



DEFRA PROJECT FO0108

**RESILIENCE OF THE FOOD SUPPLY TO
PORT DISRUPTION**

**FINAL ANNEX REPORT 7:
UK FROZEN MEAT AND FISH IMPORTS
September 2012**

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Contents

Section	Sub-section	Title	Page
1		EXECUTIVE SUMMARY	1
2		INTRODUCTION	2
	2.1	Overview	
	2.2	Background	
3		WORK PROGRAMME	3
4		RESULTS	4
	4.1	Defra import statistics (2010)	
	4.2	Meat and fish production and supply	
	4.3	UK industry players	
	4.4	UK import flows	
	4.5	Resilience of import flows	
	4.6	UK meat and fish demand	
	4.7	Food stocks and attitudes toward replenishment	
	4.8	Behavioural aspects	
5		DISCUSSION	13
	5.1	Overall assessment of the results	
	5.2	Difficulties and risks associated with current systems	
6		CONCLUSIONS	15
7		RECOMMENDATIONS	17
Table			
1.1		UK Meat and Fish Imports 2010	1
3.1		Meat and Fish Case Study Evidence Base	3
4.1		Frozen Meat and Fish Imports	4
4.2		Meat and Fish Imports Flow Types	9
5.1		Import Flow Pinch Points	16
Appendix			
I		Meat and Fish Arrival via Deep Sea Services	i
II		Meat and Fish Arrival via Short Sea Services	ii

1. EXECUTIVE SUMMARY

Meat and fish imports are particularly important for UK food manufacturing and processing, and by extension sectors such as foodservice and food retail. The leading UK overseas supply markets include Australia, Brazil, New Zealand, and Thailand for meat; and the United States and China for fish. However, because much of this supply is cleared in either the Netherlands or Germany it appears in the UK as EU product. Principal entry routes are the container ports of Tilbury and Felixstowe for non-EU imports; and East Coast ports and the Dover Corridor for EU imports. Supply chains are well structured, with stocks held on the Continent or the UK.

This Defra project 'Resilience of the Food Supply to Port Disruption' involved an assessment of possible port disruptions, their potential impact on UK food supply and the options for remedial action in the short to medium term. It followed publication in 2009 of the *UK Food Security Assessment* which indicated that there were evidence gaps about UK port capabilities and food imports.

The project was undertaken by Peter Baker (PRB Associates) and Andrew Morgan (Global 78). This Annex Report contains the principal findings, recommendations and conclusions arising from their research on meat and fish imports. Additional information can be found in **Annexes 3, 4 and 5**.

The work programme included use and further analysis of requested HMRC / Defra import tonnage data (for 2010); work with industry stakeholders to compile an accurate description of 'as-is' import scenarios (i.e. product origins, modal formats, volumes, services used and frequencies, etc.); and an attempt to understand the stakeholders' approach to ensuring consistent supply and review strategies already in place (or planned) to mitigate likely possible effects of port disruption. Findings include:

Code	Description	Non-EU tonnes k	EU tonnes k	Total tonnes k
#0201 to #0210	Meat of all import categories	198.5	1,280.0	1,478.5
#0302 to #0307	Fish and Seafood of all import categories including crustaceans and molluscs	291.9	128.0	419.9
Total		490.4	1,408.0	1,898.4

Source: Defra import statistics 2010

- The study was required to focus on frozen meat and fish imports, as opposed to investigation of other temperature regimes. However, as appropriate the research also looked at other regimes such as chilled or deep-chilled, in order to provide as full a picture as possible of import flows. The above import figures also include fish landings at UK ports such as Peterhead.
- Flow types can be segmented broadly into 1) deep sea refrigerated container liner services from non-EU sources arriving mainly at Tilbury or Felixstowe; 2) short sea refrigerated feeder container services with non-EU sources transhipped at an EU port such as Rotterdam; and 3) refrigerated road trailer services from EU sources, including Ireland.
- EU supply includes product originally from South America (e.g. beef and poultrymeat); New Zealand (lamb); and China and the USA (fish). This product will have been imported and health checked, and put into (bonded) storage in EU countries such as Germany and the Netherlands.
- Meat and fish supply chains are complex. Reasons include the volume of trading that takes place in addition to 'conventional' import and the range of entities involved in the supply chain. This situation impacts on the collective ability to plan an effective response to port disruption.

The research demonstrated that it is feasible to gather reliable information from industry stakeholders about UK meat and fish import flows. Only by working at individual flow level is it possible to obtain the essential understanding to assess and mitigate supply risk.

2. INTRODUCTION

2.1 Overview

The Defra-funded research project FO0108 'Resilience of the Food Supply to Port Disruption' involved an assessment of possible port disruptions, their potential impact on UK food supply and the options for remedial action in the short to medium term.

The project was undertaken by Peter Baker (PRB Associates), a ports and shipping specialist, and Andrew Morgan (Global 78), an international food supply chain specialist.

The research was prompted in part by the outcomes of the *UK Food Security Assessment* (published in August 2009; updated in January 2010) which indicated evidence gaps about UK port capabilities and food imports; and PRB Associates' follow-up report published in September 2009, *Background to Defra's Assessment of UK Food Security*.

The research included a series of food commodity Case Studies on imports of frozen meat and fish; citrus fruit; sugar; and palm oil. This Annex Report contains the principal findings, recommendations and conclusions arising from the research on meat and fish imports.

2.2 Background

Frozen and chilled meat and fish imports into the UK comprise largely of beef, pigmeat, mutton/ lamb, poultrymeat, fish (whitefish, salmon) and seafood (crustacean). All of these products though can be sourced from UK producers but not in the volumes required to meet demand.

Features of UK food demand in recent decades have included a progressive shift from frozen to chilled foods, demand for ready meals, and the rise of eating out. There has also been a parallel interest from consumers in such things as healthy eating, the provenance of foods, animal welfare, and sustainability.

These features have been reflected in UK food production in a number of ways. Organisations such as Unilever, the owners of iconic brands such as Birds Eye, famous for its fish fingers, initially rationalised its UK frozen food production sites and subsequently sold the business. In this particular case, the new owners have adopted a pan-European approach for production of strengthened ranges from factories that include only one UK operation.

Retailers too have adjusted their business models, to emphasise their offerings of fresh meat and fish, sometimes with a regional focus such as Scottish beef or Welsh lamb. This has aligned with a regulatory focus on traceability and with initiatives such as certification by the Marine Stewardship Council for fish supply.

However, global supply has never been more important, with long term relationships with countries such as Argentina, Brazil, and New Zealand for meats being joined by new countries such as China for fish. Against this background, the research has also examined the approach to stockholding across the whole supply chain, relevant technical issues, and the strategic and operational roles of UK players.

