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Athenry

The End of the Quota Era:
A History of the Dairy Sector and Its Future Prospects

edited by Trevor Donnellan, Thia Hennessy & Fiona Thorne

Teagasc

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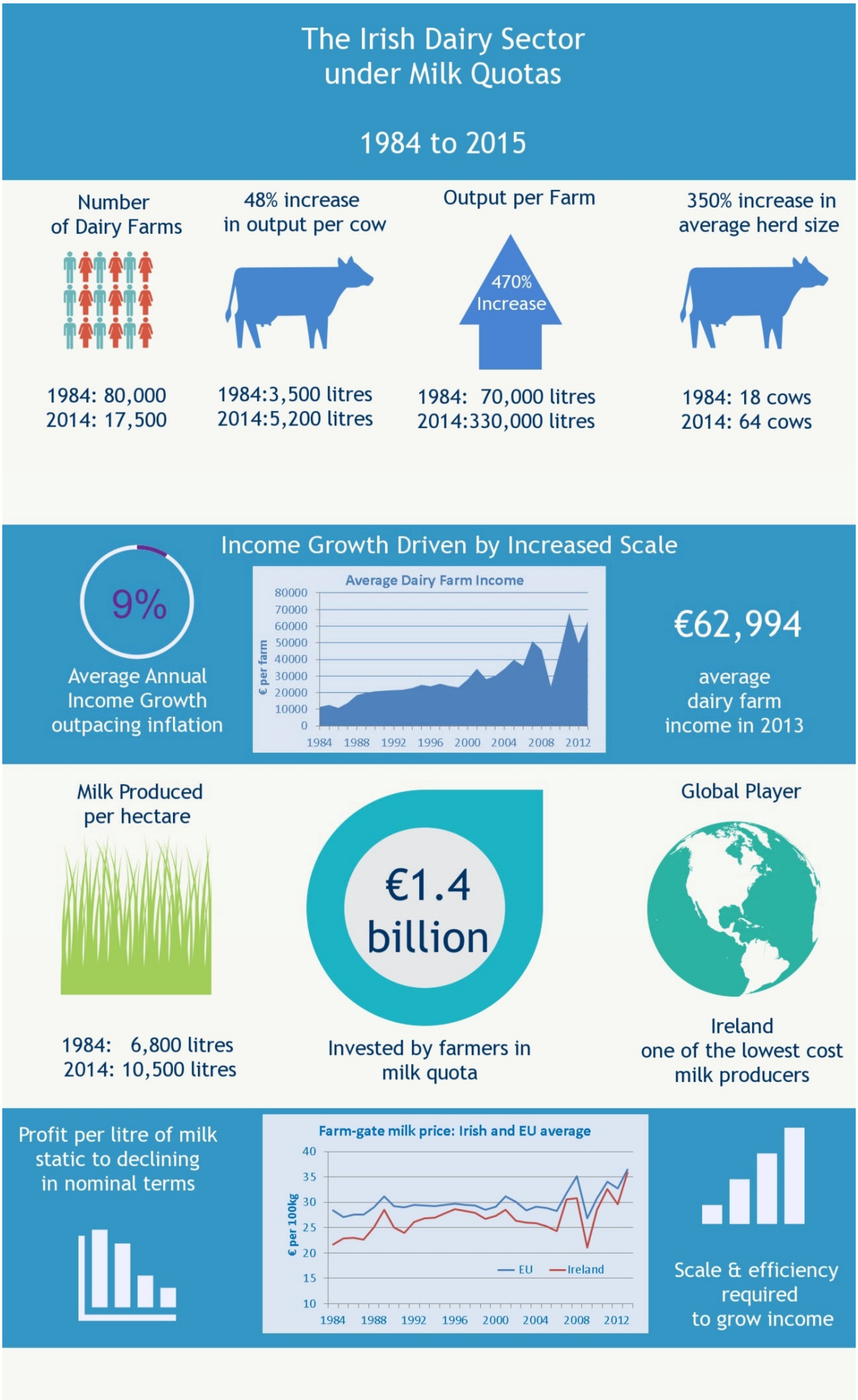

The Irish Dairy Sector
under Milk Quotas
1984 to 2015
Number of Dairy Farms
1984: 80,000
2014: 17,500
48% increase in output per cow
1984:3,500 litres
2014:5,200 litres
Output per Farm
470% Increase
1984: 70,000 litres
2014:330,000 litres
350% increase in average herd size
1984: 18 cows
2014: 64 cows
Income Growth Driven by Increased Scale
9%
Average Annual Income Growth outpacing inflation
Average Dairy Farm Income
€ per farm
€62,994
average dairy farm income in 2013
Milk Produced per hectare
1984: 6,800 litres
2014: 10,500 litres
€1.4 billion
Invested by farmers in milk quota
Global Player
Ireland one of the lowest cost milk producers
Profit per litre of milk static to declining in nominal terms
Farm-gate milk price: Irish and EU average
€ per 100kg
EU
Ireland
Scale & efficiency required to grow income

1 Overview

Trevor Donnellan

Following a number of years of gradual production increases, the European Union (EU) allowed the milk quota system to expire on April 1st 2015. The Irish dairy sector today is very different to that which existed when milk quotas were introduced in 1984. Indeed, despite the impact of the global financial crisis of 2008/09, the Irish economy in general has been transformed over the last 30 years. Ireland has moved from being the poorest country in the European Economic Community (EEC) at the time the of milk quota introduction to being one of the most affluent in the EU today.

Since 1984, the Irish dairy sector has changed considerably with a growth in average farm size, a decrease in dairy cow numbers and a persistent trend of farm consolidation and a declining number of dairy producers. Income from milk production in Ireland is now by some distance the most profitable mainstream agricultural activity when measured both on a per farm and per hectare basis.

Ireland strongly argued against the milk quota system at the time of its introduction. The Irish dairy sector had benefitted from rising prices and rapid expansion in production following accession to the EEC. Irish farmers had engaged in investment to further this expansion and the limitation of the continued growth in dairy farming was seen as a highly unwelcome and possibly catastrophic development in financial terms for individual milk producers. However, milk prices were running at artificially high and unsustainable levels at this time, propped up by increasingly expensive expenditure on intervention and disposal measures in the dairy sector, paid for from the budget of the Common Agricultural Policy. As a result, Irish farmers had to face the possibility of severe milk price reductions or the imposition of the milk quota.

In spite of this, in the decade following its introduction, Ireland became an advocate of EU supply controls in the milk sector. The stable milk prices which the system facilitated coincided with a general reduction in the price of the principal inputs to dairy production. Dairy farmers who focussed on technology adoption could control their costs and derive a good level of farm income without increasing scale. The Irish dairy sector had low production costs, but Irish milk prices were also among the lowest in the EU.

