

Where does our food come from?

Consumer Focused Review



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Contents



Abbreviations	5
List of figures	7
List of tables	8
Executive summary	9
1 Introduction	14
1.1 Background	14
1.2 Terms of reference	14
1.3 Scope	14
2 Food origin and the consumer	15
2.1 Summary	15
2.2 Quantitative research	15
2.3 Qualitative research	18
2.4 Conclusions	27
3 Case study	29
3.1 Introduction	29
3.2 Pizza ingredients	30
3.3 Conclusion	31
4 The supply chain	33
4.1 Summary	33
4.2 Introduction	33
4.3 The agricultural food sector for NI and ROI	34
4.4 Stages in the supply chain	36
4.5 The organic market	41
4.6 Processing	42

5	Food safety and food origin	44
5.1	Summary	44
5.2	Introduction	44
5.3	Microbiology	44
5.4	Chemical residues and contaminants	45
5.5	Food safety controls for the ROI and NI	47
5.6	Controls for imported food	49
5.7	Chemical contamination in food	51
5.8	Foodborne Human Infections Associated with Food Imports	55
5.9	Traceability and product recall	61
5.10	Quality assurance schemes	62
6	Nutrition	64
6.1	Introduction	64
6.2	Factors affecting the nutritional properties of foods imported onto the island	64
6.3	Changing food environment	65
6.4	Food security, food poverty and nutrition	68
7	Labelling	70
7.1	Summary	70
7.2	Introduction	70
7.3	Understanding food labels	70
7.4	Country of origin	72
7.5	Sustainable labelling	73
8	Food origin and food values	76
8.1	Introduction	76

8.2 Carbon footprint	76
8.3 Food miles and sustainability	77
8.4 Ethical labelling	78
9 Conclusions	80
9.1 Introduction	80
9.2 Key findings	81
References	84

Abbreviations



ADI	Acceptable daily intake
AES	Agri-environmental scheme
ACMSF	Advisory Committee for the Microbiological Safety of Foods
BIP	Border Inspection Posts
CAP	Common Agricultural Policy
COOL	Country Of Origin Labelling
CDC	Centre's for Disease Control and prevention
CDSCNI	Communicable Disease Surveillance Centre Northern Ireland
DAFF	Department of Agriculture, Fisheries and Food
DARD	Department of Rural Development
ECDC	European Centre for Disease Control
EFSA	European Food Safety Authority
ETS	Emissions Trading Scheme
EU-15	Belgium, France, Italy, Luxembourg, Netherlands, Denmark, Ireland, UK, Germany, Spain, Portugal, Austria, Finland, Sweden and Greece
EU-25	EU-15 plus Cyprus, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Malta, Poland, Slovakia and Slovenia
EU-27	EU-25 plus Bulgaria and Romania
FBO	Food Business Operators
FDA	Food and Drug Administration
FSA	Food Standards Agency
FSANI	Food Standards Agency Northern Ireland
FSAI	Food Safety Authority of Ireland
FSTP	Food Security Thematic Programme
FVO	Food and Veterinary Office
GATT	General Agreement on Tariffs and Trade
GB	Great Britain

GDP	Gross Domestic Product
GHG	Greenhouse Gases
GM	Genetically Modified
GMO's	Genetically Modified Organisms
GVA	Gross Value Added
HACCP	Hazard Analysis Critical Control Point
IHR	International Health Regulations
IOI	Island of Ireland
IOFGA	Irish Organic Farmers and Growers Association
IQF	Individually Quick Frozen
JECFA	Joint Expert Committee on Food Additives
MRL's	Maximum Residue Levels
MS	Member States
NI	Northern Ireland
OV	Official Veterinarian
PWE	Product Weight Equivalent
QAB	Quality Assurance Branch
RASFF	Rapid Alert System for Food and Feed
REPS	Rural Environmental Protection Scheme
ROI	Republic of Ireland
TDI	Tolerable Daily Intake
UK	United Kingdom
VI	Veterinary Inspector
WHO	World Health Organisation
WTO	World Trade Organisation

List of Figures

- Figure 2.1** Consumers' concerns with regard to the quality of foods imported from EU and non-EU countries
- Figure 2.2a** Consumers' concerns with regard to the quality of food categories (fruit and vegetables, fresh meat and fish) imported from EU and non-EU countries
- Figure 2.2b** Consumers' concerns with regard to the quality of food categories (frozen meat/poultry/fish, processed foods and tinned foods) imported from EU and non-EU countries
- Figure 2.3** Specific concerns about imported foods
- Figure 2.4** Consumers' shopping behaviour
- Figure 2.5** Supermarket perceptions
- Figure 2.6** Consumer comments regarding supermarket versus local butcher/vegetable shops
- Figure 2.7** Consumers' concerns about country of origin
- Figure 2.8** Consumers' concerns with regard to importing foods
- Figure 2.9** Consumer perceptions of food origin labelling
- Figure 2.10** Varied attitudes towards importing foods
- Figure 3.1** Import information for pizza ingredients for the ROI
- Figure 3.2** Import information for pizza ingredients for the UK
- Figure 4.1** Exports of Irish Food and Drink (€m) 2008
- Figure 4.2** Imported food supply chain for the IOI
- Figure 4.3** Total food imports for NI, the ROI and the IOI between 2002 and 2007
- Figure 4.4** Food categories as a percentage of the total trade from NI to the ROI
- Figure 4.5** Food categories as a percentage of the total trade from the ROI to NI
- Figure 5.1** Flowchart outlining the transmission of information for the Rapid Alert System for Food and Feed
- Figure 5.2** Food incidents according to hazard identified for the ROI
- Figure 5.3** 2007 EU notifications according to types of control
- Figure 6.1** The relationship between energy density and cost of food
- Figure 6.2** Case study: Food security in Ethiopia
- Figure 7.1** Labelling for sustainability
- Figure 7.2** Carbon footprint labelling

List of Tables



- Table 2.1** Focus group matrix
- Table 2.2** Accompanied shop matrix
- Table 4.1** Import values for the ROI and NI 2007
- Table 4.2** List of EU and Third Countries exporting foods into NI
- Table 4.3** List of EU and Third Countries exporting foods into the ROI
- Table 5.1** Hazard breakdown for the 76 food incidents in the ROI
- Table 5.2** Types of contamination in food for the EU in 2007
- Table 5.3** Foodborne Disease Outbreaks and International Health Regulations 2005 in Australia
- Table 5.4** Selected outbreaks in the United States of America 1988-1997 associated with emerging foodborne pathogens and factors for their emergence

Executive Summary

In 2008 **safefood** initiated a programme of scientific reviews, which profiles a specific topic of interest, identifies and describes the relevant food safety and nutritional issues pertaining to it at various points along the food chain, and identifies opportunities to communicate the human health benefits to, and influence the behaviour of, a wide variety of stakeholders.

Food occupies a fundamental position in people's lives. Regardless of age, income, social standing, culture or religious belief, every individual must eat and so has a stake in where their food comes from and how it is produced. Rapid changes to the economy, lifestyle, culture, climate, world issues and trade have opened the door to food imported from a diverse range of countries. Over the last few decades, there has been an increase in demand for better quality and more varied types of food. The food landscape on the island of Ireland (IOI) has changed enormously as spendable income increased through the economic boom. Travel to other countries became more common, people ate out more frequently and tastes diversified. New food values emerged, such as a desire for healthier foods, organic foods or 'FairTrade' food, as key examples.

More food is produced on the IOI than imported. In 2007, the total gross turnover for the Northern Ireland (NI) food and drinks processing sector was £2.7 billion¹ (€2.9 billion) and for the Republic of Ireland (ROI) the gross turnover was over €18 billion (£16.5 billion). The amounts of food exports for NI were valued at £537 million (€594 million) and for the ROI were €8.6 billion (£7.9 billion). In comparison, in NI the total amount of foods imported was valued at £460 million² (€502 million), whereas the ROI imported a total of €4.6 billion (£4.2 billion). However, the consumer research conducted as part of this review revealed greater consumer concern with foods imported from outside of the IOI. Therefore, the focus of this review is on externally produced foods, mainly on food imported from the European Union (EU) as well as Third countries³. Domestic production of key food chains for the domestic market has been reviewed in previous consumer focused reviews.

The title of the current consumer focused review being carried out by **safefood** is "Where Does Our Food Come From?", focusing mainly on food imported from the European Union (EU) as well as Third Countries. The review aims to provide consumers with the most relevant and pertinent information available about where the food they eat comes from so they can make informed choices concerning health, safety and local economies.

Consumer research

To explore consumer perceptions, attitudes and behaviour in relation to where their food comes from, **safefood** conducted both quantitative and qualitative research on the IOI as part of this review.

Quantitative research

The survey of 805 people found that more than half of the consumers on the IOI are concerned about the origins of their food. Knowing the source of their meat and fish was particularly important to many. In spite of this, however, there was a distinct lack of knowledge as to the origin of the majority of food they purchased and a severe lack of confidence in the 'loopholes' of the current labelling system. Sixty per cent of consumers on the IOI were concerned about the quality of imported fresh meat, 52 per cent fresh fish, 57 per cent frozen meat/poultry, 48 per cent processed foods (prepared meals), 31 per cent tinned food and 29 per cent fruit and vegetables.

Consumers were most concerned about poor regulations and standards of food production (48 per cent), quality (27 per cent) and fear of contamination (24 per cent) of imported foods. Consumers in the ROI were more concerned about the multiple handling of products and country of origin than consumers in NI.

1 Currency exchange £1 is equivalent to €1.0865/€1 is equivalent to £0.921 (accessed March 2009)

2 NI imports do not include imports from Great Britain (GB)

3 A Third Country is a state that is neither a Member State of an Associated State

The knowledge of how much of the food on the IOI that is imported was low. While many were aware of the amount of meat and fruit that is being imported, they had no real knowledge of the proportion of food imported or reasons why food is imported. With regard to the debate on whether food is imported or locally or nationally grown, consumers felt locally or nationally grown products were more authentic and of higher quality. Forty three per cent of consumers on the IOI were concerned about the quality of food imported from within the EU, whereas 54 per cent were concerned about the quality of imported foods from non-EU countries. However, despite these concerns, ultimately they were happy to pay the cheaper prices and avail of better choice when it came to imported goods.

Qualitative research

Qualitative research was carried out to assess consumer attitudes to where their food comes from. Through focus groups and accompanied shop research, it was found that price, convenience, increased presence and marketing of different multiples, most notably discounters, have changed how consumers shop. The desire to eat healthily is a growing concern with many consumers; however, healthy eating was not always prioritised if the price was too high. Equally, while many consumers would like to buy organic food because they felt it tasted better, or to buy 'FairTrade' for ethical reasons, again price was a barrier.

When asked about environmental issues such as 'carbon footprint' and 'food miles', these terms were understood. However, there was a general consensus that the consumer would have great trust in foods which were grown closest to home than in food originating from further away. The perception was that they would not have travelled as far and, as a result, may potentially be less harmful to the environment and in better condition. Consumers clearly expressed the wish for more honest and transparent information with regard to food sources/origins, including where foods were packaged and processed if applicable.

Food imports to the ROI and NI

There are many benefits of producing food locally. These include sustainable economic development, less environmental impact, better health, community interaction, educational opportunities, sustainable land use and natural landscapes. However, due to changes to lifestyle, culture, climate, world issues and trade, the importation of food from the EU and Third Countries is necessary. From an economic perspective, the food import sector is important with regard to international trade relations for both NI and the ROI. Importing of food is also necessary from the point of view of cost. In some cases, it is more economical to import foods where the production costs are significantly less than the IOI; hence food and food products can subsequently be sold to the consumer at a lower price than those produced locally.

Over the last few years, there has been a steady rise in food imports onto the IOI. Studies have shown that in the ROI, consumers spent just over €4 billion (£3.7 billion) or €1,000 (£921) per person annually on imported food, a figure which increased by 50 per cent in the years 2000-2007.

In 2002, the amount of imports onto the IOI were recorded at 4.5 million tonnes, which increased by approximately 18 per cent to 5.3 million tonnes in 2007. This was equivalent to an increase in value of approximately €1.5 billion (£1.4 billion).

The total food imports were valued at €4.6 billion (£4.2 billion) in the ROI in 2007, whereas, for NI the total food imports amounted to 0.9 million tonnes, which was in turn equivalent to £460 million (€502 million).

The greatest amounts of foods imported onto the IOI were cereals, fruit and vegetables. A significant amount

of food imports, especially fruit, cereals and vegetables are imported from Third Countries i.e. China, Costa Rica, and South Africa. Meat and dairy produce are mostly imported from within the EU. Although the IOI imports a substantial amount of food and food products, clearly the IOI is also a large exporter of food.

Diversity of imports

To show the diversity and range of countries from which we import food into the ROI and the UK (data unavailable for NI), an example of a processed food – Hawaiian pizza – was studied. A full breakdown of the source of these ingredients was carried out. Tomatoes for example are sourced from Greece, China, Morocco, Spain, France and Australia for the ROI and the UK.

Safety of imports

In relation to the safety of imported foods, foodborne illnesses from imported food have been caused by a wide range of pathogens worldwide, carried in a variety of different foods. Contaminated produce eaten raw is an increasingly recognised vehicle for transmission of *Salmonella* and other pathogens. Imported fresh fruit and vegetables have been linked extensively, both epidemiologically and microbiologically, to infectious intestinal disease worldwide.

Multiple countries or regions often involve outbreaks associated with fresh produce. This is recognised as an important and emerging public health concern. In recent years, fresh produce categories such as raspberries, melon, lettuce, fruit juices and sprouted seeds have been implicated as vehicles in multi-country outbreaks of a range of intestinal infections including salmonellosis, shigellosis, hepatitis, and *E. coli* O157:H7.

With regard to the IOI, only one recorded outbreak associated with imported foods was reported by the Communicable Disease Surveillance Centre Northern Ireland. In September 2004, 113 cases of *Salmonella* newport were notified and epidemiologically linked to lettuce that was thought to have originated from mainland Europe. There were no confirmed cases of the illness in the ROI; however, one case of *Salmonella* newport in Co. Donegal was found, which may have been associated with the UK outbreak. As the supply chain was very complex, a full trace back was not possible. In 2007 the Food Safety Authority of Ireland (FSAI) reported 76 food incidents of which 41 per cent were attributed to chemical contamination. In the UK (data unavailable for NI), the Food Standards Agency (FSA) investigated 1,312 food incidents, 16 per cent were attributed to chemical contamination.

Quality assurance schemes

Several quality assurance schemes are in place for food and food products on the IOI. Many of these have arisen in response to emerging issues in the EU/IOI food sector, such as BSE, foodborne illnesses and contaminants, animal welfare and environmental issues, and are designed to help reassure the consumer about where and how their food is produced.

Food safety checks

For food entering the IOI from the EU and Third Countries, a number of safety checks are in place. With regard to food from the EU, the single market concept of freedom of movement applies to imports of food from EU member states. Inspections of such imports at ports are generally only carried out following the receipt of information indicating a potential food safety problem. Inspections inland of imported EU products should be at no greater frequency than domestically produced food. The safety of the food supply chain is regulated by legislation primarily enforced by the FSA in NI and the FSAI in the ROI.

Imports of food and food products from Third Countries must come through designated Border Inspection Posts (BIP) and be subjected to a series of checks before they are allowed access to the EU market. The BIP are situated in strategic locations in each member state and are under the supervision of the relevant competent authority of the member state. The Food and Veterinary Office of the European Commission routinely audits the controls exercised at these BIP.

EU legislation

Live animals and animal products imported into the EU may only originate from a Third Country, or part of a Third Country, that is approved by the EU. The establishments from which these products are produced must be approved, in accordance with the relevant EU legislation, by the competent authority of that Third Country. The Hygiene Package also deals with imported foods.

Imports and nutrition

There is natural variation in the nutrient composition of all natural foodstuffs, home grown and imported, as it is affected by key factors such as soil and growing conditions, animal feed composition, transport and storage, and fortification.

Healthy eating guidelines emphasise the importance of eating a variety of foods to obtain all the essential nutrients required for healthy living. An increased variety of foods is associated with a better quality diet among both adults and children and is often used as an index of diet quality. In the last two to three decades, there has been a phenomenal rise in the number and variety of food available both in and outside of the home. Food imports may also result in the increased availability of cheap, sweet or fatty, high energy-dense foods. This may have a negative affect on the diets of those in food poverty, in particular.

Food labelling

There are legal requirements in place that govern the labelling of food products, whether it be meat, cereals, fruit and vegetables, beverages, seafood or prepared foods. Legislation has recently come into force on the use of nutrition and health claims on products. Correct labelling of food and food products is imperative as it enables consumers to make informed decisions about the food they eat and also builds confidence in products. There is specific EU legislation that requires country of origin information for beef, veal, fish, shellfish (whether pre-packed or loose), wine, fresh fruit and vegetables, honey, olive oil, and poultry meat imported from outside the EU. New legislation is currently being proposed with regard to country of origin and sustainability labelling.

Environmental impact

From farm to fork, food accounts for a significant share of the total environmental impact of humans on the earth. The environmental impacts arise in all parts of the life cycle of food products: agriculture, industry, retail, transport, and last but not least, the consumer phase. 'Carbon footprint' has become a widely used term and concept in the public debate on personal responsibility in tackling the threat of global climate change. The food chain, especially farming, is a large contributor to global greenhouse gas emissions.

Furthermore, awareness of 'food miles', the total distance in miles the food item is transported from field to plate, has led to a general movement towards local production and local consumption in order to minimise them. Food transport accounts for a third of all the 20.6 million tonnes of oil used in the UK food chain each year. Although food

miles are considered to have a negative impact on the environment, there are cases where it is necessary for food to travel long distances to reach the final destination. For instance, due to climate restrictions, certain fruit and vegetables must travel a significant distance. It may also be argued that the high energy used in production of these foods may create more damage to the environment due to the creation of greenhouse gases, if produced locally.

Key findings

Consumer concerns

- *A large proportion of consumers expressed concern about imported foods, particularly those from Third countries.*
- *Consumers are most concerned about the origins of their meat and fish.*
- *The main food safety concerns with imported foods were poor production standards and regulations (48 per cent), the quality of imported foods (27 per cent) and the perception that the further food travels, the greater the risk of contamination (24 per cent).*
- *While consumers expressed concern about many food issues, including food origin and production methods, currently price is the most important factor predicting food purchasing behaviour.*

Food Imports

- *The total food imports were valued at €4.6 billion (£4.2 billion) in the ROI in 2007, whereas for NI the total food imports amounted to 0.9 million tonnes, which was in turn equivalent to £460 million (€502 million).*
- *The largest amounts of foods imported onto the IOI were for cereals and fruit and vegetables. A significant amount of food imports, especially fruit, cereals and vegetables are imported from Third Countries i.e. China, Costa Rica, and South Africa onto the IOI. With regards to meat and dairy produce, these are mostly imported from within the EU.*
- *Food imports from EU and Third Countries are necessary for economic, seasonality, availability, trade and consumer demand.*

Food safety

- *On the IOI, there are controls, legislation and systems in place which aim to control both microbiological and chemical hazards in the supply chain, and, thereby, minimise the risk to consumers.*
- *No confirmed outbreaks have been associated with food imported onto the IOI.*

Nutrition

- *Food transport, variety of soil, climate and transport conditions have an impact on the quality of food.*
- *The import of food has facilitated a greater availability and variety of food which can benefit healthy eating but could also lead to the increased availability of unhealthy foods.*

1. Introduction

1.1 Background

Previous consumer focused reviews by **safefood** have reported on the beef, dairy, finfish, pork, fruit and vegetable and poultry supply chains. This series of reviews examined how food is produced, processed, sold and consumed on the island of Ireland (IOI) and includes research into consumers' awareness and perceptions of nutrition and food safety issues surrounding the individual foods studied. Due to the success of the previous consumer focused reviews, we have now begun a new series of reviews to study certain topics of interest rather than specific foods.

The purpose of this particular review is to provide consumers and other stakeholders with the most relevant and pertinent information available to enable them to make informed choices, concerning health, safety, and local economies with respect to the foods they eat and where it comes from. For the purpose of this review, Third Countries are also referred to as non-EU countries.

In 2007, the total gross turnover for the Northern Ireland (NI) food and drinks processing sector was £2.7 billion⁴ (€3.9 billion) and for the Republic of Ireland (ROI) was over €18 billion (£16.6 billion). The value of NI food exports was £537 million (€594 million) and for the ROI were €8.6 billion. In comparison, in NI the total value of imported foods was £460 million⁵ (€502 million) and €4.6 billion (£3.6 billion) for the ROI. While more food is produced on the IOI than is imported, the consumer research conducted as part of this review revealed greater consumer concern with foods imported from outside of the IOI. Therefore, the focus of this review is on externally produced foods. Domestic production of key food chains for the domestic market has been reviewed in previous consumer focused reviews.

1.2 Terms of reference

The current review focuses on the global nature of the food chain and will specifically:

1. *Identify and profile the foods that are imported onto the IOI and the range and diversity of countries involved.*
2. *Explore the distribution chain and how it functions.*
3. *Report on how the controls and standards are implemented in the importation of foods, including the role of the Food and Veterinary Offices and other regulatory bodies.*
4. *Describe how the traceability system works in the event of a national and international food scare.*
5. *Report on the nutrition implications of transportation on foods and the availability of a increasingly diverse diet.*
6. *Explore the view of consumers.*

1.3 Scope

This document collates and considers the information available in the public domain (both regulatory and scientific) on the health and food safety implications of the global food supply chain for the people on the IOI.

While the primary purpose of this review is directly pertaining to information about food safety and nutrition issues, other issues are discussed, including labelling, organic production, food import controls, carbon footprinting, ethical labelling, food miles and sustainability.

4 Currency exchange £1 is equivalent to €1.0865/€1 is equivalent to £0.921 (accessed March 2009)

5 NI imports do not include imports from Great Britain

2. Food Origin and the Consumer

2.1 Summary

This review collates and considers the information in the public domain on the food safety and nutrition aspects of the food supply chain on the island of Ireland (IOI). In order to frame the review, quantitative and qualitative research was conducted to explore consumer attitudes, perceptions and behaviours in relation to where their food comes from.

The consumer research indicated that most consumers were anxious to find out where their meat and fish had been sourced, and reported that they found current information on food origins misleading and unclear. Forty three per cent of consumers on the IOI were concerned about the quality of food imported from within the EU, whereas 54 per cent were concerned about the quality of imported foods from non-EU countries. Sixty per cent of consumers on the IOI were concerned about the quality of imported fresh meat, 52 per cent fresh fish and 29 per cent fruit and vegetables. Furthermore, 57 per cent of consumers on the IOI were concerned about the quality of frozen meat/poultry, 48 per cent about processed foods (prepared meals) and 31 per cent about tinned food.

Of the 557 consumers on the IOI who were concerned about imported foods, the highest concern was found in relation to poor regulations and standards of food production in other countries (48 per cent). Quality (27 per cent) and fear of contamination (24 per cent) were the next concerns. There were also differences in consumer concerns between the Republic of Ireland (ROI) and Northern Ireland (NI). Multiple handling of products, country of origin and not trusting the source or country were higher among consumers in the ROI than NI.

The majority were not concerned about the origins of their remaining grocery shop (fruit, vegetables, non-perishable items etc.). Value for money outweighed most concerns surrounding origin of these remaining food items (apart from meat/fish). This was illustrated by increased frequency of visiting various different multiples to find the best prices. Awareness of the numbers and types of imported food goods onto the IOI was low and many did not feel compelled to find out more about it as they felt it is an ongoing situation over which they have limited control.

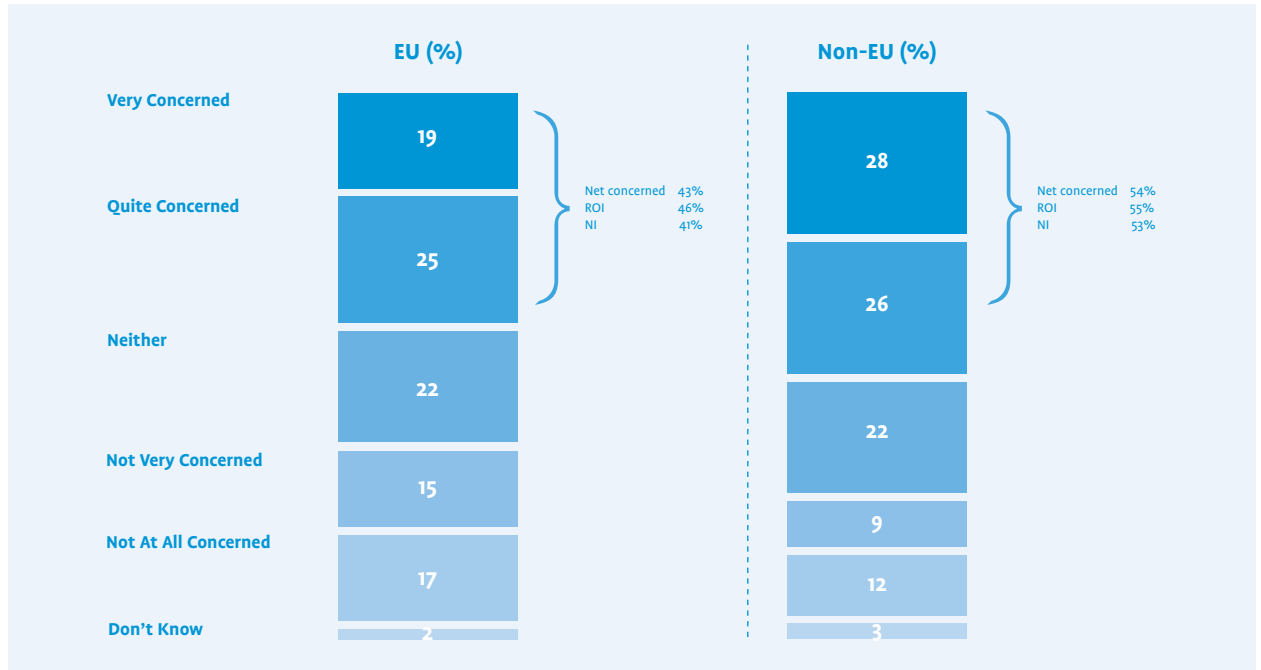
Consumers were aware of the terms ‘carbon footprint’, ‘food miles’ and ‘ethical labelling’ although understanding of the meaning of these phrases was limited. Organic produce created interest but only at the right price, particularly for those with larger families. Consumers clearly expressed the wish for more honest and transparent information with regard to food sources/origins including where foods were packaged and processed if applicable.

2.2 Quantitative research

safefood conducts bi-annual market research during which, among other things, consumers’ attitudes and behaviour in relation to particular foods and food preparation habits are determined. In its November 2008 research, consumers were asked about any concerns they had about where their food comes from. Consumers were also questioned on their awareness of imported foods and the term ‘food miles’.

A total of 805 face-to-face interviews were conducted on the IOI; 503 in the ROI and 302 in NI. The sample consisted of adults aged 15 to 74 and was nationally representative. With regard to concerns about imported foods from both the EU and non-EU countries, 43 per cent of consumers were concerned about the quality of food imported from within the EU, whereas 54 per cent were concerned about the quality of imported foods from non-EU countries (Figure 2.1).