3. WORK PROGRAMME

The work programme for this Case Study had these objectives:

- Determine the extent to which particular features of domestic and international transport infrastructure and food supply chains are likely to ameliorate / exacerbate the impact of UK port disruption on the supply of food imports into the UK
- Determine the extent to which UK food (import) security is contingent upon the resilience of overseas port infrastructure (both within and without EU waters, and now and in the future)
- Explore the behaviour, over the short to medium run (up to six months), of individual port operators, shipping companies and land-based logistics and food supply chain agents in the event of port disruption.

The programme therefore had the following principal steps:

- Desktop analysis and scoping discussions with industry specialists
- Review of HMRC / Defra imports tonnage data for 2010
- Identification of stakeholders willing to participate in the research
- Work with such stakeholders to compile an accurate description of their 'as-is' import scenarios (in terms of product origins, modal formats, volumes, services used and frequencies, etc.)
- Understand the stakeholders' approach to ensuring consistent supply and review strategies already in place (or planned) to mitigate likely possible effects of port disruption
- Report on findings to Defra and provide feedback to the stakeholders.

When the research started in September 2011, the most recent complete year for which statistics were available was 2010 so this was chosen as the preferred sample year. Also, in order to understand the physical dimensions of the flows, data about volumes (in tonnes) was chosen in preference to data about values.

Maintenance of commercial confidentiality was a key concern and in line with this the identity of participating stakeholders will not be published. However, this Annex Report does include information about key players in the industry from material already in the public domain.

The following **Table 3.1 Meat and Fish Case Study Evidence Base** provides an overview:

	Number
Participating organisations – industry sector players	16
Participating organisations – logistics services providers	7
Total participating organisations	23
Web based evidence; hard and grey literature	35
Site visits / face-to-face interviews	9
Telephone interviews	14
Additional major inputs requested from participants	6
Total items in the evidence base	64

This activity summary excludes the considerable effort required to initiate communication, encourage participation, and also to arrange conference calls and meetings. It should be noted that while some organisations responded quickly and favourably to the initial invitation to participate, others responded more slowly and needed encouragement, often over several months, to participate.

4. RESULTS

Research findings are summarised under these headings: Defra import statistics (2010); meat and fish production and supply; UK industry players; and UK import flows.

4.1 Defra import statistics (2010)

The following **Table 4.1 Meat and Fish Imports** shows the 'starting point' data for the research.

Code	Description	Felix.	Soton.	T/port	London	Imming.	L/pool	Belfast	Other ports	Non EU tonnes k	EU tonnes k	Total tonnes k	
#0201	Fresh or chilled beef	3.3		0.2	16.2		0.1			19.8	150.0	169.8	
#0202	Frozen beef	1.6		0.9	10.8					13.3	54.0	67.3	
#0203	Pigmeat	2.6		0.4	1.6					4.6	359.0	363.6	
#0204	Mutton or lamb	44.0	23.2	1.9	17.0	0.9		1.0		88.0	12.0	100.0	
#0206	Offal	5.8	2.2	0.1	5.3	0.3		0.4		14.1	33.0	47.1	
#0207	Poultrymeat	0.5	0.1	0.4	23.4		0.1	0.9		25.4	355.0	380.4	
#0210	Salted meat	0.7		0.5	32.1					33.3	317.0	350.3	
Total tonnes k		58.5	25.5	4.4	106.4	1.2	0.2	2.3	0.0	198.5	1,280.0	1,478.5	
Non EU tonnes % by port		29.5%	12.8%	2.2%	53.6%	0.6%	0.1%	1.2%	0.0%	100.0%			
		Non EU vs EU tonnes %									13.4%	86.6%	100.0%
Ports													
1 Felixstowe													
2 Southampton													
3 Thamesport													
4 London													
5 Immingham													
6 Liverpool													
7 Belfast													
8 Other ports: na													
Code	Description	Felix.	Soton.	T/port	London	Imming.	L/pool	Belfast	Other ports	Non EU tonnes k	EU tonnes k	Total tonnes k	
#0302	Fresh or chilled fish	0.4				39.5			33.1	73.0	57.0	130.0	
#0303	Frozen fish	14.2	1.7	1.0	2.2	4.2	0.3		13.4	37.0	9.0	46.0	
#0304	Fish fillets, etc.	14.3	6.5	1.8	0.8	82.0	0.8		27.6	133.8	48.0	181.8	
#0306	Crustaceans	21.5	11.6	0.3	2.8	1.8	0.1	0.7	0.1	38.9	8.0	46.9	
#0307	Molluscs	5.7	0.8	0.5	0.8	0.4	1.0			9.2	6.0	15.2	
Total tonnes k		56.1	20.6	3.6	6.6	127.9	2.2	0.7	74.2	291.9	128.0	419.9	
Non EU tonnes % by port		19.2%	7.1%	1.2%	2.3%	43.8%	0.8%	0.2%	25.4%	100.0%			
		Non EU vs EU tonnes %									69.5%	30.5%	100.0%
Ports													
1 Felixstowe													
2 Southampton													
3 Thamesport													
4 London													
5 Immingham													
6 Liverpool													
7 Belfast													
8 Other ports column includes reported UK fish landings at Scottish ports, e.g. Peterhead													

The first point to note is that the above data describe meat and fish imports in all temperature regimes: fresh, chilled, and frozen. The listed coding makes a distinction between fresh or chilled beef (# 0201) and frozen beef (#0202), and again between fresh or chilled fish (#0302) and frozen fish (#0303). However, the codes at this 4-character level for the other meat and fish import categories do not differentiate between fresh, chilled and frozen.

Although the research was required to focus only on frozen, it adopted a similar multi-temperature approach. This was based on the logic that, as all these import categories will travel in temperature-controlled vehicles, they will have common logistics infrastructure and service requirements. The only qualification is that hanging meat carcasses will need vehicles with hooks as well as refrigeration.

As an indication of scale, meat imports totalled 1.48 million tonnes (86.6% from the EU, and 13.4% from non-EU sources) in 2010. This compares with UK domestic meat production of 3.47 million tonnes, as reported in Defra's *Agriculture in the UK 2010*.

The data showed significant volumes (in descending order) from the EU for codes #0207 poultrymeat; #0203 pigmeat; and #0210 salted meat. Individually they exceeded beef imports (codes #0201 and #0202 combined). The data also showed #0204 mutton / lamb as the leading non-EU meat import.

For fish imports, the EU / non-EU balance is reversed (i.e. 30.5% and 69.5% respectively). This is principally because of the large volumes of frozen fish fillets imported from China for UK final processing and reported under code #0304. Most of this volume will arrive directly at Felixstowe or be forwarded (un-cleared) via Rotterdam to Immingham to supply factories in the Grimsby area.