The decline in dairy production costs in the mid and late 1980s began to reverse through the 1990s. The rise in input prices was not matched by an increase in milk prices and margins per litre began to fall. This became known as the price-cost squeeze. Concern existed about the competitiveness of the Irish dairy sector at the EU level. In the 1990s it was considered that the milk quota offered protection from such competition.

Individual producers addressed the price-cost squeeze by trying to increase production, but this was dependent on access to additional milk quota. In the 1990s Ireland operated a highly regulated quota transfer system which made it difficult for some producers to gain access to additional milk quota. Reacting to this, some milk producers developed a second enterprise on their farm as they found that they could fill their quota with fewer dairy cows and had residual capacity for drystock.

In the late 1990s dissatisfaction with the quota system among dairy farmers was beginning to emerge in Ireland. However, through the 1990s rather than trying to reverse the imposition of milk quotas, Ireland preferred instead to negotiate for increases in the Irish milk quota relative to other

EU member states. Again this reflected concern about the competitiveness of the Irish dairy sector within the EU.

The Irish economic boom began to take hold in the mid 1990s and by the early 2000s it was clear that incomes in agriculture, including dairy farming, were lagging behind those elsewhere in the Irish economy. Attention was increasingly turning to New Zealand and the rapid expansion in milk production and dairy product exports that it had achieved since milk quotas had been introduced in the EU. Comparisons were made between the dynamic developments in the New Zealand dairy sector and the static milk production and growing income problems in dairy farming in the EU and Ireland. Low milk prices in New Zealand required a vigorous drive to limit production costs. But low profit per litre in New Zealand was offset by increasing scale and importantly scale was not constrained by quotas.

By the mid 2000s, global economic growth was increasing the demand for agricultural commodities on the world market, with the increasing volume of dairy trade being driven by emerging economies and countries in the developing world. Increased EU dairy consumption had led to a decline in the EU's exportable surplus of dairy products. New Zealand's production growth now made it the leading supplier of dairy products to the world market. Strong demand led to rising world dairy commodity prices and New Zealand dairy farmers saw their milk prices and their incomes rise.

Against this background, Irish and other EU dairy farmers began to question the virtues of the retention of the milk quota system. A view began to emerge that Ireland would benefit from milk quota elimination, supported by research which suggested that Ireland's competitive position as a milk producer in the EU could be improved upon if the size of the average Irish farm could increase. As a result, in the mid 2000s Ireland changed its position at EU level to one that was in favour of quota removal at some future point.

This book charts the experience of the Irish dairy sector during the milk quota era and looks forward to the opportunities in the aftermath of quota removal. Chapter 2 outlines the development of the Irish dairy sector from the point of accession to the EU through to the imposition of the milk quota in 1984. Chapter 3 describes the policy environment that was in place during the milk quota era. Chapter 4 examines developments in respect of milk prices, milk production, dairy product trade and farm profitability throughout the quota era. Chapter 5 follows the evolution of the system of advisory support in the form of financial management and technology transfer provided to Irish dairy farmers over the last 30 years. Chapter 6 traces the historic and current farm level competitive position of the Irish dairy sector internationally. Chapter 7 looks to the future, examining the prospects for increases in milk production in both the EU and in Ireland and includes a focus on the implications of Irish dairy expansion at the farm level. Acknowledging that Irish dairy expansion will bring benefits to the wider economy in Ireland, Chapter 8 examines the jobs potential for the agri-food sector within the wider economy. Chapter 9 draws some general conclusions about the legacy of the milk quota system.

2 The Pre-Quota Period

Trevor Donnellan and Thia Hennessy

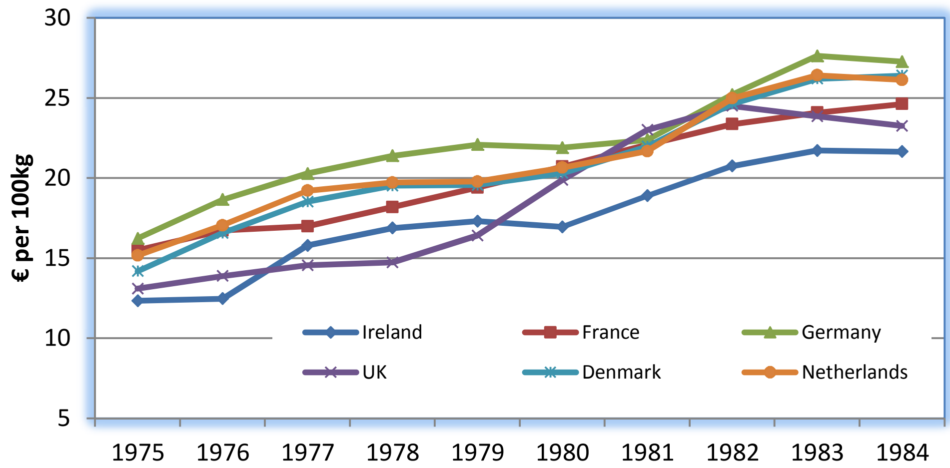
This chapter explores the impact of Ireland's accession to the European Economic Community, hereafter referred to as the European Union (EU), in 1973. The implications of EU membership for the Irish dairy sector are discussed and consideration is given to the evolution of milk prices, milk production, dairy product mix and new opportunities for dairy product exports. The chapter also considers the circumstances that led to the introduction of the milk quota system at the EU level.

2.1 *Entry to the European Union*

Ireland's entry to the EU in 1973 transformed the Irish agricultural sector. In the period prior to EU entry, the only market to which Irish dairy produce had access to on any meaningful scale was the UK. Dairy exports were principally in the form of butter, but the price received for these butter exports was poor due to the availability in the UK of competitively priced butter imports from New Zealand. Despite its undoubted importance, the Anglo-Irish relationship was one wrought with difficulties throughout the 1950s and 1960s due to Britain's assertion of its monopsonistic position. Membership of the EU offered Irish agriculture (the country's most important traded sector at the time) an opportunity to prosper, with independence from the British market – the main trading partner up to that point.

Following an initial transition period from 1973 to 1979, EU accession brought the Irish dairy sector under the full influence of the EU's Common Agricultural Policy (CAP) price support system. The Common Market Organisation (CMO) for dairy products predated Ireland's entry to the EU having been established in 1964. The dairy CMO set out to deliver a fair price for milk. This fair price took the form of a target price. It was not a guaranteed price, rather it was a price that the EU could allow the market to reach via the various policy levers at its disposal, having regard to supply and demand conditions at a given point in time.

