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Pursuing Added Value in the Irish Agri-Food Sector: An Application of the Global Value Chain Methodology

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ABSTRACT

In 2015, under its Food Wise 2025 strategy, the Irish government set itself the ambitious target of increasing Ireland's income from agri-food exports to €19 billion within ten years, an 85 per cent increase. This paper analyses the structure of the two main food systems in Ireland; the dairy and beef industries, to examine value chain efficiencies in production needed to achieve such a level of growth. This paper, lays bare a reality characterised by significant inefficiencies and suggests innovations to increase the competitiveness of the industries internationally. Moreover, the paper recognises that the ability of stakeholders to add value to primary products in the two main Irish food systems is key to the success of the Food Wise strategy.

The methodology that the paper employs to analyse the dynamics of the Irish dairy and beef systems is the Global Value Chain (GVC) methodology championed and developed by the Center on Globalization, Governance & Competitiveness at Duke University. Through the disaggregation of the various segments that comprise the food systems, the GVC methodology allows for a multidimensional analysis, and for the identification of where rationalisation is required and where value may be added to primary products. The paper presents value chain maps for both the Irish dairy and beef systems to compare and contrast the structures, institutions, characteristics and effectiveness of the two value chains. The comparison illustrates cogently where rationalisation is needed and where value may be added.

The paper finds that the Irish dairy system is more fragmented than the systems of other dairy-producing countries and that at the farm and processing levels it still requires, despite much rationalisation since the 1980s, substantial consolidation may still be necessary.

Regarding where value may be added to primary products, the paper finds that in the Irish dairy system there remains an over-reliance on basic commodity sales and that innovation to open up entirely new markets, both in terms of products, such as in the area of sports nutrition, and geographically, such as middle-eastern markets, with white cheese, is required. Regarding the Irish beef system it finds that while there is not as much scope for product diversification, innovation in branding and standardisation could produce a considerable dividend.

Comparing value chain integration, the institutional structure built upon farmer owned cooperatives in the dairy sector allows for greater coordination and responsiveness to market opportunities. The beef value chain however is much less integrated, beset by cross-value chain competition and low levels of trust, which has implications for future value generation and transformation across the chain.

1. Introduction

After the abolition of Milk Quota in 2015 and given the relatively competitive nature of the Dairy sector (Donnellan et al., 2011), Ireland through its national food development strategy, Food Wise 2025 (FW2025) has targeted an increase in the value of annual agri-food exports by 85 per cent to €19 billion and increasing value added by 70 per cent to in excess of €13 billion in the period to 2025. While traditionally a primarily commodity food exporter, given land and environmental constraints, there is a need to have a greater focus on adding value.

Ambitious projections such as these raise a number of important research questions: Given all the references to 'increasing value' above, what activities should the Irish agri-food sector focus on to provide the greatest return? Where is the value created? How should the sector be structured to facilitate optimal operation and integration in the global economy? How can policy makers ensure that jobs that are created stay in Ireland instead of moving activities overseas? Indeed, what can be done to provide an enabling policy and regulatory environment to help achieve the projections above?

Although the Food Wise strategy has a range of high-level recommendations for the development of the agri-food sector over the next decade, actually delivering on the potential will require more detailed plans to be developed by producers, processors, government agencies and related organisations. Such plans will need to be grounded in a clear and comprehensive understanding of the individual components that comprise the sector, how they interact, how and where value is created, and the ways in which the sector operates in the global economy. The majority of economic analyses related to the agri-food sector in Ireland have focused on one or two economic issues or actors – such as the co-operative structure, industry competitiveness, or the policy and regulation environment (e.g. Briscoe & Ward, 2006; Donnellan et al., 2011; O'Donoghue & Hennessy, 2015). However, little research has been conducted in the Irish context to develop an overall economic understanding of the range of activities involved in bringing an agri-food product from conception through to delivery to final consumers. This paper attempts to fill this research gap and aid in the understanding of how economic gains can be generated from agri-food by analysing the sector from a multi-dimensional *value chain* perspective.

Traditional economic concepts, such as comparative advantage, have been used to examine the kinds of issues affecting the global economy noted above. However, such concepts fail to fully account for the increasing fragmentation of processes involving production and supply of goods, both within and across countries. A body of research relating to "global value chains" (GVCs) has emerged in recent years to address this shortcoming (Gerreffi et al., 2005). Value chains, refer to the array of activities that are carried out in order to bring a product or service to the market, from initial conception all the way through to the commercialisation process (De Backer & Miroudot, 2013). Value chain analysis can therefore provide a holistic perspective of a country's engagement in a global industry by focusing on the sequences and overlaps of tangible and intangible value-adding activities, thereby offering economic insights on issues such as industry structure, governance, value creation, and the key actors and institutions that make up the industry (Gerreffi & Fernandez-Stark, 2011).

In this paper, the GVC methodology will be employed to analyse and develop a greater understanding of the two most important pillars of the Irish agri-food sector, the dairy and beef industries, in order to offer insights to industry stakeholders and policy makers considering the types of research questions highlighted earlier.

This paper will continue as follows: Section 2 explores how the concept of global value chains came about, and outlines some of the developments related to the globalisation of production processes that a value chain perspective could help explain. Section 3 describes the GVC methodology espoused by the GVC Initiative that will serve as the analytical framework for the research to follow. Section 4 applies the GVC methodology in detail to a case study on the Irish dairy value chain, and develops a value chain map – the first of its kind for the Irish dairy industry – to help explain the products, processes and activities that capture added value. Section 5 conducts a less in-depth GVC analysis of the beef industry and highlights some contrasting features between the Irish dairy and beef value chains. Finally, the paper concludes with some high-level observations that may inform policy recommendations for the Irish agri-food sector.

2. The Theory of Global Value Chains

Increasing globalisation and the related development of world production, investment and distribution systems have stimulated the creation of conceptual frameworks to help explain the ways that firms and nations engage in the global market (Neilson et al, 2014). This is partly due to the fact that earlier efforts to describe patterns of global integration,

for example the concept of comparative advantage, do not adequately account for the increasing separation of processes across the production and supply chain. The concept of “global value chains” (GVCs) has attempted to address this issue and provides the primary analytical framework for this paper.

Global Value Chain History & Definition

According to the World Trade Organisation (WTO), use of the term “value chains” first appeared as far back as the 1960s in the context of development paths for mineral-exporting economies. It was in the 1980s, however, that the term was popularised by Michael Porter in the business literature, based on the idea that an organisation as a system was made up of sub-systems, each with inputs, transformation processes and outputs. The concept included not only processes involving physical transformation but also the related support functions such as research and development or procurement.

Gereffi & Lee (2012) traced the emergence of global value chains to the 1960s when globalisation elevated competition between firms from the local to the international stage, leading to a change in production methods as firms looked for ways to reduce production costs by outsourcing different segments of the production process overseas.