Scenarios can be complex. For example, high volumes of fish are imported from Iceland, the Faroes, and Norway via Immingham. An important point to note therefore is that figures relating to non-EU fish imports include both landings at UK ports such as Peterhead and also bulk fresh / frozen catch such as that discharged at Immingham. Some is immediately exported to Continental fish markets (e.g. in France) and so cannot be translated into UK demand.

4.2 Meat and fish production and supply

In recent decades there has been an **exponential increase in global demand for meat and fish**, leading to increased production. China, for example, has become the leading importer. Protein is an essential element in the basic diet but with economic development markets are expanding and demand is rising. Within western economies the scale and pattern of demand have also changed.

Relevant factors

Many (sometimes conflicting) factors will influence patterns of demand and supply. These include increased eating out; demand for convenience foods; demand for exotic varieties of fish; consumer concerns about provenance; calls for local sourcing; and issues surrounding food safety, animal welfare, or sustainability. In the UK demand comes from institutional, public and private sectors including wholesalers, processors, foodservice, caterers, and multiple or specialist retailers.

Against this background, production and supply of meat and fish is a **complicated scenario**, with a number of different levels of producers, traders, importers, distributors and processors. In addition, as in other sectors, companies have sought to re-position themselves. For example, some overseas producers have internationalised and set up sales companies in final markets like the UK. In contrast other players have sold some of their operating units to concentrate on trading activities.

Refrigeration first allowed **meat imports** from Australia, New Zealand, Argentina, and Brazil, often produced there by British companies, more than 100 years ago. Vestey's Blue Star refrigerated vessels from those countries were a familiar sight in London's docks up to the late 1960s.

As noted above, c.87% of all meat imports are from the EU, though this will also include non-EU product destined for the UK but landed in the EU first, where it may be further processed and / or stored before being shipped on. EU imports arrive (in varying proportions for each product group) mainly from Denmark, Germany, and the Netherlands.

In terms of non-EU meat, the primary supplier of beef and poultrymeat is South America (particularly Argentina, Brazil, and Uruguay). Australia and South Africa are also significant players for all meat types, together with New Zealand for lamb. Overall supply is approximately constant through diverse sourcing, although lamb from NZ has some seasonality, which is being reduced through improved storage. UK production, except poultrymeat, has seasonality related to natural livestock cycles.

In contrast, c.70% of **fish imports** come from non-EU countries, primarily from China and Thailand. Unlike meat, where domestic production is more than twice the imported tonnage, the UK is heavily dependent on imports of fish and seafood (crustaceans and molluscs) that together represent c.80% of UK consumption. The top 5 consumed are cod, salmon, prawns, haddock and tuna.

UK consumers have become conservative when it comes to fish purchasing. Whereas a traditional fishmonger might have had more than 30 different species on sale, a modern grocery retailer is likely to have less than 10 species on the fish counter. By contrast, the foodservice sector has a far wider offering because consumers are far more adventurous when someone else does the preparation.

Important fish and seafood supply categories include white fish (e.g. cod and haddock) caught in the North Atlantic or Barents Sea; salmon (seasonal) from Canada, Chile, and Norway; cold water prawns (seasonal) from the waters off Greenland (EU) and Canada; and warm water prawns from fish farms in Bangladesh, Pakistan, India, Thailand and central America.

Supply also includes fish caught in the North Pacific, Bering Sea, and the Gulf of Alaska, which is filleted in China before shipment in refrigerated containers to European food factories, including those clustered in the Grimsby area. Tuna, which does not freeze well, is caught in the Indian and Pacific oceans and it arrives by air throughout the day at London Heathrow for supply to UK canners.

Traceability is a critical dimension for all meat and fish supply. For example, the EU requires compliance with IUU (i.e. Illegal, Unreported, Unregulated) Regulations which require certification of the catching vessel by a competent authority. When suppliers are outside the EU (i.e. the majority), bilateral agreements are in place to ensure traceability. The result is that UK importers are able to trace product back through the primary processor (e.g. in China) to the catching vessel. Similar traceability procedures and regulations apply to meat imports.

Non-EU imports will usually arrive in ISO refrigerated containers while **EU imports** will generally arrive by road in 13.6m refrigerated trailers. Whether 20' or 40' containers are used depends on the density of the product being shipped. Transport temperature regimes are ambient (e.g. for tinned beef), chilled, deep-chilled, or frozen. Although their characteristics and handling requirements might be broadly similar, it is helpful to note the following details for the individual product categories:

Products

Beef: Products include half / quarter carcass, individual bone-in or boneless cuts, offals, PAD meats that are finished ready for retail sale, and cooked meats. Supply countries include Brazil, Uruguay, Australia, and Ireland. Transit and packaging formats can range from loose carcasses, through bulk 'jumbo' pallets (for industrial use), to vacuum-packed boxed products loaded loose or palletised.

Pigmeat: Imports of pork and processed pork products (such as bacon) have increased year on year during the past decade. Approximately 60% of all pigmeat consumed in the UK is imported, with the Netherlands and Denmark as leading suppliers. Most imported pork was processed in the UK into bacon, ham, sausages and a number of other products. Imports will usually arrive from EU factories and cold stores in 13.6m temperature-controlled road trailers.

Mutton or lamb: Products are imported either as half / quarter carcasses or chilled / frozen individual pieces. Cuts are supplied to a wide range of manufacturing and foodservice customers, and may also be packed ready for retail sale. UK lamb imports come from New Zealand, Australia, South America, and the EU (particularly Ireland). Interestingly, the UK became a net exporter of lamb for the first time in almost two decades in early 2012.

Poultrymeat: Poultrymeat can arrive as raw, cooked or salted product in bulk pallets for industrial or in a wide variety of foodservice and retail formats, including in retailer own label packaging that is ready for the shelf. UK processors, wholesalers and retailers source frozen poultry of all types from Brazil, cooked products from Thailand, and chilled fresh poultry (cuts and whole birds) from Eastern Europe. EU product is likely to have come originally from countries such as Brazil and Thailand.

Fish: Because the fish and seafood industry too is now a global business, UK supply is complex. There is increasing demand for pre-packed processed fish (e.g. fish cakes, fish pie, and breaded frozen fish) and exotic (freshwater) species such as tilapia are becoming mainstream in UK retail. China is the principal supplier of filleted fish to UK processors, while fish from North American suppliers will arrive from storage in Germany or the Netherlands. Fish is also caught (by vessels from Iceland, the Faroes, or Norway), gutted, and frozen at sea. After landing at a UK port the fish might be sold to a UK customer or sent to the fish market at Grimsby or one of its Continental equivalents.