Figure 2.1: Milk Price (3.7% fat content) Euro per 100kg 1975 to 1984



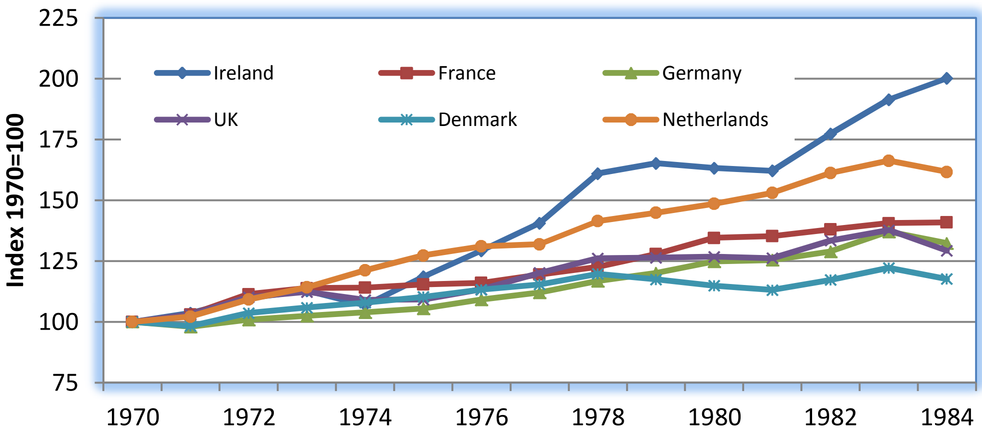
Source: Eurostat

The effects of EU accession on the Irish dairy sector can be seen clearly on examination of developments in creamery milk prices and milk production, particularly in the early years of membership. Figure 2.1 shows the development of milk prices across a number of selected EU Member States (MS) from 1975 to 1984. The Irish milk price increased by 75 percent from 1975 to 1984, although it should be noted this was a time of very high inflation. Similar price increases were experienced in other (MS) but it is notable that Ireland was starting from the lowest price position.

The increasing milk price stimulated production, with milk production in Ireland expanding rapidly over this period. Even in the period prior to EU accession, production had begun to increase as farmers anticipated higher prices following entry to the EU. Although a basic transition period of 5 years was required and the move to substantially higher agricultural prices was phased over this period, Ireland benefitted immediately from the price support system and the farm export subsidies.

Total Irish milk production doubled between 1970 and 1984. Figure 2.2 shows the growth which took place through the 1970s and early 1980s. Growth rates in France, Germany, Denmark and the UK averaged at about 2 percent per year between 1970 and 1984, while growth rates in Ireland averaged at closer to 10 percent between 1974 and 1984. The substantial increases in the Irish milk price at this time were a consequence of sharp increases in the EC support price for dairy commodities combined with successive devaluations of the green pound.

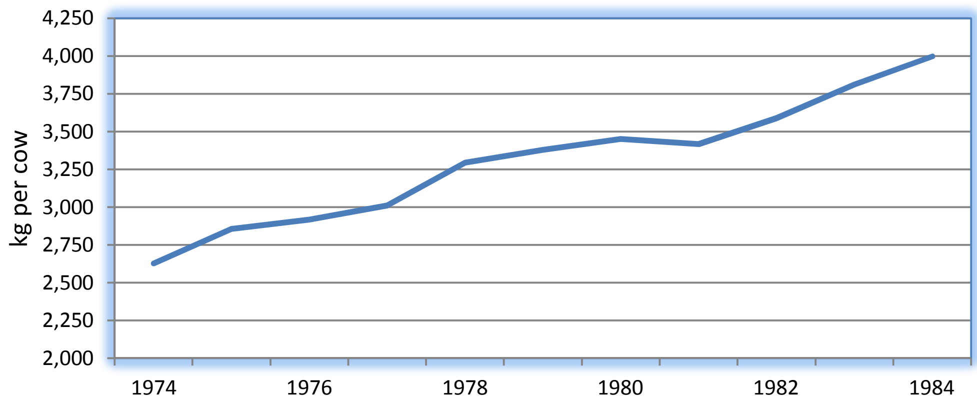
Figure 2.2: Aggregate Milk Deliveries Ireland and selected EU Member States 1970 to 1984



Source: Eurostat

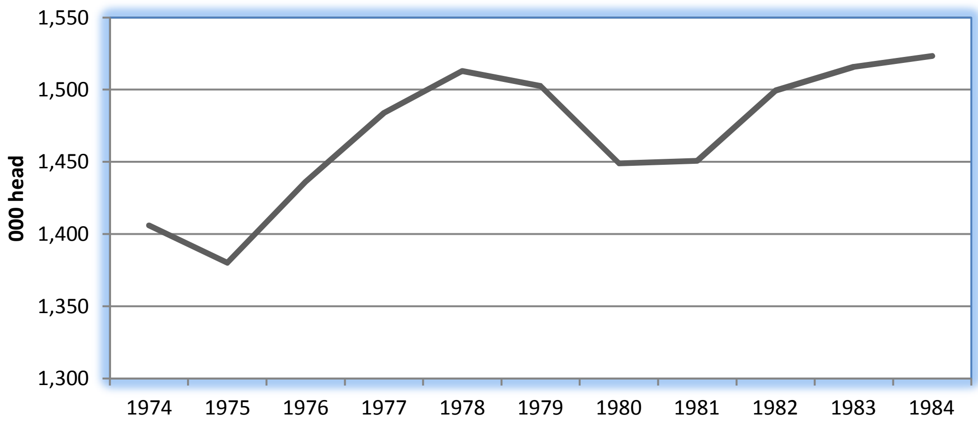
The growth in production was driven almost entirely by productivity gains. Continuing improvements in herd quality, feeding and other advancements led to sustained increases in milk output per cow in the 1970s and early 1980s. Figure 2.3 illustrates that deliveries per cow averaged at just 2,600 kg per cow in 1974 and increased by on average 4 percent per year up to 1984. Figure 2.4 shows that cow numbers increased by less than 1 percent per year over the same period. The strong increase in feed use can be observed in Figure 2.5.

