behaviour, food supply chain training for staff, as well as teaching materials for high schools, and a doubling of regionally-sourced stock (Marks and Spencer, 2012).

Fair Trade is probably one of the most well-recognised ethical production schemes internationally. This is managed and facilitated by the FairTrade Labelling Organisation International (FLO). Fair trade specifically requires farmers and growers to receive a higher “fair” price premium for their products internationally. Sales growth in verified FairTrade labelled products has increased considerably in recent years as shown in Figure 4. Between 2008 and 2011 international sales of Fair Trade products increased by 66 per cent, from €2.9 billion in 2008 to €4.9 billion in 2011. Sales growth in the US has increased from €757.8 million in 2008 and €1.03 billion in 2011 (36 per cent increase), with the United Kingdom exhibiting a growth in sales between €880.6 million in 2008 and €1.49 billion in 2011 (70.13 per cent increase). Australia/New Zealand markets have shown one of the greatest increases in consumption of FairTrade products in recent years, showing a 712.43 per cent increase in sales between 2008 (€18.5 million) and 2011 (€150.3 million) (FairTrade, 2012).

Figure 4: Growth in FairTrade product sales, 2008-2011



Source: FairTrade, 2012.

The FairTrade mark is recognised by 57 per cent of consumers in key ethical consumption markets³, with 64 per cent of those consumers placing trust in the brand. According to a 24-country survey conducted by GlobeScan in 2011, 63 per cent of consumers perceived FairTrade Labelling Standards to be very strict. In addition, 79 per cent of consumers stated that if a product that they regularly buy was branded with the FairTrade label, it would have a positive impact on their impression of the product. A further 48 per cent of consumers confirmed that the presence of a FairTrade label makes it more likely that they will purchase a product (GlobeScan, 2011).

FairTrade-certified products have also shown prominence in the purchasing decisions of consumers in emerging markets. The above mentioned study by Saunders et al (2013) showed that consumers in the UK, China and India are valuing fair trade food products. Fair trade products were perceived as “very important” by 50 per cent of Indian respondents, 42 per cent of Chinese respondents and 21 per cent of UK respondents. In addition, organic products were seen as “very important” by 56 per cent of Indian respondents, 45 per cent of Chinese respondents and 16 per cent of UK respondents. Similarly, GM-free food products were perceived as “very important” by 54 per cent of Chinese respondents, 51 per cent of Indian respondents and 19 per cent of UK respondents (Saunders et al., 2013).

4.4 Sustainable diets

The term “sustainable diets” was proposed in the early 1980s to describe dietary recommendations which promote healthier dietary habits in consumers, as well as improved environmental health (FAO, 2012). Several studies have been conducted which affirm links between dietary patterns and overall environmental wellbeing and that the impacts of human consumption on the environment can be significant.

³Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, India, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Poland, South Africa, South Korea, Spain, Sweden, Switzerland, UK and USA.

A sustainable diet attempts to minimise the associated environmental damage created by food production, encourages consumers to engage in a healthier nutritional lifestyle, and supports the creation of a robust food and farming industry and community. In particular, meat-based food systems are argued to use more land, energy and water resources than plant-based food systems. A non-vegetarian diet uses 2.9 times more water, 2.5 times more primary energy resources, 13 times more fertilizer, and 1.4 times more pesticides than a vegetarian diet (Marlow et al., 2009). Beef and lamb production systems depend most heavily on forage but also use significant amounts of grain. A shift towards feeding good-quality pasture only could reduce energy inputs by about 50 per cent as they were 11 times greater for animal protein production systems compared to grain protein production. However, some argue that in a long term view both food systems are not sustainable due to their heavy fossil energy requirements (Pimentel & Pimentel, 2003). In addition, it has been found that animal food production presents a much higher degree of Global Warming Potential (GWP) than that of plant food production (Carlsson-Kanyama et al., 2003; Duchin, 2005; Moresi and Valentini, 2010; Rejinders and Soret, 2004), and also requires a much larger surface of arable land (Brandão, 2008).

The development of environmentally friendly production systems is an important aspect when aiming to achieve sustainability in dietary patterns. Research has shown that an omnivorous diet based on products from chemical-conventional agriculture and conventional farming had the greatest impact on the environment, whereas the vegan diet based on organic products indicated to have the smallest environmental impact (Baroni et al., 2007). Similarly, Wallen et al (2004) showed that if the total Swedish population were to adopt a sustainable diet, there would be no overall decrease in energy inputs, and CO₂- emissions from production systems would only decrease by five per cent. This is because food production and distribution operators are the main users of energy resources in the food sector (about 60 per cent). Food preparation, storage, cooking methods and waste management in the household are other important aspects of energy use and CO₂-equivalents emissions (Wallen et al., 2004). Thus, it is argued that consumers' dietary choices, as they relate to the reduction of GHG emissions, cannot generate substantial changes in the level of emissions without necessary changes in the existing production systems in farming, processing, and distribution.

Moreover, Stehfest et al (2009) has shown that a global decrease of meat consumption, or even a completely shift towards a vegetarian or vegan diet could have a significantly positive effect on land use and subsequently on the reduction of GHG emissions. Using an integrated assessment model, the researchers compared several dietary variants (varying from less meat consumption to no intake of animal products) in terms of GHG emissions. Overall, a global shift to low meat intake would cut down mitigation costs by about 50 per cent in 2050 compared to the reference case which was 'no dietary change' (Stehfest et al., 2009).