Figure 2.1 Consumers' concerns about the quality of foods imported from EU and non-EU countries



Consumers were asked if they were concerned about the quality of imported foods such as fruit and vegetables, fresh meat, fish, frozen meat (poultry/fish), processed foods (prepared meals) and tinned foods. Overall, 60 per cent of consumers on the IOI were concerned about the quality of imported fresh meat, 52 per cent fresh fish and 29 per cent fruit and vegetables (Figure 2.2a). Furthermore, 57 per cent of consumers on the IOI were concerned about the quality of frozen meat/poultry, 48 per cent over processed foods (prepared meals) and 31 per cent about tinned food (Figure 2.2b).

Figure 2.2a Consumers' concerns about the quality of food categories (fruit and vegetables, fresh meat and fish) imported from EU and non-EU countries

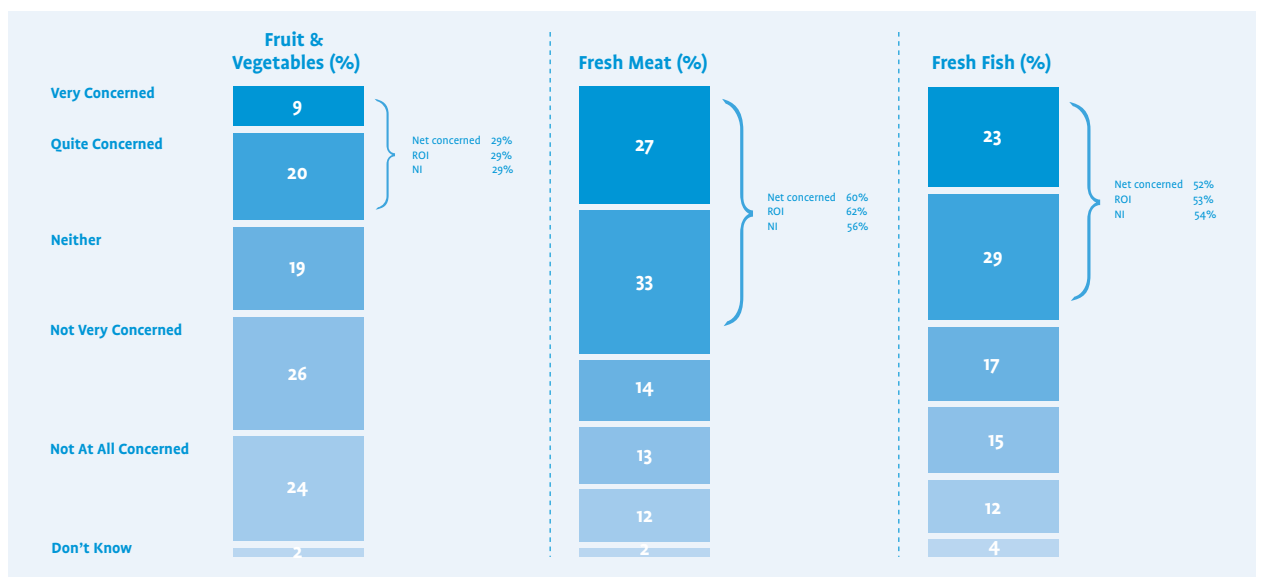
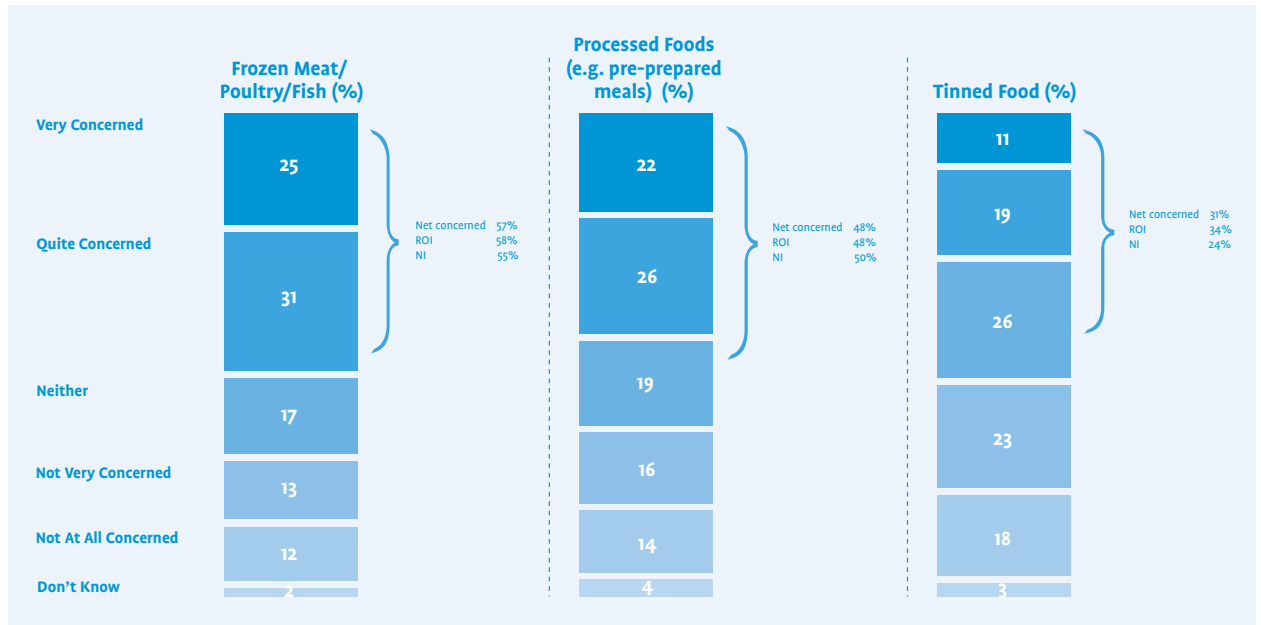
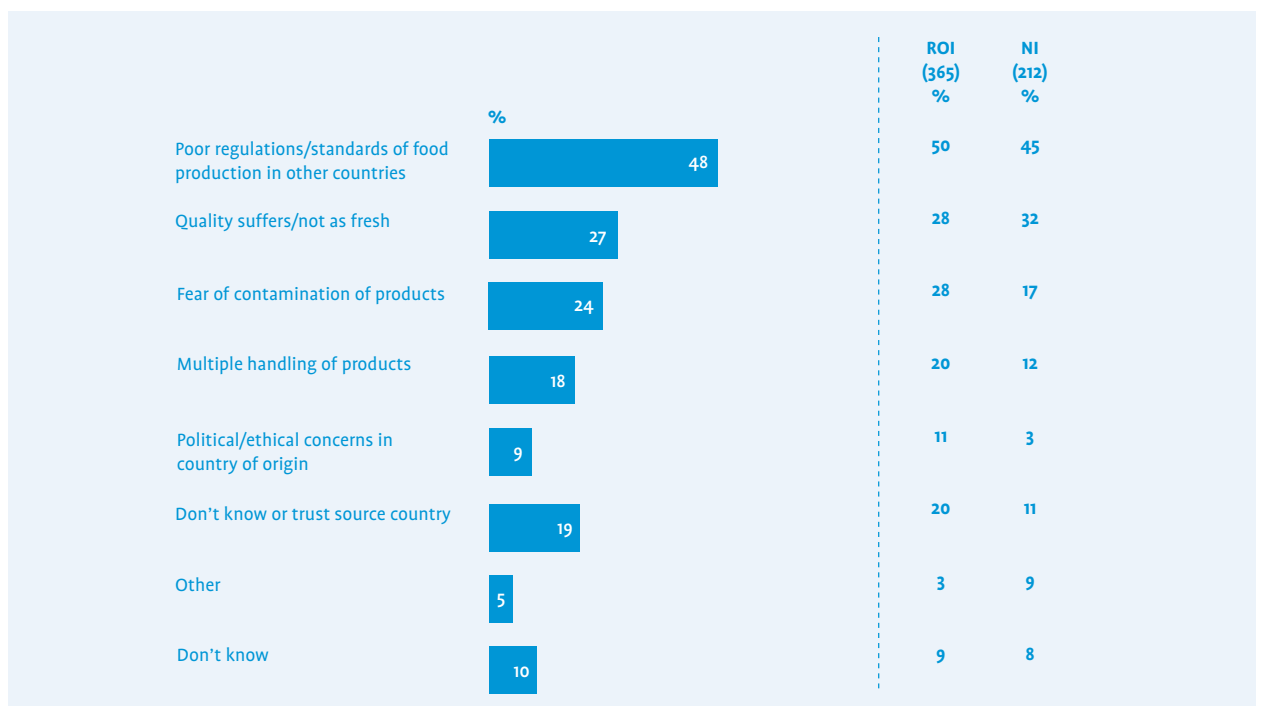


Figure 2.2b Consumers' concerns about the quality of food categories (frozen meat/poultry/fish, processed foods and tinned foods) imported from EU and non-EU countries



Of the 557 consumers on the IOI who were concerned about imported foods, the highest level of concern was found in relation to poor regulations and standards of food production in other countries (48 per cent). Quality (27 per cent) and fear of contamination (24 per cent) were the next highest concerns. There were also differences in consumer concerns between the ROI and NI. Concern about multiple handling of products, country of origin and not trusting the source or country were higher among consumers in the ROI than NI (Figure 2.3).

Figure 2.3 Specific concerns about imported foods



Consumers were asked what they understood by the term ‘food miles’. Overall 39 per cent of the consumers understood the term to be:

“Number of miles food travels from its country of origin to your plate”

However, 34 per cent of the consumers on the IOI didn’t know what the term ‘food miles’ stood for, whereas 13 per cent knew that it had an impact on the environment and the freshness of food. A greater awareness of the impact on the environment was found for consumers in the ROI (Figure 2.3). When consumers were asked whether they were willing to sacrifice food imports for the sake of the environment, 57 per cent agreed that less food should be imported onto the IOI in order to protect the environment, regardless of the fact that there would be less variety in shops and the cost of food would be higher. In comparison, 28 per cent of consumers were opposed to this.

2.3 Qualitative research

In September 2008 and February 2009, **safefood** commissioned qualitative research throughout the IOI to elicit consumers’ perceptions of the global food supply chain using focus groups and accompanied shops.

The objectives were to:

- Explore consumers’ perceptions, understanding and behaviour around local, national and imported foods.
- Determine general attitudes towards shopping, healthy eating, labelling and triggers to purchase.
- Explore attitudes to food issues such as air miles, carbon footprint, ethical labelling and areas of clarification sought.

The focus groups consisted of six discussion groups (eight participants per group) and were held amongst consumers in the ROI and NI. The groups were conducted across urban (Dublin and Belfast) and rural (Kilkenny and Newry) locations to provide a mix and allow for regional variation, if applicable. Variation in target markets was taken into account when choosing the optimum group matrix, with particular emphasis on the stage of a person’s life. Mixed and female and male only groups were conducted. Single sex groups were conducted as men and women might behave differently when interviewed alone. The focus group matrix is illustrated by Table 2.1.

Table 2.1 Focus group matrix

Group No.	Gender	Lifestage	Social Class	Age	Location
1.	Male	Working full/part time with children	BC1	45-60	Kilkenny
2.	Mixed	Working full/part time with mix of those with/without children	C1C2	25-34	Belfast
3.	Mixed	Working full/part time with children	C2D	35-50	Dublin
4.	Male	Working full/part time with mix of those with/without children	BC1	25-40	Dublin
5.	Female	Homemakers/working part-time with children	C1C2	35-50	Kilkenny
6.	Female	Homemakers/working part-time with children	C2D	40-50	Newry

'Accompanied shops' are a qualitative assessment of consumer behaviour, which allows a more detailed exploration of behaviour in the live environment. They also allow the researcher to capture actions and reactions in a natural setting, which may be otherwise difficult for the respondent to recall in a more formal type group setting.

The objective of the accompanied shop was to examine consumers' behaviour first hand in relation to the factors that drive a purchase decision. Concentrating on their attitudes towards shopping, the extrinsic factors such as healthy eating, country of origin, the organic market, 'food miles' and 'ethical labelling' were studied. Six accompanied shops were conducted in Dublin among friendship pairs. These were conducted in a variety of multiples and discount stores.

The focus groups indicated a mismatch between consumer concerns and actual behaviour. Therefore, this approach was used to provide added value to the focus groups such as how consumers react to packaging/labelling, to examine to what extent it influences choice and to assess the information sought on the package/bottle/jar. The matrix for the accompanied shops is illustrated by Table 2.2 below.

Table 2.2 Accompanied shop matrix

Group No.	Gender	Lifestage	Social Class	Age	Location
1.	Female	Working full/part time with children	BC1	45-60	Blackrock
2.	Female	Working full/part time with mix of those with/without children	C1C2	25-34	Dun Laoghaire
3.	Female	Working full/part time with children	C2D	35-40	Deans Grange
4.	Male	Working full/part time without children	BC1	25-32	Dublin
5.	Female	Homemakers/working part-time with children	C1C2	35-50	Dun Laoghaire
6.	Female	Homemakers/working part-time with children	C2D	40-50	Glasnevin

The results from the focus groups and the accompanied shops are outlined below.

2.3.1 Shopping behaviour

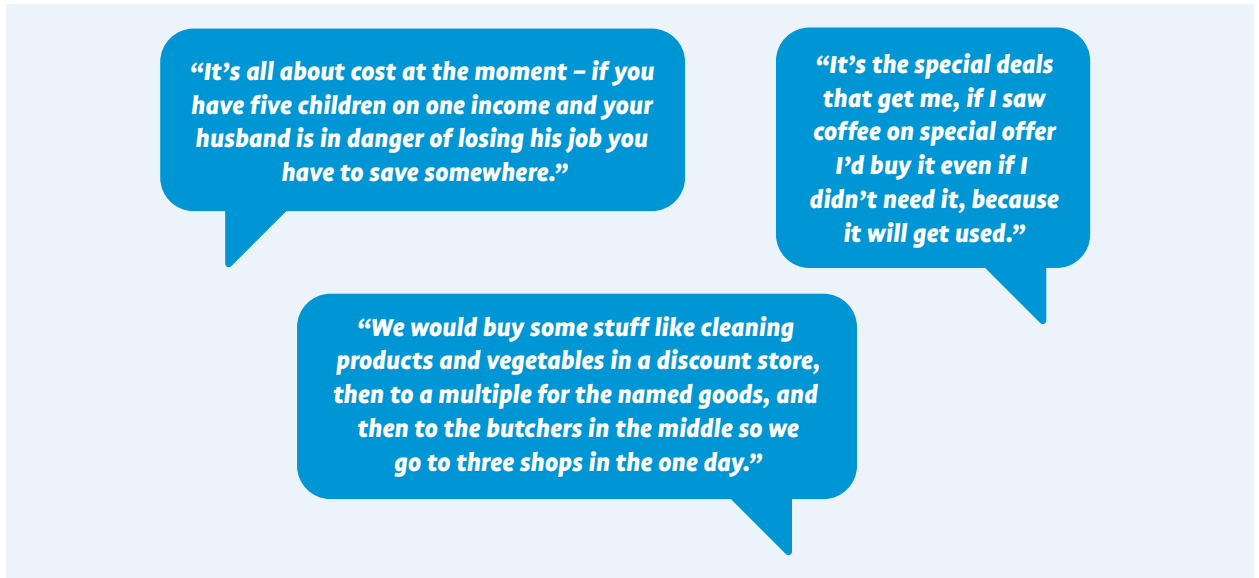
There has been a major change in consumer shopping behaviour. The following factors emerged from the focus group discussions.

2.3.1.1 Price

One of the most salient factors that has shaped consumers shopping pattern is price (Figure 2.4). Many consumers said that they just cannot afford the price of food nowadays and have taken to writing lists in order to keep within their weekly or monthly budget.

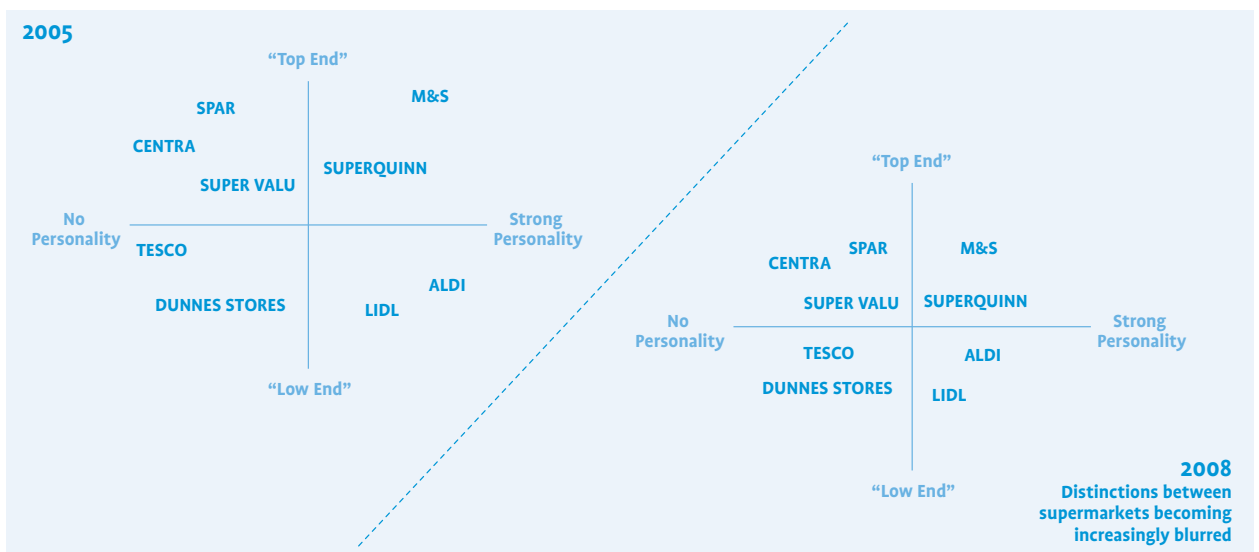
Many consumers had become more value conscious in recent times and were more willing to 'hunt out' a bargain. Trips to discount supermarkets are on the increase with many being selective in the products they would purchase there. For example, consumers mentioned household cleaning products, beer, jam, biscuits, fruit and vegetables. There was a perception that the customer base of such shops is changing.

Figure 2.4 Consumers' shopping behaviour⁶



Changes in perceptions of supermarkets were observed. The differences in supermarket perceptions for 2005 and 2008 are illustrated by Figure 2.5. It clearly demonstrates that the distinctions between supermarkets are becoming increasingly blurred and that of new ‘supermarket price wars’ are emerging. Due to the current downturn in the economy, consumers are turning to discount retailers and are purchasing a greater level of non-Irish/UK goods as price becomes the prime discriminator.

Figure 2.5 Consumer perceptions of supermarkets



⁶ Actual supermarket names have been removed

Consumers did admit that price wars between supermarket multiples have impacted favourably on their purchasing power, and naturally the longer this trend continues, the more favourable for them. In general consumers felt that 'special offers' and discounts were becoming more prevalent in the multiples and they would visit separate stores to avail of these.

2.3.1.2 Consumer perceptions of place of origin

Despite attempts to begin tightening budgetary belts, the sheer numbers of multiples available to consumers in recent times have meant that they are visiting more than one multiple and seeking out offers several times per week. The increased competition between multiples and a more informed consumer means that loyalty to one supermarket or local shop has become a thing of the past and most consumers will switch to the multiple offering the best value for money and an adequate range for their needs. Furthermore, for many consumers, the weekly shop had become a thing of the past.

When consumers were asked where they generally shop, the majority of consumers said they shopped in the large multiples whereas a small percentage shopped in discount stores.

For most products, the majority of respondents tended to do most of their shopping in the major supermarkets. However, there is a distinct preference to shop for meat products in their local butchers – particularly among those with families. This reflects the findings of the quantitative research where consumers were most concerned about the origin of meat and fish.

At an overall level, those shopping for themselves were least concerned in terms of where they sourced their meat and vegetables, whereas those with a family were more concerned about where their food comes from (Figure 2.6).

Figure 2.6 Consumer comments regarding supermarkets versus local butcher/vegetable shop



There was a deep trust associated with the local butcher with words like 'trust' 'quality' 'personable' 'good food' and 'clean' used to describe them.

Many observed that it is cheaper to purchase meat in a butcher's shop than in a supermarket, with many purchasing their meat for the week and receiving a reduction in price when they buy in bulk.

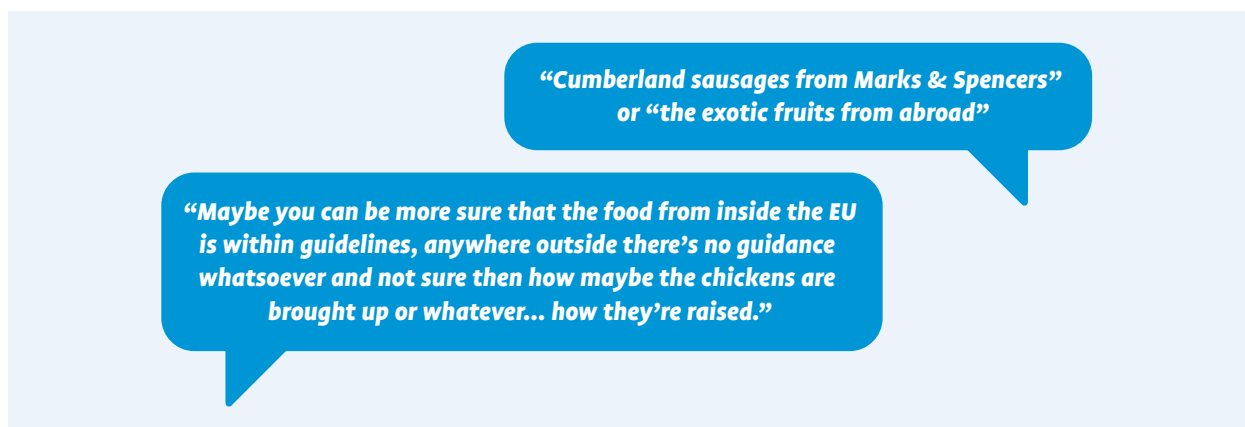
Fruit and vegetable shops lack popularity due to the convenience of consumers being able to obtain all their groceries in the one place, i.e. supermarkets. However, there was a clear perception that fruit and vegetable shops' stock is more fresh and on some occasion's better value for money.

2.3.2 Concerns over country of origin

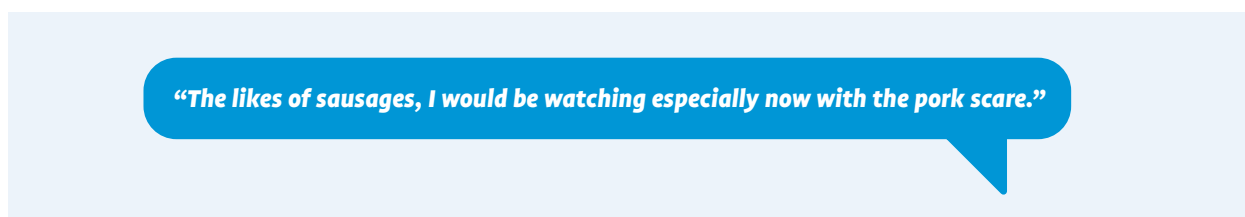
Consumers are unconcerned about origins of processed foods, mainly because they felt if they choose to eat these products they didn't feel justified enough to be concerned about them. Studies carried out on behalf of **safe food** found that 25 per cent of consumers (total 495) on the IOI looked for country of origin when reading labels. Country of origin ranked sixth out of a total of 21 items of information displayed on a food label [1]. Meat and fish origin were a cause of concern for many consumers (Figure 2.7). There were no concerns about dairy produce as most consumers assumed it came from the IOI.

There was very little concern over the origin of products in the fruit and vegetable category. This was particularly true for participants in this study who shopped in discount stores, where they perceived fruit and vegetables to be of high quality. There were limited concerns regarding origin and nutritional information for bread, cereals and confectionary.

Figure 2.7 Consumer concerns about country of origin



Knowing where their meat originated was deemed to be of importance for most respondents, particularly in terms of pork and chicken.



There was an obvious trust in brand names when it came to sausages and burgers (Figure 2.8), with many unconcerned about the country of origin. They used inferential beliefs from the good quality they experienced before to conclude that the product was sourced nationally, when in reality this may not be the case.

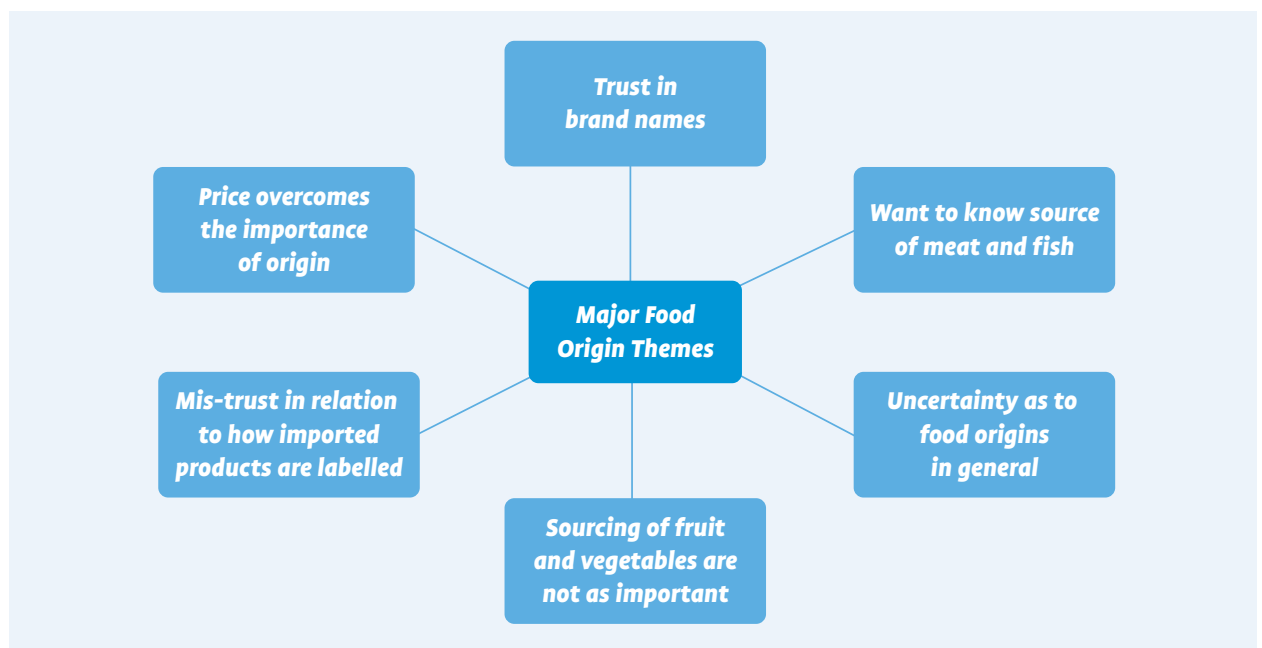
Some consumers wanted to be able to trace meat back from farm to fork, whereas others were simply happy to know that it was produced locally.