Figure 2.3: Milk Production per Cow: Ireland 1974 -2014



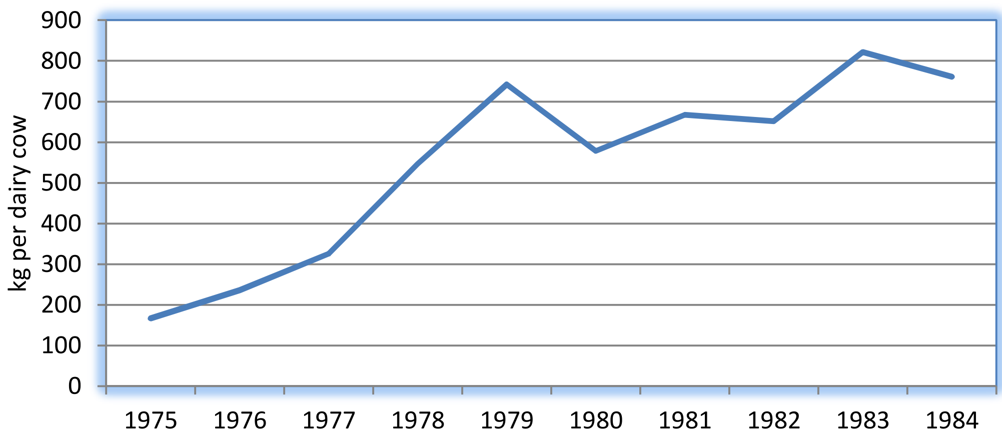
Source: Adapted from CSO data

Figure 2.4: Number of Dairy Cows Ireland 1974-1984



Source: CSO

Figure 2.5: Annual Feed use per Dairy Cow 1975 to 1984



Source: FAPRI Ireland

EU price support policies were very successful in providing an incentive for increased production however; they also had the impact of dampening EU consumer demand. With substantial increases in milk prices throughout the EU in the 1970s, a gap between domestic production and consumption began to emerge and a considerable surplus of milk existed. Various policy reforms attempted to rectify this situation. A prudent price policy was introduced for milk which froze nominal milk prices from 1979 to 1981. This led to a levelling off in milk prices in nominal terms and a sharp decline in real terms in the late 1970s. However, there was only a temporary cessation in the growth of milk supply.

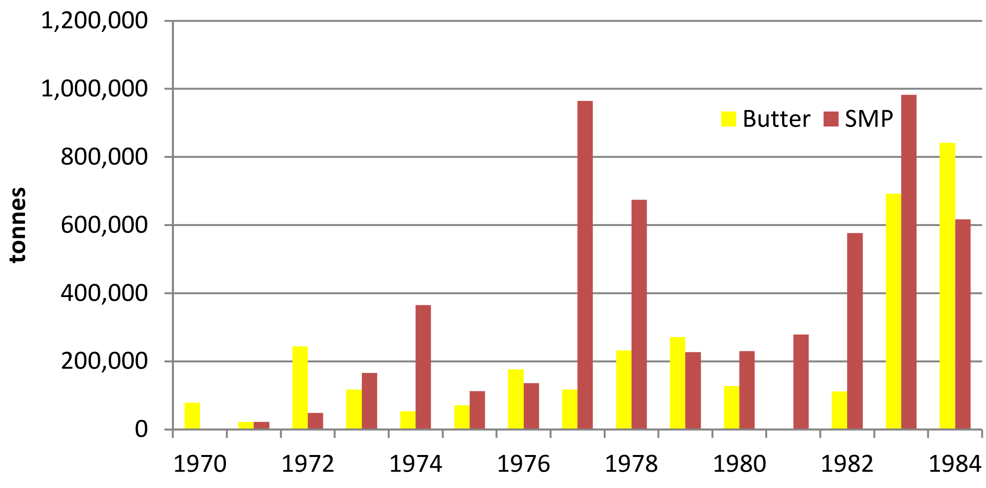
Many farmers had borrowed heavily in the late 1970s on the strength of the expectation that the milk price increases experienced in the early to mid 1970s would continue. In the early 1980s, interest rate increases accelerated bringing rates to over 20 percent. Expenditure on interest payments more than doubled between 1979 and 1982 and for the first time, in 1981, such payments comprised the highest proportion of farm overhead costs. With the introduction of the prudent pricing system a debt crisis resulted and many producers found themselves over exposed. The prudent price policy was relaxed from 1981/82 when modest nominal price increases were granted.

2.2 The Introduction of the Milk Quota

The 1970s saw the emergence of a substantial milk surplus within the European Community. This growing surplus was initially managed through intervention buying, but it was never the purpose of the intervention system to handle the volumes of surplus output, which began to be experienced in the late 1970s. Reacting to this, in 1977 the EU Council introduced the co-responsibility levy. The purpose of this levy, which was paid by producers, was to finance market development measures and some disposal measures such as the school milk scheme.[1]

As illustrated in Figure 2.6 intervention stocks continued to grow and the EU faced a spiralling budget for intervention storage and export refunds. By the early 1980s a point had been reached where expenditure on the dairy sector had become the single biggest item in the CAP budget. By that time the then 10 EU member states were producing 20 percent more milk than the EU market could absorb. As well as being a severe burden on the CAP budget, intervention was politically unpopular with the general public. The experience of food mountains in the 1980s caused the community to shift its focus away from intervention and towards subsidised consumption/disposal as a means of handling excess dairy commodity supplies.

Figure 2.6: EU Public Intervention Stocks (Year End Basis) 1970 to 1984



Source: European Commission

[1] The co-responsibility levy was subsequently abolished in 1993 as part of the 1992 MacSharry CAP reform.

By the early 1980s member states with a relatively low dependency on agriculture sought to stem the growth in the agriculture budget. The solution was the imposition in 1984 of a quota system for milk producers, which allocated specific production volumes to member states. The alternative to the milk quota system would have been a cut in support prices for dairy products; a policy which it was felt would have had a considerable negative effect on agricultural incomes. The purpose of the milk quota system was to contain the growth in milk production so that the EU's agriculture budget could continue to carry the cost of the price support framework.

The quota system was introduced initially for four years. At its point of introduction the EU milk production quota was set at 103.7 million tonnes which was the average level of production for the period 1981 to 1983. Under the quota arrangement, each Member State was given a reference quantity, with each producer in turn having an individual reference quantity. While generally the Member State quota allocation was set at 1981 levels plus 2%, flexibility was given to some member states at the time, and Ireland for example was allowed to use 1983 as its base. The initial Irish milk quota was set at the 1983 level of production of 5.28 million tonnes plus 0.245 million tonnes from the Community reserve.

Milk delivered was tested against a reference milk fat level and if the milk delivered exceeded the reference milk fat level, then for quota purposes, an adjusted milk volume would be calculated. If the adjusted volume exceeded the quota, a superlevy payment would be triggered.

2.3 Irish Opposition to Quota Introduction

From the outset, the Irish government opposed the milk super levy and quota proposals with all its diplomatic resources. Austin Deasy, the then Minister for Agriculture, recalled that *"we refused to go along with this agreement and continued to maintain our demand for special treatment"*. According to FitzGerald (1991), Deasy argued that the country "*had a vital and essential national interest in the milk sector and we made that clear. We also had a vital interest in the survival of the CAP and that is what was at stake".* Such efforts on the part of government led to the derogation by Ireland from the 1984 reforms. Other Member States had to base their production rights on the 1981 year, however, Ireland, owing to the uniqueness of agriculture in the economy and the importance of dairying within the sector was permitted to adopt the position based on 1983 production plus an additional approximate 5 percent (as outlined above). Despite these diplomatic efforts, the milk quota system put a halt on the fastest growing sector in Irish farming.