One dietary pattern that has been associated with a sustainable diet is that of the Mediterranean Diet. The dietary guidelines of this nutritional system are based on the types of food traditionally consumed in countries situated proximally to the Mediterranean Sea. The Mediterranean Diet is an example of sustainable food production, and is a dietary pattern that can combine taste and health, environmental protection, biodiversity protection and consumption of local and seasonal products. A comprehensive study of a variety of regional diets to assess their sustainability showed that the Mediterranean Diet, consisting of a high degree of foods of plant-based origin, but not excluding small amounts of meat and animal products, correlates positively with World Health Organization recommendations for personal nutrition and has a lower environmental impact than an average United States diet (Duchin, 2005).

However, clear definition of a sustainable diet is still required. Previous research has attempted to define the concept of a sustainable diet and examine potential actions for promotion of sustainable food consumption. The World Wildlife Fund's 'Livewell Plate' is among these, and contains an outline for the dual challenge of achieving a healthy, balanced diet which also supports environmental and GHG emissions targets to 2020 (as outlined in WWF's One Planet Food Strategy). Similarly, WWF's recent report "Selling Sustainability?" outlines currently

adopted practices by retailers to endorse sustainable consumption, and includes a varied range of case studies, current initiatives and recommendations for government, NGOs and retailers (WWF, 2013).

4.5 Low carbon diets

'Low Carbon' diets are also a key development within sustainable diets and low carbon initiatives are growing amongst consumers in many countries that are concerned with how their consumption habits could affect environmental wellbeing as food consumption has been identified as one of the main issues contributing to high energy use and environmental pollution (e.g. Vringer and Blok, 1995; Brower and Leon, 1999). In particular, livestock production has been identified as a large contributor to climate change. A recent study from the FAO (Steinfeld et al., 2006) shows livestock accounts for 18 per cent of global Greenhouse gas emissions. These impacts are expected to grow in the future, especially with an increased demand for animal products. Another study (Garnett, 2008) argues that UK consumption of meat and dairy account for eight per cent of UK total emissions and European studies show they account for half of the GHG emitted by food production and consumption.

Subscribers to low carbon diets choose foods which have low Greenhouse gas (GHG) emissions in their production and transportation, with an overall intention to reduce their own carbon footprints. Behaviours also associated with low-carbon diets include a reduction in the purchasing of products with high amounts of processing and packaging, and a careful approach to food waste management. The low-carbon diet is not only restricted to food consumption, but also extends to other areas, most prominently transportation, but also self-sufficiency and other behaviours that reduce GHG emissions (Saunders et al, 2010).

There is already an interest to reduce the consumption of animal products. An American study showed that 3.2 per cent of U.S. adults, or 7.3 million people, follow a vegetarian-based diet and roughly 0.5 per cent, or 1 million, of those are vegans who consume any animal products. Ten per cent of U.S., adults, or 22.8 million people, say they largely follow a vegetarian-inclined diet (Vegetarian Times, 2008). In the UK a survey conducted by the Food Standards Agency in 2009 pointed out that 3 per cent respondents were found to be 'completely vegetarian', with an additional 5 per cent 'partly vegetarian' (GfK Social Research, 2009).

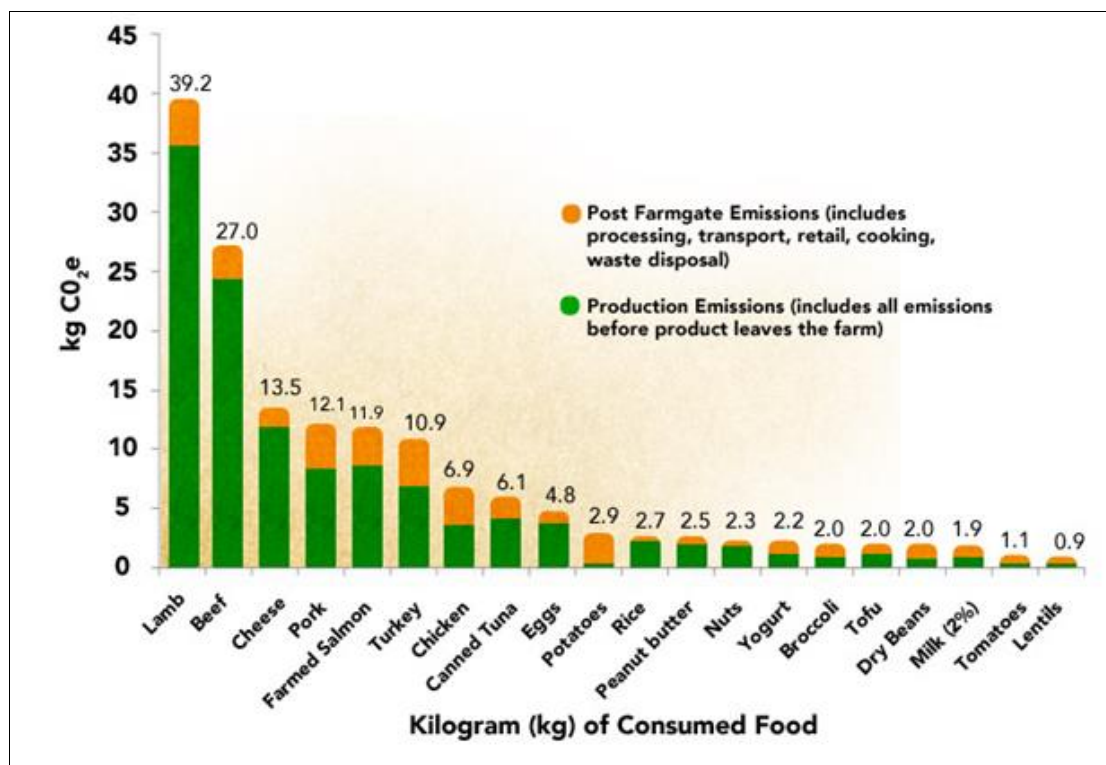
Vegetarian and vegan diets may present consumption patterns that are likely to reduce food-related GHG emissions. In their research, Guenther et al (2011) assessed the potential impact of an adoption of a vegetarian and vegan diet in the EU and US on trade and the environment using the Lincoln Trade and Environment model. Results showed that with an adoption of a vegetarian diet by 10 per cent of the US population and EU population, GHG emissions were projected to decrease by 1.2 per cent in the EU and 2 per cent in the US. However, this would also have an effect on other countries as GHG emissions in NZ were projected to drop by 1 per cent. An even greater decrease of GHG emissions was projected when half of the EU and US population would adopt a vegan diet. In this scenario, GHG emissions were projected to decrease by 14 per cent in the EU and by 16 per cent in the US to 2020. For NZ, reductions in GHG emissions were projected to reach 6 per cent by 2020 (Guenther et al., 2011).