“Sometimes they have a picture of a farm and the farmer, that is pretty accountable, it is so honest there is no way they could be making that up.”

Knowledge of fruit and vegetable sources was not deemed as important when compared to meat since many understood that we cannot grow all our own produce. There was a general uncertainty and lack of concrete knowledge and trust among consumers as to the origin of the majority of food they purchased. However, what was important for many was the price they were going to save on non-perishable foods, therefore the value of knowing the country of origin for these products meant little to most.

“The one thing I would be funny about would be any sort of meat coming from South American countries and things like that because of hygiene first of all and it has to get onto planes and be handled and stuff like that.”

Figure 2.8 Consumer concerns about importing foods

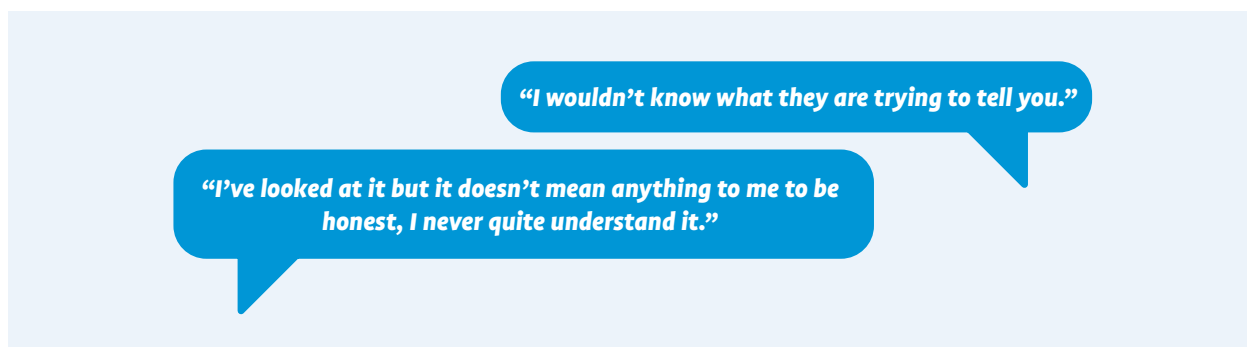


2.3.3 Consumer perceptions of food origin labelling

Awareness of nutritional information on packaging has seen a steady increase over the past few years. Studies carried out on behalf of **safe food** regarding nutritional labelling on the front of the pack have found that over 50 per cent of consumers (total 796) on the IOI were familiar with the traffic light labelling system whereas 64 per cent were familiar with the guideline daily amounts labelling [1]. Fats, sugar and salt were the most common variables sought out, and mainly by females. While this is the case, nutritional information about processed meat (particularly pork) and poultry was seen as very important, with many also actively seeking out country of origin or meat content prior to purchasing. However, when it came to other food groups there was a distinct lack of confidence and quite a bit of confusion in terms of nutritional information displayed on product packaging.

When consumers were asked if they perceived any issues with the current food information made available to them, they identified two areas of concern. The first was the lack of confidence in the integrity of the information provided and the second was the confusion around labelling (Figure 2.9). A number of questions were raised in terms of honesty. Many believed that too many companies are taking advantage of health issues when it comes to promoting products and thus only display nutritional information of benefit to the company. Much confusion prevails in terms of nutritional information displayed on product packaging: many thought there was too much clutter on packaging and were not aware of what to look for.

Figure 2.9 Consumer perceptions of food origin labelling



A similar level of mistrust was seen in relation to food origin. There was a distinct lack of knowledge as to the origin of the majority of food consumers purchased and a severe lack of confidence in the 'loopholes' of the current labelling system. Consumers clearly expressed the wish for more honest and transparent information with regard to food sources/origins including where foods were packaged and processed. A large proportion of consumers are confused and mistrustful of current food origin labelling. At the consumer focus groups and the accompanied shop, there were numerous complaints about the fact that food such as bacon and chicken can be claimed to be produced on the IOI when this may not always be the case, as it is only packaged on the IOI.

“If I’m in the butchers I will say can you mince that there, so I know what is going into it.”

“I would be more worried about chickens, somebody said some of them come from China, can you imagine that?”

“It is very easy to get made in the IOI put on anything, I would look for the traceability label.”

2.3.4 Consumer understanding of reasons for importing

Consumers were asked what they perceive to be the reason for importing foods. Most consumers understood it to be for the following reasons:

- Economic
- Choice and demand
- Seasonality
- The price of the land

Consumers had no clear idea of how much of the IOI food requirements is imported, however they did feel that they had a good awareness of what food products (mainly meat) are being imported and where they are imported from, although in reality that was not the case.

Many consumers welcomed the variation that importing foods adds to the Irish food market and the choice that they as consumers were getting from the imported goods.

“Cumberland sausages from Marks & Spencers” or “the exotic fruits from abroad”

There was general consensus that consumers have more confidence in food that has been produced within the EU (as opposed to outside). Many would try to opt for foods that came from EU countries, firstly because there was a perception that they had travelled fewer miles than foods from outside the EU and secondly because they have less confidence in the regulation outside the EU.

“I don’t mind if it [meat] is from the EU but if it’s outside I’d feel it could be dodgy... though I’m sure they have their controls in place, but I’d still prefer... I’d be happier with the EU. ”

2.3.4.1 Reactions to where pizza comes from

Consumers were shown a picture of a ham, cheese, pineapple, tomato and wheat pizza. The country of origin for each individual ingredient was also highlighted. The varied attitudes of consumers towards importing foods especially with regard to pizza is illustrated by Figure 2.10.

Figure 2.10 Varied attitudes towards importing foods



2.3.5 Organic food

There was some level of surprise at the fact that over 70 per cent of all organic foods sold on the IOI are imported – some had the misconception that organic produce was grown on the IOI only, while others understood the lack of chemicals or growing procedures involved.

“I associate organic with local because how would it be that fresh with transport... you know what I mean...”

Some believe that organic farming is something which requires a certain climate, which we don't have on the IOI and, therefore, was accepted. There was a general consensus that organic food costs too much but tastes better and was of higher quality. However, many consumers believed that the costs outweigh the benefits. The decision to buy organic was influenced more by documentaries and word of mouth rather than a personal decision to be more environmentally friendly.

2.3.6 Where our food comes from and price

When asked the question, “would you pay more to know where your food was sourced?”, many consumers said they would like to know the source of their food. However, this was contradicted by their purchasing behaviour when the values of economy and provenance were in competition. Most would not pay more for general things such as non-perishable foods or even non-meat/fish products, but did admit that they would pay more for locally

produced meat (and some currently feel that they are doing so). Some were put off by the fact that you can't fully trust what is stated on packages. For the sake of the domestic market, many were keen to buy products from the IOI. For others, however, the determining factor for purchasing behaviour was cost. Overall the importance of cost was more dominant than provenance.

2.3.7 Environmental issues

2.3.7.1 Carbon footprint

Although there was a moderate awareness and understanding of carbon footprinting – there appeared to be a sense of apathy towards it. There was concern about contamination (how the food has travelled, what it will have picked up on the way) in relation to the 'food miles' a product travels before it gets to their plate.

However, many felt there was nothing that could be done to stop it because as a nation we are constantly looking for better quality, more choice and competitive prices and chose not to think about the situation and to accept it as inevitable. There was some awareness of 'food miles', but many again factored this in as inevitable to meeting constant growing consumer demand.

2.3.7.2 Ethical labelling

Once again, price was the determining factor: some consumers implied that they would like to support such a good cause but just could not afford to make it part of their shopping habits. 'FairTrade' was the most commonly mentioned ethical labelling scheme – reactions to these products were mixed. Overall, there was relatively strong awareness surrounding 'FairTrade' products (which spontaneously emerged), and while many who purchased them felt they were making a difference to poorer working conditions, those who did not purchase the products felt it was another marketing ploy to sell them goods above the normal price.



“I watched a programme about it, that’s the only thing I know – about where they get coffee and cocoa beans...”

2.4 Conclusions

Price, convenience, increased presence and marketing of different multiples – most notably discounters – have changed how consumers shop. The desire to eat healthily is a growing concern with many consumers; however, this was not always prioritised if the price was too high. The knowledge of how much food was imported onto the IOI was low. While many were aware of the amount of meat and fruit that was being imported, they had no real knowledge of general food imports or reasons for importing. Consumers perceived locally or nationally grown products to be more authentic and of higher quality than imported products. However, they were happy to pay the cheaper prices and avail of better choice when it came to imported foods.

Knowing the source of their meats and fish was an important factor for many. In spite of this, however, there was a distinct lack of knowledge as to the origin of most of food they purchased and a severe lack of confidence in the 'loopholes' of the current labelling system. While many aspired to be healthy, economical, and to support the domestic market, this did not follow through to the in purchasing behaviour. It was observed from the accompanied shops that there is a marked difference between consumers' attitudes and their behaviours.

For example, consumers have expressed a concern about labelling of food products, but, our research found that consumers most of the time didn't check the labelling when purchasing food items. Price was their main concern.

'Carbon footprint' and 'food miles' were terms which were understood, however, there was a general consensus that the consumer would have more trust in foods which were from closer countries than from those further afield – the perception was that they would not have travelled as far as other goods and as a result may potentially be of a better quality. While consumers aspire to be more environmentally friendly, ethical and healthy, price overcomes these issues when it comes to purchasing behaviour.

Key findings

- *Forty three per cent of consumers on the IOI were concerned about the quality of food imported from within the EU, whereas 54 per cent were concerned about the quality of imported foods from non-EU countries.*
- *Sixty per cent of consumers on the IOI were concerned about the quality of imported fresh meat, 52 per cent fresh fish and 29 per cent fruit and vegetables from non-EU countries. Furthermore, 57 per cent of consumers on the IOI were concerned about the quality of frozen meat/poultry, 48 per cent over processed foods (prepared meals) and 31 per cent over tinned food from non-EU countries.*
- *Awareness of the numbers and types of imported food goods onto the IOI is relatively low. Consumers thought that most of the produce produced on the IOI is consumed on the IOI.*
- *The main food safety concerns with imported foods were the poor production standards and regulations (48 per cent), the quality of imported foods (27 per cent) and the perception that the further food travels, the greater the risk of contamination (24 per cent).*
- *Most consumers were anxious to find out where their meat and fish have been sourced.*
- *Consumers reported that they found current food origin information misleading and unclear.*
- *The majority were not concerned about the origins of their remaining grocery shop (fruit, vegetables, non-perishable items etc.).*
- *Consumers perceived locally or nationally grown products to be more authentic and of higher quality than imported products. However, they were happy to pay the cheaper prices and avail of better choice when it came to imported foods.*
- *Consumers were aware of the terms 'carbon footprint', 'food miles' and 'ethical labelling' although understanding of these terms was limited. Fifty seven per cent of consumers agreed that less food should be imported onto the IOI in order to protect the environment, regardless of the fact that there would be less variety in shops and the cost of food would be higher.*
- *Consumers clearly expressed the wish for more honest and transparent information with regard to food sources/origins including where foods were packaged and processed.*
- *While consumers expressed concern about country of origin, labelling etc, this fails to translate into purchasing behaviour. In reality, price was the most important factor.*

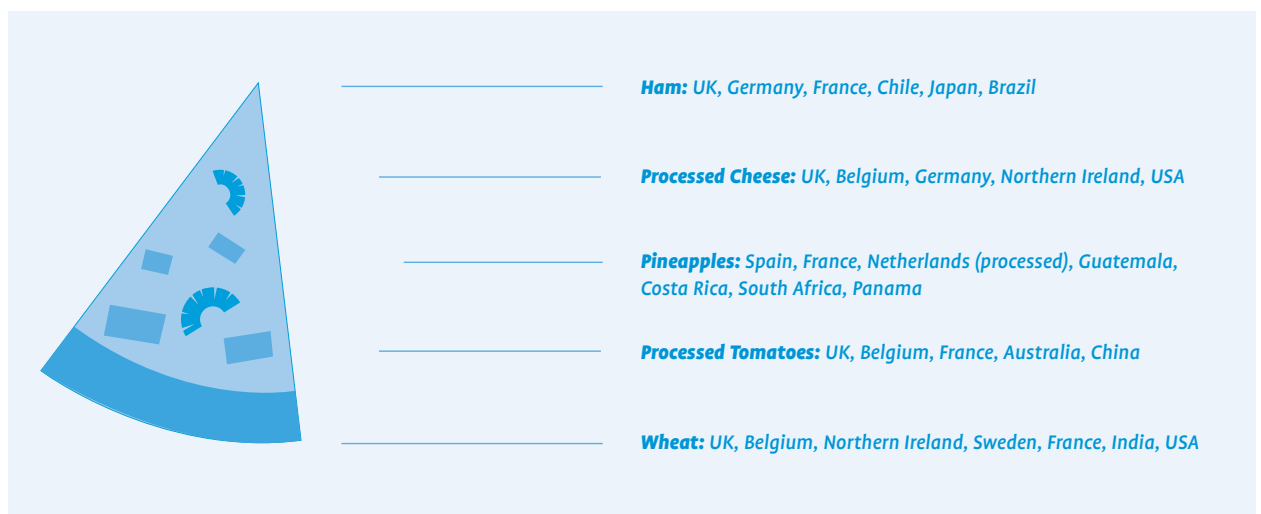
3. A Case Study

3.1 Introduction

Much of the food we eat today is imported from a vast range of countries. Whether it is for seasonal, availability, cost, convenience or trade reasons, our food is imported from EU member states and Third countries. A Third Country is a state that is neither a member state nor an associated state. Studies from the Republic of Ireland (ROI) [2] and Northern Ireland (NI) [3] showed that cereals are the food category with the highest volume of imports into the island of Ireland (IOI).

The purpose of this review is to study where our food comes from. In order to achieve this, an example of a processed food with a selection of different ingredients, which can be imported from a vast range of countries, was examined. Pizza is a prime example of this. In this review, the typical Hawaiian pizza (ham, cheese, pineapple, processed tomatoes and wheat) was chosen and the source of each ingredient imported into the ROI and the UK (data unavailable for NI) was identified as far as was possible. Figure 3.1 illustrates the vast range of countries from which ingredients for a Hawaiian pizza are imported into the ROI. However, it must be noted that for processed foods, i.e. processed cheese and tomatoes, information about their true country of origin is not always available. This is because food from many countries may be processed together and then transported.

Figure 3.1 Import information for pizza ingredients for the ROI [2]



With regard to the UK, Figure 3.2 above outlines the countries from which ham, cheese, pineapples (fresh, dried or processed), processed tomatoes and wheat are imported. The data and country of origin for processed foods (see above) are unavailable for NI.

Figure 3.2 Import information for pizza ingredients for the UK [3].



3.2 Pizza ingredients

3.2.1 Ham

Pigmeat is imported into the ROI as ham, bacon, sausages, offal and pork. In 2007, the ROI imported a total of 62,773 tonnes of pork and pork products. Of this, 61,946 tonnes (99 per cent) of all imported pork products came from EU countries, with the remaining one per cent (827 tonnes) imported from Third Countries. The main EU countries processed pork was imported from were Germany, France, Denmark and The Netherlands, and the major Third Country importers were Chile, Japan and Brazil (Figure 3.1).

With respect to the UK, 742,560 tonnes of pork meat (fresh or chilled) valued at £1.2 billion⁷ (€1.3 billion) was imported in 2007. The major EU countries from which it came from were Denmark, Germany, the ROI, Spain, Belgium and The Netherlands, and the main Third Country imports were from Brazil, Chile and New Zealand (Figure 3.2).

3.2.2 Cheese

The main types of cheese used for pizza production are mozzarella, analogue or processed cheese. However, not all of the processed cheese that is imported is used in pizza production. The total amount of processed cheese imported into the ROI for 2007 was 6,259 tonnes. This in turn was valued at €22 million (£20 million). Of this, the majority of cheese was imported from EU countries such as NI, Germany, France, Belgium and the UK, and a minor amount from the USA.

In the same year, 58,767 tonnes of processed cheese was imported into the UK from EU countries for example, the ROI, Germany and France. In comparison, 651 tonnes was imported from Third Countries such as the USA, Canada and Australia. The values of these were recorded to be £159 million (€172 million) and £1.8 million (€2 million), respectively.

⁷ Currency exchange £1 is equivalent to €1.0865/€1 is equivalent to £0.921 (accessed March 2009)

3.2.3 Pineapple

Pineapples are imported into the ROI either in fresh, processed or dried form. Due to climate restrictions, freshly grown pineapples are imported from countries with a tropical climate, such as, Costa Rica and Guatemala. Pineapples, once imported into the EU, undergo substantial transformation (see Section 7), for instance, they may be canned and exported for further distribution within the EU.

In 2007, 4,051 tonnes of fresh, processed and dried pineapples valued at €4.3 million (£4 million) were imported into the ROI. Approximately 71 per cent of the pineapples imported were from Third countries such as Costa Rica, Ivory Coast, Guatemala, South Africa and Panama. The remaining 29 per cent consisted of processed pineapples and were imported from EU countries: Spain, France, UK, NI and the Netherlands.

In the UK, 11,360 tonnes (17 per cent) of pineapples in processed form were imported from EU countries Germany and the Netherlands in 2007. The majority of pineapple imports were imported from Third Countries Guatemala, Costa Rica, Puerto Rico and Panama. This value equated to 54,322 tonnes, which was recorded as 82 per cent of the overall imports.

3.2.4 Tomato

In general the tomatoes used for pizza production are first processed and packaged in cans. The total processed tomato imports in 2007 amounted to 14,092 tonnes, which was equivalent in value to €9.3 million (£8.4 million). The majority of these imports into the ROI were from the EU; in this case 93 per cent of the total imports were from Belgium, France and the UK, and the remaining 7 per cent was imported from Australia, USA and China. In relation to the UK, 471,211 tonnes were imported from EU countries such as Greece, Italy, Spain and Portugal in 2007. In comparison, 13,470 tonnes were imported from Argentina, Thailand, Israel and Morocco.

3.2.5 Wheat

Wheat is the major raw ingredient used to produce pizza dough. Wheat is imported from a vast range of countries within the EU as well as Third Countries. In 2007, 28,333 tonnes of wheat valued at €8.8 million (£8.1 million) were imported into the ROI from EU countries UK, NI, Belgium and France. In comparison, less than one percent (0.97 tonnes) of wheat was imported from Third Countries India and the USA.

As for the UK, 56,182 tonnes were imported from EU countries Belgium, France, Spain and Italy and these were subsequently valued at £11 million (€12 million). Third country imports amounted to 13,022 tonnes, which were valued at £3.8 million (€4.1 million). The Third Countries involved were India, USA and Argentina.

3.3 Conclusion

Pizza is just one example of a composite meal with ingredients from all over the world. Many other examples could have been chosen. From the information displayed in this chapter, it is evident that there are a wide range of countries involved in the export of food ingredients for a pizza into the ROI and the UK (data for NI is not available). The remainder of this review will study in detail the supply chain involved in food imports from the EU and Third Countries, food safety controls in place, nutritional aspects, labelling and environmental factors involved in the importation of foods from around the world.

Key findings

- In this review, Hawaiian pizza was used as a composite meal with ingredients from all over the world.
- The ingredients, ham, wheat, pineapple, processed cheese and tomatoes can be imported from a range of different countries from within the EU and Third Countries. Imported foods account for a large proportion of food consumed on the IOI.

Import information for pizza ingredients for the ROI



Import information for pizza ingredients for the UK



4. The Supply Chain

4.1 Summary

The total gross turnover of the Northern Ireland (NI) food and drinks processing sector was estimated to be £2.7 billion⁸ (€2.9 billion) in 2007 [4]. In the Republic of Ireland (ROI), the food and drink industry had a gross output of over €18 billion (£16.5 billion) and accounted for approximately seven per cent of the Gross Value Added, approximately 10 per cent of exports and eight per cent of total employment [5, 6]. In 2007, NI exported 1.055 million tonnes of food and food products [3]. This was equivalent in value to £537 million (€594 million). For the ROI, food exports were valued at €8.6 billion (£7.9 billion) [7]. Although the island of Ireland (IOI) produces a large amount of food and food products, due to trade, economic, seasonality and consumer choice reasons, a large amount of food and food products are imported onto the IOI.

The food import sector is important with regard to international trade relations for both NI and the ROI. There has been a steady rise in food imports onto the IOI. In 2002, the amount of imports onto the IOI were recorded at 4.5 million tonnes, which increased by approximately 18 per cent to 5.3 million tonnes in 2007. This was equivalent to an increase in value of approximately €1.5 billion (£1.4 billion). In 2007 the total food imports were valued at €4.6 billion (£4.2 billion) in the ROI whereas for NI⁹ the total food imports were valued at £460 million (€502 million).

The food categories with the highest volume of imports onto the IOI were cereals and fruit and vegetables. A significant amount of food imports onto the IOI, especially fruit, cereals and vegetables are imported from Third Countries: China, Costa Rica, and South Africa. With regard to meat and dairy produce, these are mostly imported from within the EU.

Furthermore, there is significant cross-border trade between NI and the ROI with regard to soft drinks, live pigs, beer and other products. For example, approximately 40 per cent of pigs slaughtered in NI are reared in the ROI.

4.2 Introduction

Food occupies a fundamental position in people's lives. Regardless of age, income, social standing, culture or religious belief, every individual must eat and so has a stake in where their food comes from and how it is produced. What's more, food is a part of our heritage and culture and shared meals are an important way to socialise with family and friends [8].

For many hundreds of years, food crops and products have travelled the world as they have been bought and sold, or exchanged between different countries and cultures. In recent years, there has been enormous growth in the businesses and industries that are involved with this trade. There can be many links in the trading chain from growers, to transporters, to processors, advertisers, retailers and finally consumers. The links in the chain can be complicated and can travel across many miles – locally, nationally, and even globally [9].

The World Trade Organization (WTO) negotiates trade agreements between governments, settles trade disputes and operates a system of trade rules. The bulk of the WTO's current work comes from the 1986-94 Uruguay Round of trade negotiations and earlier negotiations under the General Agreement on Tariffs and Trade (GATT). The WTO is also responsible for maintaining trade restrictions, for example, to protect consumers or prevent the spread of disease [10]. The rules set out by the WTO are essentially contracts, binding governments to keep their trade policies within agreed limits. Although negotiated and signed by governments, the goal is to help producers of goods and services, exporters, and importers to conduct their business, while allowing governments to meet social and environmental objectives [10].

⁸ Currency exchange £1 is equivalent to €1.0865/€1 is equivalent to £0.921 (accessed March 2009)

⁹ NI imports do not include imports from Great Britain (GB)

Rapid changes to lifestyle, culture, climate, world issues and trade have opened the door to food imported from a diverse range of countries. Over the last few decades, there has been an increase in demand for better quality and more exotic types of food. People are also aspiring to eat more healthily and to buy food that has a reduced impact on the environment. Diet and attitudes to food have changed markedly in recent years and will continue to do so [11].

4.2.1 Local food economies

Local food economies are defined as a system of producing, processing and trading, primarily of organic and sustainable forms of food production. Where the physical and economic activity is largely contained and controlled within the locality or region where it was produced [12]. The benefits of local food economies are sustainable economic development, environmental improvement, better health, community interaction, educational opportunities, sustainable land use and landscapes [12].

The local food concept, although relatively new to the IOI compared to some of our European counterparts, is becoming increasingly popular throughout the island. The evidence for this can clearly be seen in the opening of farmers' markets. There are now over 130, public, private and community markets on the island, as well as farm shops and certain food service establishments in which locality foods are available [13].

With regard to consumers and the local food concept, research carried out in 2007 by Bord Bia [14] on consumers' perceptions of local food, found that seven out of 10 shoppers express a preference to buy local food, with 93 per cent of those that buy local doing so because they want to support the local economy. Of the local food that consumers buy, 29 per cent source their local food from farmers' markets, 35 per cent from local supermarkets and 23 per cent from larger supermarkets. The overall findings indicated that consumer demand is for authentic local food with health, naturalness and freshness being the primary motivating factors for purchase. According to the Bord Bia survey, three out of four Irish grocery shoppers claim to buy local food because 'they want the most natural kind of food they can get' [14]. Furthermore, 72 per cent of Irish consumers agreed with the statement that food produced locally results in higher quality products. This is a significantly higher level of agreement than in NI at 59 per cent and Great Britain at 55 per cent [15]. However in comparison, in the current study, while consumers were willing to support the local economy, price was a major factor which determined consumers' purchasing habits. In the current economic climate, consumers' preference was competitive price over support for local economies.

4.2.2 Food imports

Food imports account for a significant amount of the retail market on the IOI. According to Bord Bia (2008), consumers in the ROI spent just over €4 billion (£3.7 billion) or €1,000 (£921) per person annually on imported food, a figure which increased by 50 per cent in the years 2000-2007 [16]. Food and food products are imported onto the IOI for economic, seasonality, consumer demand and trade reasons. In general, imported food or food products are less expensive than locally produced foods. On the IOI, food production costs are relatively high. These costs may include, labour, energy, transport, production, packaging etc, whereas in Eastern Europe and Asia, for example, the same costs are much less and hence it is more economical to import food and food products than producing them locally. This is often seen in the case of foods that are in season e.g. 'Irish' potatoes versus 'Cyprus' potatoes. Furthermore, it is necessary to import food and food products, for example, exotic fruits are imported from countries with a warm climate. The importation of a wide variety of foods all year round enables the consumer to make informed choices with respect to the food they eat.