De Backer & Miroudot (2013) describe a slightly different path to the creation of the GVC concept, citing Bair (2005) in tracing it back to the idea of “commodity chains” that appeared towards the end of the 1970s. The basic approach was to identify all the various inputs and transformations necessary to develop a final product and to map the chain of processes involved. The idea of a “global commodity chain” was later introduced by Gary Gereffi, where he mapped the apparel commodity chain across countries: from the raw materials, such as cotton, wool or synthetic fibres, to the final products in the form of garments. De Backer & Miroudot (2013) note that in the 2000s, there was a shift in terminology to the “global value chain” arising from the analysis of trade and industrial organisation as a value-added chain.

The definition of value chains therefore is broadly defined as the full range of activities and processes that are needed to bring a product from conception through the intermediary stage of production to delivery to final consumers. Leading on from this definition, a global value chain can be simply explained as “the sequence of all functional activities required in the process of value creation involving more than one country” (Banga, 2013, p.6).

Insights from the Study of Global Value Chains

The GVC concept encompasses a number of characteristics of the world economy today. The Organisation for Economic Co-operation and Development (OECD) suggests a number of important developments related to the globalisation of production processes that GVCs could help explain or manage (2013):

- Economies are becoming more interconnected through global value chains..
- Firms and countries are increasingly specialising in particular tasks and business functions rather than in specific products.
- Global buyers and suppliers are key players.

From the perspective of GVCs, these developments in the global economy raise a number of questions with respect to industrial policy. For example:

- What activities or roles should a country specialise in?
- What is the best environment for enabling firms and industries to successfully take part in the global economy?
- How can policy makers support the creation of employment, wealth and innovation amid increasing global competition?
- How can policy makers ensure that the benefits of investment in new industries, such as jobs, added value and innovation accrue to the domestic economy?

Questions such as these are not easily answered but, by developing a better understanding of how global value chains operate, individual countries can gain some insights into how to achieve economic gains amid the evolving changes in the world economy (Sturgeon *et al.*, 2013). By using global value chains to their advantage and by playing to their strengths, countries can improve income, employment, and productivity (OECD, 2014).

Although dairy and beef commodities and value-added products are traded globally, and whose value chains are truly global in nature, this paper will focus on the value chain activities as they pertain to Ireland to facilitate domestic decision making.

3. Global Value Chain Methodology

Gereffi & Fernandez-Stark (2011), the Global Value Chain (GVC) framework offers insights into the way global industries are organised through the study of the structure and dynamics of different players involved in a given industry, helping to identify changing production patterns, connecting activities across multiple countries and actors within a single industry, and clarifying roles across countries.

The methodology is increasingly being adopted by a range of institutions and governments as part of efforts to understand the different layers of global industries, where actors seek to identify a country's or firm's best position in the GVC as well as the most competitive supply of tasks or business functions, with the goal of informing the development of programmes and policies to add value and, ultimately, to promote economic development.

There are four basic elements that the GVC methodology investigates¹:

- Input-output structure
- Geographical scope
- Governance structure
- Institutional context

Input-Output Structure

The aim of this step of the analysis is to gain general knowledge about the industry in question and then map the entire input-output process involved in bringing a product or service to the market, from conception to end use by final consumers. The input-output structure is typically represented as a set of value chain “boxes” demonstrating the flow of goods and services including, for example, research and development, inputs, processing, marketing, distribution and sales (Figure 1).

Figure 1. Generic Industry Value Chain Segments



Source: adapted from Gereffi & Fernandez-Stark (2011); Le Heron et al. (2010); Sturgeon et al., (2013); USAID (2007)

It is also important to develop a contextual understanding of the type of firms involved in the industry, including their global reach, size, and ownership. By identifying the firms in the chain it is also possible in this step of the analysis to develop insights into the prevailing governance structure within the chain.

Geographic Scope

Supply chains are often fragmented around the world as different countries or regions specialise in areas of competitive advantage. The typical scenario is that developing countries offer low labour costs and raw materials, while wealthier nations leverage their highly educated workforce to specialise in research and development or marketing. Although GVCs can be found at different geographic scales – such as local, national, regional and global – what is remarkable today is the extent of the global fragmentation and how improvements in technology and transportation have facilitated the dispersion of production that was not possible before. Within the GVC methodology, geographic scope can be assessed by identifying the lead firms in each part of the value chain for a given industry and the presence of these leading firms within particular countries or regions.

Governance

Analysing the governance structure looks at the global economy from the top down to develop an understanding of how a value chain is controlled and coordinated, focusing on the distribution of power between firms. Governance of global value chains, can be described in terms of “producer-driven” and subsequently “buyer-driven” chains. Producer-

¹ This description is largely based largely on the work of Gereffi & Fernandez-Stark (2011).

driven chains are typically vertically integrated along all segments of the supply chain and associated with high-tech sectors, including the automotive, pharmaceutical, or infant milk formula industries. Because technology and research and development are such critical parts of such industries, lead firms are most likely to control the design of products as well as most of the assembly which may be split across different countries. Production in buyer-driven chains, on the other hand, can be completely outsourced and is controlled by retailers and branded marketers – such as Nike, Inc., or McDonald's (De Backer & Miroudot, 2013).

Institutional Context

According to Gereffi & Fernandez-Stark (2011), the institutional framework identifies how local, national and international conditions and policies impact on the globalisation in each stage of the value chain. Within this framework, the ability for a firm to enter into the global value chain depends to a large extent on three separate dynamics at the local level: economic (for example, labour costs and access to finance); social (such as availability of labour and relevant skills); and institutional (such as the tax structure, subsidies or policies that may promote or hinder industry development). Analysing the local dynamics in which a value chain is embedded can be achieved by mapping all the relevant industry actors in the value chain and their main role in the chain.

An additional element of analysis often included as part of the GVC methodology is referred to as *upgrading*, which describes the dynamic movement within the value chain by examining how producers shift to higher value stages of the chain. Upgrading can be considered a self-development process by which firms enhance their knowledge and capabilities – such as acquiring the expertise to produce milk-derived ingredients for the sports nutrition market – thereby facilitating innovations or improvements that increase the value of their goods or services (Frederick, 2014).