Previous research which has sought to measure the impact of low carbon diets on GHG emissions has reached differing conclusions. While some studies have indicated the adoption of a vegetarian would have little impact on personal GHG emissions reduction (5.9 per cent) (Collins and Fairchild, 2007), others have indicated potentially significant reductions (23 per cent) (Frey and Barrett, 2006) compared with a meat-based diet. Alternatively, a substitution of white meat, eggs and vegetables for red meat and dairy once a week could also achieve a higher degree of GHG reduction when compared with a diet which is high in locally-sourced food (Weber & Matthews, 2008). This may lead to changes in the use of pastoral land from which food and materials are obtained, which would also require robust carbon footprint analysis (Garnett, 2008).

Consequently, there has been a rise in the attention being given to low carbon diets. A report by DEFRA on sustainable consumption, for example, talks about low environmental impact diets and reduced meat consumption. They recommend intervening with supermarkets to promote quality dairy and meat consumption over quantity, although the exact form of this intervention has yet to be seen. They also state that behavioural changes should be levered by encouraging more fruit and vegetable consumption to reduce consumption of meat (Owen et al, 2007). Similarly, a study conducted by Dr Eric Davison (Woods Hole Research Centre, Massachusetts) has found that in order to meet emissions reductions targets in nitrous oxide (N_2O) (as set by the IPCC), the developed world would be required to reduce consumption of red meat products by 50 per cent per consumer by 2050. This is due to the high applicability of nitrous-based fertilizers and manure products as contributors to nitrous oxide emissions, for which the authors recommend significant reductions and improvements in fertilizer and manure management (Davison, 2012).

Different food products have different levels of GHG emissions as shown in Figure 3. The Environmental Working Group (2011) showed that lamb, beef, cheese, pork and farmed salmon generate the most GHGs and have therefore the highest environmental impact. Ninety per cent of beef's emissions, 69 per cent of pork's, 72 per cent of salmon's and 68 per cent of tuna's emissions are generated in the production phase which requires most resources (including chemical fertilizer, feed, fuel, pesticides and water). In the case of beef and dairy, this is due to the high methane (CH_4) emissions from the ruminants' digestion processes and manure, as well as the nitrous oxide generated from growing feed. In contrast, most of plant protein's emissions are generated after crops leave the farm (processing, transport, cooking and waste disposal). The least environmentally damaging animal products are poultry meat, eggs and dairy products that are certified organic, humane and/or grass-fed (EWG, 2011).

Figure 5: Full lifecycle GHG emissions from common proteins and vegetables



Source: EWG (2011)

In a 2008 report, Garnett reviewed previous assessments of production and consumption-related GHG emissions of diverse products and developed a series of consumption patterns with low associated carbon emissions. These included a lower rate of consumption of meat and dairy products, a reduction in home food waste, the purchasing of certified sustainable fish products, purchasing a higher degree of local and/or seasonal foods, and an increased purchasing of certified organic and/or ethical food products. The author concluded that changes in consumption patterns alone are not sufficient to meet GHG emissions reduction targets of 80 per cent by 2050, but additionally the refinement of food production technologies (Garnett, 2008).