4.3 The agricultural food sector for NI and the ROI

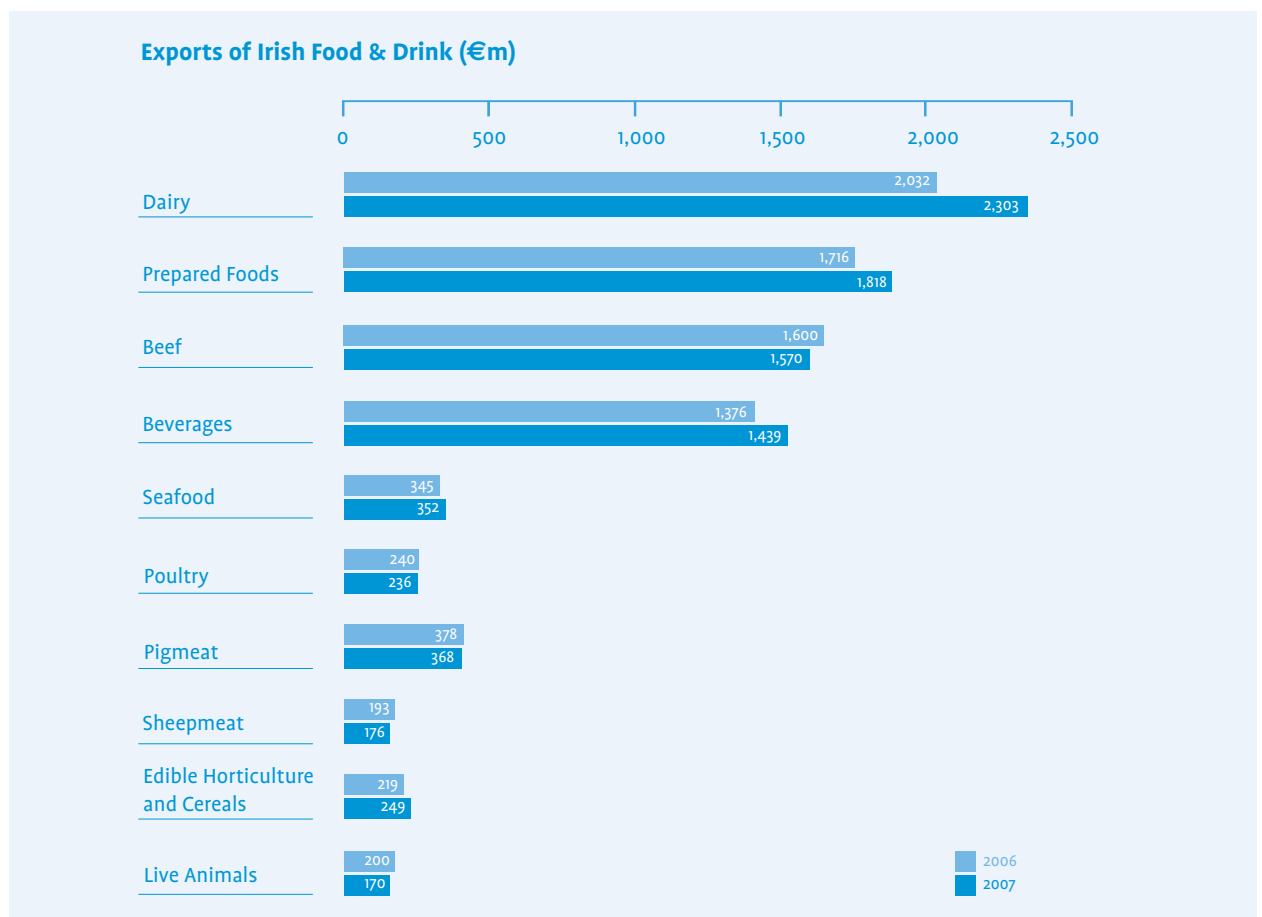
The total gross turnover of the NI food and drinks processing sector is estimated to have increased from £2.6 billion (€2.8 billion) in 2006 to £2.7 billion (€2.9 billion) in 2007. When expressed in real terms (using the GDP deflator), gross turnover increased by 2.6 per cent between 2006 and 2007 [4]. It is estimated that the number of full-time employee equivalents in the food and drinks processing sector decreased from 18,442 in 2006 to

18,403 in 2007; a decrease of 0.2 per cent. The food and drinks processing sector is the largest contributor to the sales, external sales and employment of the NI manufacturing sector [17], accounting for 18.9 per cent of total manufacturing sales, 15.8 per cent of manufacturing external sales and 22 per cent of manufacturing employment in 2006 [4]. In 2007, NI exported 1.055 million tonnes of food and food products, which was in turn equivalent to £537 million (€594 million) [3].

The food and drink industry for the ROI has a gross output of over €18 billion (£16.5 billion) and employs 230,000 people [5]. The agricultural food and drink sector accounts for approximately seven per cent of the ROI's GVA, approx. 10 per cent of exports and eight per cent of total employment [6]. In 2007, the Irish agricultural food and drink exports increased by an estimated five per cent to reach approximately €8.6 billion (£7.9 billion) [7]. The UK was the main destination for Irish agri-food and drink exports in 2007 accounting for 42 per cent of all exports. Thirty one per cent of exports went to the Continental EU markets while the remaining 27 per cent went to international markets.

The latest estimates of the distribution of agricultural food and drink exports in 2007 by sector for the ROI was as follows: dairy products and ingredients (27 per cent), prepared consumer foods (21 per cent), beef (18 per cent), live animals (2 per cent), beverages (17 per cent), pigmeat and poultry (7 per cent), sheep and sheep meat (2 per cent), seafood (4 per cent) and edible horticulture (3 per cent). Figure 4.1 below illustrates the total value of food exports for the ROI for 2007.

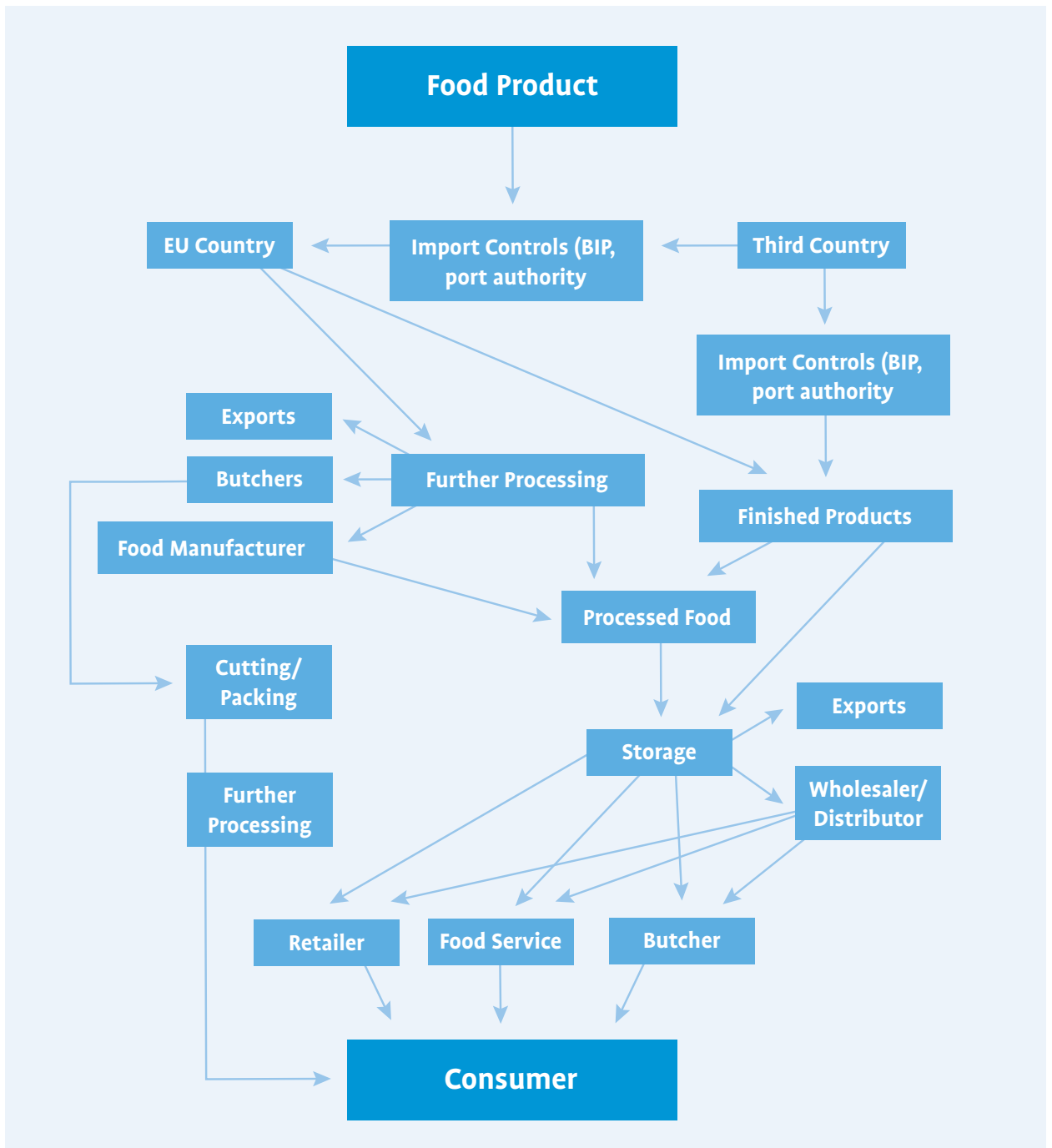
Figure 4.1 Exports of Food and Drink from the ROI (€m) adapted from Bord Bia, 2007 [15]



4.4 Stages in the Supply Chain

Imported foods can appear in any form of a raw ingredient or a finished product, which might, for example, be vacuum packed, tinned or frozen [18]. Figure 4.2 below outlines the stages in the supply chain of imported foods for the IOI.

Figure 4.2 Imported food supply chain for the IOI

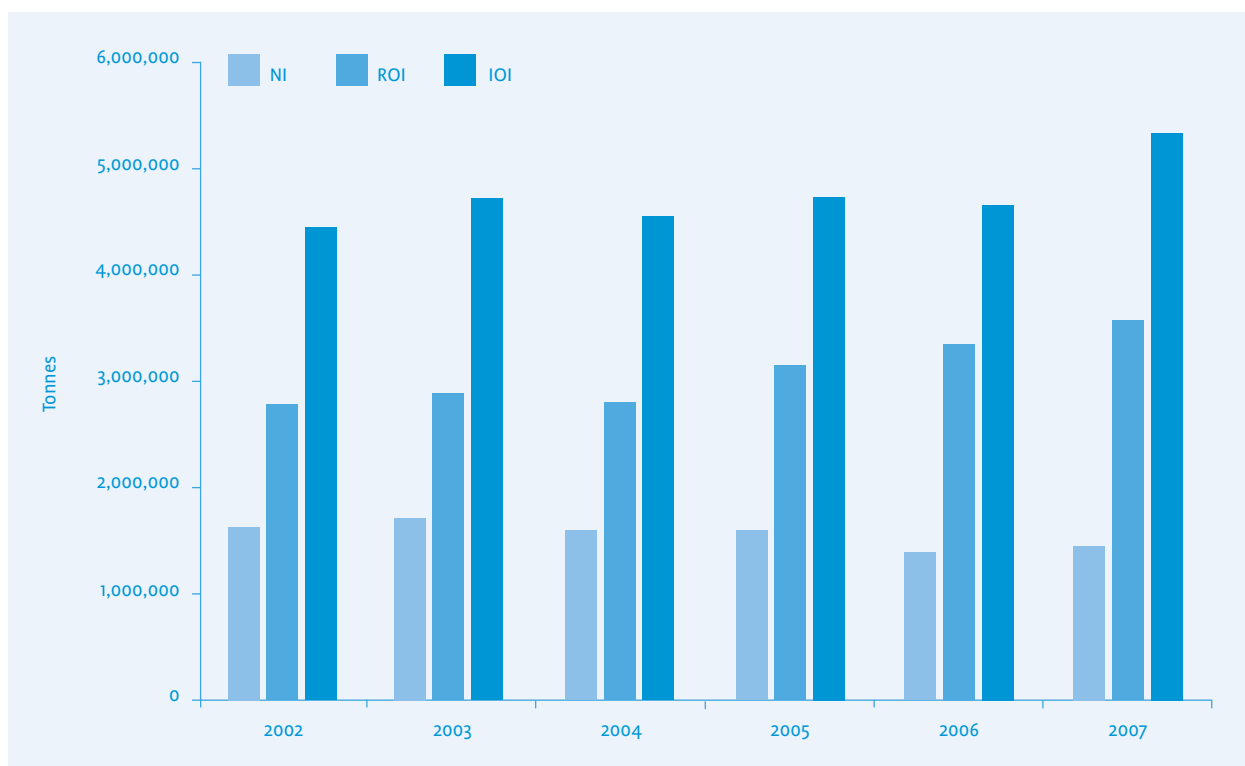


4.4.1 Food imported onto the IOI

In EU terms, import means a product sourced from countries outside of the EU, i.e. not intra-community trade. For the purpose of this review, however, import describes a product sourced outside of the IOI i.e. either from a member state or a Third Country.

Over the past few years, there has been a steady increase in the amount of imports onto the IOI, from 4.5 million tonnes in 2002 to 5.3 million tonnes in 2007 an increase of approximately 18 per cent [2, 3]. This was equivalent to an increase in value of approximately €1.5 billion (£1.4 billion). Figure 4.3 outlines the quantity of foods imported into NI, the ROI and the IOI between 2002 and 2007.

Figure 4.3 Total food imports for NI¹⁰, the ROI¹¹ and the IOI between 2002 and 2007 [2, 3]



4.4.2 Northern Ireland

NI imports a significant amount of its overall food requirements, which in 2007 amounted to over 860,000 tonnes (Table 4.1). The values presented in Table 4.1 below include products that may be further processed once imported and then re-exported to countries within the EU as well as to countries outside of the EU. Of this approximately 88 per cent is imported from EU sources with the remaining 12 per cent imported from Third Countries [3].

In 2007, the total NI food imports were worth £460 million¹² (€502 million) (Table 4.1). Cereals and fruit and vegetables in 2007 were recorded as categories with the highest volumes imported; 518,526 and 112,879 tonnes respectively, whereas those with the lowest volumes were seafood and beverages 10,882 and 12,562 tonnes respectively [3].

¹⁰ Food and live animals (tonnes)

¹¹ Food imports (tonnes)

¹² NI imports do not include imports from Great Britain (GB)

Table 4.1 Import values¹³ for the ROI and NI 2007

Product*	ROI (tonnes)	NI (tonnes)	ROI (Million €)	NI (Million £)
Cereals ¹	1,493,593	518,526	890	101
Fruit and vegetables ²	727,875	112,876	733	72
Dairy ³	481,045	69,435	441	80
Prepared foods ⁴	526,681	63,456	734	29
Beverages ⁵	229,891	7,103	1,083	13
Meat ⁶	179,998	84,531	585	154
Seafood	43,012	4,097	178	11
Total	3,682,095	860,024	4,644	460

1 Cereals and cereal preparations

2 Fruit and vegetables including nuts and fruit preparations

3 Dairy and dairy preparations

4 Prepared foods (sugar, chocolate, confectionary, ingredients etc)

5 Beverages (coffee, tea, spices)

6 Meat and meat preparations

* Note: The values presented are based on all food imported into the ROI and NI including ingredients that may be processed and re-exported. The NI imports do not include imports from Great Britain

4.4.3 Republic of Ireland

The total amount of food imported into the ROI in 2007 was valued at €4.6 billion (£4.2 billion), which in turn was equivalent to approximately 3.7 million tonnes as illustrated by Table 4.1 [2]. Over 60 per cent of imports by value came from within the EU. Although a significant amount of food is imported into the ROI, a high volume of food is produced within the ROI and exported to a vast range of countries. The ROI is an exporting country, exporting as much food and food products as that which is imported.

Over one third of pig meat consumed in the ROI is imported. ROI pig meat imports were 80,866 tonnes and were valued at over €2 million (£1.8 million) in 2007 [19]. A considerable proportion of pork imports coming into the ROI are destined for further processing and eventual re-export as part of a final product [19]. The majority of pork products imported are carcasses and backs or loins [20]. In 2007, pig meat was primarily imported into the ROI from the UK (45 per cent, including four per cent from NI) and continental Europe (54 per cent). Of the latter, the main countries which provide imports to the ROI market are Germany (21 per cent), Netherlands (13 per cent), France (eight per cent) and Denmark (5 per cent). Third Country imports only represent one per cent of all ROI imports and Chile is the principal provider.

Imports of beef amounted to 33,000 tonnes in 2005. This brought total beef availability (including ROI beef production) for the year to 574,000 tonnes. In 2007 the beef imports were valued at €88.5 million (£81.6 million). Beef was mostly imported within the EU from Germany and Denmark and from Third Countries, particularly Brazil. Despite the large numbers of broilers produced each year on the island, output volume does not currently meet market demand. Over one-third of the weekly consumption of poultry in NI and the ROI is provided from imports [21]. Some of the larger companies in the UK have established subsidiaries in Third Countries, which export to the EU [21]. In order to fulfil the demand by consumers for fresh chicken meat/chicken meat products, over 55,500 tonnes of poultry meat is currently imported into the ROI per annum, a figure valued at over €1.9 billion (£1.8 billion) in 2004 and rising to over €2.6 billion (£2.4 billion) in 2007 [2].

¹³ Currency exchange £1 is equivalent to €1.0865/€1 is equivalent to £0.921 (accessed March 2009)

Imports into Europe from Third Countries are facilitated by the significantly lower production costs in exporting countries, e.g. in Brazil labour costs are approximately one-fifth the cost in the EU and total production costs are approximately half those in the EU¹⁴.

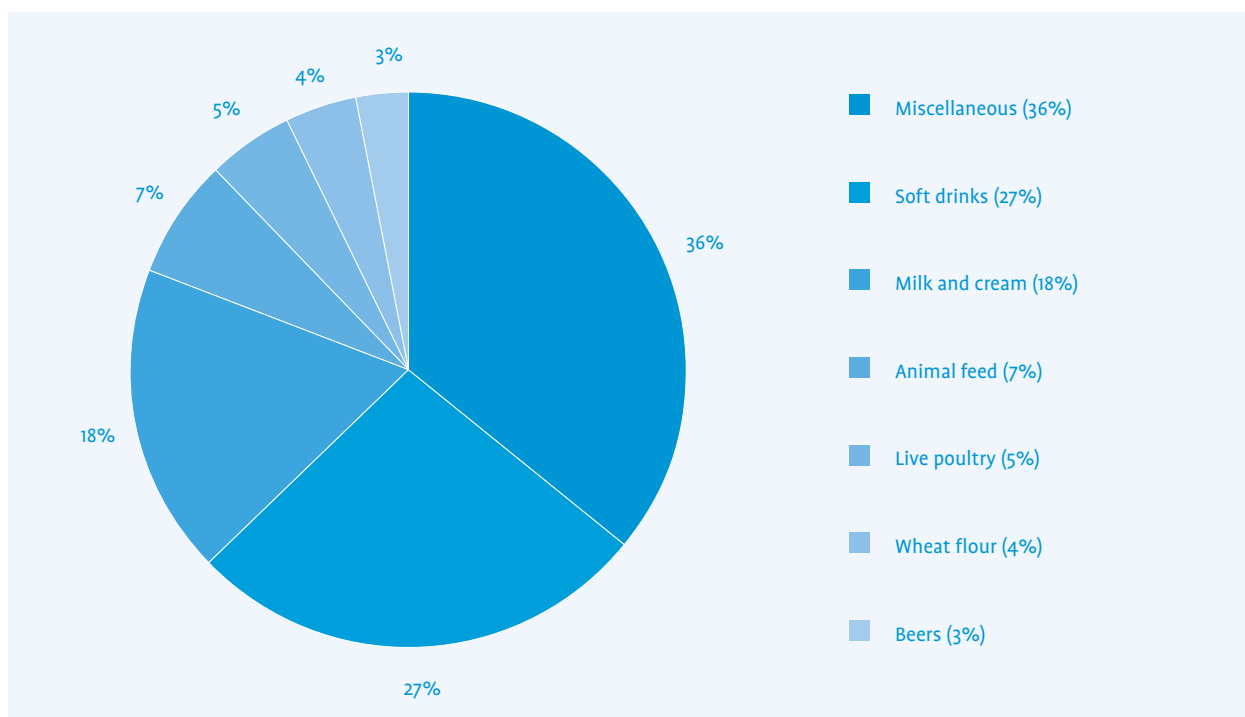
NI is the sole supplier of imported milk to the ROI market with the total milk imports from NI by processors and pasteurisers in bulk and in packaged form amounting to 612 million litres in 2006, the highest milk import volumes on record [22]. The total dairy imports for 2007 to the ROI, amounted to 481,045 tonnes, valued at €441 million (£407 million) (Table 4.1) [2]. With regard to seafood imports, 86 per cent are imported from within the EU with the remainder obtained from Third Countries [23].

The ROI is approximately 80 percent self sufficient in its domestic fruit (native fruits, i.e. apples, pears etc) and vegetable production [24]. However, due to climate conditions, the growing of certain fruits (exotic fruits, i.e. pineapples, kiwis etc) and vegetables is restricted and, therefore, the ROI is heavily dependent on imports (e.g. citrus fruits, bananas, grapes etc). Imports were valued at €340 million (£314 million) in 2003, a decrease of three percent on 2002 [24]. However, figures for 2007 were found to have increased to €733 million (£676 million) [2].

4.4.4 Inter-trade between the ROI and NI

Although a high percentage of food is imported into the ROI from the EU and Third Countries, a substantial amount of imports are obtained cross border from NI, approximately €410 million (£378 million¹⁵). The same applies for food imported into NI from the ROI valued at €572 million (£528 million). Figures 4.4 and 4.5 illustrate the percentage of trade between NI and the ROI, respectively. Figure 4.4 clearly illustrates that there is high percentage of cross trade for soft drinks, miscellaneous products and milk and cream from NI into the ROI. With regard to the ROI, there is high percentage of cross trade for beer, soft drinks and pigs from NI as illustrated by Figure 4.6 [25].

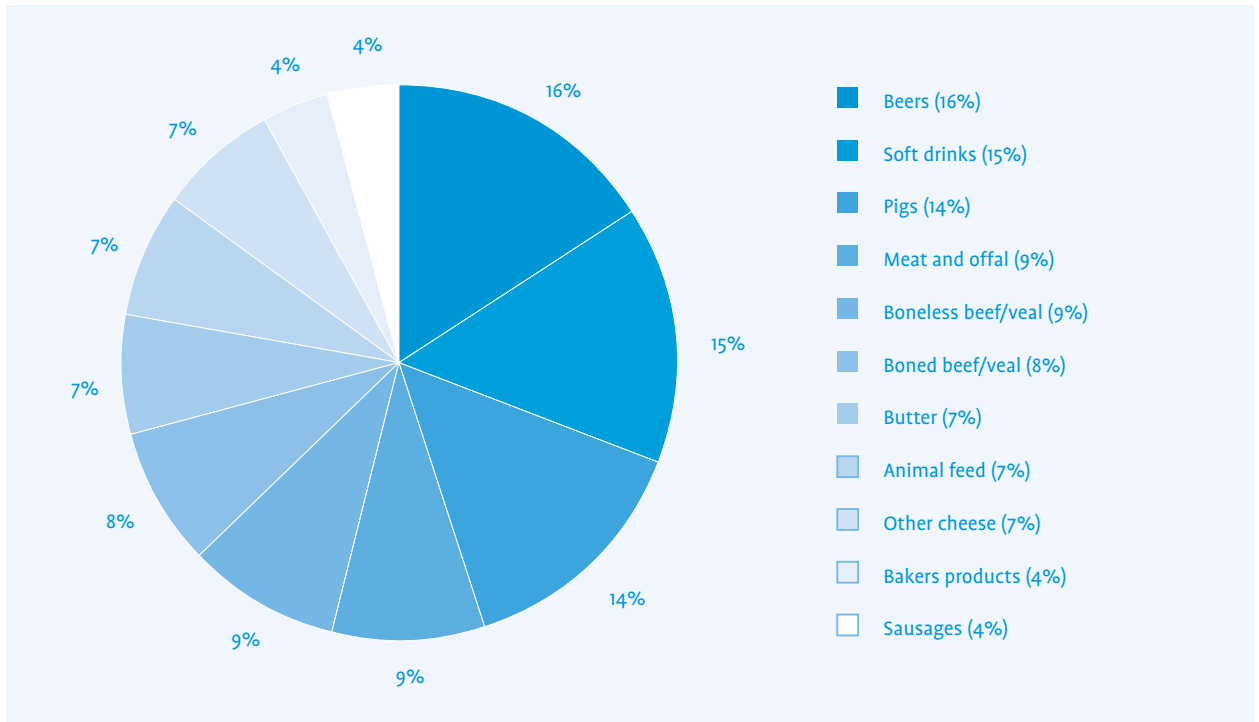
Figure 4.4 Food categories as a percentage of the total trade from NI to the ROI [25].



14 <http://www.north-south.nl/files/Peter/Brazil/Poultry%20Brazil.ppt>

15 Currency exchange £1 is equivalent to €1.0865/€1 is equivalent to £0.921 (accessed March 2009)

Figure 4.5 Food Categories as a percentage of the total trade from the ROI to NI [25]



4.4.5 European Union and third country imports

Within the EU, agricultural products are protected by quota and managed by a licensing system. Import of specified products without a quota licence is prohibited. These products include cereals, rice, beef and veal, sugar, isoglucose, oils and fats, seeds, milk and milk products, wine, processed fruit and vegetables, sheep meat, buffalo meat and goat meat [26].

Table 4.2 and Table 4.3 display the top importers of cereals, prepared foods (food ingredients, processed foods etc), fruit and vegetables, dairy, beverages and meat into NI and the ROI, respectively [2, 3]. For all food categories, the UK, The Netherlands, France and Germany are the leading importers. Of the Third Countries, Canada, USA, Thailand, New Zealand and Argentina ranked the highest importers of food and food products onto the IOI.

Table 4.2 List of EU and Third countries exporting foods into NI¹

Product description	European Union	Third Countries
Cereals	Netherlands, France, Germany, Denmark, Belgium, Republic of Ireland	Eastern Europe (excluding EU), Latin America, North America, Middle East
Prepared foods	Netherlands, Spain, Germany, Belgium, Republic of Ireland, Denmark	Middle East, North America
Fruit and Vegetables	Germany, Italy, France, Spain, Netherlands, Republic of Ireland, Belgium	Eastern Europe (excluding EU), Latin America, Middle East, North America, Sub-Saharan Africa, Asia and Oceania

Dairy	Republic of Ireland, Germany, Netherlands, Belgium	Eastern Europe (excluding EU)
Beverages	Germany, Netherlands, Republic of Ireland	Latin America, Sub-Saharan Africa, Asia and Oceania
Meat	Netherlands, France, Germany, Republic of Ireland	Latin America, Middle East, Asia and Oceania
Seafood	Germany, ROI, Belgium	Asia and Oceania, North America, Sub-Saharan Africa

1 UK Trade Data, 2008

Table 4.3 List of EU and Third countries exporting foods into the ROI¹

Product description	European Union	Third Countries
Cereals	Northern Ireland, UK, France, Germany, Denmark, Netherlands, Spain, Poland	Canada, Thailand, Pakistan, USA, Brazil, Argentina, Egypt, South Africa, Peru, Colombia, Costa Rica, Honduras, New Zealand, Chile
Prepared foods	UK, Netherlands, Germany, Portugal, Italy, Northern Ireland, France, Greece	Thailand, China, USA, Swaziland, Turkey, Israel, Egypt, India, Ghana
Fruit and Vegetables	Northern Ireland, France, Spain, Germany, UK	Costa Rica, Peru, Colombia, Egypt, New Zealand, Honduras, Chile, Argentina, Canada, USA, Brazil
Dairy	Northern Ireland, UK, Finland, Germany, France, Belgium, Austria, Italy, Denmark	Kosovo, Argentina, Singapore, China, Thailand, Canada
Beverages	UK, Northern Ireland, Netherlands, Germany, France, Luxembourg	Brazil, South Africa, Israel, Argentina, China, Saudi Arabia, Indonesia, Canada, Kenya, India, USA
Meat	UK, Northern Ireland, Netherlands	USA, Thailand, Brazil, Argentina
Seafood ²	UK, Germany, Denmark, Iceland	India, Seychelles, US, Thailand, Philippines

1 Bord Bia, 2008

2 Bord Iascaigh Mhara, 2008

4.5 The organic market

Organic food may be defined as food that is produced free from preservatives or artificial pesticides. Consumer consumption of organic foods is on the increase. It is the view of the Irish Organic Farmers and Growers Association (IOFGA), that concerns about food safety, nutrition and water quality are on the increase and a way to combat these concerns is to produce food organically [27]. Nonetheless, organic food is subject to certain contamination risks for example, from mycotoxins. In 2006, the organic market in the ROI was valued at approximately €66 million (£61 million), with a market growth rate estimated at 10-15 per cent per annum. However, between 2006 and 2008, there was a substantial increase in the market of 82 per cent, an increase in value to over €100 million (£92 million) in 2008.