4. GVC Analysis of the Irish Dairy Industry

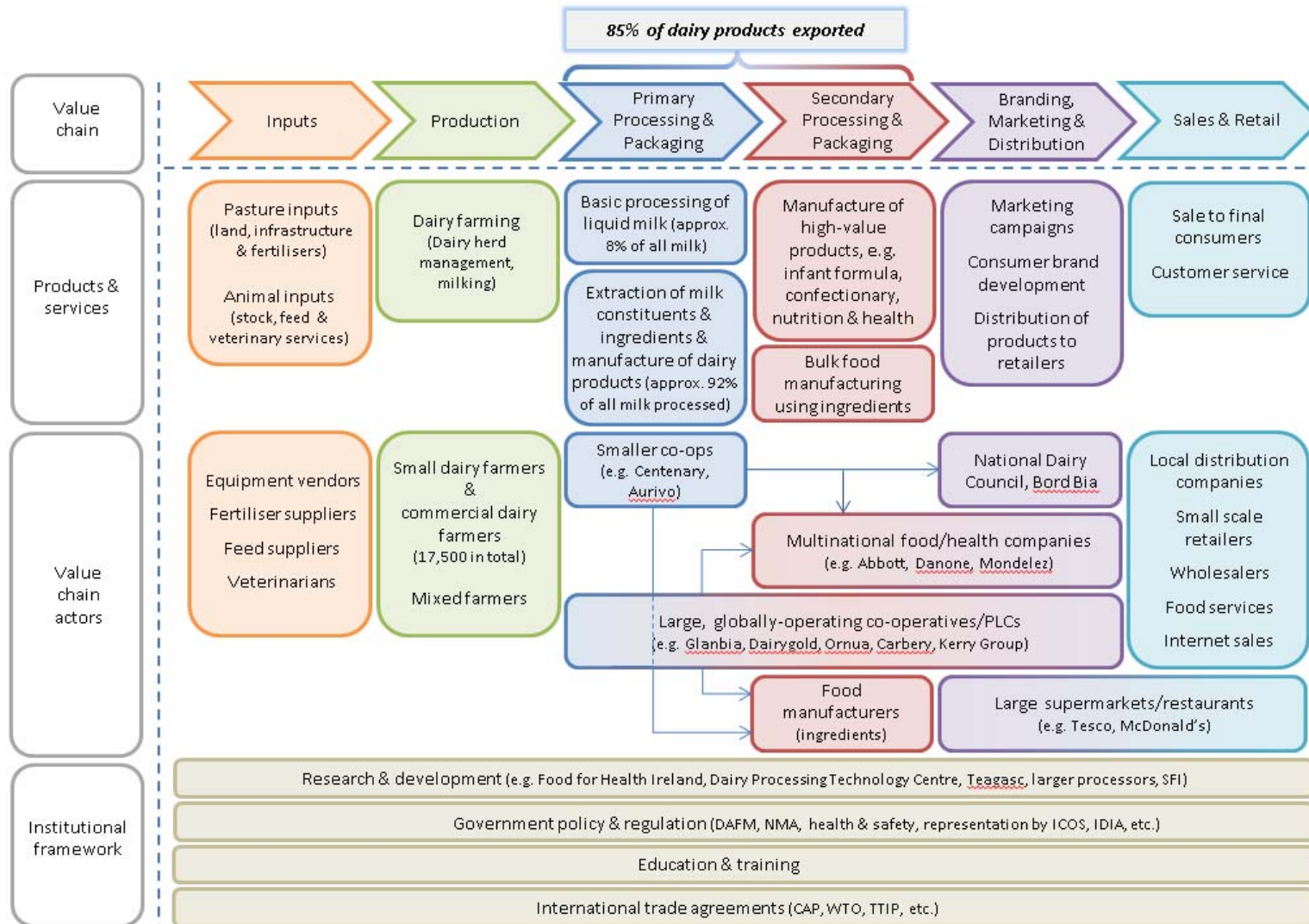
Developing plans to make progress on the FW2025 recommendation of developing dairy value-added products whilst ensuring, that the maximum value possible is retained indigenously, requires a clear understanding how the industry is organised, how and where the value is added, and the key players involved in capturing the value generated. This section maps and analyses the Irish dairy value chain, using the GVC methodology.

This approach involves identifying the key products, activities, actors and locations involved in taking a good or service from raw material to production and finally on to the consumer, and presenting the information in the form of a value chain map (Figure 2).

Inputs to Dairy Farming

Dairy farming requires a range of different inputs which can be divided in terms of animal inputs, such as stock, feed and veterinary services, and pasture inputs, such as land, infrastructure and fertilisers (Le Heron *et al.*, 2010), often characterised into two categories: direct costs which apply to a specific farm business and vary with farm output; and overhead costs which relate to the farm as a whole and are incurred irrespective of the level of output (Teagasc, 2015). Table 1 below provides averages for the key costs incurred and profit margins experienced by dairy farmers in 2014.

Figure 2. The Irish Dairy Value Chain Map



Source: author's own research, with conceptual ideas from Gereffi & Fernandez-Stark (2011); Le Heron et al. (2010); Sturgeon et al., (2013); USAID (2007)

Animal feed and fertiliser are generally the main inputs which affect the cost of milk production (Teagasc, 2015). In Ireland's case, the overwhelming majority of dairy herds eat fresh grass for up to 300 days per year, with conserved grass the main food source during the winter months. The low-input, grass-based production system used in Ireland is seen as advantageous when animal feed prices are high, due to the relatively low input content of feed compared with high-intensity confinement systems seen in many other countries.

The downside to the reliance on such a low-input production system is that output per cow is typically also significantly lower compared to more intensive production systems that utilise concentrates over grass. An additional shortcoming is that production is also more seasonal under the pasture-based system seen in Ireland, leading to higher costs at the processing level as processing facilities built to accommodate peak period milk production can only operate at such levels for a limited period of the year (Donnellan et al., 2011).

Milk Production

There are approximately 17,500 dairy farms in Ireland which produce over 91 per cent of all milk processed in Ireland (Agri Aware, 2014). Since 2012, milk intake has increased year on year, likely reflecting producers' efforts to begin ramping up production in anticipation of the lifting of milk quotas in 2015. Although the 2014 figure of 5.6 billion litres produced domestically represents an improvement over previous years, that volume is small compared to approximately 21 billion litres produced in New Zealand in the same period (DCANZ Statistics, 2015).

Income from milk production in Ireland has for some time been the most profitable conventional agricultural activity when measured both on a per-farm and per-hectare basis (Teagasc, 2015). With the abolition of the milk quota regime as of April 2015, the dairy industry in Ireland is once again engaging in rapid expansion in order to tap into the export potential offered by increasing demand for dairy products worldwide – due in large part to changing dietary preferences among an expanding middle class in many developing countries. The Irish Government and industry experts have targeted an ambitious 50 per cent growth in milk production by the year 2020, amounting to an additional 2.7 billion litres over baseline production figures.

Dairy Processing

Liquid milk is composed of water (~87%), lactose (~4.8%), fat (~3.8%), protein (~3.4%) and minerals (~1% or less) (Dairy Ireland, 2013). In simplest terms, dairy processing involves the processing of liquid milk for human consumption and the separation and concentration of its different constituents to manufacture commodity dairy products. Around 480 million litres of liquid milk was processed for human consumption in 2014 (see Table 1), accounting for only eight per cent of total milk processed in 2014 in that year. As much as 85 per cent of dairy products produced are exported each year

The remaining 92 per cent of the milk pool underwent *primary processing*² into dairy commodities and products, including butter, cheese, milk powders, casein and whey powder, with some of these products continuing on to undergo *secondary processing*, for example to be made into higher value products such as premium cheeses, infant milk formula or sports nutrition products and ingredients. Table 2 provides an indication of the volume of core dairy products undergoing primary processing in 2014.