Low carbon diets have also been promoted heavily by popular supporters such as Sir Paul McCartney (PETA, 2013) and other campaigns. Third-party entities have recommended changes in consumer behaviour to reduce meat and dairy consumption and have initiated campaigns to promote these consumption behaviours. These include Farm Animal Rights Movement's (FARM) 'Meatout' campaign, initiated in 1985, which encourages consumers to adopt a vegan diet for one day a year (March 20th annually) across the US to promote a healthier lifestyle, as well as reduce associated carbon and other GHG emissions inherent in meat and dairy production (FARM, 2013a). The group also promotes regular adoption of a vegetarian/vegan diet in the form of 'Meatout Mondays', which encourages consumers to remove meat and dairy products from their daily intake every Monday, stating personal health, animal welfare and environmental improvement benefits (FARM, 2013b).

5 KPI Identification Database

5.1 Introduction

Consumer concerns regarding sustainability within food procurement change. As government and retailer policy adapts to these concerns, it is imperative to assess these fast-moving trends in real-time. It is also important for producers, growers and industry bodies to assess consumer trends and the tools that are being used by government and retailers to communicate with consumers. The selectivity of this information is inherently variable, and requires adjustment to sector- and industry-specific trends. This necessity is a driving factor in the development of assessment tools for industry and related groups to measure the impact of their own practices.

In response, the Agriculture Research Group on Sustainability (ARGOS) has initiated the development of The New Zealand Sustainability Dashboard, with the aim of developing a “sustainability assessment and reporting tool in partnership with five primary industry sectors in New Zealand”. The dashboard aims (in part) to benchmark and verify the sustainability credentials of New Zealand exported products through the examination of sustainability-based key performance indicators (KPIs) within internationally-recognised monitoring and assessment frameworks for production. In addition, an internet application aimed at facilitating these assessments will be established, through which interested parties (such as producers and other industry bodies, as well as policy makers and regulators in agriculture) may upload their own monitoring results and immediately receive feedback on the sustainability of their operation(s).

As stated in ARGOS Critical Step 1.3.1 (KPI identification and rating):

*Together with our international collaborators, review of ARGOS results and international sustainability assessments **to identify a reduced set of KPIs and lead indicators** for on-going monitoring on vineyards and kiwifruit orchards (or its substituted sector) and inclusion in the Sustainability Dashboard. Regional Council partners have been consulted and a **partnership to develop a woody-vegetation metric** for biodiversity is signed off. Select green, amber and red alert thresholds for key indicators to reflect New Zealand ecology and sector constraints. Green will indicate best practice, amber for still adequate performance but nearing thresholds or a need for improvement, and red signals regulatory limits or codes of practice have been breached.*

In order to inform the selection of key performance indicators (KPI) for inclusion in the Sustainability Dashboard, the concept of a database reporting on measures included in key market assurance and good practice schemes, as well as regulatory frameworks, was developed. This database (the KPI Identification Database) was to contain specific indicators by which economic, social, environmental and governance-based regulation, best practice and market assurance principles have been measured by various product and company schemes internationally. Examples of such schemes include certification and accreditation body schemes such as FairTrade, GLOBALG.A.P. and ISO standards. The information selected was to be quantifiable, or based on conformance (i.e. yes/no criteria).

5.2 Scheme selection

The selection of schemes for inclusion in the database was based on a previous project undertaken by the AERU. This project, titled the Eco-Verification Database was developed for Ministry of Economic Development and Ministry for the Environment in 2008, and comprised a selection of approximately 150 international schemes for eco-verification of products and businesses. The schemes included in this database were then extracted and analysed for possible inclusion in the KPI Identification Database. Of these schemes, it was proposed that

the final number of schemes for inclusion in the KPI Identification Database should be a total of approximately 50.

In analysing schemes from the Eco-Verification Database, a set of initial criteria was established to assess their applicability to the KPI Identification Database. Criteria for the exclusion of standards and schemes from the KPI Identification Database included:

- A base in other previously established standards:
 - i.e. Global Ecolabelling Network (GEN) standards are firmly based on ISO 14024 standards.
- A lack of availability in standards information (particularly specific criteria)
- A lack of availability of English language standards
- The non-inclusion of principles associated with the Database design (see 5.3).

5.3 Database design

In order for researchers to effectively utilise the KPI Identification Database, a robust design (and subsequent implementation) were required. The development of the overarching design of the database was based on the following criteria:

- Efficient and easy selection of categories of information
- Sourcing of quantifiable information versus “yes/no” criteria
 - e.g. a required percentage of a particular production element versus conformity to a selected production practice or goal
- Inclusion of the ability to source original documents with additional information regarding selected and included schemes

Background documents provided a key element in the design and implementation of database principles. The key document used as a basis for the structure of database navigation and categorisation principles was Food and Agriculture Organisation of the United Nations’ (FAO) Sustainability Assessment of Food and Agriculture Systems (SAFA) Guidelines (version 1.0). This document was selected as a key structural tool on the basis of analysis by ARGOS, and its previous use by ARGOS in determining key categories for assessment of the sustainability of agricultural operations.

Based on Microsoft Access 2010, the application programming work was carried out by Paul Rutherford in consultation with Tim Driver and Lesley Hunt (ARGOS). The database comprises a single Microsoft Access document which includes provision for the effective input of scheme measures and their subsequent categorisation.

5.4 Selection of categories, themes, goals and indicators

An effective selection of categories which would be used to categorise the selected measures of each scheme were selected. These were heavily based on FAO’s SAFA Guidelines, and formed under four main categories: Good Governance, Environmental Integrity, Economic Resilience and Social Well-Being.