4.3 UK industry players

This section provides information about some leading UK and international players in the UK market. World economic pressures and opportunities alike have encouraged a global view of matters that has led to collaboration, joint ventures and acquisitions, such as when Brazil's JBS acquired Swift in the USA and Australia to become the world's largest beef company.

In line with this it should be noted that because many importers and producers have internationalised, some of them many decades ago, it can be misleading to assess situations on a purely national basis. So while a company might be producing poultrymeat in the UK for example, and taking advantage of this provenance in its marketing, the same company can at the same time be running a similar operation, also to world-class standards, in South America.

Companies have developed a holistic end-to-end approach in order to manage the supply chain from field or ocean to the retail shelf or restaurant. However, the traditional UK meat production areas, including those along the M62 corridor; and the UK fishing industry areas around the West Country, Grimsby or Fleetwood are still important. Also, London retains its prominence as a trading location, although it still has to compete particularly with the Netherlands for international deals.

Industry trade associations include the International Meat Trade Association (IMTA) which has a membership that includes importers, exporters, international traders, and wholesale distributors of meat and meat products; the British Meat Producers Association (BMPIA) focused on the abattoirs and processors; and the British Poultry Council (BPC) for the poultry sector.

The following profiles, all summarising information from the public domain, provide an overview of some of the leading players (in alphabetical order) in the meat and fish industrial sectors. The first five describe selected IMTA members, and the second group describe other players, including two fish processors. Many are involved in import activity from EU and non-EU sources.

IMTA members include:

Dawn Meats Group, Waterford (Ireland), part of the Queally Group (Ireland's largest privately owned agri-business), is one of Europe's largest food processing companies and suppliers of Irish and British beef, pork, and lamb. It processes over 0.5m cattle and 1m lambs, and produces 200,000 tonnes of added value products (including retail packs) each year to customers across Europe. It also has an international trading team in London sourcing and supplying products around the world.

JBS Global (UK) Ltd, North Finchley is a wholly-owned subsidiary of JBS SA of Brazil, the world's largest protein producer and exporter. The parent company has feedlot operations in the USA, Australia and Brazil and plants around the world processing beef, pork, lamb and poultry. The London operation is one of the largest importers of meat in Europe, importing and distributing JBS product from around the world to retail, wholesale and foodservice customers throughout the UK and Europe.

Marfrig Europe, Huntingdon is a major distributor of frozen and chilled beef in the UK. It is part of Brazil's **Marfrig Group**, the world's third largest protein producer and exporter. Other Marfrig Group food companies include **Moy Park**, headquartered in Northern Ireland, which operates across Europe, and supplies companies such as McDonald's; and Brazil's **Seara** acquired from Cargill in 2009 and a leading supplier of poultry products to the UK from its European base in the Netherlands.

Towers Thompson Ltd, Turnford, founded in 1898, specialises in the import, export, and distribution of chilled, frozen and cooked meats and poultry, with an international customer base in more than 50 countries. In 2010 it established **Towers Thompson Seafood**, based near Grimsby. This company imports and distributes frozen fish and seafood into the UK and European markets from all over the world but particularly from Russia, the Netherlands, Poland, China, and Vietnam.

Vestey Foods UK Ltd, Coulsdon became a Vestey Food Group company in 2003 and is one of the country's leading meat importers and distributors. Imports include Australian chilled beef; Brittany pork through a joint venture with COOPERL; New Zealand and Australian lamb; and frozen and cooked poultry from Europe, South America and Thailand. In addition, its new Seafood Division supplies globally-sourced fish and seafood to UK manufacturing, wholesale and catering sectors.

Other industry players include:

2 Sisters Food Group, Birmingham. Founded in 1993 and still a privately-owned company, it supplies products in the poultry, chilled, bakery and frozen categories to the retail, foodservice and food manufacturing sectors. It is predominantly a private label manufacturer but also has the Buxted and Devonshire Red poultry brands within its portfolio. Its European poultry division has six sites in the Netherlands and one in Poland. Its fish brand is Donegal Catch.

Birds Eye (Iglo Foods Group), Feltham. As its frozen foods market declined, Unilever, the former owner of this iconic brand rationalised its UK operations. Then, in November 2006, the Birds Eye and Iglo businesses were sold to private equity fund Permira. Birds Eye markets a wide range of frozen value-added products including fish, chicken, ready meals, and pies in the UK and Europe. The bulk of manufacturing is split between Lowestoft and other Iglo sites in the EU, particularly in Germany.

Cranswick plc, Hull is one of the largest pork processors in the UK, supplying major multiple retail customers, food manufacturing and foodservice. Its product range includes fresh pork, sausages, bacon, cooked meats, charcuterie, and other products. Brands include Jamie Oliver and Simply Sausages. Charcuterie products are sourced overseas. International trading has been a recent major growth area with export markets in Europe and Far Eastern markets.

Dunbia, Dungannon now operates from 10 sites across the UK and Ireland. It supplies red meat (i.e. beef, pork and lamb) products for the retail, commercial and foodservice markets in the UK and internationally. Its portfolio includes value added products with sauces, marinades, garnishes and stuffings. Each factory has its own focus – for example, the Llanybydder site has gained a worldwide reputation for its lamb, sourced in Wales and overseas.

Young's Seafood Limited, Grimsby is part of the Findus Group. It is the UK's market leader in chilled and frozen, own label and branded fish and seafood. As well as its Grimsby headquarters and principal processing plants, the company has specialist operations in Scotland, Northern Ireland and southern England. The main focus of the company is on the retail market, but it also serves sectors such as the independent wholesale trade. It sources from the UK, the EU, and non-EU countries.

4.4 UK import flows

As was described in **Section 4.1** above, UK meat and fish imports arrive mainly as full unit loads either in ISO containers (non-EU traffic) or 13.6m road trailers (EU traffic). Nearly all movements will use refrigerated equipment but there are some exceptions, such as tinned corned beef that arrives from South America for UK industrial food processing and retail in ambient dry freight containers.