Table 1. Milk Sales for Human Consumption by Type of Milk (million litres)

ilk	
d milk	
med milk	

² *Primary processing* of food is generally done to make it safer to consume, easier to transport, more appealing to consumers or more convenient to use: for example, pasteurising, drying, and manufacturing of basic dairy commodities, or cutting and boning of beef and manufacture of beef-based products such as hamburgers. *Secondary processing* of food occurs after primary processing to create food products that are significantly different from the original raw ingredients that form the product: according to the Irish Dairy Industries Association, secondary processing includes the manufacture of infant milk products, nutrition products and ingredients, and dairy-based liqueur and confectionary products (IDIA, 2007).

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Source: CSO

Table 2. The Utilisation of Milk in Ireland – Primary Processing

ilk	on litres
	tons
mostly cheddar)	tons
ilk powder	ons (2011)
d milk powder	ons**
	ons
pwder	tons (2011)

Source: CSO, IFA

**Partial due to confidentiality issues

The mainstream processing industry is made up of 16 processors ranging from smaller co-operative creameries such as Centenary/Thurles or North Cork, to large, globally operating co-operatives such as Dairygold or Carbery, and also some public limited companies (PLCs) such as Glanbia and Kerry Group, which have their shares listed on the Irish Stock Exchange.

The farmer-owned co-operative model has been the dominant organisational structure within the dairy industry since its inception, helping to provide producers with a voice in decision making, and a large degree of consistency with respect to market access and milk prices. Importantly, the co-operative model has also facilitated relatively orderly coordination along the value chain.

In addition to the types of processors noted above, there are also a number of important multinational corporations (MNCs) with operations in Ireland that do additional processing of dairy products, such as Abbott Nutrition (infant formula), Danone (infant formula), Nestlé's Wyeth Nutrition (infant formula) and Mondelēz (chocolate crumb). In terms of products, 12 of the plants process milk powder; nine of them process butter; eight are cheese-making plants; and four large plants manufacture infant milk formula or ingredients for same (2015).

The "Prospectus Report" of the Irish dairy processing industry written in the early 2000's concluded that although the number of processing co-operatives and plants had dropped during the 1990s and into the 2000s, the Irish dairy processing industry remained relatively fragmented compared to other dairy-producing countries. It suggested that the tradition of small scale of dairy processing would need to make way for plant rationalisation and consolidation in order to achieve economies of scale. Some industry consolidation has taken place in recent years, with the three largest processors – Glanbia, Dairygold and Kerry Group – processing approximately 70 per cent of the total milk pool in 2014, compared to 2001 when a similar market share was held by the four largest processors (Prospectus and Promar International, 2003; Teagasc, 2015). However, this level of consolidation falls far short of Ireland's major competing dairy export countries such as Denmark or New Zealand, where one company processes as much as 70 or 80 per cent of the milk pool (Prospectus and Promar International, 2003).

From Commodity to Value Added Products

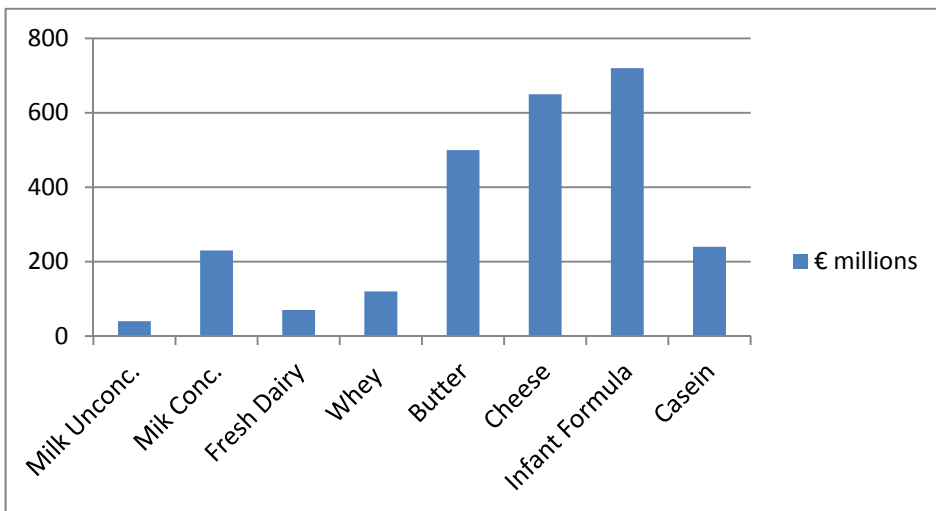
Historically, Ireland's dairy product mix has been weighted towards undifferentiated products or commodity output, such as liquid milk, milk powders, bulk butter and cheese, and casein. More recently, industry players and policy makers have emphasised developing more differentiated products that can command higher prices due to their relative scarcity, brand appeal, or ability to meet the specific needs of consumers. Such value-added, and usually more highly processed, products include infant formula products and ingredients, nutrition products and ingredients, and premium cheeses like Kerrygold's Kildery cheese (a specialist Maasdam-type cheese being marketed and sold in Germany). As recently as 2008, close to two thirds of Irish dairy exports were priced at world base commodity price level, with the remaining one third making up value-added or branded products (Enterprise Ireland, 2009).

One of the challenges of relying so heavily on commodity-based exports is that commodity prices can fluctuate considerably from year to year, although that effect was neutralised somewhat over the past decades thanks to a number of market supports under CAP, such as export subsidies and intervention buying for butter and skimmed milk powder. However, the removal or phasing out of CAP market supports over the past few years has further encouraged

the dairy industry to focus more on developing value-added products and ingredients that can command a price premium and are generally more stable in prices compared to commodity products (Ryan, 2014).

Perhaps the most frequently-cited example of a value-added product in the dairy industry is infant milk formula. The processing of milk constituents and other ingredients into infant milk formula is not the most milk-intensive activity in the dairy industry, but the share of value added to Irish exports is significant, with sales overseas around €700 million in 2012, close to 30 per cent of the value of Irish dairy exports in value terms (see Figure 4 below). According to a Teagasc report on the dairy industry, the MNCs involved in producing infant milk formula are able to mark up their product by as much as 20 to 30 per cent, far more than the low single digit per centage mark-up applied to standard dairy commodities (Teagasc, 2015).

Figure 4. Irish Dairy Exports in Value Terms (2012)



Source: Eurostat, Teagasc (2015)

In addition to the large MNCs, the larger Irish dairy processors have also invested heavily to *upgrade* their activities in the value chain in order to realise the potential for higher and more stable returns of value-added products.