Beneath this overarching level of categorisation (Category), three other levels of categorisation were selected, comprising the following hierarchy: Category (Good Governance, Environmental Integrity, etc), Theme, Goal and Indicator. The specific detail for each of these hierarchical levels was determined in consultation with members of the ARGOS team. These are detailed in the supporting appendix, Categories, Themes, Goals and Indicators of the KPI Identification Database.

5.5 Selection of key measures

After the initial establishment of the KPI Identification Database, data input and processing began. One of the key practices involved in effectively populating the database was that of measure selection, i.e. the selection of the specific individual requirements of the selected schemes for inclusion in the database. It was initially decided, for the most nominal use of the data in analysis and application in the Sustainability Dashboard, that the selection of measures should be based on two key properties:

- 1) Quantifiable information should always be included;
- 2) Compliance-based “yes/no” measures should be included.

Considering this, measures which adhered to these principles were selected and input into the database. In addition, at the time of data entry, it was impossible to determine if the information was usable by the analysis team. Therefore, a higher volume of data was entered into the database to ensure that a generous amount of information was available for analysis. The relevance of this information, it was considered, would be determined by the analysis team based on the categorisation principles applied within the database design.

5.6 Examples of selection method(s)

For inclusion in the database, it was highly preferable that schemes met the criteria outlined in Section 5.2 of this document. Some operational examples of prominent schemes that were not included in the database are listed below:

Blue Angel (Der Blaue Engel)

Blue Angel is a Germany-based eco-verification scheme that is used to certify a wide range of products as “eco-friendly”, or companies that exercise particular care in environmental stewardship and resource efficiency. In examination of the Blue Angel Standards, it was found that the product categories that its criteria applied to, as well as the body of information available within each product category, were insufficient for inclusion in the database. This was based on the applicability of these standards to the type of production processes and products that were likely to be examined (with reference to the Sustainability Dashboard), as well as a distinct lack of applicable quantifiable or compliance-based criteria.

Tesco: Nature’s Choice

UK retailer Tesco’s “Nature’s Choice” verification scheme is also of high importance, particularly in the United Kingdom and some international markets. It is the retailer’s own verification scheme and certifies products and/or producers that exercise good environmental and ethical stewardship in production. However, there was a distinct lack of availability of information regarding the specific criteria of the scheme, and it was therefore unable to be included within the KPI Identification Database.

6 Conclusion

This report examined trends in consumer concerns regarding food in traditional export markets to New Zealand including the UK, Japan and the US but also in emerging export markets such as China and India. These trends are affecting and will continue to affect what consumers buy and the premiums they will pay. The implications of these for New Zealand were explored in this report. The report also extended to other issues that may have potential to impact on New Zealand exports such as the sustainable/ low carbon diets. These have the potential to impact markets particularly in the US and EU and of course are counteracted by growth in Asia

The changing international policy environment, especially within developed countries, reflects the breadth of sustainability initiatives. As agriculture is New Zealand's main export, it is essential for New Zealand to meet environmental benchmarks in order to gain and/ or retain market access. Examples of this include the EU Common Agricultural Policy which is currently undergoing a reform process, to be implemented in 2014, with proposed changes indicating a further shift towards ethical and environmental outcomes. Similarly, the US Farm Bill has been extended by the Agriculture Reform, Food, and Jobs Act of 2012 which has removed the direct payment of subsidies to farmers, replacing this with a revenue loss subsidy. Also, there is growing evidence of environmental policies in emerging countries. In the case of India and China agricultural policies that deal with broader issues tend to part of wider environmental policies. Government action reflecting global movements to mitigate the negative effects of climate change are being undertaken in China. Reflecting retailer policy towards sustainability, market assurance schemes such as LEAF Marque, the Red Tractor scheme and GlobalG.A.P. set standards for sustainable production and are adopted by many retailers in the UK and EU. However, there is also an adoption of sustainability practices for retailers in emerging markets. Foreign retailers in China have implemented various sustainability schemes. For example, UK-based retailer Tesco was recently granted the "Green Supply Chain Award" for a distribution centre in South China.

The value that consumers place on different food attributes is varies across different market segments, countries and commodities. Basic food attributes such as food quality and safety are most important to consumers in overseas markets. In particular food safety is an important attribute for many consumers in emerging countries such as China and India with a high willingness to pay extra for this attribute.

Many consumers are reacting to the associated environmental and social impacts of the products they are purchasing, and seeking out products that promote sustainable practices in production and consumption. An example of a growing market segment includes the LOHAS ("Lifestyles of Health and Sustainability"), which includes relatively high percentages of consumers within the USA, UK, China, France, Japan, Taiwan and Australia. Studies have shown that consumers in developed countries value sustainability attributes in food products, however consumers in emerging countries such as China and India placed an even higher value on environmental and social attributes of food products.

There have been many systems put in place to meet retailer and consumer demands for sustainable goods including carbon footprint labelling schemes, where producers and retailers label goods with the amount of carbon emissions produced by this product. Such schemes are being adopted in many countries including the UK, USA, France, Japan and Switzerland. The current move towards food product labels displaying carbon emissions information seems set to continue into the future although difficulties in relation to consumer understanding of the labels persist and may need to be addressed for carbon footprint labels to gain traction. This is more difficult when the method of developing carbon labels is not consistent. Thus, an important

obstacle to develop a carbon label lies in harmonising the different global methodologies that exist to calculate, verify, certify and report on GHG emissions.