The commentary in **Section 4.4** therefore describes these basic flow types:

- Deep sea container services arriving directly at a UK port (non-EU)
- Deep sea container services involving an onward feeder service to a UK port (non-EU)
- Road trailer services arriving by RoRo ferry at a UK port (EU)

Although the second type is effectively a variation on the first one, there can be significant differences such as in transit time. The way they align overall with the Defra import classification is shown below:

Code	Description	Import flow types (and source)
#0201 to #0210	Meat of all import categories	<ul style="list-style-type: none">• Deep sea container services with option of short sea container feeder services if transhipped (non-EU)• Road trailer services (unaccompanied / accompanied) via East Coast ports or (accompanied) via Dover Corridor (EU)
#0302 to #0307	Fish and Seafood of all import categories including crustaceans and molluscs	<ul style="list-style-type: none">• Deep sea container services with option of short sea container feeder services if transhipped (non-EU)• Road trailer services (unaccompanied / accompanied) via East Coast ports or (accompanied) via Dover Corridor (EU)

- **Deep sea container services arriving directly at a UK port (non-EU)**

Most non-EU meat and fish arrives by **deep sea container services** at 1) Southampton or Felixstowe if coming from Asia, Oceania, or North America; or 2) Felixstowe or Tilbury, if from South America. The first group will include lamb from New Zealand and fish from China; and the second group beef and poultry from Argentina, Brazil, or Uruguay.

In addition to calling at a UK port, vessels will also call at European ports such as Le Havre, Rotterdam, Bremerhaven, or Hamburg. The ports of call vary by shipping line and service while the final port rotation can vary according to circumstances.

A point to note is that those container vessels – such as those operated by Hamburg Süd – that sail on the North / South trades linking the Southern American countries with Europe have a far higher proportion of electrical connections (reefer plugs) than do the larger container vessels on the East / West services linking Asia or North America with Europe.

Key features of these import flows are:

- Traffic might be seasonal (e.g. lamb from New Zealand; or fish from Alaska)
- Product might be in bulk or be packed and labelled ready for retail sale
- Temperature regimes can vary by product. Typically frozen = -22°C; chilled = -1°C to +0.5°C
- Long distance chilled operations have been enabled by vacuum packing and gas-flushing
- Loads can comprise block-stacked loose cartons; jumbo pallets (pallecons); or be palletised
- Choice of refrigerated ISO container size (20' or 40') depends on product density
- Typical payloads can range from 14 to 24 tonnes
- Speed of clearance and risk of demurrage at the port terminal is affected by factors such as port health inspection capacity and levels of veterinary staff experience
- Containers are moved by road from the port to the importer

- **Deep sea container services involving an onward feeder service to a UK port (non-EU)**

Alternatively, non-EU product might be transhipped onto a feeder container service at Rotterdam for delivery to a port such as Immingham for UK clearance. This option can be useful for imports of raw material (such as fish fillets in bulk) to food manufacturers and processors in the North of England.

This option will add to overall transit time. For example, terminal transshipment at Rotterdam onto the feeder vessel might not be immediate and the feeder service itself might operate on a weekly basis.

These first flow types are illustrated in **Annex 7: Appendix I**.

- **Road trailer services arriving by RoRo ferry at a UK port (EU)**

As regards imports from the EU it is important to recognise the historic strength of northern Europe in the meat and fish industries. Germany and Poland were renowned for cooked meats and sausages; Denmark and the Netherlands for bacon. Similarly countries bordering the North Sea or the Baltic have had substantial fishing industries. Resultant food processing expertise remains, even if factories are now supplied with raw material from overseas. All this has encouraged the development of cold and cool logistics operations based at or near strategic locations such as Rotterdam or Hamburg.

Continental temperature-controlled logistics operations are also favoured by non-EU meat and fish exporters when bringing product into Europe. One major South American exporter interviewed stated that whereas UK port-centric storage was “*expensive and UK laboratories slow for testing samples, in Rotterdam the forwarder, the Customs officers, and the veterinary inspectors, were all under one roof at the cold store, and when needed the Dutch laboratories were quick*”. He also commented that he could choose between 6 to 10 Dutch cold stores depending on his requirements.

Also, many food groups (e.g. Findus, Iglo, and Masterfoods), now work on a pan-European basis and will often centralise stockholding to meet overall European, as opposed to purely UK, requirements. The result of all these factors is that product from around the globe, although ultimately destined for

the UK, is likely to be held and cleared on the Continent before appearing in the UK as EU product. This applies for example to fish and seafood from the USA or Asia; and to beef and poultry from South America.

Onward movement to the UK will be by **road trailer**, using either accompanied or unaccompanied RoRo ferry services to East Coast ports (from the Humber down to Harwich), or via the Dover Corridor as accompanied traffic. Choice of route often depends on the final destination in the UK – for example, the Humber ports give good access both to the food manufacturers and processors in the M62 corridor and to the fish industry located in Grimsby.

These flows are illustrated in **Annex 7: Appendix II**.

Key features of these import flows are:

- Product might be in bulk or be packed and labelled ready for retail / foodservice sale
- Temperature regimes can vary by product. Typically frozen = -22°C; chilled = -1°C to +0.5°C
- Loads can comprise jumbo pallets (pallecons) or be palletised
- Typically, road vehicles (13.6m refrigerated trailers) will have payload capacity of 22.5 tonnes (split over 26 pallet spaces) but actual payloads will be affected by product density and the type of transport equipment in use (e.g. single platform vs. double-deck trailers)
- EU cold stores are concentrated close to EU ports or production areas
- A high proportion of UK food manufacturing is spread across eastern and northern England
- Choice of route (even from Denmark) depends on RoRo service capacity and frequency
- Vehicles enter the UK as accompanied RoRo traffic via Dover Corridor
- Vehicles enter the UK as accompanied or unaccompanied RoRo traffic via East Coast ports
- Transit cycle times are short and tightly controlled

One of the features noted above was the choice of route for these meat and fish traffics. Exhaustive traffic surveys would be required to establish the precise situation but one piece of anecdotal evidence was that while one major Netherlands transport operator routed 99% of its traffic as unaccompanied refrigerated trailers via Purfleet; another split its traffic 60% as unaccompanied, via Felixstowe (occasionally Immingham) and 40% as accompanied, via the Dover Corridor.

4.5 Resilience of import flows

The resilience of import flows to port disruption can be summarised as follows:

- As regards deep-sea container flows, the capability, capacity, and risk profile of the **origin ports** are generally of a high standard. Most of the container terminals are operated by a global operator such as APM Terminals, DP World, or Hutchison, who can be expected to apply best practice standards to cargo handling and vessel turnaround. Other ports include Itajaí in Brazil, which has an APM terminal and a key export route for Brazilian poultrymeat, has steadily increased capacity over the past 15 years.

However, there have been problems. Although Itajaí showed a remarkable ability to recover from the serious flooding it experienced in late 2008 in terms of maintaining service, it took two years for some of the infrastructure to recover completely. Further severe flooding also occurred late in 2011. Climate change can be expected to impact not just on ports themselves but on the landside transport links.