While the growth of the Irish dairy sector was impressive in the period leading up to the introduction of the milk quota, it is important to note that this growth was stimulated by the high and rapidly increasing prices that prevailed at that time. Prices, however, were at unsustainably high levels and some reform was necessary. An analysis conducted by agricultural economist Seamus Sheehy in 1982 showed that, in the short term at least, the supply control mechanism was much less damaging to farmers and the national economy than the price reductions that would have been required to achieve the same budgetary outcome. In other words, the milk quota could be viewed as the "lesser of two evils". While some commentators speculate as to what the Irish dairy sector would look like today if the quota had not been imposed 30 years ago, it is important to note that inference should not be drawn from the growth rates being achieved in the period leading up to the imposition of the milk quota as they were supported by unsustainably high prices.

3 Dairy Policy in the EU in the Milk Quota Era

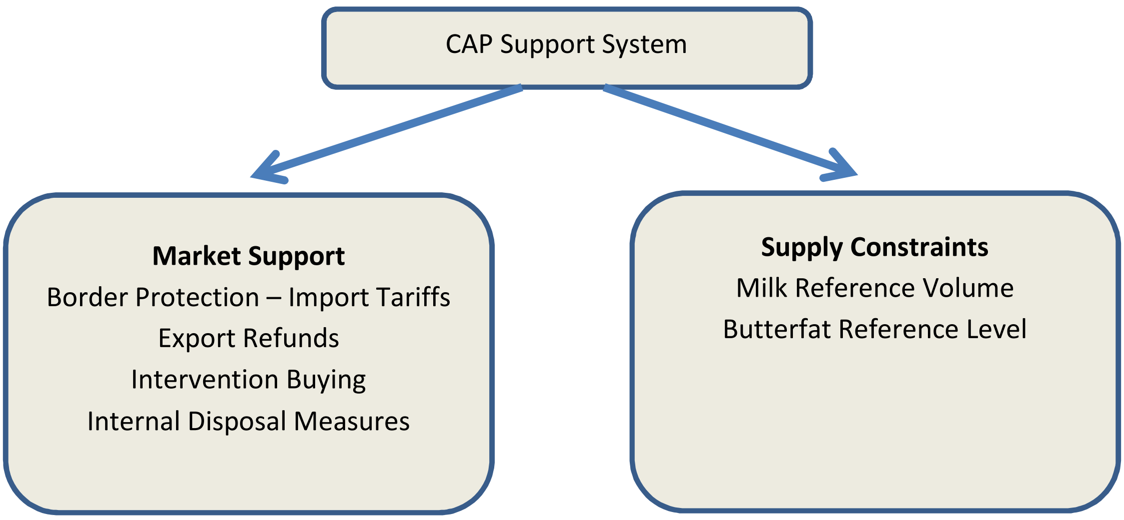
Trevor Donnellan

Since EU accession and throughout the milk quota period Irish dairy farming has been subject to a range of policies, some specific to the dairy sector itself and others which form part of the wider suite of measures that support agricultural incomes in the EU. In this chapter the evolution of these measures are detailed. These include the EU commodity pricing system, export refunds and import tariffs, intervention and internal subsidised disposal measures and the milk quota system.

3.1 Prices Supports for the Dairy Sector in the EU

Under the dairy CMO numerous policies were operated to support the dairy sector. Figure 3.1 summarises the range of measures used by the EU to support dairy prices. For the 30 year lifespan of the milk quota system price supports ensured that internal EU dairy prices for dairy products were maintained above world dairy market prices. While it is true that in recent years the gap between EU and world dairy prices has become smaller, for much of the milk quota era the price gap was considerable. Without these price supports the quota system would have failed in its objective of maintaining milk prices.

Figure 3.1: Structure of the CAP for Dairy



Source: Authors' own diagram

The EU made heavy use of border protection to prevent imports by using variable import levies to ensure that produce from outside of the EU did not displace domestically produced dairy products (Box 3.1). In instances where the EU was more than 100 percent self-sufficient in a dairy product, export subsidies were also needed so that the excess product could be disposed of outside the EU at lower prices, while still maintaining the internal market price for EU milk producers.

As part of the dairy CMO two prices were set by the Council in each milk year - July 1 to June 30: the *Target Price* and the *Intervention Price*.

Box 3.1: Trade Protection Mechanisms

As part of the GATT URA, agricultural trade was brought within the bounds of trade reform. Previously, agricultural trade had enjoyed a privileged status and various trade measures used by countries to protect their agriculture sector were not covered by GATT rules. Import levies and tariffs were considered to be an important barrier to freer trade in agriculture and thus it became part of the negotiations for the GATT URA.

Following the implementation of the GATT URA in 1995, the system of border protection involving threshold prices and variable import levies for certain milk products was replaced by fixed tariffs. Most of the tariffs became specific rate tariffs. For some products an ad valorem rate came into force and in some other cases a combination of an ad valorem duty and a specific rate was used.

In a gradual process, which took place over the period July 1995 to July 2000, these import tariffs were reduced by 36% for all products - with the exception of SMP where the reduction was 20%. Some countries continued to have specific market access arrangements, allowing them market access at reduced (approximately 1/3 of normal) tariff rates. These exemptions were detailed in the GATT current access and minimum access agreements. By 2000 the minimum access agreements allow increased imports of products from 3% of domestic consumption to 5% of domestic consumption.

Under the terms of the GATT URA, by the year 2001, expenditure on export refunds had to be reduced by 36%. In addition the volume of exports had to be reduced by 21%. For butter and SMP the reductions were based on the average of the base years from 1986 to 1990. For cheese and other dairy products the base was set at the average of the 1991 and 1992 figures.

While on the face of it these export restrictions appeared severe, closer examination showed that at the time this was not entirely so. Butter exports were not constrained by these restrictions. Exports of butter from the EU were very high in the period 1986-90 with the result that in 1995 and 1996 levels of butter exports were well short of GATT allowable limits.

Nevertheless these restrictions would mean that EU dairy production would be limited to the size of the EU domestic market plus the limit on subsidised exports. In practice the presence of the EU milk quota was also a binding factor. Over time this would mean that the EU's share of world dairy trade would decrease.

With one eye on a possible World Trade Organisation (WTO) Doha Round Agreement on trade reform, the EU made the so called "Mandelson Offer" in respect of trade reform which included a commitment to abolish export subsidies. In the dairy sector little use of export subsidies has been made by the EU over the last ten years, save the exceptional situation that emerged during the commodities prices crash during the global financial crisis which led to the temporary reintroduction of export subsidies in January 2009 and their cessation in November of that year.

Target Price: Although now defunct, the target price was a central feature of EU dairy policy for much of the quota era. The target price was not a guaranteed price, but rather a notional price that the Council would allow farmers to receive for milk in a given year based on the operation of policy levers at its disposal. The target price was also of relevance in the formula for calculation of superlevy payments up until the time of its abolition in 2004 as part of the CAP Mid Term Review.

Intervention Price: The intervention system exists to this day in the EU dairy sector. The intervention price effectively is the price paid for surplus milk production and places a floor on the level to which dairy prices in the EU can fall. Public intervention schemes are operated by the European Commission for butter and skimmed milk powder (SMP). Intervention agencies were empowered to buy all quantities offered for intervention at the intervention price until intervention 'buying in' would be suspended.