A growing issue is water quality and quantity which has the potential to affect New Zealand given the recent rise in nitrogen use and nitrate pollution. Water usage is a concern in some consumer segments, and there is a future possibility of water footprint labelling schemes and/or the measurement of embedded or virtual water in products. A shared standard on definitions and calculation methods as a basis for formulating sustainable water strategies and policies was developed in 2011 by the Water Footprint Network.

Concern over intensification of agriculture overseas and the subsequent loss in wildlife and biodiversity has led to an increased interest in biodiversity from governments, retailers and consumers. This has led to government policy development but also retailers positioning market segments with wildlife and biodiversity schemes. For example, the French kiwifruit producer SIKIG has launched a product label to communicate the biodiversity footprint among other environmental indicators. However, the challenges lie within the methods of measuring biodiversity that is sometimes also described as ecological footprinting (EF). The Global Footprint Network took initiative and released the Ecological Footprint Standards 2009. In 2012, they commenced the update of the standards.

Animal welfare is a very highly rated concern for consumers in traditional markets such as the UK and EU. However, consumers in emerging countries such as China and India also showed high concern over the welfare of animals used in the production of their food. Thus, this trend is growing in importance worldwide, and the banning of battery hens is part of the movement towards increasing regulation around animal welfare.

A growing trend in sustainable living is the concept of reducing meat and dairy consumption due to the high carbon footprint of such products, with concepts such as low carbon diets. Research in this area could be explored assessing the impact of these changes on nutrition and the sourcing of alternative sources of fibre and protein.

Consumption of locally produced goods has grown, particularly in developed countries. The local foods movement promotes the purchasing of food sourced from locally-based producers. This is to support local communities but also some argue to reduce individual carbon footprints. As a result, alternative food networks, including community-supported agriculture, farmers' markets and food box schemes are slowly generating higher interest as a means of reducing the environmental impact of individual consumption. The Food Miles report among other showed this was a false premise but New Zealand has to be aware of this factor and still argue that locally-grown food is not necessarily better for the environment. In addition, New Zealand could also stress the importance of the community within the country and the fact that New Zealand imports food supports this.

Ethical consumption has grown considerably over the last three decades. Fair Trade is probably one of the most well-recognised ethical production schemes internationally with 57 per cent of consumers in traditional export markets recognising the FairTrade mark. Between 2008 and 2011, sales of Fair Trade products increased by 66 per cent.

In 2012, ARGOS has initiated the '*NZ Sustainability Dashboard*' programme that aims the development of a "sustainability assessment and reporting tool in partnership with five primary industry sectors in New Zealand". In order to inform the selection of key performance indicators (KPI) for inclusion in the Sustainability Dashboard, the concept of a database reporting on measures included in key market assurance and good practice schemes, as well as regulatory frameworks, was developed in this report. This database (the KPI Identification Database) was to contain specific indicators by which economic, social, environmental and governance-based regulation, best practice and market assurance principles have been measured by various product and company schemes internationally. Currently, the database includes 41 schemes;

examples of such schemes include certification and accreditation body schemes such as FairTrade, GLOBALG.A.P. and ISO standards.

To conclude, New Zealand has a number of key opportunities in overseas markets to effectively position its exports and enhance the value for these. This is across all premium market segments in both the traditional and emerging markets. New Zealand is in an important position to obtain market advantage with our relatively low intensive production systems and positive perception in markets. Traditionally New Zealand has excellent reputation for delivering quality and safe food which are still the most important attributes. However, of growing importance are the methods by which food is produced and concern for communities and environmental factors. Thus, positioning and marketing New Zealand products on this basis, and developing industry structures that can ensure these demands are met and that the benefits and signals flow down to producers, is important.

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APPENDIX: Categories, Themes, Goals and Indicators of the KPI Identification Database

CATEGORY	THEME	GOAL	INDICATOR
Good Governance	Governance Structure	Corporate Ethics	Corporate Ethics
	Accountability	Holistic Audits	Holistic Audits
			Internal Audits
			Management Review
	Participation	Responsibility	Responsibility
		Conflict Resolution	Conflict Resolution
			Public Participation
			Disciplinary Practices
		Grievance Procedures	Grievance Procedures
		Stakeholder Communication	Stakeholder Communication
			Internal Communication
	Rule of Law	Commitment to Fairness/Legitimacy	Commitment to Fairness/Legitimacy
			Legal Compliance
			Social Policy

			Fair Trade
		Co-Responsibility	Co-Responsibility
		Remedy, Restoration and Prevention	Remedy, Restoration and Prevention
	General Governance	Environmental Protection Investment	Environmental Protection Investment
			Environmental Policy
		Farm Cooperation	Farm Cooperation
		Farm Strategy and Planning	Farm Strategy and Planning
			Objectives and Targets
			Social and Environmental Mgmt
			Buildings and Structures
			Assurance Schemes
		Market Information Sharing	Market Information Sharing
		Monitoring and Assessment	Monitoring and Assessment
			Internal Audits
			Production Volumes
Good Governance	General Governance	Monitoring and Assessment	Environmental Impact Assessment
			Compliance Monitoring