- Resilience of the supply chain also depends on the availability of **suitable long distance sea freight capacity** for reefer traffic. In order to mitigate the effects of shipping overcapacity arising from the 2008 world economic downturn, some container services have been withdrawn or reduced in frequency. A related issue is the need for **adequate numbers of reefer plugs** on container vessels and at terminals. However, where there has been significant historic demand for temperature-controlled capacity, as in the South American meat trades with Europe, shipping lines like Hamburg Süd have invested in suitable vessels (and have also maintained high service frequencies).

- The capability, capacity, and risk profile of the **destination ports** is also fairly consistent across the larger UK container ports used for non-EU meat and fish imports (see **Annex 4** and **5**). Tilbury in particular, as the key destination for North / South food trades, has invested in reefer plugs and in its Border Inspection Post facilities. However, some interviewees expressed concern following their experience of limited port health capacity at Felixstowe.
- Resilience of **origin and destination ports for EU arrivals** centres on the capability, capacity, and risk profile of the Dover Corridor terminals (as described in **Annex 3**); ports such as Cuxhaven (DE) and Rotterdam (NL) and their corresponding UK ports from the Humber down to the Thames (as described in **Annexes 5** and **6**). This scenario reflects the importance of supply from Germany and the Netherlands, with other traffic coming particularly from Denmark, Poland, and Spain. The spread of UK ports involved provides some resilience but any consideration of risk must take into account the fact that much of this is unaccompanied trailer traffic with consequent limitations on terminal reefer capacity, as at Purfleet or Harwich.

4.6 UK meat and fish demand

- UK meat and fish import demand can be split into **four principal segments**: namely food manufacturing and processing; wholesale; foodservice; and retail. Unlike citrus fruit, where UK demand has a strong retail bias, significant manufacturing and processing of meat and fish takes place in the UK, often using raw material stocks held in the EU. Processed products are then pulled into the appropriate final (retail or catering) distribution channel to reach the consumer.
- As noted earlier, even though this high-level segmentation is straightforward, because there are many different types of player, **complex supply chain scenarios** can result. However, patterns of demand have some common characteristics as follows.
- First, **high levels of time-based performance** are required for many EU and non-EU flows. As shown by the following two examples, this can be for different reasons: one being effective use of shipping and transport resources; and the other because of product shelf-life.

An example of a **time-critical EU flow** is as follows. Refrigerated meats from all over northern Europe are consolidated into refrigerated (reefer) trailer loads at a depot in the Netherlands. The loaded trailers are then taken by Dutch tractor units to the Hook of Holland ferry terminal, before being shipped as unaccompanied traffic on an overnight service to Harwich. Locally-based tractor units collect the trailers from the port for delivery to food processors across the UK and subsequent (reloaded) return to Harwich.

This whole system works like a conveyor belt – it is highly-efficient and tightly-timed – but any port disruption could wreak havoc with the positioning of transport equipment and schedules.

An example of a **time-critical non-EU flow** is provided by the import of deep-chilled vacuum-packed lamb from New Zealand, which has to travel from the UK port to the processor for final processing and / or configuration for retail sale. The product shelf-life is adequate for normal circumstances, allowing it to be transported from New Zealand, processed, and put on the shelf at the retail store within the time limitations.

However, if for example Felixstowe is closed because of high winds, the ship is diverted, and the consignment then arrives from Rotterdam several days late, with a consequent risk of insufficient remaining shelf-life by the time it reaches the retail shelf.

- Next, **seasonality of demand** within the week and within the year has to be taken into account. On the one hand as product is sourced globally supply can be consistent, and also because accessible buffer stocks can be held in Europe, variations in demand can also be covered. On the other hand, consumer demand will increase with retailer promotions and at holiday periods, such as Easter, summer time and Christmas. Seasonality has important implications for supply chain planning and execution including for how to mitigate the effects of port disruption.

The above features affect the behaviour of demand in all four segments (food manufacturing and processing; wholesale; foodservice; and retail).

4.7 Food stocks and the attitude of the supply chain to replenishing stock

The key findings are:

- Best practice in supply chain management has encouraged keeping stocks to a minimum to **contain costs**, not only those directly associated with storage and handling, but also the cost of capital tied up in stock. It has also encouraged the holding of stock upstream, closer to its source, in order to give (apparently paradoxically) higher levels of customer service. This latter feature has been enabled particularly by faster information flows and responsive transport systems.
- Stock levels vary across the supply chain. For example upstream stocks held in continental Europe will be driven by factors such as harvest seasonality (e.g. fishing seasons) or the need to maintain production (e.g. poultry growing and slaughtering) in the country of origin. Moving downstream, a UK food processor may hold around 2 weeks of raw material stock to avoid the risk of production line shutdown. Once produced, finished goods stock levels will be kept to the minimum consistent with the need to meet wholesaler or retailer demand.
- As players have concentrated on efficient consumer response techniques, pulling stock through as required, they have become **dependent on frequent, reliable and fast deliveries** from their suppliers. Retailers might hold several weeks of cover for frozen products in selected cold stores, chilled products are handled on a cross-dock basis with only transit stock in the system. Therefore 24/7 scenarios are the rule for outbound transfers to customer distribution centres (DCs), creating what is virtually a non-stop flow from factory to retail store or catering outlet.
- The only variations to the above are when **stock build** takes place to cover such things as supply shut-down (e.g. Chinese New Year affecting fish imports), procurement opportunities, retailer promotions, or seasonal demand (such as over the Christmas holiday). In these situations, because the inbound supply chain could not cope with the traffic volumes if everything were done on a just-in-time basis, additional third-party cold storage will be employed to build frozen stock (of items that might have a shelf-life of up to 18 months). With the exception of procurement opportunities, these events are planned well in advance.

4.8 Behavioural aspects of the various players in the event of supply chain disruption

Although stakeholders regard their Business Continuity Planning as commercially sensitive, a reasonable body of evidence about behavioural aspects was compiled. The main findings are:

- While the **competence and supply chain knowledge** of the stakeholders was evident, the production managers interviewed generally relied on their forwarding agents and logistics service providers for information and formulation of a suitable response to any disruption. Transport operators are used to 'thinking on their feet' when faced with short-term disruption such as temporary port closure and finding alternative routes and ferry services.
- **Information systems** provide visibility of the entire supply chain, so that order and shipment status can be, and is, monitored. GPS systems, often linked to data loggers monitoring quality aspects such as container or trailer load temperatures, provide real-time information on progress. When combined with a pro-active management culture and style typical of logistics service providers, this supports resolution of problems.
- A final point to note regarding behaviour is that many key players will be managing things on at least a pan-European, if not international, basis. A typical scenario will have a number of production units across Europe, including the UK, supported by centralised stock holding. As a result, the response to port disruption in the UK could include temporary re-allocation of production to an alternative plant in continental Europe.