Intervention exists in two forms - Public storage and Private storage. Public storage is of primary importance in that it puts a floor on the producer price of milk. Private Storage plays a secondary role in that it exists to improve market stability by balancing seasonal variations in production.

Over the first 20 years of the quota system intervention prices remained relatively stable. However, in the 2000s intervention prices were reduced and restrictions were placed on the volume of intervention purchases and the period over which purchases could be made.

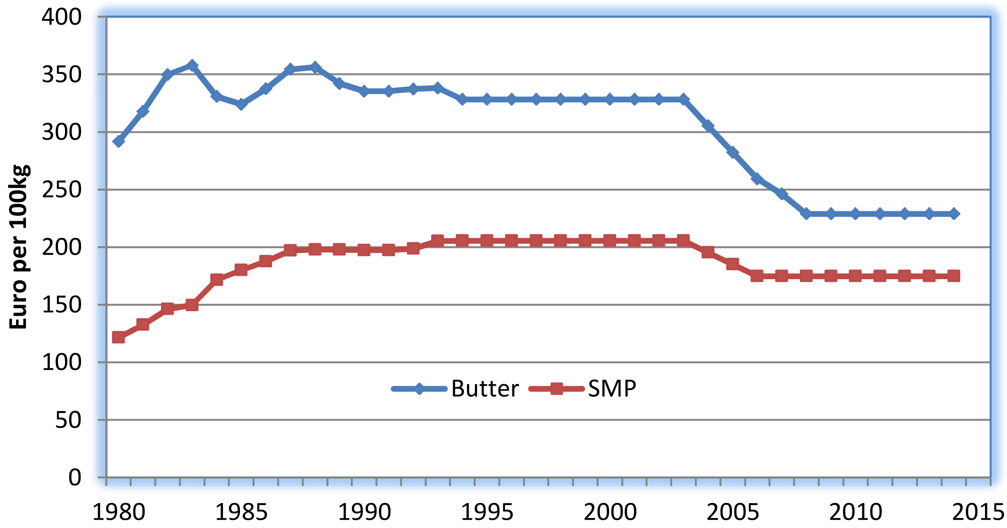
From 1987 there was a major change to the operation of butter intervention. Up to this time there had been unrestricted access to intervention for butter resulting in a stockpile e.g. in 1986 butter intervention reached 60 percent of EU production. From 1987 a limit of 180,000 tonnes was introduced.

Public intervention buying of SMP was limited to the peak months of production; March to August. Buying in could be suspended at a level of 109,000 tonnes. No market price conditions and no minimum buying in prices existed. SMP private intervention was used when public intervention was suspended in the March to August intervention period.

Figure 3.2 shows the evolution of intervention prices. Agenda 2000 introduced reductions in intervention prices of 15 percent spread over three years with compensation in the form of a dairy premium per tonne of quota, which was initially coupled to production. Under the Mid Term review of Agenda 2000 in 2003 it was agreed that the dairy compensation would be decoupled from production and subsumed into the Single Farm Payment. As part of the CAP Health Check in 2008, the intervention mechanisms for butter and skimmed milk powder were left unchanged for the first 30,000 tonnes of butter and 109,000 tonnes of SMP, with tendering to be introduced for levels beyond these limits.

Minimum Import Price: In addition to the Target and Intervention prices a third category of price, the *Minimum Import Price,* was set above the Intervention price so that domestic production could not be displaced by cheaper imports from outside the EU. Historically, a variable levy was placed on imports into the EU so as to ensure that the minimum import price remained above the intervention price when the world price fell relative to internal EU prices. However, the General Agreement on Tariffs and Trade (GATT) Uruguay Round Agreement (URA) concluded in 1995 resulted in the elimination of variable import levies and their replacement by fixed import tariffs.

Figure 3.2: EU Intervention prices 1980 to 2015



Source: European Commission

Internal Disposal Measures

Measures to increase consumption on the domestic market, known as subsidised disposal measures, were also in operation to dispose of intervention products. For example in the 1990s subsidised butter use accounted for up to 30 percent of domestic use and could be used in food manufacturing, namely in confectionary and ice cream production. Discounted sales to the poor were also used as a disposal mechanism. Up until 1999, subsidised butter sales were made to social welfare recipients under the "butter voucher scheme". Subsidised use of SMP in the EU fell from a high of 40 percent of domestic consumption in the mid 1980s to about 20 percent in the late 1990s. Under the CMO surplus SMP was subsidised for use in animal feed (making skimmed milk more attractive with respect of substitute feeds) and also in casein products.

Over the last ten years the use of subsidised internal disposal measures in the dairy sector has been curtailed. Schemes still exist for the subsidised use of milk in schools and for the sale of subsidised dairy products to charities. However, since 2006 there has been no subsidy for the use of butter in food manufacturing and subsidies on the use of SMP in animal feed and skim milk for casein production ceased in 2007.

3.2 Evolution of the Milk Quota System at EU level

Following the introduction of the milk quota system, the drop in EU milk production which occurred in 1985 and 1986 did not have the desired effect of restoring a balance to the EU dairy market. In April 1986, under a programme known as the Community Cessation Scheme, the Council decided to further reduce the total guaranteed quantities in 1987/88 (by 2 percent) and 1988/89 (by 1 percent). In 1988 it was agreed that the quota system would be extended until 1992. More importantly, a temporary quota cessation scheme was introduced in 1987/88. Under this scheme 4 percent of the quota was suspended in 1987/88, 5.5 percent in 1988/89 and 4.5 percent in 1989/90, 1990/91 and 1991/92 after which time it was decided that the "temporary" cessation would continue indefinitely.

The MacSharry CAP reforms in 1992 initially proposed to reduce the quota by a further 3 percent, although this policy was not contained in the final agreement and it was agreed to extend the milk quota system until 2000. However, the co-responsibility levy was abolished at this time.

In 1997 the Commission proposed that the quota system be extended to 2006 with the possibility of a review of the system in 2003. Under Agenda 2000 it was agreed that the EU milk quota would increase by 2.4 percent with specific increases being granted to Ireland, Italy, Spain, Greece and Northern Ireland in 2000/01 and 2001/02. Ireland's quota reference volume increased by 2.9 percent over this period, with no change in the butterfat reference level. It was also agreed that there would be a general phased 1.5 percent increase granted to the rest of the EU member states, but that this would not transpire until 2005/06, 2006/07 and 2007/08. Subsequently it was decided in the CAP Mid Term Review in 2003 that the phasing in of this general quota increase would be delayed by one year.

By the 2000s the future of the quota system started to become the subject of debate. At the time there was pressure from Britain, Denmark, Sweden and Italy for elimination of supply controls on the basis that the system was inhibiting the EU's access to growing export markets, but ultimately these efforts to abolish the milk quota system were unsuccessful. A concession that was achieved however, was that in the subsequent CAP reform the default position would be that the quota system would expire unless member states voted for its retention.