			Assessment Tools
			Production Management
		Planning Instruments and Documents	Planning Instruments and Documents
			Record Keeping
			Quality Management
		Quality Management	Quality Management
			Planning
			Documentation
			Policy
			Infrastructure
			Monitoring and Assessment
			Control
Environmental Integrity	Atmosphere	Air Quality	Compliance
			Air Pollution
		GHG Accounting	Compliance
			GHG Emissions
			GHG Initiatives
			Carbon Accounting

		Noise	Noise
			Light
		Stratospheric Ozone	Compliance
	Biodiversity/Ecosystem Services	Biodiversity	Conserving Genetic Resources
			Diversity of Agricultural Production
			Flora Density/Diversity
			Habitat Conservation
			Habitat Diversity and Connectedness
			Indicator Species
			Intensity of Agricultural Production
			Native Birds
			Species Reduction
Environmental Integrity	Biodiversity/Ecosystem Services	Biodiversity	Aquatic Biodiversity
			Monitoring and Analysis
			Biodiversity Enhancement
		Ecosystem Integrity	Ecological Priority Areas
			Genetically Modified Organisms

			Plant Protection Management
			Reporting, Monitoring and Strategy
			Pest Management
			Inappropriate Technologies
	Land	Environmental Protection	Compliance
			Protection of Forests Against Logging
			Appearance
		Land Cover	Pasture Cover
			Natural Cover
			Field Margins
		Land Location	Land Location
		Land Management	Crop Management
			Positive Management Inputs
			Kaitiakitanga (Sustainable Mgmt)
			Kaikōkiritanga (Pro-Active Precautionary Approach)
			Weed and Pest Management
			Wild Procurement

		Land Use	Area of Protected Land
			Conservation Area
			Intensity of Forest Resources
			Pasture Use
			Type of Operation
			Viticulture-Specific
		Land Use Change	Area of Deforestation
			Conversion of Forests to Other Uses
			Reforestation of Depleted Forests
Environmental Integrity	Land	Land Use Change	New Production Areas
		Pollution/Degradation	Compliance
			Contaminated Sites
			Effluent Management
			Land Degradation, Erosion and Desertification
			Land Pollution – Contaminants
	Te Mātāpono Hauora	Maintenance of Inter-Connections for Well-Being	Production of Healthy Mahinga Kai
	Resources and Materials	Energy Accounting	Energy Intensity of Production

			Energy Return on Investment
		Energy Conservation	Energy Conservation
		Energy Consumption	Direct Energy Sources Produced
			Direct Energy Sources Purchased
			Direct Energy Sources Sold
			Energy Initiatives
			Fuel Consumption
			Intermediate Energy Use
			Non-Renewable Energy Use
			Renewable Energy Use
			Refrigeration
		Fertiliser/Nutrient Use	Composting/Manuring
			Equipment
			Nutrient Management
			Fertiliser Management
		Hazardous Waste Reporting	Hazardous Waste (Quantity by Weight)
			Method of Waste Disposal
			Solid Waste Composition

Environmental Integrity	Resources and Materials		Waste Spill Reporting
		Materials Used	Non-Renewable Resource Use
			Recycled Materials Input
			Total Material Use
		Materials Used	Equipment
		Packaging Initiatives/Recycling	Packaging Initiatives/Recycling
		Pest/Crop Management	Biological Control
			Chemical Disposal
			Chemical Storage
			Compliance
			Equipment/Training
			IPM
			Pesticide Use
			Weed Control
			Chemical Use
			Maximum Residue Limits
			Chemical Transport
			ICM
			Residues (General)

			Spray Drift
			Frost Protection
		Resource/Material Initiatives	Eco-Efficiency
			Resource Management
			Pollution Management
		Transport	Carbon Emissions
			Vehicle-Kilometres Travelled (VKT) by Road
		Waste Disposal	Recycling
			Solid Waste Disposal
			Waste Produced
			Waste to Landfill
			Waste Storage
			Waste Minimisation
		Soil Composition (Chemical)	Mineralisable Nitrogen
			Nitrogen Content
			Olsen Phosphate
Environmental Integrity	Resources and Materials	Soil Composition (Chemical)	pH Level
			Phosphorus Balance

			Heavy Metal Content
			Elemental Deficiency
		Soil Management	Ammonia Emissions
			Erosion Risk
			Nutrient Loss
			Soil Conservation
			Inputs
			Sterilisation
		Soil Properties	Biological
			Macroporosity
			Soil Compaction
			Soil Organic Matter
	Fresh Water	Access to Water	Depth of Groundwater Table
			Freshwater Demand
			Water Quantity
			Water Storage
			Water Supply
			Water Use Intensity
		Effect of Activities on Water	Effect of Activities on Water

		Groundwater Quality	pH Level
			Water Salinity
			Chemical Composition
		Recreational Water Quality	pH Level
			Water Salinity
		Recycled Water	Recycled Water
		Surface Water Quality	pH Level
			Water Salinity
		Water Biodiversity	Water Biodiversity
		Water Conservation	Water Conservation
			Monitoring and Assessment
Environmental Integrity	Fresh Water	Water Consumption	Water Consumption
			Irrigation
		Water Initiatives	Water Initiatives
			Wetland Protection
			Wastewater Treatment
		Water Pollution	Grey Water/Run Off Disposal
			Effluent Management
			Water Discharge Management