5. DISCUSSION

5.1 Overall assessment of the results

Although the pattern of UK import flows can be complex when the full range of supply markets is taken into account, there are a number of factors that emerge for discussion as follows:

Relevant factors

- UK meat and fish supply comes from a wide range of countries but with significant dependency on countries such as Brazil for poultrymeat or China for fish, even though trade data might make it look as if supply originated in the EU. A major problem in a country of origin would disrupt existing sourcing arrangements which could in turn require rapid reconfiguration of supply chain arrangements, assuming that alternatives are feasible and viable.
- Existing supply chains are well-developed as a result of application of modern supply chain management techniques. However, there is a strong trading culture, particularly in the meats sector, which is a strong influencer about how physical supply chains work in practice. Logic does not always apply. Possible scenarios for risk management should take into account the needs of food manufacturing and processing; wholesale food distribution; foodservice; and retail.
- The complexity of the supply chain is illustrated by the following list of possible entities:
 - Agri-business and fishing suppliers in the countries of origin
 - Exporters
 - Forwarding agents
 - Port and terminal operators
 - Port health authorities
 - Veterinary laboratories for testing
 - Shipping lines
 - Land-based logistics service providers (including multi-modal operators)
 - Importers
 - Traders
 - Food manufacturer or processors
 - Wholesalers
 - Foodservice wholesalers
 - Retailers
 - Trade associations
 - Government (at national, regional or local level)
- This means that when attempting resolution of port disruption it might (not) be within the authority and capability of a single entity to find a solution. The nature and duration of port disruption can also determine the appropriate response(s). One example described above related to the difficulties that would be experienced if there was disruption affecting the movement of unaccompanied road trailers via RoRo ferry services on the Thames or further north. Even short-term port disruption would require interaction between multiple entities with differing levels of authority and responsibility.
- A point to note concerns fish imports from Iceland, the Faroes, and Norway. As was noted at the end of Section 4.1 significant volumes of fresh and frozen fish from these sources are landed at Immingham, some for UK consumption and other imports forwarded to the Continent by road (in refrigerated containers or road trailers. Reporting on these flows is complex, so for the sake of clarity they were excluded from Table 4.2 above. However, in terms of potential UK port disruption scenarios, these Immingham imports can be considered to be similar in type and frequency to arrivals in containers on feeder services from Rotterdam.
- A related point is the provision of adequate Border Control and Port Health facilities. Even the level of existing provision can be a problem, as illustrated by the fact that imports arriving at Immingham have to be taken to Port Health at the Grimsby Border Inspection Post (BIP) for

inspection before being returned to Immingham for Customs Clearance. As can be appreciated, this c.17 mile round-trip uses significant time and resources. Also, the Grimsby BIP will approve imports only between 09:00 and 14:00 hours to allow time to complete the IUU documentation. Finally, if Immingham (or the Grimsby BIP) were to be out of action, alternative ports such as Teesport will not (or are unlikely to) have adequate or appropriate Port Health facilities.

5.2 Difficulties and risks associated with current systems

In addition to those described or inferred above, more general difficulties and risks associated with current systems include the following:

- Non-EU deep sea container flows are concentrated on Tilbury and Felixstowe and alternative UK terminal capacity at Southampton and Thamesport is very limited. If disruption were severe enough to require vessels being diverted to Continental ports, feeder vessel capacity for transport back to the UK would also be likely to be constrained; as would space on RoRo ferries.
- EU road trailer flows are spread between the Dover Corridor, the Thames and East Coast ports up to the Humber. Flows coming even from Denmark, Germany or Poland for example, because of limited capacity and frequency of available RoRo services on the most direct routes to the UK, will use the Dover Corridor. Other, high intensity, flows such as between the Netherlands and the UK will often use unaccompanied trailer services. Both of these scenarios mean that traffic is not easily switched to alternative routes and services in the event of disruption.
- Although there is already a general awareness of the current risks, industry stakeholders have only limited understanding of the details. They must be persuaded about the merits of sharing information about their Business Continuity Planning for contingency planning.

The most likely pinch points, which vary by import flow, can be summarised as follows:

	Import flow (and source)	Appearance	Port group(s)	Pinch points
1	Deep sea container service (non-EU)	ISO reefer container	Tilbury or Felixstowe	Port access channel or terminal at port of loading or discharge
2	Deep sea container feeder service (non-EU)	ISO reefer container	Immingham	
3	Road trailer service (EU)	13.6m reefer trailer via RoRo ferry (accompanied or unaccompanied) or Eurotunnel Shuttle (accompanied only)	Dover Corridor, Tilbury, Purfleet, Harwich, Felixstowe, or Humber	

6. CONCLUSIONS

The research showed that UK supply of meat and fish has a high dependency on supply from non-EU sources, including North and South America, Asia, and Oceania. UK food manufacturers and processors (i.e. importers) are concentrated in eastern and northern England and supply chains are configured accordingly.

Key features of existing supply chains are that: they have multiple stakeholders, which introduces complexity; can often have an EU element for initial processing and / or storage; supply includes both frozen and chilled products; stock levels are appropriate for the supply chain stage (e.g. 2 weeks' raw material stock at UK factories); while chilled products have short shelf life and stocks are low, frozen products will have far longer shelf life and stock build may occur particularly to anticipate high seasonal demand.

Direct supply in ISO containers from non-EU sources will usually be landed at Tilbury (particularly North–South trades in meat) or Felixstowe (particularly East-West trades in fish). Alternatively containers can arrive on feeder vessels to ports such as Immingham. Supply in road trailers from the EU will arrive via the Dover Corridor; and as accompanied or unaccompanied traffic on RoRo services arriving at ports including Tilbury, Purfleet, Harwich, and the Humber.

Severe port disruption on any of these routes would be likely to affect UK manufacturing and processing quickly, although raw material stocks are probably sufficient to mitigate the effects in the short-term; with food service and retail sectors affected thereafter. Although road transport has inherent flexibility it could prove difficult to reschedule disruption to unaccompanied trailer services.