At this time there was a growing wider realisation that international market opportunities for dairy exports did exist. World dairy prices were rising partly because of growing international demand and partly because EU exports were stagnant. Other major dairy exporters such as New Zealand saw their dairy exports grow, as did the United States and South America, but even so the strength of market demand was such that world dairy prices needed to increase to clear the market. In the EU, political opinion began to lean towards a major reform of the quota system, with consideration being given to trade in milk quota between member states, a large increase in the EU quota, an increase in quota for particular member states or even the complete abolition of the quota system.

Subsequently, in the CAP Health Check in 2008 it was confirmed that the EU milk quota system would be abolished in 2015. A quota phase out mechanism was also agreed, motivated by a desire to ensure that the sector did not experience a so called 'hard landing' i.e. a severe drop in milk prices due to a sudden increase in milk production at the point of quota elimination. Accordingly, it was also agreed that there would be five successive annual increases of 1 percent in the EU milk quota beginning in 2009/10 and continuing through to 2013/14.

The butterfat adjustment formula introduced in 1986 had remained unaltered through to the 2000s. As the butterfat levels in delivered milk increased over the years, the differential between the butterfat in the milk delivered and the butterfat reference level grew larger and the applied butterfat adjustment increased over time leading to calls for its revision. As part of the CAP Health Check in 2008 it was decided to reduce the adjustment factor from 0.18 percent to 0.09 percent. This had the effect of halving the upward adjustment applied to milk volumes with a butterfat content in excess of the reference fat level. This change in the butterfat adjustment had the effect of giving a further 1% increase in the milk quota from 2009 onward.

Box 3.2: Superlevy Mechanism

In order for the quota system to work effectively, penalties were necessary for breeches of the quota reference quantities. In the initial years, the penalty for over production or superlevy was calculated as 100 percent of the target price for milk, but in 1990 the superlevy was raised to 115 percent of the target price. In 2004/05, following on from the CAP Mid Term Review, the target milk price was abolished and the superlevy was converted to a euro amount. This euro amount was reduced gradually to €27.83 per 100kg in 2007/08 and it remained unchanged at that level for the remainder of the life of the quota system. With the rise in EU milk prices that took place over the last ten years, the effectiveness of the superlevy as a means of constraining production has been reduced, with low cost producers considering it profitable to produce milk in period of high prices, even when faced with a superlevy bill.

3.3 Conclusion

The system of support mechanisms for the dairy sector in the EU was enhanced with the introduction of the milk quota in 1984. After some modifications the quota system was effective in limiting the scale of support from the CAP that needed to be provided to the dairy sector. The EU continued to operate a range of measures to ensure that the volume of dairy imports into the EU was limited and to ensure that surplus EU dairy products could be exported to third countries. In the 2000s the pressure of trade reform negotiations led the EU to modify its support mechanisms, with intervention supports being reduced and export subsidies effectively eliminated. A growing realisation that the milk quota system was limiting the opportunity to avail of new export opportunities led to agreement in 2008 that the milk quota would be increased and eventually eliminated in 2015.

4 Market and Farm Level Developments in the Milk Quota Era

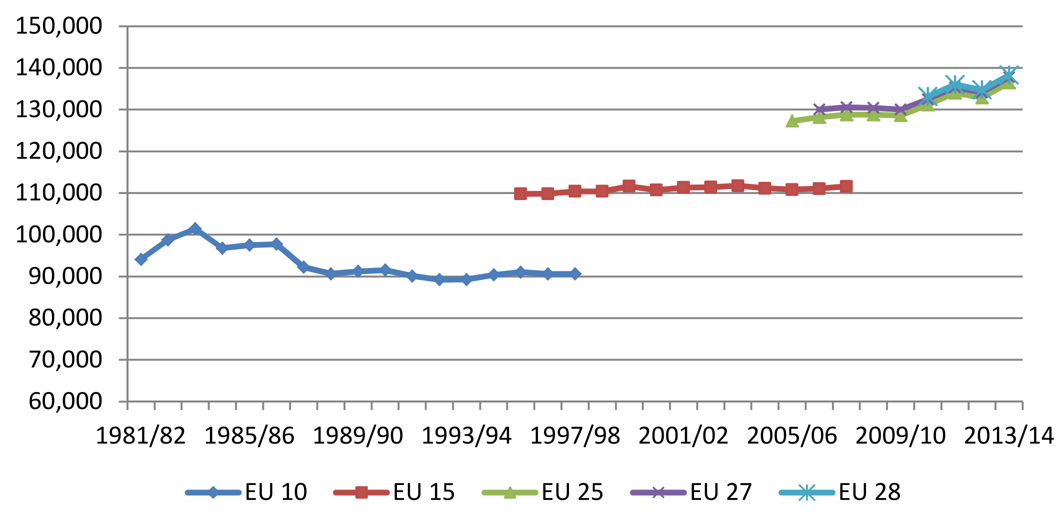
Thia Hennessy, Trevor Donnellan, Patrick Gillespie, Brian Moran and Cathal O'Donoghue

In this chapter the effect of the imposition of milk quotas and the subsequent development of the Irish dairy sector at a national level and at farm level is explored. Developments in milk production, dairy product mix, dairy trade, milk prices, production costs, productivity, processing and farm level consolidation are explored. Conclusions are drawn about the impact of all these issues on farm level income in the thirty year milk quota period.

4.1 EU Milk Production & Utilisation and Dairy Commodity Market Price Developments

After the EU milk quota was introduced EU10 milk production gradually contracted, in the face of a number of subsequent reductions in milk quota. This decrease was masked by the continuing enlargement of the EU to 12 countries with the inclusion of Spain and Portugal in 1986 and the creation of the EU15 with accession of Austria, Finland and Sweden in 1995. The EU25 was created with the inclusion of 10 Central and Eastern European countries (CEEC) in 2004 and the EU27 with the arrival of Bulgaria and Romania in 2007. Figure 4.1 decomposes EU milk production by these various EU country groupings so that the restriction which the milk quota system imposed on EU milk production can be observed. Even though EU milk production has increased substantially it was only in 2006 that the quota system began to be relaxed to give all member states a capacity to increase milk production.