Adding Value through Secondary Processing: Whey Protein Isolate

Liquid whey is an interesting example of how value can be added through additional processing. Whey, a by-product of cheese and casein production, was until relatively recently considered to be of very little value. However, thanks to investments in processing technology, and advances in the science of human nutrition, Whey Protein Isolate (WPI) containing 90 per cent protein is now considered a valuable ingredient for the sports nutrition industry. This industry was estimated to be worth \$10.1 billion globally in 2014 and growing at 11 per cent each year (DAFM, 2015). Table 4 below profiles the greater value that can be extracted by varying degrees of processing raw whey, to be used as ingredients in products as diverse as ice cream, infant milk formula and sports nutrition products.

Table 4. Value Added from Processing Liquid Whey

	on Raw Whey	in Process	per Ton of Powder*
powder		Whey – raw whey (6% solids) is dried to powder form (6% solids)	
Whey protein concentrate (WPC35)		Whey – further value added by extracting lactose to 35% protein	
Whey protein concentrate (WPC 80)		Whey – further lactose extracted to 80% protein	
Whey Protein Isolate (WPI)		Whey – nearly all the fat and lactose is extracted to 90% protein	

Source: Dairy Ireland (2013), US Dairy Export Council (2015)

*Figures reflect average prices as of end-2014

Branding, Marketing and Distribution

In the relatively small domestic market, accounting for no more than 15 per cent of milk production and processing, most dairy co-operatives and PLCs market and sell their products, whether at the local level or on a national scale. The National Dairy Council, a non-profit organisation funded by a voluntary dairy farmer levy, supports growth in the consumption of dairy products in Ireland through education, marketing and communications programmes. Bord Bia, an Irish state-funded agency, also helps to promote sales of Irish food and horticulture, including dairy, in the domestic market in addition to its role in linking Irish producers and their customers worldwide.

A considerable amount of the sales and marketing activities for the extensive export market for dairy products is led by the three largest processors – Glanbia, Dairygold and Kerry Group – in addition to Ornuia (formally known as the Irish Dairy Board Cooperative Limited), an agri-food commercial co-operative that packages, markets and sells dairy products to overseas markets on behalf of its members and the Irish dairy farmer. These large, globally-operating co-operatives/PLCs maintain a high degree of vertical integration within the value chain, often controlling everything from milk collection and primary processing to secondary processing and on to branding and distribution. Ornuia accounts for the majority of dairy exports from Ireland, using packing and distribution subsidiaries in a number of countries to export a range of branded products such as Kerrygold, Dubliner, Pilgrims Choice and MU. Ornuia has been particularly helpful in providing a platform for the smaller and medium-sized co-operatives to access export markets (Briscoe & Ward, 2006). However, due to their wide reach and, in some cases, similar product lines, Ornuia and the larger co-operatives and PLCs have ended up being in direct competition with one another in a number of markets worldwide, leading to inefficiencies and a situation where Ireland is at a disadvantage compared to its main international rivals who have more integrated marketing and distribution systems (Prospectus and Promar International, 2003).

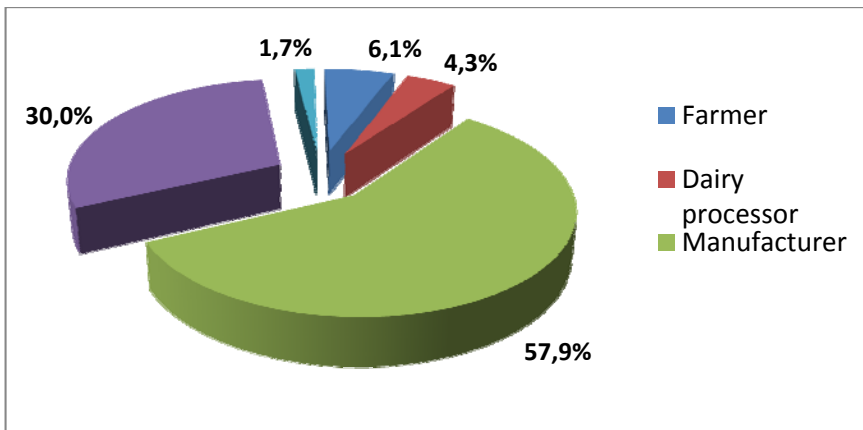
The other key players in the marketing segment are the MNC processors which invest heavily in advertising their branded products like Aptamil, Cow & Gate (Danone) and Similac (Abbott Nutrition). These major processors invest a large part of their sales effort in targeting healthcare professionals (rather than retailers) in order to take advantage of their credibility in the eyes of consumers with respect to products such as infant milk formula.

Sales and Retail

In terms of sales of liquid milk in Ireland, retailers are the main distribution channel accounting for close to 80 per cent of all fresh milk, with food services/catering and 'doorstep' deliveries making up around 10 per cent each. Within the retail sector, the three largest supermarket chains – SuperValu, Tesco and Dunnes Stores – controlled 74 per cent of the Irish grocery market in 2014 (NMA, 2014). This significant market share of the big supermarkets provides them with considerable bargaining power over processors and producers, a situation that is compounded by the fact that milk imports from Northern Ireland can often be available more cheaply than milk from Irish producers (Matthews, 2009). According to the National Milk Agency, over 64 per cent of liquid milk is sold under the retailers' own labels, which may sell for up to one quarter less than processors' brands (NMA, 2014). Although the own label figure is relatively high, the fact that up to 36 per cent of the liquid milk pool is sold under the more expensive processors' brands suggests that the processors still retain a reasonable measure of market power. In Ireland, processor prices for liquid milk sales to retailers are not published and so it is not possible to give accurate figures for the margin breakdown of a litre of milk. However, an Irish Farmers Journal estimate from 2009 offers an indication of the relative strength of the retail take from sales of liquid milk, with a similar share of margin between farmer, processor and retailer.

Much of the value from a commodity product like liquid milk can be captured by the retail sector, but the picture may be quite different for more highly processed, value-added dairy products. A study by Coriolis Research of the New Zealand infant milk formula industry (see Figure 7 below) estimated that the lion's share of the value of a can of infant milk formula is created by the manufacturer (or secondary processor). This suggests that FW2025 efforts to maximise the value of processed goods retained indigenously should focus on encouraging processors that engage in more complex, higher value processing to locate their factories in Ireland, rather than locating them overseas and shipping lower value ingredients to them from Ireland, such as milk powders.

Figure 7. Share of Value for a Can of Infant Milk Formula (New Zealand)



Source: Coriolis Research (2014)

Institutional Context

Creating the right institutional and regulatory environment – including activities such as government policy, international trade agreements, research and development, and education and training – is an important enabler of driving value-added activities in the agri-food sector in general. The CAP has been hugely influential in the dairy industry through the imposition of milk quotas. Their abolition in April 2015 provides Irish dairy farmers with an important opportunity to increase milk production for the first time in 30 years. CAP funding, in the form of direct payments, also plays an important role in helping farmers to finance expansion plans and expenditure on farm inputs and services, as well as helping to smooth out volatility in milk prices (Agri Aware, 2014). Climate change is a very important area that will require a comprehensive institutional response over the coming years as part of the DAFM’s forthcoming National Mitigation Plan (DAFM, 2015).