A fair appraisal of the Meat and fish Imports Case Study would therefore be:

Objective	Result
1 Determine the extent to which particular features of domestic and international transport infrastructure and food supply chains are likely to ameliorate / exacerbate the impact of UK port disruption on the supply of food imports into the UK	A substantial base of meaningful evidence by individual flow type has been compiled, enabling a preliminary assessment of risk. Amelioration features include storage of non-EU product in Europe; factors that exacerbate the situation are the dependencies on Tilbury / Felixstowe, the Rotterdam and Bremerhaven / Hamburg port clusters, the Dover Corridor, and on the use of unaccompanied RoRo services
2 Determine the extent to which UK food (import) security is contingent upon the resilience of overseas port infrastructure (both within and without EU waters, and now and in the future)	EU meat and fish traffic is spread across a range of European terminals although there are capacity and frequency limitations on some routes. For non-EU imports there is a wide spread of ports of origin and most are operated by global players with high levels of operational competence
3 Explore the behaviour, over the short to medium run (up to six months), of individual port operators, shipping companies and land-based logistics and food supply chain agents in the event of port disruption	Likely behavioural responses include a) changing import route and mode of transport; b) trying to increase stock in the system and / or c) identifying alternative supply sources. There is understandable stakeholder reluctance to provide information about their Business Continuity Planning in view of its commercial sensitivity

The work programme also segmented imports into high-level categories, first of all into individual import flow types, and then into more detailed information about routes. At this level it was possible to show how the flows depended on infrastructure, transport equipment and services of different types.

It showed that it is feasible to gather reliable information from industry stakeholders about UK meat and fish imports. Although compilation of evidence was time-consuming and encountered some setbacks, such as when stakeholders were cautious about whether to participate, the overall result was positive. More work is now required to map upstream flows and also on how to encourage industry players to prepare robust scenario plans to cope with serious port disruption.

7. MESSAGES AND FINDINGS

The recommendations arising from the research are as follows:

1. A scenario planning exercise combined with detailed modelling is required to evaluate business risk, particularly for deep sea flows of meats from South America and of fish from the Pacific via China or the USA. More needs to be known about interim pre-production stock levels held in continental Europe, in particular in Germany and the Netherlands.

This would facilitate planning of a suitable response to port disruption involving EU flows, as many of these in fact concern product that originated in non-EU sources (such as those highlighted above) rather than coming from EU countries in the first place.

This could possibly be undertaken on a collaborative basis by the industry's leading players with UK government encouragement and involvement.

2. A suitable framework and forum must be devised in which industry stakeholders can be persuaded to share information about their Business Continuity Planning processes and conclusions. This could also support the first recommendation described above.
3. There are also some evidence gaps such as those relating to the implications of increased sourcing from countries other than the current supply leaders (i.e. alternative sources of supply involving different import channels to the UK market). These gaps need to be filled through continuing investigation using the approach and methodology employed for this research.

Appendix I: Meat and Fish Arrival via Deep Sea Services

Import flow classification		
A	Food commodity	<i>Meat and fish</i>
B	Source region / country	<i>Southern hemisphere (e.g. Brazil or New Zealand)</i>
C	Temperature / atmosphere regime	<i>Frozen or deep chill</i>
D	Transport mode(s)	<i>Deep sea (plus option of short-sea feeder)</i>
E	Flow type	<i>Temperature-controlled unit load</i>
Logistics information		
1	Commodity format	<i>Packed in cartons</i>
2	Shipping unit	<i>Container</i>
3	Vessel / vehicle type	<i>Container ship (deep-sea or feeder)</i>
4	Terminal handling	<i>Deep-sea (or short-sea) container terminal</i>
5	Storage on arrival	<i>Cold store</i>



Deep-sea container vessel



UK deep-sea container terminal (Felixstowe)



Short-sea feeder container vessel (ex. Rotterdam)



UK cold store (Grimsby)

Pictures © 2012 London Container Terminal (Tilbury) Ltd, Maritime Transport Ltd, Unifeeder UK, Yearsley Group

Appendix II: Meat and Fish Arrival via Short Sea Services

Import flow classification		
A	Food commodity	<i>Meat and fish</i>
B	Source region / country	<i>European production or storage</i>
C	Temperature / atmosphere regime	<i>Frozen or chill</i>
D	Transport mode(s)	<i>RoRo ferry service</i>
E	Flow type	<i>Temperature-controlled unit load</i>
Logistics information		
1	Commodity format	<i>Packed in cartons or jumbo pallets</i>
2	Shipping unit	<i>Reefer trailer</i>
3	Vessel / vehicle type	<i>RoRo ferry (accompanied or unaccompanied)</i>
4	Terminal handling	<i>Ferry terminal</i>
5	Storage on arrival	<i>Cold store</i>



RoRo ferry loading at night



RoRo ferry terminal (Killingholme)



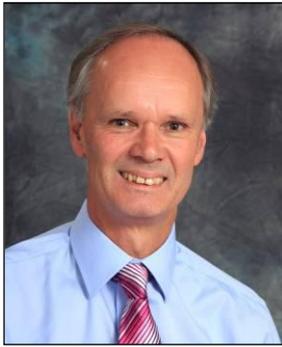
Reefer truck arriving in the UK



Meat import arrival at UK factory

Pictures © 2012 Dunbia Ltd, Global 78 Ltd, PRB Associates Ltd

ABOUT THE AUTHORS



Peter Baker, the founder and owner of PRB Associates, specialises in operational, financial and market analysis in the ports and shipping sectors; with working experience in the ports sector and in RoRo ferry operations.

In addition to a range of project commissions in the UK and internationally, Peter has researched and produced the '*UK Short Sea Freight RoRo and LoLo Capacity Analysis and Report*' every year since 2000 and for the first time in 2009 produced an Irish equivalent. The report and database information provide a detailed analysis and assessment of the capacity provision and spread in the market, with comprehensive route, service, vessel and port information contained in detailed appendices.

PRB Associates Limited specialises in providing shipping and transport consultancy and analysis services for private and public sector organisations. Founded in 1998, PRB Associates has successfully completed commissions for freight generators, freight transport service providers (shipping lines and road transport operators), port operators and various public sector organisations. Assignments have ranged from service analyses, feasibility studies, financial modelling and economic impact studies, to market research and appraisal and national transport strategy formulation.



Andrew Morgan, the founder of Global 78, has extensive international business and logistics experience gained in projects across many industrial sectors, including food supply projects in Europe, Brazil and India. These advisory and implementation projects have ranged in scope from agri-business, through manufacturing and processing, to wholesale and retail distribution in final consumer markets.

A Chartered Member of the Chartered Institute of Logistics and Transport (UK), Andrew is the author of '*Making the Brazil Connection – managing risk in the international food supply chain*' and also co-author of the UKIBC Report '*India Agri-Food Supply Chains: Overview and Opportunities*'.

Global 78 Limited is focused on helping commercial clients discover new perspectives for success in local and international markets and for delivery of real bottom-line improvements. It also undertakes research for public sector policy-making. Food supply chains are complex. Innovation, resilience and sustainability are all vital elements for successful policy, strategy, and operations. The Global 78 team therefore provides clients with quality research, specialist advice, and support for implementation.

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