Although there are 1,230 producers farming organically in the ROI, 70 per cent of organic food in the ROI is imported, which means that the remaining 30 per cent is produced domestically from 0.9 per cent of the available agricultural land [28]. This is approximately 44,600 hectares which is lower than the EU average of 3.6 per cent across the 25 EU member states. However, the Irish government has established a programme to increase the land area under organic production to five per cent of the total agriculture area by 2012. Fruit and vegetables comprise the largest organic food type (45 per cent) while meats (25 per cent), dairy (10 per cent) and other organic groceries make up the balance [28].

The organic market is the fastest growing segment within the food section in the UK. In 2006, the global sales of organic food and drink increased by £2.6 billion (€2.8 billion) to £19.3 billion (€21 billion). In the same year, retail sales of organic products in the UK were worth an estimated £1.9 billion (€2.1 billion), representing a 22 per cent increase since 2005. The retail market for organic products has grown by an average of 27 per cent a year over the last decade [29]. As for 2007, the UK organic market value has increased by an estimated 10.4 per cent, which is above the year-on-year growth for the total grocery market.

Approximately, 81 per cent of the UK organic market is comprised of fruit and vegetables, dairy products, breakfast cereals, bread, flour and baked products, meat, meat products and fish. The balance is comprised of organic baby and toddler foods. The total organic sales overall for 2007 were estimated at 1.6 per cent of the total grocery sales by value overall [30]. Only five years ago 70 per cent of the organic food bought in the UK was imported. Now imports account for only 30 per cent of the organic market and much of that is exotic produce such as chocolate, bananas, tea and coffee, which can not be grown in the UK [31]. Data for NI is unavailable.

4.6 Processing

Most foods that are imported onto the IOI are processed further before they reach the supermarket, restaurants and finally the consumer. In 2007, 526,681 and 63,456 tonnes of prepared foods were imported into the ROI and NI, respectively. The prepared foods category consisted mainly of ingredients such as confectionary, sugar, processed foods (pineapples, tomatoes) etc. These ingredients are imported from a wide range of countries and are further used in the production of processed foods. A prime example is pizza (see section 3).

It is important to note that during the manufacture of processed foods, the nutritional composition of the food changes. For example, salt may be added to food to act as a preservative or flavour enhancer etc. This is done for economical or in some cases, technical reasons.

The growth of the processing sector in the ROI and the UK stems from the increased demand for pizza toppings, salads and prepared foods. The manufacturing and processing industries in the ROI typically look to international suppliers to supply their needs for frozen ingredients at commodity prices [32]. In 2007, the prepared foods category was recorded as one of the highest amount of food imports onto the IOI. These comprised of mainly food ingredients and foods ready for further processing. Section 3 in this review shows the range of countries involved in exporting food ingredients into the ROI and UK.

Key findings

- The total gross turnover of the NI food and drinks processing sector was estimated to be £2.7 billion (€2.9 billion) in 2007. In the ROI, the food and drink industry had a gross output of over €18 billion (£16.5 billion) and accounted for approximately seven per cent of the Gross Value Added, approximately 10 per cent of exports and eight per cent of total employment.
- In 2007, NI exported 1.055 million tonnes of food and food products valued at £537 million (€594 million), whereas, for the ROI, food exports were valued at €8.6 billion (£7.9 billion).
- Food imports from the EU and Third Countries are necessary for economic, seasonal, availability, trade and consumer demand reasons. These have led to a steady rise in food imports onto the IOI in recent years.
- In 2002, the amount of imports onto the IOI were recorded at 4.5 million tonnes, which increased by approximately 18 per cent to 5.3 million tonnes in 2007. This was equivalent to an increase in value of approximately €1.5 billion (£1.4 billion).
- The total food imports were valued at €4.6 billion (£4.2 billion) in the ROI in 2007, and £460 million (€502 million) in NI.
- Of foods imported onto the IOI cereals and fruit and vegetables make up the highest volume. A significant amount of food imports, especially fruit, cereals and vegetables are imported onto the IOI from Third Countries i.e. China, Costa Rica, and South Africa. Meat and dairy produce are mostly imported from within the EU.
- There is a significant amount of cross-border trade between NI and the ROI in particular, soft drinks, live pigs, beer and other products.
- Food imports account for a significant amount of the retail market for the IOI.

5. Food Safety and Food Origin

5.1 Summary

On the island of Ireland (IOI), controls, systems and legislation are in place that aim to control both microbiological and chemical hazards in the supply chain and, thereby, minimise the risk to consumers' health. Imported foods are recognised as vehicles for foodborne illness in humans thus making outbreaks associated with internationally distributed foods more common. However, there have been no confirmed outbreaks related to imported foods recorded on the IOI. In 2007, 76 food incidents were reported in the Republic of Ireland (ROI) of which 41 per cent were attributed to chemical contamination whereas for the UK (data unavailable for Northern Ireland (NI)) 1,312 food incidents were investigated.

5.2 Introduction

Foodborne illness is caused by the consumption of, or contact, with food that has been contaminated with some type of microbiological, biological, chemical or physical hazard. Food import control systems on the island strive to both control these hazards and minimise the risk to consumers.

The research findings from the focus groups indicated specific food safety concerns among consumers associated with the origin of food. The exception was the perception that the further food travels, the greater the risk of 'contamination'. It appeared that consumers had not developed this perception to a point where they differentiated between the different types of contamination, whether physical, microbiological or chemical. Rather, contamination was used as an umbrella term to represent a group of worries about food becoming adulterated through the food chain.

These findings are in accord with the EC Eurobarometer report published in 2006 that assessed how people in the EU perceive risk [33]. In that survey, the level of worry among EU citizens did not vary much between food contamination issues. For example, concerns about 'contamination by bacteria such as *Salmonella* in eggs or *Listeria* in cheese' affected 65 per cent of Europeans, with 26 per cent declaring that they were 'very worried'. A similar proportion claimed that they were worried about 'pollutants such as mercury or dioxins'. The general level of concern amongst consumers on the IOI in relation to food issues was consistently low when compared with other regions where, in a general sense, concern was highest in the southern and eastern countries in mainland Europe.

This chapter will look at the microbiological and chemical aspects of the food import supply chain. This includes some associated hazards and risks, and the controls in place to minimise such risks.

5.3 Microbiology

5.3.1 Scientific information relating to microbiological hazards in domestic versus imported food products

It is notable that in addition to the 'contamination' concern discussed above, UK consumers have reported that by buying local produce they are purchasing more nutritious, tasty and safe foods [34]. The Advisory Committee for the Microbiological Safety of Foods (ACMSF) has established an ad hoc Group on Imported Foods to assemble information on the current situation on imported foods. The group reported that within the UK, because of the limited reporting of provenance data, few UK outbreaks have been attributed to imported foods. Their investigation of the microbiological safety of illegally imported bush meat concluded that the risk of foodborne illness from consumption of bush meat appeared to be very low. However, in the US in response to a number of high profile outbreaks associated with imported foods, the Food and Drug Association (FDA) has proposed a set of measures to stop contaminated food at source. This plan challenges the existing paradigm of inspection only at the border by proposing to place more responsibility elsewhere, especially at the point of production abroad.

In examining the consumer perception that local foods are safer than imported produce, it is worth noting the outcomes of research studies and other scientific information available for the IOI. **safefood** research has particularly examined the safety of foods produced in each jurisdiction on the island where different systems of control are in operation.

Eggs

The **safefood** project 03-RESR-005 *Development of a risk assessment model for Salmonella in shell eggs and processed eggs on the IOI* looked at the prevalence of *Salmonella* in eggs in each jurisdiction and compared the two different approaches to *Salmonella* control. In NI a vaccination regime is adopted, while in the ROI, controls based on routine monitoring for *Salmonella* and subsequent culling of infected flocks are applied. The study found that both methods are equally effective in controlling salmonellas. The study analysed a total of 30,000 eggs from flocks in NI and the ROI for the presence of *Salmonella*. Two egg samples were found to contain *Salmonella* (0.04%) with only the shells contaminated and no *Salmonella* Enteritidis (serotype commonly associated with contamination of eggs) was found. Infections from *Salmonella* in the human population are, therefore, unlikely to result from eating eggs produced on the IOI. Statistically, eggs produced on the IOI had a significantly lower *Salmonella* prevalence than that seen in an earlier major UK survey in 2003 [35].

Pork

The ongoing **safefood** /FIRM project 04-RESR-08 *Occurrence of Salmonella in pork on the IOI and an assessment of the risk factors contributing to its transmission* has investigated the microbiological status of pork. Although some variation in the prevalence of *Salmonella* on pork carcasses and in cutting plants has been observed between plants and jurisdictions, the study concluded that levels of contamination were comparable in each jurisdiction, with no significant variation observed.

Fish

The shelf-life for commercially major species is between 14 and 17 days during normal fish handling procedures. Interestingly, under the same conditions, fish from warmer, tropical water will last 21 to 24 days [36]. The disparity in the shelf-life potentials depending upon origin may be explained by the different microflora present in temperate and tropical waters. In the former, psychrotrophic and/or psychrophilic bacteria may be part of their natural flora, which are not found in tropical waters. These cold tolerant bacteria are pre-adapted to grow at low temperatures and thus cause more rapid spoilage effects at storage temperatures.

5.4 Chemical residues and contaminants

One of the findings of the Eurobarometer survey in 2006 with regard to risk issues was that consumers, while not differentiating greatly between the various types of risks, were more likely to be concerned about risks caused by external factors over which they had no control. These included pesticides residues, environmental pollutants, genetically modified organisms (GMOs), food additives and BSE (Bovine Spongiform Encephalopathy). The **safefood** focus group research showed that consumers characterise these and other issues under the generic term 'contaminants'. However, in terms of food safety regulation, this term has a specific meaning. It refers to chemicals present in the environment that may unintentionally contaminate food at some point along the production chain. While BSE and, under certain circumstances, genetically modified (GM) material are loosely regarded as 'contaminants', they are not included within the regulatory definition. The distinction is made between contaminant chemicals and those which are present in food having been deliberately added for a specific purpose during production. These are termed 'residues'. These chemicals fall into two broad categories, namely those used in the production of crops (agrochemicals) and in the production of food animals. The former includes pesticides and biocides while the latter includes veterinary medicines, supplements and biocides.

5.4.1 Chemical residues

Given the nature of modern, conventional (as opposed to organic) farming systems, there is a risk that agrochemicals and veterinary medicines used in food production may persist in the food even after it is harvested. Ideally, these 'residues' should not be present in food at this stage. However, realistically they can and do remain in food, even up to the time when it is consumed. To guard against any adverse health effects that could potentially arise from exposure to chemical residues, the regulatory objective within the EU (and elsewhere) is to establish Maximum Residue Levels (MRLs) for agrochemicals and veterinary medicines. The MRL is simply the maximum amount of a residue allowed in a food. MRLs are set for all types of raw food and some processed food commodities that are destined for human or animal nutrition.

In establishing an MRL, regulators take a number of factors into consideration. These include best practice usage guidelines which assist the producer in getting the maximum benefit of the chemical for the minimum amount applied. Also, data on potential residue intake by consumers, the physico-chemical and biological properties of the chemical, trade issues and the experiences of other national and international regulatory agencies are drawn on as well. The MRL serves both to safeguard human health and to regulate trade in treated food commodities. They are a check that best practice is being adhered to during the production of food.

MRLs are not, in themselves, safety limits for human health although these are taken into consideration when establishing the MRL. The safety limit is the Acceptable Daily Intake (ADI) which is the amount of a chemical in food that is considered safe if ingested every day over a lifetime. The ADI is primarily determined from toxicological data derived from tests on laboratory animals and is an integral part of the safety assessment of chemicals used worldwide by most agencies including the WHO/FAO, Joint Expert Committee on Food Additives (JECFA) and the European Food Safety Authority (EFSA). The MRL is invariably lower than the ADI. Therefore, a violation of an MRL is not necessarily a cause of concern for public health.

MRLs are set for specific chemicals in specific products and are applied regardless of the origin of the food product. For agrochemicals and veterinary medicines prohibited in the EU, no MRL is applied as no food product generated using these chemicals' is permitted for sale on the EU marketplace. On the IOI, marketing of agrochemicals is under the remit of Department of Agriculture Fisheries and Food (DAFF) in the ROI and Department of Agriculture and Rural Development (DARD) in NI while the marketing of veterinary medicines is the responsibility of the Irish Medicines Board in the ROI and the Veterinary Medicines Directorate in NI.

5.4.2 Chemical contaminants

A 'contaminant' is defined under Council Regulation 315/93/EEC as: 'any substance not intentionally added to food, which is present in such food as a result of the production (including operations carried out in crop husbandry, animal husbandry and veterinary medicine), manufacture, processing, preparation, treatment, packaging, transport or holding of such food, or as a result of environmental contamination' [37]. These include chemicals such as dioxins, fungal toxins, heavy metals and radioactive particles. While BSE and GM material can also be viewed as potential contaminants, they are the focus of more specific EU legislation. Current EU law requires mandatory labelling of food products derived from modern biotechnology or products containing GMOs if the total GM content of the food product is one per cent or more. The potential for accidental contamination of conventional food by GM material is also addressed in EU legislation [38].

As is the case for chemical residues, the overarching caveat is that food containing a contaminant at a level that causes concern from a public health perspective should not be on the market. Unlike chemical residues, the philosophy with regard to chemical contaminants in food is that there is no reason they should be present in the first place. However, this might not always be achievable in practice. Consequently, there is a need to establish safe consumption levels for specific contaminants in foods. This is the Tolerable Daily Intake (TDI) which is an estimate of the amount of a substance in food or drinking-water that can be safely consumed every day over a lifetime [39]. More stringent TDIs are established for protection of vulnerable groups such as infants and young children [40].

5.5 Food safety controls for the ROI and NI

A substantial body of EU-based legislation now underpins the food safety regulatory regime on the IOI. The most significant development was the coming into force in 2006 of a number of EU regulations which are collectively referred to as the 'Hygiene Package.' This clearly places responsibility for food safety and hygiene across the entire food chain on the Food Business Operator, whatever position they occupy in the food production chain. Policing of these obligations is carried out by a number of government agencies involved in various regulation and enforcement activities.

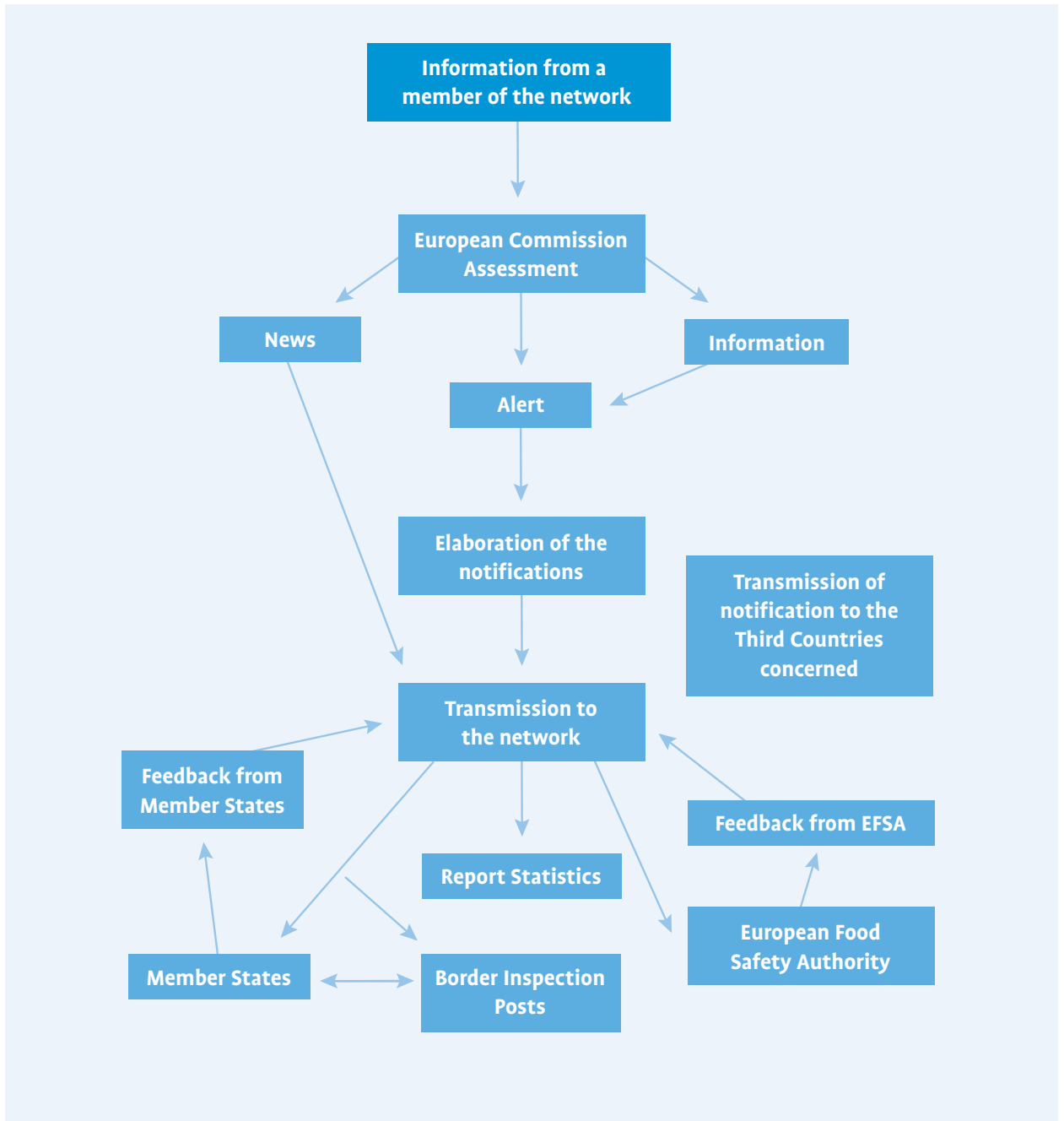
The Hygiene Package builds on general food law established by EC Regulation 178 of 2002 [41]. The overarching principle of this regulation is that food should not be placed on the market if it is unsafe. The Food Business Operator has a number of obligations in this regard including informing the consumer if unsafe food has been placed on the market and having in place systems and procedures which assist in the traceability of such food by the competent authorities. This regulation also established the European Food Safety Authority and provided the legal basis for the Rapid Alert System for Food and Feed (RASFF). On the IOI, the RASFF function is coordinated by the Food Safety Authority of Ireland (FSAI) and the Food Standards Agency Northern Ireland (FSANI). In the ROI, the FSAI has service level contracts with the Health Service Executive (HSE), DAFF and The Department of Communications, Marine and Natural Resources (DCMNR) to oversee the enforcement of the Hygiene Package and other national and EU legislative and safety programmes.

In NI, the FSA works with DARD and has similar service level agreements with local authorities through Environmental Health Officers and official veterinarians, in enforcing the Hygiene Package and other food safety legislation.

5.5.1 Rapid alert system for food and feed (RASFF)

A rapid alert system for food has been operating within the European Commission since 1979, but it was the publication of the General Food Law (Regulation No 178/2002) which gave the RASFF legal status. The RASFF is primarily a tool for exchange of information between the central competent authorities for the regulation of food and feed in the member states in cases where a risk to human health has been identified and measures are needed, such as withholding, recall, seizure or rejection of the products concerned. Figure 5.1 outlines the transmission of information for the RASFF [42].

Figure 5.1 Flowchart outlining the transmission of information for the Rapid Alert System for Food and Feed [adapted from EUROPA].



Alert notifications

Alert notifications are sent when a food or feed presenting a serious risk is on the market and when immediate action is required. Alerts are triggered by the member state that detects the problem and has initiated the relevant measures, such as withdrawal/recall. The notification aims at giving all the members of the network the information to verify whether the product concerned is on their market, so that they also can take the necessary measures.

Consumers can be reassured that products subject to an alert notification have been withdrawn or are in the process of being withdrawn from the market.

The member states have their own mechanisms to carry out such actions, including the provision of detailed information through the media if necessary.

Information notifications

Information notifications concern a food or feed that was placed on the market for which a risk has been identified, but for which the other members of the network do not have to take immediate action, because the product has not reached their market or is no longer present on their market or because the nature of the risk does not require any immediate action.

Border rejections

These notifications concern food and feed consignments that have been tested and rejected at the external borders of the EU [and the European Economic Area (EEA)] when a health risk was found. The notifications are transmitted to all EEA border posts in order to reinforce controls and to ensure that the rejected product does not re-enter the Community through another border post.

The specifics of food hygiene and safety control at different points in the food chain are specified in further pieces of legislation [43-47]. Again these are aimed at the Food Business Operator (FBO) and tend to concentrate on food of animal origin especially with regard to microbiological compliance [48, 49]. That said, the obligations of EU member states to carry out official controls to verify FBO compliance with the regulations are also specified [50]. The national competent authorities are endowed with enforcement powers, including recourse to the law, to ensure compliance with the food hygiene regulations.

5.6 Imported food controls

5.6.1 Import food controls for the European Union

The single market concept of freedom of movement applies to imports of food from EU Member States (MS). Inspections of such imports at ports are generally only carried out following the receipt of information indicating a potential food safety problem. Inspections inland of imported EU products should be at no greater frequency than domestically produced food [51].

5.6.2 Import food controls for Third Countries

Imports of food and food products from Third Countries must come through designated Border Inspection Posts (BIPs) and be subjected to a series of checks before they are allowed access to the EU market. The BIPs are situated in strategic locations in each MS and are under the supervision of the relevant competent authority of the MS. The Food and Veterinary Office (FVO) of the European Commission routinely audits the controls exercised at these BIPs.

Live animals and animal products imported into the EU may only originate from a Third Country, or part of a Third Country, approved by the EU. The establishments from which these products are produced must be approved, in accordance with the relevant EU legislation, by the competent authority of that Third Country. EU food veterinary inspectors routinely audit these countries and establishments. Third Country imports must be accompanied by health certification signed by an official veterinarian in the country of export and must be presented at the BIP at point of entry into the EU. In addition, the animal products must be appropriately wrapped, packaged and labelled with a health mark. The imports undergo a 100 per cent documentary and 50 per cent physical checks before being cleared for entry into the EU. It should be noted that the BIP is not always in the country of final destination.

Unlike the requirements for Third Countries involved in the export of food of animal origin, those Third Countries involved in the export of food of non-animal origin do not have to appear on a list of exporters approved to export to the EU (normally held by the competent authority in cases of food of animal origin). In many cases, it is sufficient that exporting establishments in Third Countries are known to, and accepted as suppliers by, importers of food in the EU. For consignments containing plant or plant products which are covered by EU plant health legislation (listed in part B of Annex V to Directive 2000/29/EC), the exporter must obtain a phytosanitary certificate issued by the competent authority of the exporting country [52a]. This normally involves registration. These measures exist to prevent the introduction of serious diseases and pests of plants and plant products into and within the EU. The phytosanitary certificate certifies that the plants and/or plant products:

- *have been subject to the appropriate inspections*
- *are considered to be free from harmful organisms and*
- *are considered to conform with the phytosanitary regulations of the importing country [52b].*

Guidelines to explain the EU's import requirements for food and food products were issued by the FVO in 2003 in order to facilitate the safe trade in food with Third Countries. The guidelines are based on existing legislative requirements and specific needs identified by FVO inspectors from their contacts with Third Country partners. They explain approval systems, administrative procedures, and provide information on the EU's animal health, animal welfare and food safety requirements.

5.6.3 European Union, Food and Veterinary Office

The function of the FVO is to ensure effective control systems through the evaluation of compliance with the requirements of EU food safety/quality, veterinary and plant health legislation, both within the EU and in Third Countries exporting to the EU. The FVO does this mainly by carrying out inspections in MS and in Third Countries exporting to the EU.

Each year the FVO develops an inspection programme, identifying priority areas and countries for inspection. In order to ensure that the programme remains up to date and relevant, it is reviewed mid-year. The FVO makes recommendations to the Third Country's competent authority to deal with any shortcomings revealed during the inspections. On the IOI the competent authorities are FSANI/FSAI for public health related issues and DARDNI/DAFF for animal/plant health issues. The competent authority is requested to present an action plan to the FVO on how it intends to address any shortcomings in the food production system. Together with other Commission services, the FVO evaluates this action plan and monitors its implementation through a number of follow-up activities.

In its role, the FVO, where appropriate, may highlight areas where the Commission may need to consider clarifying or amending legislation or areas where new legislation might be required. Thus, the FVO plays a key role in the development of EU policy in the food safety and quality, veterinary and plant health sectors. In addition, the FVO produces other reports, such as summaries of the results of inspections or the annual EU-wide pesticide residues monitoring reports. The FVO also publishes an annual report on its activities, which reviews the progress of its inspection programme and presents the global results.

5.6.4 Border inspection posts

BIPs are EU approved entry points for food and food products originating from countries outside the EU and are managed by local authorities. These posts are located at road, rail, airport or port entry points into the EU. There are currently five BIPs on the IOI, namely Dublin Airport, Dublin Port, Shannon Airport, Belfast International Airport and Belfast Harbour. The list of BIPs operating within the EU is drawn up in Commission Decision 2001/881/EC, as amended. Third Country import controls can be undertaken in any individual MS before the product is allowed to circulate freely in other MS, which effectively means that each MS is dependent on every other state to ensure that Third Country imports are controlled.

The organisation of veterinary checks on products i.e. plant and animal origin entering the EU from Third Countries is governed by European Council Directive 97/78/EC. Poultry meat comes under Category two, which means the frequency of physical checks is 50 per cent, while for other fresh meats the frequency is 20 per cent. Sampling for laboratory analysis may also be carried out. Foods failing to comply with the control checks may be detained for further examination, returned to the exporting country or destroyed. All rejections are notified to the EU Commission and if a public health risk is identified, a communication is issued to all MS via the RASFF. Once the shipment has met the required conditions, it is released for free circulation within the EU. However, copies of the Health Certificate and the BIP clearance document must accompany the consignment to its final destination. The aforementioned Directive has been transposed into national legislation in NI by the 'Products of Animal Origin (Third Country Imports) Regulations (Northern Ireland) 2004', and in the ROI by European Communities (Importation of Animal and Animal Products from Third Countries) Regulations, 1994 (S.I. No. 292 of 2000), as amended. Commission Regulation EC/1756/2004 provides for food plant health checks at a reduced frequency where this can be justified.

The Competent Authority in the MS carries out initial monitoring of controls at BIPs. In the case of the ROI, this is done by Veterinary Inspectors' in DAFF on behalf of the FSAI and in NI by Veterinary Officers in DARDNI. The FVO is required to inspect BIPs with an annual throughput of more than 2000 consignments each year, and smaller ones less frequently with all MS visited at least every three years to assess the performance and uniformity of the national enforcement systems. Where the operations or the facilities for checking product at a BIP are considered inadequate, approval of the BIP may be withdrawn. In the FVO Annual Report for 2003, the findings of BIP Audits conducted during that time period in MS show that there were minor non-compliances in the areas of staff training, identification and selection of consignments, working procedures and supervision of transit trade, hygiene and documentation. In addition, a number of major non-compliances were also found mainly related to facilities and equipment in BIPs. Similar findings were found for the FVO Annual Report for 2006.