Research into innovative new processes and products that add value is vital to ensure the continued success of the industry. Although the larger processors have their own research and development operations, the public sector in Ireland plays an important role by investing in programmes and initiatives to support the production and commercialisation of value added products. One such initiative is the Dairy Processing Technology Centre (DPTC), hosted by the University of Limerick. The DPTC is a collaboration of eight companies and 10 research performing organisations working to position Ireland as a world leader in dairy innovation³. Food for Health Ireland, a partnership between Enterprise Ireland and the dairy industry, is another important initiative set up to identify novel ingredients coming from milk to develop functional food ingredients with health benefits for consumers.

Continuing on the research and development theme, the establishment of an innovative cheese production facility in Saudi Arabia provides an example of what can be achieved through partnerships between different actors across the value chain framework. In late 2013, Ornu announced a multi-million euro investment to develop a new state-of-the-art manufacturing plant in Riyadh. The investment formed an important component of national efforts to develop new routes to market in light of the additional milk production expected in the aftermath of the abolition of milk quotas. The new facility will use pioneering technology developed by Teagasc, (the Irish Agriculture and Food Development Authority) and Ornu to produce a range of fresh white cheeses that appeal to local market tastes. The technology allows milk protein ingredients to be recombined in Riyadh for fresh white cheese production, thereby adding significant value to the Irish milk powder concentrate that is shipped from Ireland to Riyadh (Teagasc, 2013). This initiative illustrates the importance of having a favourable institutional environment: the development of new market potential was made possible by a collaborative partnership between Teagasc, a state-funded organisation investing in scientific research and development, and the commercial sector, in this case Ornu.

5. GVC Analysis of the Beef Industry and Comparison with Dairy

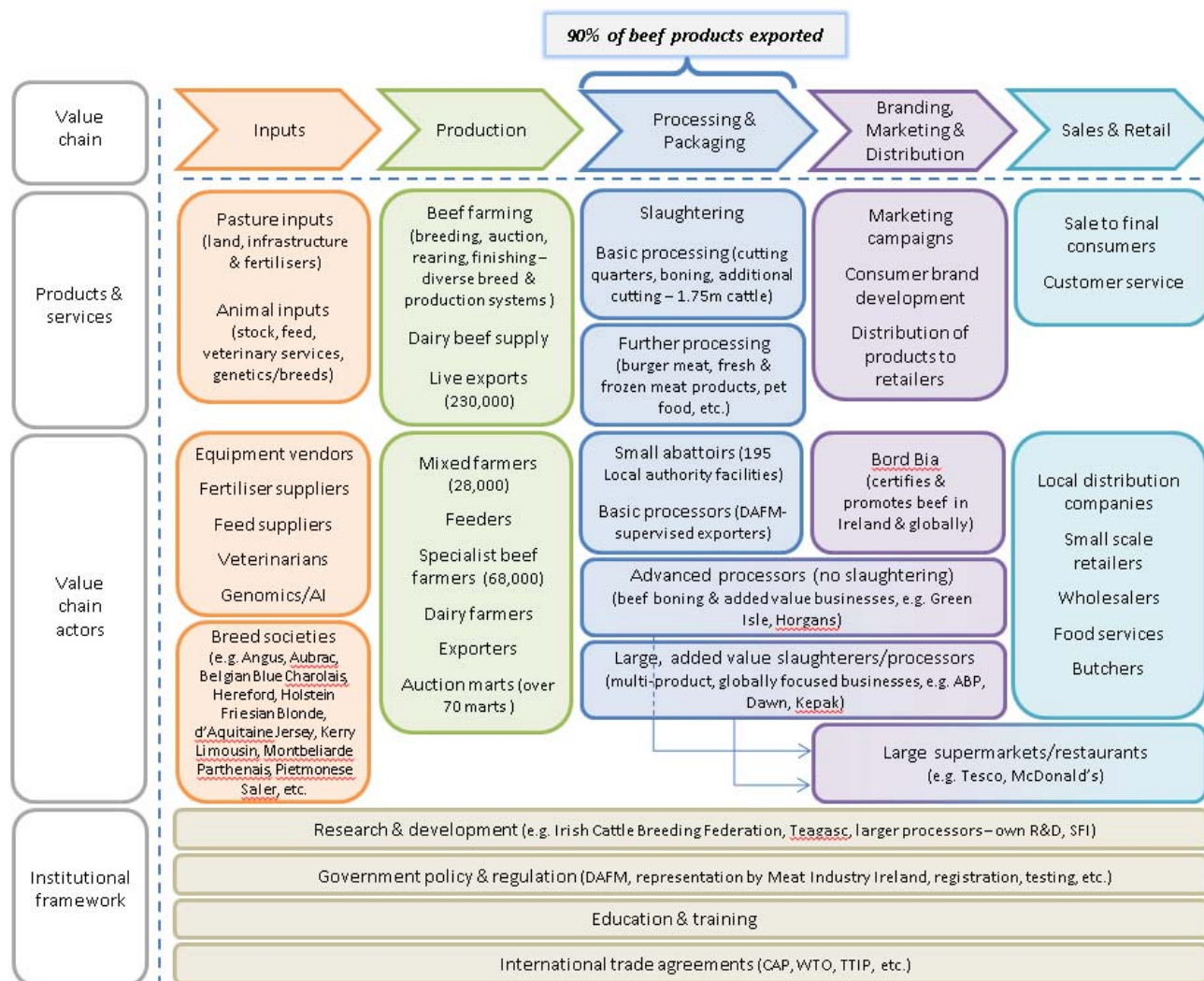
This section will develop a value chain map for the Irish beef industry, describe briefly the key elements that make up the beef value chain in Ireland, and make some high-level comparisons between it and the dairy value chain. Such

³ The DPTC consortium includes eight companies: Arrabawn Co-op, Aurivo, Carbery, Dairygold, Glanbia, Kerry, Lakeland Dairies and Tipperary Co-Op and 10 research performing organisations: University of Limerick (Host), Teagasc, UCC, UCD, TCBB at NUIG, DCU, TCD, DIT, ITT & CIT.

comparisons may identify areas of strength or weakness within each chain that could provide insights for policy making in regard to the research questions highlighted earlier, for example, what is the optimal industry structure, or what activities should Ireland specialise in to generate and retain value domestically.

The beef industry is the most significant component of the Irish agri-food sector, accounting for over one-third of gross output (34 per cent). The overwhelming majority of beef produced in Ireland – amounting to nine out of every 10 cattle produced in Ireland – is targeted for export to the UK, Continental Europe and international markets. This makes Ireland the largest net exporter of beef in the EU and the fifth largest in the world. In 2014, the volume of beef exports exceeded 520,000 tonnes generating over €2.2 billion in revenue, a 50 per cent jump in value over 2010 figures (Bord Bia, 2015.)