Economic Resilience	Production	Animal Health	Antibiotic Use
			Livestock Productivity
			Pathogen Incidence
			Weaning
			Animal Modification
			Animal Medicines and Supplements
			Access to Veterinary Services
			Monitoring and Assessment
			Animal Health Resources
			Biosecurity
			Casualty
			Cleanliness
			Depopulation
		Animal Welfare Compliance	Feed & Water
			Freedom from Stress
			Freedom of Movement
			Herd Management
			Housing

Economic Resilience	Production		Species-Appropriate Behaviour
			Husbandry
			Introduction of Stock
			Stocking Rates/Densities
			Stock Transport
			Slaughter
		Animal Welfare Compliance	Milking Parlour
		Animal Productivity	Animal Productivity
			Conversion
			Organic-Specific
			Breeding
			Bee-Keeping
			Aquaculture
		Crop Productivity	Crop Productivity
			Seed Stock
			Organic Production (General)
			Conversion
			Breeding
			Harvest Times

	Business	Community Engagement and Welfare	Community Monitoring/Improvement	Impact
			Community Investments	
			Community Services Support	
			Corruption Analysis/Mitigation	
			Fines/Sanctions	
			Legality of Operations	
			Local Involvement/Development	Community
			Local Procurement	
			Public Political Involvement	
			Ethical Trading	
		Eco-Efficient Purchasing	Eco-Efficient Purchasing	
		Economic Vulnerability	Input Self-Sufficiency	
			Internal Investment	
			Level of Indebtedness	
			Liquidity Reserve	
			Long-Term Investment	
			Payment Criteria	
Economic Resilience	Business	Financial Arrangements and	Price Premium	

		Relationships	Provision of Sale Contracts
			Purchasing
		Financial Well-Being of Business	Access to Finance/Credit
			Compound Annual Growth Rate
			Cash Flow-Turnover Ratio
			Financial Contribution to NZ Economy
			Debt/Asset Ratio
			Depreciation
			Dividends
			EBIT Margin
			Equity/Asset Ratio
			Net Farm Income
			Operating Expense Ratio
			Production Figures
			Return on Assets
			Return on Equity
			Revenue
			Product Value

			Product Consumption
			Taxation
		Financial Wellbeing of Employees	Employee Wages and Benefits
			Livelihood Security
		People Management	Absenteeism
			Contract Labour
			Employee Engagement
			Employee Turnover
			Personnel Management/Review
			Salaries, Income Level and Benefits
			Seasonal Labour
			Staff Training/Skills Enhancement
			Working Times
Economic Resilience	Business	People Management	Conduct
			Visitors
		Product Quality and Safety	Customer Satisfaction Monitoring
			Food Quality
			Food Safety

			Non-Compliance Monitoring
			Product/Service Assessment
			Product/Service Improvement
			Provision of Product/Service Information
			Traceability
			Equipment Best Practice
			Quality Management
			Design and Development
			Certified Product Purity
			Product Storage
			Processing
			Product Transport
			Product Packaging
			Maximum Ingredient Levels
			HACCP
		Size	FTE Employed
			Revenue
	Labour/Work Rights	Equity	Age

			Gender
		Employee Welfare	Health and Safety Indicators
			Provision of Health Care/Education
			Provision of Legal Protection
			Provision of Sanitation
			Health and Safety Policy
		Workplace Safety	ACC Experience Rating
Economic Resilience	Labour/Work Rights	Workplace Safety	Lost Time Injury Frequency Rate (LTIFR)
			Monitoring and Assessment
			Accident Prevention
			Provision of Health/Safety Equipment
Social Well-Being	Community	Social Capital	Cultural Diversity
	Cultural	Tikanga (Cultural Ecological Wisdom)	Whakapapa
			Rangatiratanga
			Kaitiakitanga
			Wairua and Mauri

			Mātauranga Taiao
		Whanaungatanga (Fairness)	Equity
			Life Opportunity
			Respect
			Social Justice
			Stewardship
	Quality of Life	Financial Situation/Decent Livelihood	Capacity Building
			Wage Level
		Health and Safety	Food Security
			Health Resources
			Physical and Psycho-Social Health
			Sanitation/Conditions
		Occupation and Education	Occupation and Education
		Personal Freedom and Values	Personal Freedom and Values
		Social Relations	Social Relations
	Social/Human Rights	Education	Education
		Equity	Cultural/Religious Rights
			Gender Equality

Social Well-Being	Social/Human Rights		Indigenous Rights
			Minority Rights
			Non-Discrimination
			Support to Vulnerable People
		Equity	Abuse Mitigation
		Food Security	Food Security
		Investment in Human Rights	Provision of Housing
			Provision of Sanitation
			Provision of Food and Water
		Labour Rights	Child Labour
			Employment
			Forced/Compulsory Labour
			Freedom of Association
			Bargaining
			Working Hours
		Monitoring and Assessment	Discrimination/Violation
			Freedom of Association