5.7 Food incidents

5.7.1 Food incidents for the ROI and the UK (including NI) in 2007

A food incident may arise from, but not be limited to, a problem identified by a food manufacturer, an official agency through testing or investigative work, or because of information received from enforcement agencies in other countries. In the ROI, the FSAI is the contact point for the RASFF. By the end of 2007, the FSAI had managed 76 food incidents for that year, the same number managed in 2006. Of the 76 food incidents, 41 per cent concerned chemicals and 20 per cent concerned microbial contamination. Figure 5.2 and Table 5.1 illustrates the breakdown of these 76 food incidents [53].

Figure 5.2 Food incidents according to hazard identified for the ROI

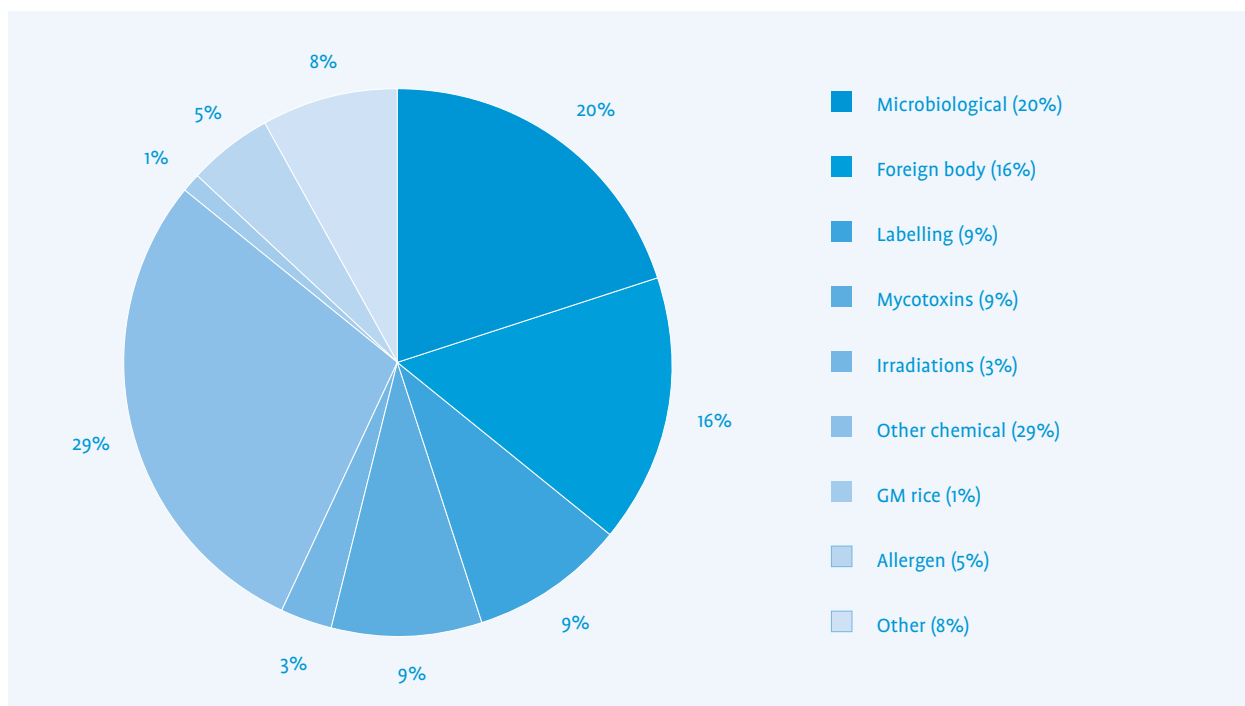


Table 5.1 Hazard breakdown for the 76 food incidents for the ROI

Hazard type		Number	% of all food incidents
Microbiological		15	20%
Foreign body		12	16%
Labelling		7	9%
Chemical	Total	31	41%
	<i>Mycotoxins</i>	7	9%
	<i>Irradiations</i>	2	3%
	<i>Other chemical</i>	22	29%
GM rice		1	1%
Allergen		4	5%
Other		6	8%
Total		76	100%

In addition, 29 product recalls or withdrawal notifications by food businesses were received by the FSAI in 2007. A further 73 minor food incidents were also investigated. Finally the FSAI issued 24 RASFF notifications (20 alert notifications and four information notifications) regarding food products that had been distributed to or from the ROI in 2007 [53].

In NI, the FSA is the point of contact for the RASFF. The FSA have two categories for incidents. (1) Incidents involving contamination of food or animal feed in the processing, distribution, retail and catering chains. These incidents may result in action to withdraw food from sale and, in certain circumstances, to recall, alerting the public not to consume potentially contaminated food; and (2) Environmental incidents e.g. fires, chemical/oil spills, radiation leaks etc. In 2007 the FSA investigated 1,312 in the UK. The major categories of incidents were environmental contamination such as fires, spills and leaks (17 per cent), natural chemical contamination including mycotoxins, algal toxins and others (16 per cent), microbiological incidents (12 per cent) and on-farm incidents (12 per cent). In 2007, the FSA issued 115 food alerts, four of which required action from local authorities [54]. Data for NI is unavailable.

5.7.2 Food incidents for the EU

In 2007, a total of 2,979 original notifications classified as 961 alert notifications and 2,015 information notifications were received through RASFF [55]. Most notifications concern official controls on the internal market. The second largest category of notifications concerns controls at BIPs when consignments were not accepted for import (“border rejection”) (Figure 5.3).

Figure 5.3 2007 EU notifications according to type of control (adapted from [55]).

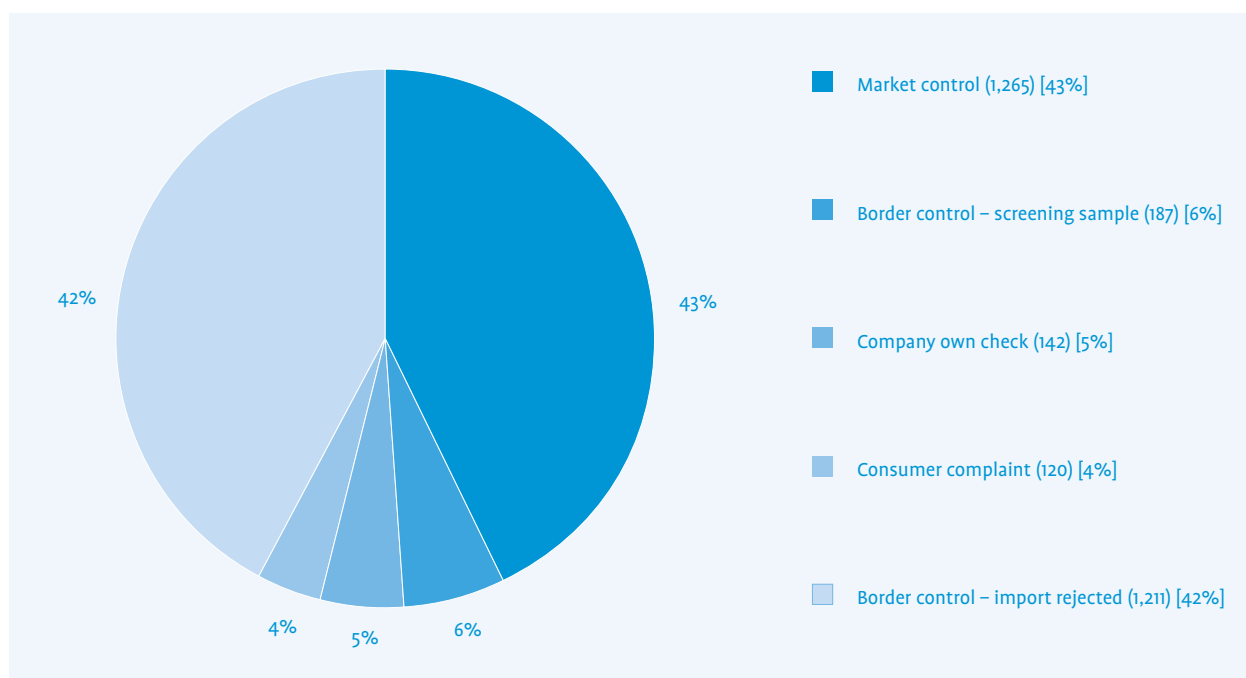


Table 5.2 outlines the spectrum of contamination that was found in food in 2007. The number of notifications and the country of origin are also listed. It is clear from Table 5.2 that the most frequent contamination of foods in 2007 concerned mycotoxins (754 notifications). Alfatoxins were the most prevalent mycotoxins found, in particular in nuts, nut products and seeds. The countries of origin were mainly Iran, Turkey, India, China, USA and Brazil. In addition, high numbers of notifications concerned pesticide residues in peppers and various vegetables (180), foreign bodies in fruit and vegetables (137) and mercury in fishery products (124). The countries of origin were mainly Spain, China, Italy and Indonesia.

Table 5.2 Types of contamination found in food for 2007 (adapted from [55]).

Substance	Product	Number of notifications	Country of origin
Mycotoxins i.e. Alfatoxins, deoxynivalenol (DON), fumonisins, ochratoxin A and Zearalenone	Cereals and bakery products, coco preparations, coffee and tea, feed for producing animals, pet food, fruit and vegetables, herbs and spices, milk and milk products, nuts, nut products and seeds.	754	Iran, Turkey, Lebanon, US, Syria, China, Argentina, Egypt, India, Ghana, Brazil, Nigeria, Nicaragua, Pakistan, Spain, Morocco, Italy
Dioxins	Fish liver, Cod liver oil capsules, eel, guar gum ¹	20	Denmark, Poland, Norway, France
	Feed	10	Turkey, China
Polycyclic aromatic hydrocarbons ² (PAH)	Fishery products	29	Latvia, Poland, Turkey, African countries, Asian countries
Mercury	Fishery products, Swordfish (73 notifications), Shark (21 notifications)	124	Spain, Italy, Indonesia
Foreign bodies ³ i.e. insects, mites, glass, metal, other materials ⁴	Fruit and vegetables, tea, coffee and cocoa products, primarily imported for raw coffee and for chocolate, processed products, glass packaged products, all food	137	China (19 notifications) and other countries
Residues of veterinary medicinal products	Fishery products	58	India, China, Bangladesh, Vietnam, Thailand, China, Spain, Jamaica
	Honey and royal jelly	49	Various countries
	Meat other than poultry	13	China, Brazil, Poland, UK
	Poultry	2	Belgium, Hungary
	Milk	1	Lithuania
Pesticide residues	Peppers and various vegetables	180	Spain (28 notifications) and other countries

1 Guar gum is a thickening agent that is used in the manufacture of jams, jellies, fruit spreads, ice cream, soft drinks, puddings, pet food etc.

2 PAH's are a group of diverse organic compounds which are potentially genotoxic and carcinogenic.

3 There were 27 border rejections and 45 consumer complaints

4 Other materials i.e. wood, wires, nails, plastic, (parts of) rodents, snails etc.

5.8 Foodborne human infections associated with food imports

Imported foods are recognised as new vehicles for foodborne illness in humans [56]. During the past two decades the global trade in foods has increased. International trade and travel raise new foodborne disease threats. Since there has only been one outbreak of imported foods reported on the IOI, this section draws on data from other countries to illustrate the variety of food outbreaks.

5.8.1 Epidemiologic and microbiological information limitations

Tracing individual episodes of human infection to a food source is inherently difficult. Estimating the risks associated with consuming different foods is a complex epidemiological process. Disease risks from foods can only be derived from the analysis and interpretation of a large body of evidence. This evidence includes laboratory infectious disease surveillance data, hospital episode statistics, food intake surveys, outbreak surveillance data, death statistics and special studies related to infectious disease outbreak investigations.

Considerable caution must be exercised in attributing clinical infections to particular foods. The complexity of this attribution is compounded by such issues as accurate food labelling and the presence of a number of ingredients (perhaps from different countries or even continents) in a composite dish. In addition, monitoring and surveillance schemes for foodborne pathogens are not harmonised between countries (neither in EU nor globally) and this presents additional difficulties in the interpretation of available data. Foodborne disease data are generally not directly comparable between countries and sometimes not even between years in an individual country [57].

However, a number of factors contribute to the food poisoning potential of imported foods. The trend towards greater geographic distribution of products from large centralised food processors carries a risk for dispersed outbreaks [58]. Our food supply is now globalised and mass-distributed food products, if intermittently contaminated or contaminated at a low level, can result in illnesses that may appear sporadic rather than part of an outbreak. Outbreaks can also occur from imported foods consumed primarily by immigrant groups [59] as a means of keeping in touch with their native culture and this can cause difficulties in identifying food vehicles, particularly if these foods are 'home produced' or brought back from holiday visits to family abroad. International travel has also introduced us to foreign foods and tastes which leads to more imported foodborne disease potential. People with a weakened immune system become infected with foodborne pathogens at lower doses which may not produce an adverse reaction in less vulnerable people, this is particularly true for *Listeria* and *Cryptosporidium* infections, for instance there was a recent cluster of cases of pregnancy related listeriosis in the ROI which predominantly involved immigrant women [60]. The population of highly susceptible persons is expanding as our population ages and as patients live with serious illnesses such as cancer, AIDS and diabetes. Changes in microbial populations have led to the evolution of new virulent strains in old pathogens, new pathogens and the development of antimicrobial resistance. This subsequently can now be transported within a short time from country to country as a foodborne organism [58].

5.8.2 Reviews of foodborne outbreaks associated with internationally distributed foods

An Australian review [61] over a seven-year period 2001-2007 revealed that 14 (1.8 per cent) of 768 foodborne outbreaks were associated with foods that were distributed internationally. In total, these outbreaks affected at least 542 persons in Australia, 4.4 per cent (542/12,423) of all those affected by foodborne disease outbreaks during the period, but the numbers affected in these outbreaks from other countries are unknown (Table 5.3).

Outbreak no.	Year	Outbreak description	Implicated food	Public health impact serious?	Significant risk for international spread?	Significant risk for international travel or trade restrictions	Should this be reported to IHR
1	2001	23 cases of <i>Salmonella</i> Typhimurium definitive type 104	Helva from Turkey	No, small outbreak of moderate severity	Yes, food distributed globally; multiple European countries reporting cases	No, increased testing of imported sesame seed products only	No
2	2001	55 cases of <i>S. Stanley</i> and <i>S. Newport</i>	Dried peanuts from China	No, moderate outbreak of mild illness	Yes, food distributed globally, cases reported in UK and Canada	No, novel food product	No
3	2002	55 cases of <i>S. Montevideo</i> and <i>S. Tennessee</i>	Tahini from Egypt	No, moderate outbreak of mild illness	Yes, food distributed globally; cases reported in New Zealand and contaminated product in Canada and UK	No, increased testing of imported sesame seed products only	No
4	2002	230 cases of suspected norovirus infection	IQF oysters from Japan	No, large outbreak of mild illness	No, food vehicle poorly characterized	No, limited information for decision	No
5	2003	3 cases of <i>S. Montevideo</i>	Tahini from Lebanon	No, small outbreak of mild illness	Yes, food distributed globally, see outbreak 3	No, increased testing of imported sesame seed products only	No
6	2003	17 cases of suspected norovirus	IQF oysters from Japan	No, small outbreak of mild illness	No, food vehicle poorly characterized	No, limited information for decision	No
7	2003	35 cases of norovirus infection	IQF oysters from Japan	No, small outbreak of mild illness	Yes, virus detected in imported oysters	Yes, Australia restricted imports	Yes
8	2003	48 cases of norovirus	IQF oysters from Japan	No, moderate outbreak of mild illness	Yes, virus detected in imported oysters	Yes, Australia restricted imports	Yes

Outbreak no.	Year	Outbreak description	Implicated food	Public health impact serious?	Significant risk for international spread?	Significant risk for international travel or trade restrictions	Should this be reported to IHR
9	2004	5 cases of suspected norovirus infection	IQF oysters from Japan	No, small outbreak of mild illness	No, food vehicle poorly characterized	No, limited information for decision	No
10	2004	3 cases of norovirus infection; related to outbreak 7	IQF oysters from Japan	No, small outbreak of mild illness	Yes, virus detected in importation of fish only	Yes, Australia restricted imports	Yes
11	2005	5 cases of ciguatera poisoning in a family	Snapper from Fiji	No, small outbreak; moderate severity	No, domestic importation of fish only	No	No
12	2006	5 cases of methemoglobinemia in 2 families	Sodium nitrite powder from China	No, small outbreak; moderate severity	Unknown	No	No
13	2006	3 cases of <i>Vibrio cholerae</i> infection	White bait from Indonesia	No, small outbreak of moderate severity	Yes, fish imported commercially	Yes, countries may have put in place trade restrictions	Yes
14	2007	55 cases of <i>Shigella sonnei</i> biotype G infection, with related cases in Denmark	Baby corn from Thailand	No, moderate outbreak of moderate severity	Yes, food distributed to several countries with other countries reporting cases	Yes, countries may have put in place trade restrictions	Yes

Several point-source outbreaks were related to each other by a common food source, even though the foods were often branded differently and supplied by different companies. The outbreaks of suspected norovirus infection (outbreaks 4, 6 and 9) were associated with individually quick frozen (IQF) oysters all harvested from the same region in Japan. This association was later confirmed after a national investigation into 3 related outbreaks (outbreaks 7, 8 and 10). These outbreaks occurred over a three year period and resulted in Australia's imposing restrictions on importation of IQF Oysters from this growing area. In that review, no outbreak was considered to be of 'serious public health impact'.

WHO revised the legally binding International Health Regulations (IHR) which came into force in 2007. Under these regulations the authors of the Australian review showed that 50 per cent (7 of the 14 outbreaks included) would have required notification to the WHO.

5.8.3 Multinational foodborne outbreak reviews in USA and Europe

A review of selected outbreaks in the US over the 10 year period 1988-1997 [62] identified emerging foodborne pathogens and associated factors (Table 5.4). This review illustrates the emergence of recently described pathogens such as VTEC O157:H7 and the emergence of well-recognised pathogens such as *Salmonella* Enteritidis associated with new food vehicles. It concludes that as the diversity of foods in the market place has increased, illnesses have been associated with an increasing range of internationally distributed foods.

Table 5.4 Selected outbreaks in the United States of America 1988-1997 associated with emerging foodborne pathogens and factors for their emergence [62].

Pathogen/outbreak	Location(s)	Year	Factors in emergence	Reference
Hepatitis A Frozen strawberries	MI	1997	International travel and commerce technology and industry	28
<i>Salmonella</i> Typhimurium DT104	NE	1996	Microbial adaptation	48
Farm visit <i>Cyclospora cayetanensis</i> Guatemalan raspberries	Multistate, Canada	1996	International travel and commerce	25
<i>Salmonella</i> Enteritidis PT 4 Egg-containing foods	CA	1995	International travel and commerce technology and industry	44
<i>Salmonella</i> Enteritidis Mass-distributed ice-cream	Multistate	1994	Technology and industry	34
Norwalk-like virus Gulf Coast oysters	LA	1994	Economic development and land use	53
<i>Escherichia coli</i> O157:H7 Fast-food chain hamburgers	Multistate	1993	Technology and industry breakdown of public health measures	54
<i>Escherichia coli</i> O157:H7 Raw apple cider	MA	1991	Human demographics and behaviour. Technology and industry	15
<i>Vibrio cholerae</i> O1,El Tor Thai coconut milk	MD	1991	International travel and commerce Human demographics and behaviour	39
<i>Trichinella spiralis</i> Undercooked pork	IA	1990	International travel and commerce Human demographics and behaviour	40
<i>Salmonella</i> Chester Sliced cantaloupe	Multistate	1989	International travel and commerce Human demographics and behaviour	22
<i>Yersinia enterocolitica</i> Pork chitterlings	GA	1988	Human demographics and behaviour	41

A review of two foodborne outbreaks caused by the same strain of *Salmonella* Typhimurium DT104 identified some challenges in their investigation [56]. Two distinct but linked outbreaks caused by the same organism and traced

to two types of raw beef provided from the same supplier were detected. The Danish investigation relied mainly on microbiological sampling with limited epidemiological information. This worked because most cases were associated with carpaccio consumed at one restaurant. The Dutch investigation involved cases dispersed throughout the country and required a substantial epidemiological study. The reviewer concluded that there is a need for a standardised approach (standardised molecular microbiological methods, standardised epidemiological approach, protocols for information exchange, adequate capacity in all countries and international databases) in the prompt identification and control of multi-national foodborne outbreaks associated with imported foods. In addition it identifies the need for trust among experts and a willingness to share sensitive information at an early stage.

5.8.4 Outbreaks on the IOI

Only one recorded outbreak associated with imported foods was reported by the Communicable Disease Surveillance Centre Northern Ireland (CDSCNI). In September 2004, 113 cases of *Salmonella* Newport were notified and epidemiologically linked to lettuce that was thought to have originated from mainland Europe. There were no confirmed cases of the illness in the ROI; however, surveillance was increased as there was one case of *Salmonella* Newport in Co. Donegal which may have been associated with the UK outbreak. As the supply chain was very complex, a full trace back was not possible.

5.8.5 Range of associated food products

A very wide range of imported food products have now been associated with foodborne illness caused by a wide range of pathogens worldwide.

Contaminated produce eaten raw is an increasingly recognised vehicle for transmission of *Salmonella* and other pathogens. Imported fresh fruit and vegetables have now been linked extensively, both epidemiologically and microbiologically to infectious intestinal disease worldwide [63]. There are some important features associated with the role of fresh produce acting as vehicles of intestinal infection. Contamination often occurs early in the production process, e.g. via animal manure or contaminated water used during growth or harvesting. Ingredients from many countries may be combined in a single dish making the specific source of contamination difficult to trace. Fresh produce foods typically have fewer barriers to microbial growth such as preservatives; therefore, simple errors can make the food unsafe.

Definitively tracing back the produce source of an outbreak may be impossible because this food usually has a short shelf life and may have exited the food chain by the time the outbreak is recognised [64]. Also, consumers may not remember eating produce in the form of garnishes, e.g. parsley [65].

The involvement of multiple countries or regions is a particular feature of outbreaks associated with fresh produce. This is recognised as an important and emerging public health concern. In recent years fresh produce categories such as raspberries, melon, lettuce, fruit juices and sprouted seeds have been implicated as vehicles in multi-country outbreaks of a range of intestinal infections including salmonellosis, shigellosis, hepatitis, and *E. coli* O157:H7.

The widespread geographic distribution of these minimally processed ready to eat foods results in outbreaks that are very difficult to detect. Only a few sporadic cases may be detected in any given jurisdiction. The identification of multi-country outbreaks is facilitated if the causative organism is of an unusual serotype and the epidemiologic and laboratory authorities collaborate at the relevant international level.

A number of outbreaks illustrate this: a recent outbreak in 2008 in the United States of *Salmonella* Saintpaul associated with multiple raw produce items (jalapeno peppers, serrano peppers and tomatoes) represents the

largest foodborne disease outbreak in the US in the past decade. A total of 44 states and Canada had 1,442 cases over a three month interval. The outbreak was traced to a Mexican source [66].

An outbreak of *Salmonella* Thompson in late 2005 in a number of Northern European countries was linked to imported rucola lettuce from one Italian producer. Irrigation with non potable water was the likely cause of massive contamination of the lettuce [67].

Imported iceberg lettuce was also associated with an outbreak of *Shigella sonnei* in several European countries in 1994. Imported iceberg lettuce of Spanish origin was the identified vehicle of transmission [68].

Imported fresh fruits are another implicated food. Examples include watermelons in 1979 and 1993, cantaloupes in 1990 and pre-sliced cantaloupes linked to *Salmonella* Poona infections in 1991 [69]. Additionally, outbreaks of cyclosporiasis, have been linked to the consumption of raspberries, lettuce and basil [70].

Even herbal tea can be a vehicle for foodborne disease as illustrated by a *Salmonella* Agona outbreak from contaminated tea containing aniseed in Germany in 2002 [71].

Three outbreaks of *Salmonella* Montevideo in Australia were associated with sesame-based foods imported from the Middle East [72].

Meats

Traditionally, meats are recognised as vulnerable foods and imported meats also pose risks.

Imported minced beef was responsible for a small outbreak of *Salmonella* Typhimurium DT104 in Norway in 2005. Each year in Norway it is estimated that up to 80 per cent of the 2,000 annual cases of *Salmonella* are acquired from sources outside the country as domestically produced meats are ‘virtually free from *Salmonella*’. It is likely that subsequent cooking of the mince prevented a much larger outbreak [73].

A recent study comparing 581 *Salmonella* Schwarengrund isolates from persons and animals in Denmark, Thailand and the United States suggest the spread of multidrug–resistance *Salmonella* Schwavergrund. The resistant strain was transferred from Chickens to persons in Thailand and from imported Thai chicken products to persons in Denmark and the United States [74].

Milk and eggs

Imported German chocolate was associated with a large international *Salmonella* Oranienburg outbreak involving three European countries and Canada. Daily consumption of chocolate and having shopped for chocolate at a large chain of discount stores were associated with illness and pointed the investigation to the responsible food vehicle [75].

From 2002-2004 over 80 outbreaks of *Salmonella* Enteritidis (other than phage type 4) were linked to Spanish eggs used in the catering trade in the UK. In a subsequent survey of all UK eggs used in catering, only 0.3 per cent were contaminated with *Salmonella*. However, 12,000 samples of eggs found that 5.6 per cent of Spanish eggs samples were contaminated with *Salmonella* [76].

5.8.6 An emerging issue: antimicrobial resistance

Antimicrobial resistance of foodborne pathogens has been increasingly recognised in recent decades by authorities such as the Centre for Disease Control (CDC) in the US and European Centre for Disease Control (ECDC) in Europe. Imported foodstuffs have been implicated in this emerging problem.

A study based on Danish surveillance data (2000-2001) estimated the percentage contribution of each animal source to human antimicrobial resistant *Salmonella* cases. Imported food accounted for 9.5 per cent of all cases, the most important source being imported chicken. Multidrug and quinolone resistance was rarely found in cases acquired for Danish food but was common in cases related to imported products (49.7 per cent and 36 per cent of attributable cases). It is suggested that the quinolone-resistance isolate have a higher ability to survive food processing and/or cause disease [77].

A review of 208 *Salmonella* isolates recovered from imported foods entering the US in 2001, revealed that 11 per cent of isolates were resistant to at least one antimicrobial and 3.4 per cent were multidrug resistant. Overall, it was concluded that there was extensive genetic diversity among the *Salmonella* serotypes contaminating those imported foods [78].

5.9 Traceability and product recall

In recent years, there have been a series of high profile food scares, which have focused attention on how the supply chain operates, from imports to production through processing, and finally distribution. Such scares have the potential to seriously damage consumer confidence in the food chain, whether they present real or perceived food safety risks. They have also highlighted deficiencies in traceability systems and also in European Law. The consequence of this was the formulation and adoption of EU Commission Regulation (EC) No 178/2002 which lays down the general EU principles and requirements of food law including traceability and recall requirements. This regulation was implemented as of 1 January 2005.