Figure 8. The Irish Beef Value Chain Map



Source: author's own research

Mapping the Beef Value Chain

Beef farming in general requires much of the same inputs as the dairy farming enterprise, such as stock, feed, veterinary services, land, and fertilisers. However, there is a large degree of heterogeneity in the beef industry in terms of specialisation, intensification, breed, production systems, and types of animals – such as suckler cows, calves, heifers, young cattle, bulls and steers – resulting in significant variation in costs across farms.

Compared to the profits enjoyed by dairy farmers in 2014, cattle finishers endured negative net margins before direct payments were taken into account; the experience for single suckling enterprises did not differ much, with margins also dipping into negative territory in the same period.

Despite the growth in dairy production in the run up to the abolition of milk quotas, beef production remains the leading enterprise on Irish farms. Close to 28,000 mixed farms are involved in some aspect of the beef supply chain and approximately 68,000 farms specialise in beef production (Agri Aware, 2013) – this compares to approximately 17,500 farms specialising in dairy production. According to the Department of Agriculture, Food and the Marine, the beef farming industry in Ireland is divided across the three main roles required at the production stage – suckler producers, fatteners and cattle finishers – serviced by over 70 auction marts around the country (DAFM, 2015; IFA, 2013). In total, around 1.75 million head of cattle were produced for slaughter and processing in Irish slaughterhouses and meat processing plants in 2014. Furthermore, Ireland is also a significant exporter of live animals, with over 230,000 animals worth over €170 million shipped overseas in 2014. The expansion of the dairy herd in the current post-milk quota environment is also expected to increase beef output by between five and 10 per cent in the coming years (DAFM, 2015).

The Irish beef processing industry is made up of around 30 large-scale, DAFM-supervised private processing facilities which are approved to export from Ireland to the UK, Continental Europe and other international markets. Of these, some are focused primarily on slaughtering, cutting and packing the chilled or frozen meat for export – such as Ashbourne Meat Processors, Foyle Food Group, etc. – while a number of larger, added value processors – like ABP, Dawn Meats or Kepak – engage in the above activities in addition to further processing the meat, for example manufacture of burgers, dog food, or ready-meals. In addition, the Local Authority Veterinary Service supervises over 190 low-volume slaughterhouses that may export only within the EU, while there is also a large number of beef boning and beef added value processing businesses that do not have slaughtering facilities (Enterprise Ireland, 2009; Agri Aware, 2013). In 2014, over 570,000 tonnes of beef were processed by Irish facilities, with as much as 90 per cent exported. The UK is the largest single market for beef exports, taking in approximately 270,000 tonnes worth over €1 billion (Bord Bia, 2015). In terms of distribution channels, around 47 per cent of exported beef from Ireland ends up being sold in the retail sector, with 29 per cent going to the food service sector and 24 per cent being used in food manufacturing (Agri Aware, 2013).

In recent years the Irish beef processing industry has undergone a noteworthy transformation, switching from being a commodity business with heavy reliance on supports and intervention to a focus on supplying differentiated and premium product such as fresh, chilled beef to more upmarket, quality and safety-conscious retail and food service customers across the UK and Continental Europe (Agri Aware, 2013). Rather than selling live animals or carcasses of beef to institutional buyers through the intervention system or wholesale markets, as happened in the past, Irish beef is increasingly being sold in multiple and diverse boneless beef cut-portions in many different consumer-ready packaging formats (Dawn Meats, 2015).

On the marketing side, Bord Bia fulfils an important role in promoting Irish farms as environmentally-friendly producers of safe, high-quality beef. Similar to the dairy value chain, a small number of large processors invest in branding their products for export markets, assisted by the Bord Bia, led Quality Assurance Schemes. With regard to sales and retail, the large restaurant and retail chains are pivotal players in the beef value chain resulting from their massive purchasing power. For example, McDonald's is the largest purchaser of Irish beef by volume each year, buying up over 40,000 tonnes of beef which is then exported to other European markets; likewise, Tesco purchases almost 14 per cent of the entire value of Irish beef exports annually (Tesco Ireland, 2012).

The beef industry is influenced by many of the same institutional structures as the dairy industry. Research and development efforts among public and private actors are focused on optimising fresh meat quality, and there is a growing need for training and education to enhance skills in product innovation and marketing. Perhaps more than any other institutional structure, the CAP plays a vitally important role in the beef industry by heavily subsidising farmer income. In 2014, cattle rearing farmers received an average of €15,469 while other cattle farmers (mostly

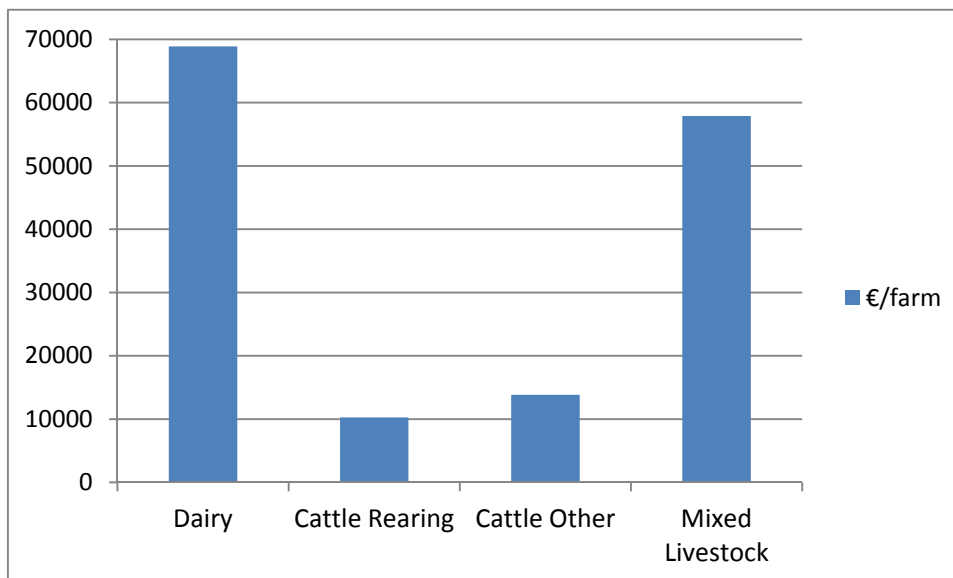
fatteners) received an average of €18,349 in subsidies, accounting for 151 per cent and 133 per cent of income, respectively (Hennessy & Moran, 2015).

Comparing and Contrasting the Beef and Dairy Value Chains

Beef production is generally regarded to be a complex enterprise, particularly due to the heterogeneity within the breed and production systems – such as the “cattle rearing” (mostly suckler cow production), “cattle other” (mostly fattening) and “mixed livestock” classifications (Hennessy & Moran, 2015). There are a wide range of entry and exit points for livestock, including auction marts, exports, rearing, finishing, addition of dairy beef and private sales, making the beef production phase remarkably intricate. The nature of the commodity itself – livestock of very different breeds, size, etc. – adds further complexity when compared with the relative homogeneity of cow milk production within the dairy value chain.