5.9.1 Product traceability

In today's global food market, effective traceability and product recall systems are paramount, even in the best-managed food business where an issue involving the safety of a foodstuff may occur. Regulation (EC) No 178/2002 was introduced to increase consumer confidence in the safety of all foods consumed and to ensure that all businesses involved in the production, manufacture, distribution or retail of food and drink items have a reliable traceability system in place.

Article 18 of regulation No 178/2002 requires that traceability of 'food, feed, food producing animals, and any other substance intended to be, or expected to be, incorporated into a food or feed shall be established at all stages of production, processing and distribution'.

In the event of a foodborne hazard being identified in a particular food or food product or a case of foodborne illness associated with consumption of a food or food product having been reported,

- *a full traceability system should permit identification of where that product has originated*
- *the raw materials involved in its production*
- *the company that handled the product since it was produced*
- *how it has been stored during transit*
- *and the final destination of the product.*

This information should enable a rapid and targeted recall of potentially hazardous product, thereby preventing any further food safety problems.

5.9.2 Product recall

The objective of product recall is to protect health by informing consumers of the presence on the market of a potentially hazardous foodstuff and by facilitating the efficient, rapid identification and removal of the unsafe foodstuff from the distribution chain. There are two levels of product recall:

- 1 *Recall – the removal of unsafe food from the distribution chain extending to food sold to the consumer.*
- 2 *Withdrawal – the removal of an unsafe food from the distribution chain not extending to food sold to the consumer.*

The FSAI has issued a Guidance Note (FSAI 2002) relating to Product Recall and Traceability (applicable only to food) and also a Code of Practice on Food Incidents and Food Alerts (FSAI 2004). A similar guidance document has been issued by the FSA (2004).

In the ROI, a 'National Crisis Management Plan' was developed by the FSAI in conjunction with all of the official agencies so that a structured, coordinated and efficient response to any food safety crisis can be employed where the event arises.

The FSANI has set up an Incidents Taskforce to strengthen existing controls in the food chain so as to reduce the possibility of food incidents occurring and also to improve the management of such incidents when they do occur.

5.9.3 Case study: dioxin in Irish pork 2008

In December 2008, a national and international recall of all Irish pork and pork products was issued following the discovery of unacceptable levels of dioxin in samples of Irish pork fat. The traceability arrangements in place at the time of the recall allowed for pork and pork products to be traced to the day of production but not to the individual farm. Therefore, potentially contaminated and uncontaminated pork products could not be distinguished resulting in the necessity for a blanket recall of all Irish pork and pork products. In contrast, similar dioxin contamination in beef and beef products did not result in a blanket recall as the beef traceability system allowed products to be traced directly back to farm level.

5.10 Quality assurance schemes

The emergence of various quality assurance schemes, though not all, has arisen in response to several developments in the EU/IOI food sector, such as BSE, foodborne illnesses and contaminants, animal welfare and the environment. In particular they are a means of satisfying retailers in meeting their due diligence requirements in the sourcing of food and food products.

There are a number of quality assurance schemes in place for food and food products on the IOI. For meat products the following quality assurance schemes are in place:

- *Farm quality assurance schemes*
- *National beef assurance scheme*
- *NI Beef and Lamb Farm Quality Assurance Scheme*
- *Bord Bia Beef Quality Assurance Scheme*
- *NI Pig Quality Assurance Scheme*

- *Bord Bia Pig meat Quality Assurance Scheme*
- *Assured Chicken Production*
- *Bord Bia Chicken Quality Assurance Scheme*

In NI there are two relevant quality schemes run by the Sea Fish Industry Authority. These are the Quality Wholesaler Award and the Quality Processor Award. In the ROI, The Irish Quality Fish Programmes have been developed by Bord Iascaigh Mhara in conjunction with various stakeholders (e.g. FSAI, MI, feed manufacturers, fish farmers, processors, etc.) and International Food Quality Certification Ltd., who independently inspect and certify the schemes.

Two quality assurance schemes for horticultural produce have been developed in the ROI by Bord Bia in conjunction with the FSAI, the Department of Agriculture Fisheries and Food and industry representatives. These consist of the Prepared Vegetables Standard and the Bord Bia Specification for Horticultural Producers. In NI, The Assured Produce scheme is a wholly owned subsidiary of Assured Food Standard for the production of assured fruit, salads and vegetables. More information on each of the individual quality assurance schemes can be obtained from the previous consumer focused review of the chicken, finfish, fruit and vegetables, beef, milk and pork supply chains.

Key findings

- *On the IOI, there are controls, legislation and systems in place which aim to control both microbiological and chemical hazards in the supply chain, and, thereby, minimise the risk to consumers.*
- *While there are incidences of contamination (e.g. mycotoxins, foreign bodies, allergens, irradiation etc) these are monitored and controlled through EU inspections.*
- *The safety of the food supply chain is regulated by legislation primarily enforced by the Food Standards Agency in NI and the Food Safety Authority in the ROI.*
- *Imports of food and food products from Third Countries must come through designated Border Inspection Posts and be subjected to a series of checks before they are allowed access to the EU market.*
- *A number of quality assurance schemes exist on the IOI. These schemes seek to provide assurances to buyers and consumers of the quality and safety of food imports on the IOI by establishing standards to which participating producers must adhere.*
- *It is recognised that the increase in international trade means that imported foods are potential vehicles for foodborne illnesses. A variety of outbreaks have been recorded in other countries, particularly in foods served raw.*
- *No confirmed outbreaks have been associated with food imported onto the IOI.*

6. Nutrition

6.1 Introduction

This chapter provides an overview of the main factors related to its origin that impact on the nutritional aspects of food available on the island. The potential consequences of a changing food environment will be discussed.

6.2 Factors affecting the nutritional properties of foods imported onto the island

There is natural variation in the nutrient composition of all natural foodstuffs. The factors that mediate this variation are relevant to both foods grown on the island of Ireland (IOI) and food imports. Some key factors include soil and growing conditions, animal feed composition, transport and storage, and fortification.

6.2.1 Soil and growing conditions

Soil conditions, in particular the mineral and trace element content, vary within and between countries. Plants absorb minerals and trace elements from the soil that they are grown in, so the concentration of these nutrients in the plant food is dependent on their concentration in the soil.

A good example of how imports have influenced the mineral content of bread in UK and the Republic of Ireland (ROI) is evidenced in the case of selenium. As a result of a change in EU policy and bread making technology there has been a switch from using selenium-rich, protein-rich wheat flour imported from North America and Canada to low-selenium low-protein varieties which are grown in Europe [79, 80]. This has resulted in the contribution of bread to selenium intake within the EU dropping by more than 50 per cent [80]. The selenium content of foods from the ROI including meats, wheat and flour were compared to those that originated in the UK and USA/Canada [81]. Interestingly, the ROI and UK foods had higher selenium contents when compared to their North American counterparts. Foods from the ROI were on average higher in selenium than the UK equivalents reflecting variation in mineral content of soil between regions.

New advances in biotechnologies have also led to the development of cereal and plant varieties with higher mineral contents than standard varieties [82, 83]. These plant foods may play an increasing role in the food chain on the IOI in the future.

6.2.2 Animal feed composition

It is not surprising that animal feed composition also has a strong influence on the nutrient composition of animal-based food products. Fat-soluble vitamins are stored in the fat of meat and their concentrations are highly dependant on the animal's diet [84]. The fatty acid content of beef has been shown to be altered by diet. Grass-fed animals were found to have a higher omega-3 content than grain-fed animals [85]. A high percentage of animals on the IOI produced for food consumption are grass-fed compared to other countries.

6.2.3 Transport and storage

The duration and conditions of food storage can have a large effect on the nutrient content of foods. Water content has a major effect on the nutrient content of foodstuffs – as water content decreases over time, a change in nutrient content will concurrently occur. This is especially true in plant foods which are comprised mainly of water. Water-soluble vitamins are the most unstable nutrients in foods and are more likely to be affected by storage conditions. Fat-soluble vitamins tend to be more stable and are, therefore, less easily lost. Some vitamins, like riboflavin and vitamin E, are light sensitive and, hence, storage away from light is important to retain nutrient quality. Other vitamins, like vitamin C are susceptible to heat damage and must be stored in cooler conditions to retain maximal vitamin content.

Fruits and vegetables continue to respire after being harvested. This respiration can lead to a reduction in water content, and a deterioration of water-soluble vitamin content. Methods for reducing respiration include: refrigeration during transport and storage and reducing oxygen content of the surrounding atmosphere. Other methods of food preservation can have an effect on nutrient content, for example the use of additives such as sulphites to prevent bacterial growth and sulphur dioxides to prevent colour change in dried fruits and vegetables can destroy thiamin (Vitamin B₁) content.

6.2.4 Fortification

Fortification is the addition of nutrients to enhance the nutrient content of certain foods. Different countries have different rules/guidelines concerning fortification based on the nutrient requirements of their populations and whether they are being met. Many foods are fortified with nutrients before they are imported in order to comply with the fortification regulations of the target market. Foods may be fortified either voluntarily or by law. In the UK it is mandatory since the Second World War (1939) to fortify margarine with vitamins A and D. Mandatory fortification of bread with thiamin, niacin, calcium and iron followed in 1940 [86]. In the ROI fortification with micronutrients is done on a voluntary basis. However, the FSAI has recently issued a report on possible mandatory fortification of some breads with folic acid [87].

Many imported foods are fortified with nutrients on a voluntary basis. In 2007 a new EU regulation on the voluntary fortification of food came into force - Regulation (EC) No 1925/2006. It sets safe upper limits and minimum lower limits for fortification. This aims to regulate food fortification in the EU and, therefore, allow free trade across EU countries.

6.3 Changing food environment

The IOI has seen considerable economic growth in the past four decades. Internationally, trends in food consumption patterns have demonstrated that economic development is accompanied by improvements in a country's food supply and increased imports [88]. In recent decades, food and food products on the IOI have become commodities produced and traded in a market that has expanded from a predominantly local one to a global one. Food imports, coupled with advances in food production in industrialised countries such as the ROI and the UK have resulted in greater accessibility and variety of available foods. This can have positive and negative effects on food and nutrient intake. On the positive side, it is associated with gradual declines in dietary deficiencies. On the other hand, because we can consume what we like all year round without reference to seasons, we often consume more calories than we need and our diets have narrowed in the foods we consume. Therefore, despite choice being wider, this has resulted in the re-emergence of nutrient deficiencies among some people as dietary variety narrows.

6.3.1 The food environment and obesity

Adverse dietary changes known as the ‘nutrition transition’ occur with economic growth and associated increases in imports of unhealthy products such as foods that are high in fat and sugars. These then become cheaper and more widely available to all of the population. These changes include shifts in the structure of the diet towards a higher energy-dense¹⁶ diet with increased fat and added sugars in foods, saturated fat intakes mostly from animal sources, reduced intakes of complex carbohydrates and dietary fibre, and reduced fruit and vegetable intakes [89]. This is often accompanied by lifestyle changes including less physical activity. This has been seen on the IOI with a greater availability of highly processed foods containing more calories, refined carbohydrate, sugar and fat in recent decades. This is reflected in the diet on the IOI being characterised by a high total fat, saturated fat, added sugar and salt content [90, 91].

Almost two thirds of adults on the IOI are overweight or obese and rates are rising among children and teenagers [90-93]. Causal food-related factors in the development of obesity include the consumption of energy-dense foods, low fibre intakes and low fruit and vegetable intakes [88]. This, coupled with more sedentary lifestyles has led to the current obesity levels.

The change in the food supply has influenced access to food and the way people eat on the IOI. Food habits have changed, with a move away from three traditional meals a day to more continuous eating throughout the day [90, 91].

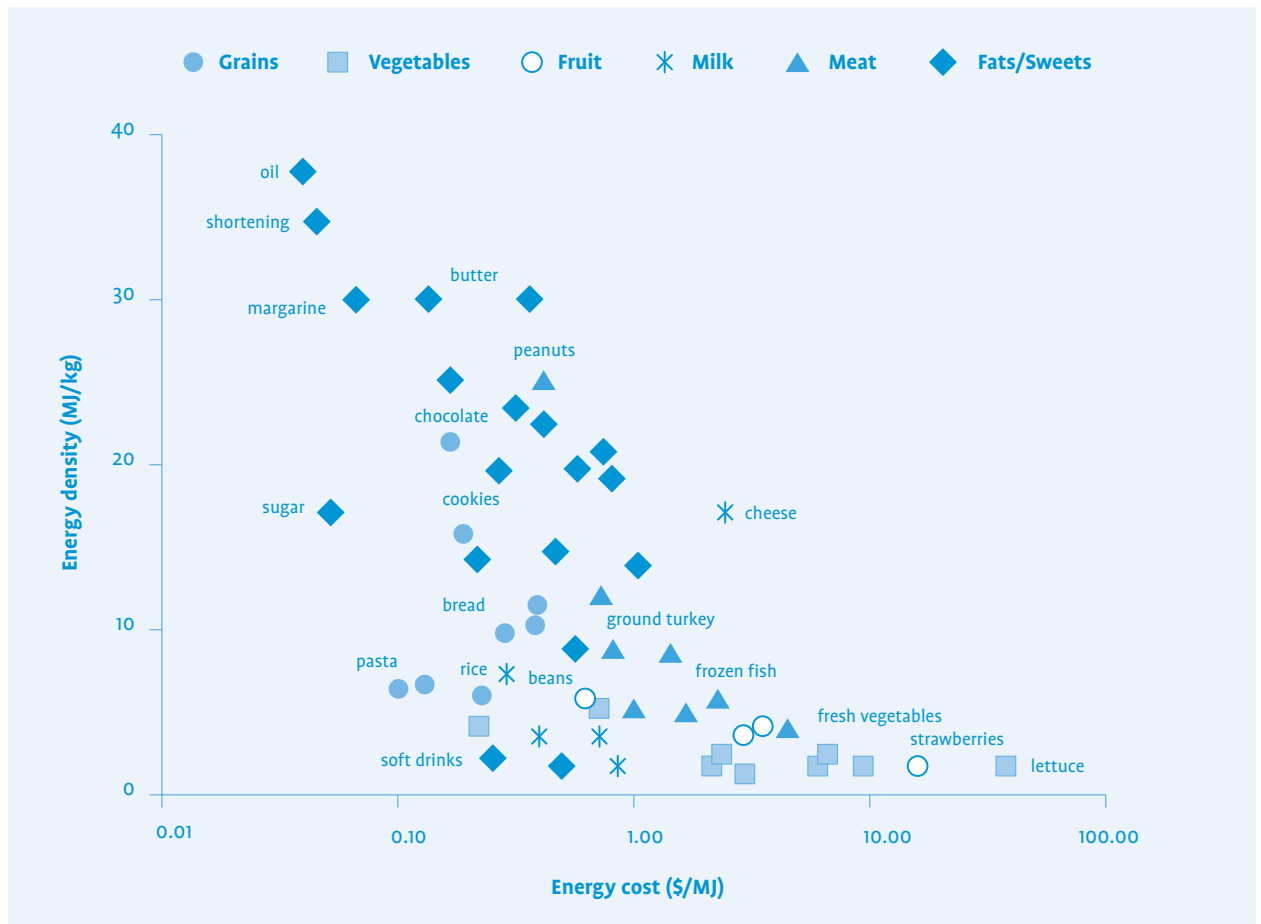
Lifestyles have changed and have created less time for food preparation resulting in a greater reliance on convenience foods, snacking and eating out. The impact of food eaten outside of the home on nutrient intakes of adults on IOI has been investigated [94-96]. These studies concluded that:

- *Food eaten outside of the home was found to contribute disproportionately more to dietary fat intake (corrected for energy intake) when compared to food prepared at home.*
- *High fat diets are more calorific and can promote passive over-consumption of excess calories and promote weight gain [94].*
- *Food eaten outside the home is also more likely to be lower in fibre and micronutrients and to displace other nutrients in the diet.*

Individuals from disadvantaged sectors of the population are more likely to be overweight and obese and eat poorer diets [97, 98]. The mediating factors driving this association are multifaceted. Figure 5.1 shows an inverse relationship between energy density (MJ/kg) of selected foods and their energy cost (\$/MJ). From Figure 6.1, it can be clearly seen that foods such as added sugar, oil, shortening, margarine, fried potatoes, and refined grains provide dietary energy at much lower cost than lean meat, fish, fresh vegetables, or fruit [89]. Thus the availability of cheap energy-dense, nutritionally-poor food has contributed in part to the higher obesity rates among disadvantaged groups.

¹⁶ Energy-dense foods are those that provide the most dietary energy per unit weight

Figure 6.1 The relationship between energy density and cost of food [89]



6.3.2 Variety of food

Healthy eating guidelines emphasise the importance of eating a variety of foods to obtain all the essential nutrients required for healthy living. An increased variety of foods is associated with a better quality diet among both adults and children and is often used as an index of diet quality [99]. In the last two to three decades, there has been a phenomenal rise in the number and size of food outlets as a result of food imports. For example, in the 1950s the average food store had approximately 500¹⁷ products compared to the average supermarket which now has 30,000 products [100].

Prior to the growth of food imports from other countries into the IOI, pre-famine Ireland supplied about 70 per cent of UK food and was reliant on local foods available in any given seasons, in addition to a small number of imported goods. In recent times seasonality became less important in relation to the availability of fruits and vegetables, in particular, from different countries. As a result the variety of foods available all year round to those on the IOI has increased greatly. This offers the potential for consuming more varied diets and thereby increasing the variety of nutrients consumed. However the variety and choice of food does not always lead to a healthy choice in terms of diet and nutrition.

17 New products, line extensions or variations of an existing product

6.4 Food security, food poverty and nutrition

Food security relates not only to food safety but exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life [101, 102]. The EuropeAid Co-operation Office is now implementing a new programme for food security which has been devised to help developing countries feed their people. The Food Security Thematic Programme (FSTP) operates worldwide and promises to provide innovative solutions in countries that face either temporary or structural food security problems that are linked to poverty [103].

The European Commission's food security policy has guided EU action in the fight against hunger since 1996. This new programme will improve support given to the developing world in a number of ways. It will be used when existing geographic instruments are not sufficient to address global, continental or certain regional food security issues and crises. The FSTP will also offer valuable support following the phasing out of humanitarian assistance. In these situations, it has been difficult for geographical instruments to operate because of the exceptional circumstances of transition that some states find themselves in. Such instruments cannot function effectively in failed or fragile states [103]. An example of the work the food security unit is currently carrying out is described below in Figure 6.2.

Figure 6.2 Case study: Food security in Ethiopia. Source [104]

Case study: Food Security

Since 1998, the food security unit has been working in Liben and Filtu districts in Southern Ethiopia. The area is semi-arid, and most of the 265,000 people who live there are pastoralists or agro-pastoralists, which means that animal products are their primary source of food, income, and economic assets. During the two annual rainy seasons, some people grow grains and vegetables to sell or supplement their diet.

The project Save the Children involves:

- Targeting direct distribution of food and food for work to needy families during the harshest time of the year;
- Training community health workers and veterinary workers;
- Training women's groups to make butter with new technology, and to pool their earnings from selling the butter in bank accounts; and
- In partnership with communities, building new health and vet posts, and developing more water and grazing resources.

From 1998 to 2001, this project has achieved the following:

- The rate of stunting in under five children has declined from 53% to 28%, despite two years of severe drought in the impact area;
- 9,972 households and 70,000 livestock benefited from ponds expanded through food for work activities; and
- 14 communities and 225 individuals have opened savings accounts.

Food security is not only used to describe the challenges of feeding people adequately in developing countries as described above, it is also used at the household level and at the national or regional levels – notably in times of external stress such as poor harvests, which impact upon food supply in such regions and are transmitted down to vulnerable populations at national and household level. At the household level, food security is used in developed countries in relation to food affordability and access issues for low-income consumers [105].

In 1989, Lee and Gibney carried out research on patterns of food and nutrient intake in a suburb of Dublin in the ROI with chronically high unemployment. Data was collected on 50 households in the area of the study looking at diet history of a typical seven days in a recent month, weekly food purchases, income, and food expenditure. Overall these authors found differences between people who were unemployed and those who were working. For example, higher intakes of full-fat dairy produce and snack foods were observed among unemployed people compared to those working [106]. Furthermore, research carried out by Friel and Conlon (2004) on food poverty in the ROI, found that the recurring impact of financial constraints on food choice not only affects the nutritional quality of individuals' diets but also defines the social and cultural food boundaries within which socially disadvantaged groups operate. A recent all-island study carried out by **safefood** found similar results. When consumer attitudes to food, nutrition and health were studied, it was found that price had a greater perceived influence than healthy eating on food choices among adults of low socio-economic status [107].

Due to the current worldwide economic crisis, the Food and Agriculture Organization (FAO) has estimated that countries will spend \$215 billion¹⁸ (€166 billion, £153 billion) more paying for imported foods in 2008 than they did in 2007, taking the world food import bill to \$1,035 billion (€801 billion, £737 billion). This will in turn have a detrimental effect on countries with low incomes and food deficits, which the FAO estimates will spend an additional \$169 billion (€131 billion, £120 billion) for the same amount of imported food as in 2007, a rise of 40 per cent on their 2007 food import bill [108, 109].

Key findings

- *Food transport, variety of soil, climate and transport conditions have an impact on the quality of food.*
- *The import of food has facilitated a greater availability and variety of food which has benefits for healthy eating.*
- *Many foods are fortified with nutrients before they are imported in order to comply with the fortification regulations of the target market. Foods may be fortified either voluntarily or by law.*
- *The consumption of cheap, energy-dense imported foods may lead to an increase in the risk of obesity.*
- *Those in lower socioeconomic groups may be particularly vulnerable to weight gain.*

¹⁸ Currency exchange £1 is equivalent to €1.0865/€1 is equivalent to £0.921 (accessed March 2009)

7. Labelling

7.1 Summary

Labelling enables consumers to make informed decisions about the food they eat and also builds confidence in products. Legal requirements govern the labelling of food products, whether it be meat, cereals, fruit and vegetables, beverages, seafood or prepared foods. Legislation has recently come into force on the use of nutrition and health claims on products.

The introduction of front of pack labelling has been shown to be a beneficial tool that can be used to increase nutritional awareness among consumers of the food they are eating. Front of pack labelling has the potential to help consumers make better and healthy food choices [110]. With regard to Country of Origin labelling, consumers are concerned about where their food originates for meat and fish products. Therefore accurate labelling of these foods is important. Currently legislation regarding Country of Origin Labelling is being reviewed at EU level.

7.2 Introduction

Food labels, especially those used on processed and prepared foods, need to convey a great deal of information to consumers. Labels need to tell the consumer what they are buying, the nutrient content, if it contains any ingredient that might affect people with allergies, and how to store and cook it safely [111]. This section outlines the legislation that covers food labelling along with various types of voluntary food labelling schemes operated by the food industry. The general labelling of food products is governed by Council Directive 2000/13/EC on the Labelling, Presentation and Advertising of Foodstuffs.

7.3 Understanding food labels

The purpose of a food label is to inform the consumer about what is in the food. One of the most significant and important functions of a food label is to provide the list of ingredients and information about that particular food or drink. This information provides a tool to compare the content and quality of different food and helps consumers to make informed food choices.

The three key objectives of the label are:

- To provide information about the product
- To distinguish the food or drink from the others on the shelf
- To give information on whether the food/drink is safe to eat, for example 'best before' and 'use by' dates

Food labels are often the only source of information available about a food and as a result are controlled by strict regulations. Some information must be presented on a label by law, but often additional information is given. A typical supermarket offers about 20,000 different food items. Food labels can help consumers to choose from among the options available. Knowing how to read a food label can help the consumer to get the best value for money and choose healthy options.

In the 19th Century, food labels were rarely used and manufacturers simply identified what was inside a box or container. If we take a look at the diet of our grandparents, it was completely different to our diet today. For urban dwellers, shopping involved making a daily trip to the local shop and to the baker for fresh bread made on the premises from scratch. Consumers went to the greengrocer who sold them their fresh vegetables and to the butcher who hand-wrapped their meat. Those who lived in the country produced their own food on the farm and baked their own bread.

Processed foods come in many different kinds of packages and containers that protect the food from invading microbes and make them safe and available all year round. This wasn't always true, of course. The past fresh food was only available as the seasons allowed and, unlike today, far fewer foods were imported.

7.3.1 What information should be on a label?

Labels may appear to be very different in shape and size, colour and design but, some things are common to all labels and are legally bound to be shown. The most important items that should be included on a food label are as follows:

- *Name of food*
- *List of ingredients*
- *Allergens¹⁹ that might be present*
- *Quantitative ingredient declaration*
- *The total net weight of the food or drink*
- *'Use by' or 'best before' dates*
- *Place of origin (not mandatory, but new legislation is being proposed)*
- *Special storage instructions*
- *Instructions for use*
- *Name and address of the manufacturer, packer or seller*
- *Alcoholic strength*

Council Directive 2000/13/EC sets out general provisions on the labelling of pre-packaged foodstuffs to be delivered to the ultimate consumer. Sale of loose (over the counter) non-pre-packaged food (when it is packaged on the premises from which it is to be sold), is governed by Article 14 of Directive 2000/13/EC. This legislation permits individual member states to decide what labelling information needs to be shown, and how it should be displayed, subject to the condition that the consumer still receives sufficient information. The only requirement for foods sold loose specified on the IOI is that the name of the product and the presence of allergens must be given.

Directive 2000/13/EC is implemented in the Republic of Ireland (ROI) by the European Communities (Labelling, Presentation and Advertising of Foodstuffs) Regulations 2002 (S.I. No. 483 of 2002) and in Northern Ireland (NI) by the Food Labelling Regulations (NI) 1996 (SR NI 1996 No. 383), as amended. Enforcement of this legislation lies with the Food Safety Authority of Ireland (FSAI)²⁰ in the ROI and the District Councils in NI.

Directive 2003/89/EEC, amending directive 2000/13/EC, concerns the labelling of allergens in foodstuffs. This legislation requires food manufacturers to indicate the presence of potential allergens (from a list of 12 as laid down in the Directive) if they are used as ingredients in pre-packed foods, regardless of their quantity.

More information regarding food labelling and legislation can be found in the previous consumer focused review of the chicken, finfish, fruit and vegetables, beef, milk and pork supply chains. Furthermore new nutrition and health claims legislation is currently under review.

¹⁹ Allergens are ingredients that some people are allergic to i.e. gluten, nuts, soya etc. Food allergies should always be diagnosed by a GP or dietician.

²⁰ The FSAI have overall responsibility for the enforcement of the general labelling legislation in collaboration with its official enforcement officers – the environmental health officers of the Health Service Executive.

7.4 Country of origin

There is no statutory definition of 'place of origin or provenance' in the Food Labelling Regulations 1996 or of 'origin or provenance' in Directive 2000/13/EC [112]. However, specific EU commodities legislation requires country of origin information for beef, veal, fish, shellfish (whether pre-packed or loose), wine, most fresh fruit and vegetables, honey, olive oil, and poultry meat imported from outside the EU [112].