Despite the sizeable contribution of the beef sector to the overall economy, and the fact that the largest proportion of farms are involved in beef production, the system is characterised by low levels of economic viability at farm level, with incomes for beef farmers (before subsidies) much lower than those received by dairy farmers (see Figure 10 below).

Figure 10. Average Farm Income by System, 2014



Source: Hennessy & Moran (2015)

The much lower incomes from beef farming are due to a number of factors such as farm size, efficiency and location in marginal areas. However, differences in coordination and producer power within the structure of the beef and dairy production and supply chains may also be contributing to the disparity in incomes. For example, on the dairy side, the farmer-owned co-operative structure gives farmers a voice in decision making in their industry and facilitates a relatively integrated chain, from inputs through to the processing stage. However, on the beef side, a measure of coordination occurs through the livestock mart system but no large-scale farmer-owned group, processor or co-operative currently exists. As a result, Irish beef farmers are in a weak position when it comes to price negotiations with a disparate group of private sector processors, and the beef chain is characterised by intra-supply chain competition and mismanagement.

This, in turn, risks impairing the overall efficiency of the chain and reducing the opportunities and capacity for creating added value (O'Donoghue & Hennessy, 2015). Another risk associated with limited coordination across the production and supply chain is the potential for significant variations in the quality and consistency of beef products – as highlighted by studies conducted in the U.S. in the 1990s, the lack of coordination and limited information sharing across the beef chain led to large variations in beef quality, which was a major determinant of a 20-year decline in beef consumption (Goldberg, Knoop & Shelman, 2005). Efforts to expand exports of premium cuts of high quality Irish beef could certainly be put at risk unless improved coordination across the beef chain can be achieved.

Another notable difference between the beef and dairy processing industries is the level of processing involved. As highlighted earlier, secondary processing – or the manufacture of food products that are significantly different from the original raw ingredients – is a very important component of the dairy value chain with considerable investment and returns associated with further processing of milk constituents, for example into added value products and ingredients for the nutrition and infant formula industries. Although the manufacture of some beef added-value products such as ready-made meals or dog food could be considered secondary processing within the beef value chain, the scale of such activity is small compared to the dominant activities of cutting, boning and packing chilled and frozen meat, as well as the basic processing of meat for products like hamburgers.

The lack of meaningful secondary processing activities in the beef value chain begs the question of why that is. Should more investment be made into innovative ways of further processing beef? As noted earlier, the efforts of the Irish beef industry to capture more value have been focused the 'premiumisation' of beef sales rather than on seeking out opportunities to develop new added value products based on additional processing. Investment in the beef industry is more likely to focus on technologies and systems to reduce costs, ensure higher quality produce and prolong shelf life rather than on developing additional added-value products derived from beef. Ultimately, it may be the case that beef, as a raw material, is simply less versatile, less amenable than dairy to further processing.

In the area of marketing, products from the beef value chain are generally not branded to the same extent as dairy products, and nor the same level of global recognition as a number of dairy products with household names, such as Kerrygold, nor the marketing capacity, comparable to that of Ornu.

6. Conclusion

This paper argued that in order to get a handle on questions relating to the potential expansion of the Irish Agri-Food sector, it was important to develop an overall economic understanding of the range of activities and actors involved in bringing an agri-food product from conception through to delivery to final consumers. This was achieved by analysing the two most important pillars of the Irish agri-food sector – the dairy and beef industries – from a multi-dimensional value chain perspective, using the Global Value Chain (GVC) methodology.

Summarising conclusions, firstly, it could be argued that Irish production systems are relatively inefficient. On the dairy side, output volumes are hindered somewhat by the seasonality of production and the reliance on a less intensive grass-based system. Farm sizes for both dairy and beef production are small compared to competitor countries; similarly, the processing industry remains relatively fragmented compared to Ireland's main rivals, and even the biggest processors are small compared to the biggest global food companies. To ensure the continuing competitiveness of the Irish agri-food sector, it is likely that further consolidation will be required at both the farm and processor level to help increase scale and improve cost efficiency, particularly with respect to the large processors. Further consolidation would also enable the sector to become less dependent on commodity products, more likely to invest in new technologies and facilities, and would facilitate taking advantage of existing and emerging product and market opportunities.

A second major challenge relates to the continuing reliance on commodity sales to overseas markets. As noted earlier, as recently as 2008 close to two thirds of Irish dairy exports (not to mention beef exports) were priced at world base commodity price level. Given the lack of scale and cost disadvantages, the Irish agri-food sector is not going to succeed in the long term by relying on commodities. Exports must be oriented towards higher – margin, value-added products (Bell & Shelman, 2012). It seems clear that considerable value can be generated by the Irish agri-food sector, by continuing to invest in capacity to move up the value chain. The story of Glanbia becoming a global player in the area of sports or functional food nutrition sets the example of what can be achieved by investment in innovation and diversification into higher value products.

There must also be an institutional environment that promotes innovation beyond that which is done by the largest companies – Teagasc's leading role in the development of pioneering technology to produce a range of fresh white cheeses that appeal to local market tastes in the Middle East provides an example of a publicly-funded agency driving the innovation agenda. In addition, the sector must reduce its reliance on lower value business-to-business exports, such as to the food ingredients industry, and focus more on expanding business-to-consumer sales of branded products, as has been done to considerable success by the likes of Ornu with its Kerrygold brand.

Thirdly, the evidence from the dairy and beef industries highlights a range of related challenges such as a lack of coordination along the production and supply chain, intra-chain competition, and even intra-sector competition that holds the agri-food sector back from competing on the global stage.

Structural deficiencies such as the lack of a co-operative model or a single, dominant firm in the beef chain, can lead to a less integrated chain with associated problems such as inefficiency and products of inconsistent quality. With reference to the lack of coordination in the Irish beef industry, Bell & Shelman highlight the success story of the turnaround in the US beef industry over the past decade or so, wherein two significant members of the supply chain worked together to satisfy the quality needs of a single large customer – McDonald's – leading to significant improvements in quality, consistency, efficiency and, most importantly, enhanced margins (2012).

It's worth noting that in cases where dominant companies or co-operatives do emerge, policy makers may need to provide an enabling environment whereby the lead companies are incentivised to retain the majority of their high value-adding activities in Ireland to ensure that the value accrues domestically. Finally, with respect to intra-sector competition, some of the larger processors often end up being in direct competition with one another in a number of markets worldwide, leading to inefficiencies and a situation where Ireland is at a disadvantage compared to its main international rivals. Efforts to encourage more collaboration and greater trust among the processors could reap a range of benefits in areas such as cost-effectiveness, innovation, logistics, and market access.

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