The Food Labelling Regulations 1996 states that food products readily available to the consumer should be labelled with:

'...particulars of the place of origin or provenance of the food if failure to give such particulars might mislead a purchaser to a material degree as to the true origin or provenance of the food'

According to the FAO/WHO and the World Trade Organisation Rules, the term country of origin is deemed to be the place of last substantial change i.e. "substantial transformation". This means the final processing which gives the final product its essential character. Some examples would be battering or breading for chicken nuggets or fish fingers, ready meals, rasher or sausages etc.

Various other types of origin labelling may also be displayed on food and food products [113].

'Farmed' or 'Agriculture' is a new definition for origin which was introduced in the Organic regulation, where organic produce will be labelled according to whether the raw materials come from the EU or a Third Country.

'Made in' or 'Produced in' is used for processed products. The place of production can more accurately be indicated by a 'Made in' indication. On the other hand, 'Made in' or 'Packaged in' may conceal information about the origin of the raw material.

'Ingredients from' is used for processed products. This indication can resolve confusion about whether the origin refers to the origin of the ingredients or the place of manufacture. In some cases (wine, olive oil), the indication 'obtained in X from olives/grapes harvested in Y' is used.

'Localisor' is used where the origin labelling refers to a particular text apart from the brand or food name. For some foods a localisor is used, such as 'Emmenthal Francais', within the name of the product itself.

According to the Food Standard Agency (2008), the true place of origin of a food should always be given if the label as a whole would otherwise imply that the food comes from, or has been made in, a different place or area. There are several ways in which to identify the country of origin if not stated for meat products. These are quality assurance logos, details of the manufacturer, farmer or seller, promotional displays and so on. It is important to note that identification marks are not an indicator of origin. These illustrate that the product has met with the requirements of the European hygiene legislation (Regulation No. 853/2004) [112].

EU legislation which came into force in 1993 provides for a system for the protection of food names on a geographical or traditional recipe basis. This system is similar to the familiar 'appellation contrôlée' system used for wine. The scheme highlights regional and traditional foods whose authenticity and origin can be guaranteed. Under this system, a named food or drink registered at a European level will be given legal protection against imitation throughout the EU. Producers who register their products for protection benefit from having a raised awareness of their product throughout Europe. This may in turn help them take advantage of consumers increasing interest in regional and specialty foods [114].

With effect from 1 May 2009, 'Protected Designation of Origin' (PDO), 'Protected Geographical Indication' (PGI), or 'Traditional Specialty Guaranteed' (TSG) and/or the appropriate logo associated with the designation must appear on the product label (Article 12.2 of Council Regulation (EC) No 509/2006 for TSG products, and Article 8.2 of No 510/2006 for PDO/PGI products).

- *PDO is open to products which are produced, processed and prepared within a particular geographical area, and with features and characteristics which must be due to the geographical area.*
- *PGI is open to products which must be produced or processed or prepared within the geographical area and have a reputation, features or certain qualities attributable to that area.*
- *TSG is open to products which are traditional or have customary names and have a set of features which distinguish them from other similar products. These features must not be due to the geographical area the product is produced in, nor entirely based on technical advances in the method of production.*

In the United States, mandatory country of origin labelling (COOL) was signed into law in 2002 as part of the Farm Security and Rural Investment Act (2002 Farm Bill). The COOL provision requires country of origin labelling for beef, lamb, pork, fish, perishable agricultural commodities and peanuts. Mandatory COOL for the remaining commodities came into effect in September, 2008. The Australian COOL Standard was enforced in June 2006 requiring retailers to differentiate local produce, as opposed to imported produce, at the point of purchase.

In the EU, mandatory COOL only applies for certain food commodities as mentioned earlier. As from the first of January 2008, COOL is compulsory in the EU for all fresh fruit and vegetables. Pre-packaged foods must be labelled with the name of the manufacturer, packager or seller. However this information may not inform the consumer as to where the product was processed or where the ingredients were obtained. This defect has consequently led consumers on a global scale to repeatedly and overwhelmingly express their support for country of origin labelling of food products. In 2007, **saferfood** carried out quantitative research with regard to consumers' perception of country of origin. Of the 796 respondents, 59 per cent were concerned about the origin of their food. Therefore the concept of knowing where food comes from is important and is heavily dependant on accurate and proper labelling of foodstuff. However, legislation on food origin is currently under review at EU level.

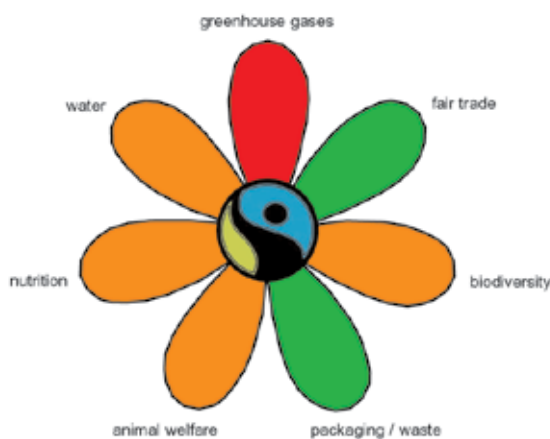
7.5 Sustainable labelling

A novel use of food labelling is to encourage more sustainable food and farming systems. It aims to prompt consumers to use their purchasing power to influence the development of social, environmental, health and animal welfare values in the food system [115]. A product can be considered sustainable if its production enables the resources from which it was made to continue to be available for future generations without generating negative environmental effects, without causing waste products to accumulate as pollution, and without compromising the well-being of workers or communities.

There are many types of sustainable labelling. These include, 'Local', 'Antibiotic Free', 'Cage Free', 'Grass Fed', and 'GMO free' (made without genetically-modified organisms), LEAF (linking environment and farming), Organic, 'FairTrade', Farm Assured, Traffic Lights, Freedom Food and Vegetarian [115, 116]. A sustainability food label should be as comprehensive as possible in its scope, given the current state of knowledge, and be designed to be flexible enough to incorporate changes [115].

To give an example, Sustain has proposed a new sustainability label (Figure 7.1). The petals of the flower represent different sustainability issues, for example, greenhouse gases, water, nutrition, animal welfare, packaging/waste, biodiversity and 'FairTrade'. The 'traffic light' grading for each issue reflects the balance of concerns for each issue. Unique aspects of the labelled product can also be given additional prominence (in this case 'FairTrade') i.e. centrally placed [115].

Figure 7.1 Labelling for sustainability (adapted from [115, 117])



The Carbon Trust is a company that was set up by the UK Government in 2001. The purpose of this company is to accelerate the move to a low carbon economy by working with organisations to reduce carbon emissions and develop commercial low carbon technologies. The Carbon Trust is working with a number of companies, including food manufacturers and retailers, to pilot a carbon reduction information label which gives a measure of a product's 'carbon footprint' from source to store and includes its use and means of disposal. An example of 'carbon footprint' labelling is illustrated by Figure 7.2 below.

Figure 7.2 Carbon footprint labelling (adapted from [118])



Key findings

- *Country of origin labelling is mandatory for certain food products, for example, beef, veal, fish, shellfish (whether pre-packed or loose), wine, most fresh fruit and vegetables, honey, olive oil, and poultry meat imported from outside the EU.*
- *New legislation for country of origin labelling within the EU is currently being reviewed.*
- *New labelling systems are currently being developed by a number of organisations to communicate sustainability issues.*

8. Food Origin and Food Values

8.1 Introduction

This chapter covers aspects of the food supply chain that have not been discussed in earlier sections, including carbon footprint, food miles, sustainability and ethical labelling.

8.2 'Carbon footprint'

Climate change is increasingly recognised as a major challenge, and it is widely accepted that the greenhouse gas (GHG) emissions caused by humans are having a negative impact on the environment. Virtually all human activity generates carbon dioxide (CO₂) or other GHG emissions that contribute to climate change. Examples include using electricity generated from fossil fuel power stations, burning gas for heating or driving a petrol or diesel car, and the production, transport and disposal of raw materials and consumer goods. The total set of GHG emissions caused directly and indirectly by an individual, organisation, event or product is commonly called their 'carbon footprint'. Calculating the 'carbon footprint' of an organisation can be the first step to reduce the emissions it causes [119].

Food accounts for a significant share of the total human impact on the environment. The environmental impacts arise in all parts of the life cycle of food products: agriculture, industry, retail, transport, and finally, the consumer phase [120]. 'Carbon footprint' has become a widely used term and concept in the public debate on responsibility and abatement action against the threat of global climate change. The total environmental impact from the food system per capita differs between countries and regions as a result of the types of food eaten and the efficiency, in a broad sense, of the farm-to-fork system [120].

The food chain, especially farming, is a large contributor to global GHG emissions. Carbon released by land clearance, methane from ruminant animals and nitrous oxide released from fertilisers and manure help to contribute to the GHG emissions from agriculture and land-use change. Agriculture is estimated to account for 10–12 per cent of the total emissions of the gases that contribute to the human induced global warming effect [121]. Agriculture generates approximately 10 per cent of the EU GHG emissions [122] and nearly 30 per cent of the emission in Ireland [123]. More recent work on energy use in the production sector has compared different production systems, such as organic and conventional farming in industrialised nations. Organic production has been assessed as a potential solution to reducing GHG gases within the agriculture sectors [124]. Several studies show that organic farming relies on lower per hectare fossil fuel inputs than conventional systems, with much of this difference attributable to the high energy requirements used to manufacture fertilizers [125-127]. Organic farming uses less energy because it does not rely on fertilisers and chemicals used in intensive farming, the manufacture of which creates GHG [128].

In the Republic of Ireland (ROI), the agricultural environmental scheme (AES) was implemented as the rural environmental protection scheme (REPS), which was designed to reward farmers for carrying out activities in an environmentally friendly manner. Strict guidelines are set out for nutrient management [129]. The objectives of the scheme are:

- to establish farming practices and production methods which reflect the increasing concern for conservation, landscape protection and wider environmental concerns, such as to protect wildlife habitats and endangered species of flora and fauna and
- to produce quality food in an extensive and environmentally friendly manner.

With regard to the UK, the food chain has huge environmental impacts. Approximately 18 per cent of UK GHG emissions are related to food production and consumption. Nearly half of these emissions come from farms, and fall outside current UK domestic targets for carbon dioxide, and are beyond the scope of the EU Emissions Trading Scheme and other carbon pricing mechanisms [130]. Reducing the food chain's dependence on energy, water and other resources will reduce its exposure to future increases in resource prices. Reducing the quantity of waste and GHG emissions can improve resource efficiency and anticipate the changes required for the transition to a low-carbon economy [11]. Since 1990, the food and drink manufacturers in the UK have cut CO₂ emissions by 17 per cent, which is equivalent to on average 58,000 fewer tonnes of CO₂ a year. This was achieved by making factories more energy efficient, boosting productivity and making better use of renewable sources of energy. In the UK, there is a target to reduce CO₂ emissions by 20 per cent before 2010.

Food is travelling an increasing distance to get to our plates because of consumer demand for non-seasonal and non-indigenous foods, as well as the complexity of supply chains. The transportation of food generates the equivalent of 19 million tonnes of carbon dioxide a year in the UK, with road freight being the largest contributor. Food transport accounts for a third of all the 20.6 million tonnes of oil used in the UK food chain each year [131]. Furthermore, food transport accounts for 25 per cent of UK heavy goods vehicle movements, generating substantial congestion, accident and infrastructure costs. With consumer concern about climate change, there has been considerable interest in the concept of labelling products with details of the carbon emissions associated with their production.

A substantial amount of organic food is imported onto the IOI by air travel. Air-freighting organic food raises a range of environmental and social justice issues. According to the Soil Association, less than one per cent of organic imports come by air-freight, but air-freight has the highest global warming potential of any form of transport. It suggests that air-freight can generate 177 times more greenhouse gas than shipping. In Europe, the agricultural environmental strategy of the common agricultural policy (CAP) is largely aimed at enhancing the sustainability of agro-ecosystems. The measures set out to address the integration of environmental concerns into the CAP encompass environmental requirements and incentives integrated into the market and income policy, as well as targeted environmental measures that form part of the Rural Development Programmes (e.g., agricultural environment schemes) [129].

8.3 Food miles and sustainability

'Food miles'

'Food miles', the total distance in miles the food item is transported from field to plate, has led to a general movement towards local production and local consumption in order to minimize them. 'Food miles' however, are a poor indicator of the environmental impact of food products and small-scale production is not necessarily resource-efficient or low-impact. Evidence suggests that at some times during the year, transporting produce from other countries may have a lower environmental impact than heating or refrigerating produce grown in Britain [132].

The term 'food miles' includes the travel of food from country to country, farm to shop and shop to consumer. Over the last few years, there has been a growing increase in the amount of food that is transported within the UK. Since 1978 the average distance for each trip has increased by 50 per cent [133]. Transporting food large distances creates a lot of problems for the environment as well as the food itself. However, there are cases where it is necessary for food to travel long distances to reach the final destination. For instance, due to climate restrictions, certain fruit and vegetables must travel a significant distance. The rise in food miles has led to increases in the environmental, social and economic burdens associated with transport. Economists call these the 'hidden costs' in that the costs are picked up somewhere else, outside the food system. These include carbon dioxide emissions, air

pollution, congestion, accidents and noise. There is a clear cause and effect relationship between ‘food miles’ and these burdens – and in general higher levels of vehicle activity lead to larger impacts. Growing concern over these impacts has led to a debate on whether to try to measure and reduce ‘food miles’ [134].

As for the ROI, the average distance travelled by imported food is 3,000 miles, making it at greater risk of damage through transportation and handling. The absence of a single, clear guaranteed Irish label makes choosing local produce difficult. Being able to do so would benefit our environment by reducing the amount of carbon emissions associated with transporting food over such a long distance [135]. Data on distance travelled is not available for food in Northern Ireland (NI).

Lifecycle analysis of food products (i.e. analysis of the amount of energy a product has produced/used at each stage of the product’s life from raw materials through to final disposal) is an emerging method for measuring the impact of a food on the environment. One recent example has shown that lamb from New Zealand may be more environmentally friendly than that grown in the UK or the ROI due to the inputs, which are not carbon intensive, or less so, in New Zealand. However, extensive evaluation of the lifecycle analysis of food products is beyond the scope of this review.

Sustainability

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development is not a definite situation of harmony, but rather a process of change. Resources, investments, technological advancements and institutional changes must be coherent with future as with present needs” [136].

Recent years have seen growing concern about the sustainability of agricultural and food systems and the unintended side-effects that can be imposed on the environment and human health [137]. The UK Government’s vision for the food system is one that is more sustainable – economically, socially and environmentally. It has defined that its future strategic policy objectives for food should be to secure:

- *fair prices, choice, access to food and food security through open and competitive markets;*
- *continuous improvement in the safety of food;*
- *a further transition to healthier diets;*
- *and a more environmentally sustainable food chain [11].*

8.4 Ethical labelling

The term ‘ethical trading’ is frequently used to refer to the sourcing of products from companies that guarantee core labour and human rights standards to their workforce [138]. Consumers are becoming more and more interested in the way goods are produced. Ethical labelling schemes, such as eco-labelling and animal welfare labelling, give consumers the opportunity to choose products that meet their own ethical standards. Businesses can choose to sell and consumers can choose to select products that are produced and traded in a way that may provide good employment or environmental standards and extra benefits to the producers [139]. What’s more, reducing distortions in agricultural trade and raising agricultural productivity in the developing world could contribute to global food security [11].

The most widely known ethical labelling program is the 'FairTrade' labelling program. 'FairTrade' is an alternative approach to conventional trade, which aims to alleviate poverty in the southern hemisphere, providing fair opportunities to access northern markets [140]. 'FairTrade' labels are awarded to goods imported from developing countries which have been produced according to social and environmental agreements such as the International Labour Organization Conventions and the United Nation's Agenda 21 recommendation [52, 141].

A prime example of a 'FairTrade' product is coffee. Coffee is regarded as the second most valuable commodity after petroleum in the global market, and the number one labelled 'FairTrade' commodity [142]. The 'FairTrade' system benefits over 800,000 farmers organized into cooperatives and unions in 48 countries. 'FairTrade' has helped farmers provide for their families' basic needs and to invest in community development [142].

'FairTrade' has become one of the fastest growing markets in the world. 'FairTrade' products are available from nearly 79,000 points of sale throughout Europe with about €120 million (£111 million) of the annual retail sales generated via 'FairTrade' retail outlets. There are over 2,800 of these specialist shops in Europe, stocking almost exclusively 'FairTrade' products [143]. The 'FairTrade' labelling program is becoming a very popular way to market coffee and bananas. Sales figures for 'FairTrade' commodities are rising at close to 40 per cent per year in North America and the Pacific Rim combined [141]. The success of 'FairTrade' is due to increasing cooperation between the traditional 'FairTrade' players in Europe. Importing organisations have built their international networks, which are cooperating intensively at European and even global level [143].

Key findings

- *The food chain, especially farming, is a large contributor to global Green House Gas (GHG) emissions.*
- *Reducing the quantity of waste and GHG emissions can improve resource efficiency and anticipate the changes required for the transition to a low-carbon economy.*
- *In Europe, the agri-environmental strategy of the Common Agricultural Policy is largely aimed at enhancing the sustainability of agro-ecosystems.*
- *In general, higher levels of vehicle activity lead to larger impacts, however evidence suggests that at some times during the year, transporting produce from other countries may have a lower environmental impact than heating or refrigerating produce grown locally.*
- *Recent years have seen growing concern about the sustainability of agricultural and food systems and the unintended side-effects that can be imposed on the environment and human health.*
- *In the ROI, the average distance travelled by imported food is 3,000 miles.*
- *There is a growing demand among consumers for ethically labelled products and these have become very popular with consumers, for example, 'FairTrade' coffee, chocolate and fruit.*

9. Conclusions

9.1 Introduction

The food environment on the island of Ireland (IOI) has changed dramatically over the past two decades. Although the IOI produces a large amount of food and food products, due to trade, economic, seasonal and consumer demand, a large amount of food and food products are imported onto the IOI.

Food is imported from both the EU and Third Countries. Over the past few years, there has been a steady increase in the amount of food imported onto the IOI. Between 2002 and 2007, the quantity of foods imported onto the IOI has increased by 18 per cent, which in turn is equivalent in value to €1.5 billion (£1.4 billion). Overall, 88 per cent of the food imported into Northern Ireland (NI) is obtained from within the EU compared to 60 per cent for the Republic of Ireland (ROI). The value of food imports for NI and the ROI for 2007 were £460 (€502) and €4.6 billion (£4.2 billion) respectively. Examples of EU countries from which food and food products are imported into NI are: France, Germany, ROI, The Netherlands and Belgium and for the ROI are: Denmark, France, UK, Italy, Spain and The Netherlands. Food and food products are also imported from Third Countries, for example, for NI these include, Eastern Europe, Latin America, North America and the Middle East and for the ROI food is imported from Canada, Thailand, China, Costa Rica, Kenya, Brazil, Argentina and New Zealand.

On the IOI, there are controls, systems and legislation in place which aim to minimise both microbiological and chemical hazards in the supply chain, and, thereby, limit the risk to consumers. The safety of the food supply chain is regulated by legislation primarily enforced by the Food Standards Agency in NI and the Food Safety Authority in the ROI. Hygiene laws for EU Member States, commonly referred to as 'The Hygiene Package', cover all aspects of the food chain from a food hygiene perspective, including extensive measures to ensure the safety of food and food products from farm to fork. The Hygiene Package also deals with imported foods. The regulation of suppliers and produce coming onto the EU market is the responsibility of the European Commission's Food and Veterinary Office.

Imports of food and food products from Third Countries must come through designated Border Inspection Posts and be subjected to a series of checks before they are allowed access to the EU market. A number of quality assurance schemes exist on the IOI. These schemes seek to provide assurances to buyers and consumers of the quality and safety of food imports on the IOI by establishing standards to which participating producers must adhere.

A very wide range of imported food products have now been associated with foodborne illness caused by a wide range of pathogens worldwide. Contaminated produce eaten raw is an increasingly recognised vehicle for transmission of *Salmonella* and other pathogens. Imported fresh fruit and vegetables have now been linked extensively, both epidemiologically and microbiologically, to infectious intestinal disease worldwide. However, no confirmed outbreaks have been associated with food imported onto the IOI. While there are incidences of contamination (e.g. mycotoxins, foreign bodies, allergens, irradiation etc) these are monitored and controlled through EU inspections.

There is natural variation in the nutrient composition of all natural foodstuffs. The factors that mediate this variation are relevant to both foods grown on the IOI and food imports. Some key factors include soil and growing conditions; animal feed composition; transport and storage; and fortification. The duration and conditions of food storage can have a large effect on the nutrient content of foods for example; refrigeration during transport and storage and the use of additives such as sulphites to prevent bacterial growth and sulphur dioxides to prevent colour change in dried fruits and vegetables can destroy thiamin content.

Fortification is the addition of nutrients to enhance the nutrient content of certain foods. Many foods are fortified with nutrients before they are imported in order to comply with the fortification regulations of the target market.

Foods may be fortified either voluntarily or by law. Many imported foods are fortified with nutrients on a voluntary basis. The import of food has facilitated a greater availability and variety of food which has benefits for healthy eating. However, this has coincided with a wider availability of low cost highly processed foods that is often high in fat and calories and low in micronutrients. This may particularly affect those experiencing food poverty.

Due to greater awareness with regard to food and health, a proportion of consumers are becoming more concerned about where their food comes from. The consumer survey conducted as part of this review found that most consumers are anxious to find out where their meats and fish have been sourced. In a survey of 805 people, 43 per cent of consumers on the IOI were concerned about the quality of food imported from within the EU, whereas 54 per cent were concerned about the quality of imported foods from non-EU countries. Sixty per cent of consumers on the IOI were concerned about the quality of imported fresh meat, 52 per cent fresh fish and 29 per cent fruit and vegetables from non-EU countries. Furthermore, 57 per cent of consumers on the IOI were concerned about the quality of frozen meat/poultry, 48 per cent about processed foods (prepared meals) and 31 per cent about tinned food from non-EU countries. Consumers also found current information about food origin misleading and unclear. With regard to fruit, vegetables, non-perishable items etc, consumers were not concerned about their origin.

Both focus groups and the accompanied shops showed that the main concern for consumers was the price of food rather than the country of origin. Consumers perceived locally or nationally grown products to be more authentic and of higher quality than imported products. However, they were happy to pay the cheaper prices and avail of better choice when it came to imported foods. They also considered organic food to taste better and be of higher quality, however, many consumers believed that organic food was too expensive. This is perhaps due to the current climate and economic issues. From a food safety perspective, consumers expressed few concerns about where their food comes from. The exception was the perception that the further food travels the greater the risk of contamination.

This review collated and considered the information available in the public domain (regulatory and scientific) on the health and food safety implications of the food supply chain. On the basis of the evidence the review highlights a number of key findings for stakeholders in the food supply chain, including legislators and policy makers, producers, transporters and processors, as well as retailers and consumers.

9.2 Key findings

9.2.1 Primary producers, transporters and processors

On the IOI, there are controls, systems and legislation in place which aim to control both microbiological and chemical hazards in the supply chain, and, thereby, minimise the risk to consumers.

The safety of the food supply chain is regulated by legislation primarily enforced by the Food Standards Agency in NI and the Food Safety Authority in the ROI.

Imports of food and food products from Third Countries must come through designated Border Inspection Posts and be subjected to a series of checks before they are allowed access to the EU market.

A number of quality assurance schemes exist on the IOI. These schemes seek to provide assurances to buyers and consumers of the quality and safety of food imports on the IOI by establishing standards to which participating producers and processors must adhere.

Many foods are fortified with nutrients before they are imported in order to comply with the fortification regulations of the target market. Foods may be fortified either voluntarily or by law.

New labelling regulations for food origin are being developed at EU level; however, for certain foods origin labelling is a legal requirement.

Overall, the primary production and processing aspects of the food supply chain are well controlled and regulated. Nevertheless, it is essential that processors take appropriate measures to ensure that the contamination of food does not occur, whether the ingredients are sourced inside or outside of the IOI.

9.2.2 Retailers and caterers

There are legal requirements in place which govern the labelling of food products, whether it be meat, cereals, fruit and vegetables, beverages, seafood or prepared foods.

Country of origin labelling is mandatory for certain food products, for example, beef, veal, fish, shellfish (whether pre-packed or loose), wine, most fresh fruit and vegetables, honey, olive oil, and poultry meat imported from outside the EU.

New legislation for Country of origin labelling within the EU is currently being reviewed.

Consumers are concerned about the origins of specific foods i.e. meat and fish.

Consumers find current information misleading and unclear.

9.2.3 Consumers

The importation of foods from within the EU and Third Countries is necessary and very important. Food is imported onto the IOI for various reasons; variety, seasonality, economic and trade. Food imports are also necessary because on the IOI we can't produce sufficient amounts of certain foods to meet consumer demand.

The majority of food imported onto the IOI is obtained from within the EU; however, products such as fruit, vegetables and cereals are imported from Third Countries.

Forty three per cent of consumers on the IOI are concerned about the quality of food imported from within the EU, whereas 54 per cent are concerned about the quality of imported foods from non-EU countries.

Sixty per cent of consumers on the IOI are concerned about the quality of imported fresh meat, 52 per cent fresh fish and 29 per cent fruit and vegetables from non-EU countries.

The main food safety concerns with imported foods is the perception that the further food travels, the greater the risk of contamination. However, there are legislation and controls in place to minimise food safety risks from imported food for consumers.

Most people are anxious to find out where their meat and fish have been sourced and reported that they do find current food origin information misleading and unclear.

The majority are not concerned about the origins of their remaining grocery shop (fruit, vegetables, non-perishable items etc.).

Consumers perceived locally or nationally grown products to be more authentic and of higher quality than imported products. However, they were happy to pay the cheaper prices and avail of better choice when it came to imported foods.

Among research participants, there was an awareness of the terms ‘carbon footprint’, ‘food miles’ and ‘ethical labelling’ although understanding of these terms is limited.

Consumers clearly expressed the wish for more honest and transparent information with regard to food sources/origins including where foods were packaged and processed.

Awareness of the numbers and types of imported food goods onto the IOI is relatively low. Consumers thought that most of the produce produced on the IOI is consumed on the IOI.

The nutritional benefit of consuming at least five portions of fresh fruit and vegetables a day have been well identified and without food imports the range and quality of fruit and vegetables available would be significantly reduced.

When purchasing food products, the information available on food labels is important. There are own labelling schemes in place, which provide useful information to the consumer with regard to the daily guidance on the intake of fat, sugar, calories etc. Nutritional information is not found on all foods, however where it is present, it may be illustrated on front of pack only if back of pack labelling is present.

The food we consume can have a high impact on the environment through its carbon footprint and food miles. However, just one of the ways which consumers can address these issues and subsequently become more environmentally friendly is through the conservation of water and energy, recycling and reusing materials.

9.2.4 Policy makers and legislators

A large proportion of consumers are confused and mistrustful of current food origin labelling. The review of this legislation at EU level appears to be timely.

Further information with regard to food safety can be obtained from previous consumer focused reviews carried out by **safefood**. These reviews covered the areas of the beef, poultry, fruit and vegetable, finfish, dairy and pork supply chain and can be found at www.safefood.eu

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