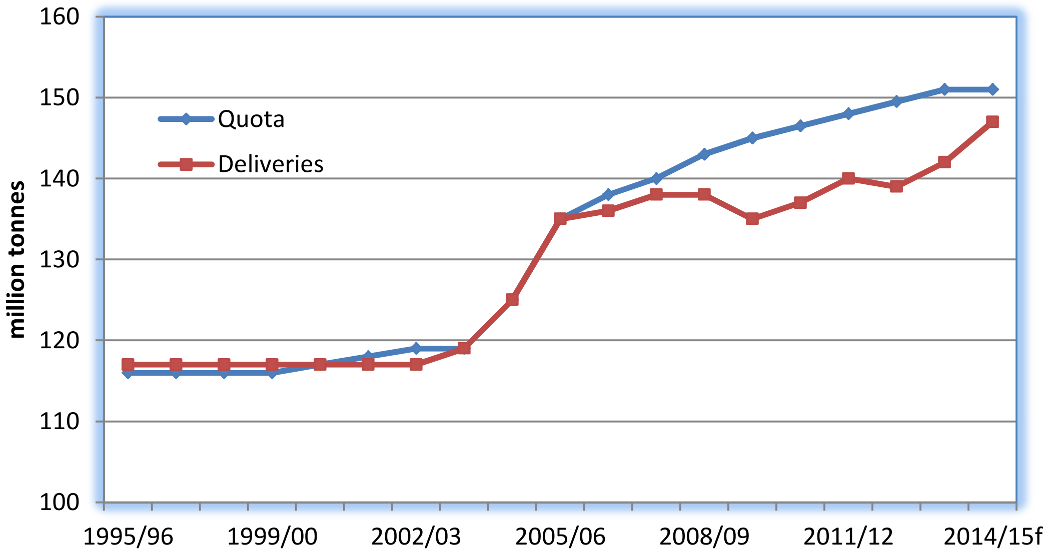
Figure 4.1: EU Quota Year Milk Production



Source: European Commission

Developments in respect of EU milk production relative to the milk quota can be observed in Figure 4.2. For the most part, the EU milk quota was until the enlargement process began in 2004. The quota allocations to the new member states made provision for future growth in the proportion of the milk produced that would be delivered, however in many cases milk deliveries did not grow at the pace anticipated. Among the CEECs only Poland and Cyprus fully availed of their quota allocation on entry to the EU. Enlargement immediately created a situation of quota underfill in the EU. At this time also Greek milk production began to contract.

Figure 4.2: EU Milk Quota and Milk Deliveries



Source: European Commission

CAP reform also made provision for increases in milk quota in 11 of the EU15 member states in 2007/08 (those which had not been granted a quota increase in 2000/01 and 2001/02). However, Spain, Sweden Finland and the UK did not see their milk production expand to avail of these quota increases. Bulgaria and Romania joined the EU in 2007 with milk quota allocations that were considerably above their pre-existing deliveries. Both countries saw their dairy sectors contract after EU entry leading to a growing substantial underfill in their quota allocation.

Further enlargement in the EU milk quota followed from 2009 through to 2014 as part of the process designed to ensure a soft landing for the EU dairy sector at the point of quota removal. The dairy crisis of 2009 created financial difficulties for producers around the EU and increased exits from production, causing a general decline in milk production around the EU in 2009. Increases in quota allowed further expansion in dairy production in some member states, such as Ireland, Austria, Cyprus, Denmark, Germany, Italy and the Netherlands, but elsewhere in the EU production was either unchanged or contracted. The effect generally of the increase in quota at this time was to further increase the gap between the EU milk quota and the volume of milk delivered. By 2013, milk deliveries in the EU27 were about 7 percent below quota in aggregate. Table 4.1 shows how the deficit between member state milk deliveries and member state milk quotas developed through time.

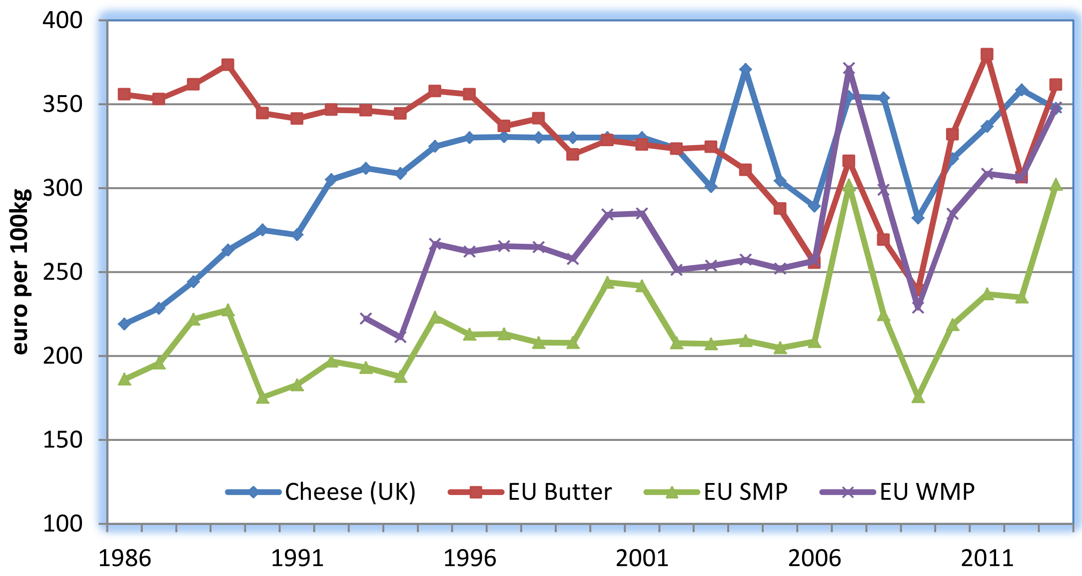
Due to exceptional profitability and favourable weather the deficit between quota and deliveries is forecast to decrease in the 2014/2015 milk year with several member states forecast to exceed their quota and many other member states increasing their production and thereby reducing the gap between their national quota and their deliveries.

Table 4.1: Percentage quota year milk production in excess or deficit of quota by Member State

	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14
Austria	-3.5	3.7	3.8	3.4	1.4	2.8	3.3	3.2	1.2	-1.5	0.7	4.2	3.6	3.2
Belgium	-0.5	0.2	0.9	0.4	0.7	-0.1	-1.2	-0.1	-1.7	-3.7	-0.3	-0.5	-3.6	0.0
Denmark	0.4	0.1	0.5	0.8	0.1	-0.1	0.6	0	-0.3	0.4	0.6	-0.2	0.4	2.1
Finland	1.1	2.9	1.4	-0.1	-2	-1.6	-3	-6.3	-9.4	-10.5	-11	-13.5	-14.3	-12.8
France	-0.7	-0.1	0.1	-1.5	-1.1	-1.4	-2.6	-1.4	-4.8	-8.6	-5.1	-3.6	-7.4	-6.9
Germany	0.9	0.5	-0.3	1.3	1.5	0.7	0	1.3	-0.9	-2.1	-0.7	0.1	0.1	1.9
Greece	2.3	-0.2	-3.5	-1.5	-11.9	-5.3	-5.4	-8	-11.8	-17.5	-20.4	-23.6	-26.2	-28.9
Ireland	-0.3	0.2	-0.2	0.5	0.8	-1.8	-0.3	0.7	-2.5	-10.3	-0.4	1.1	-3.0	0.6
Italy	3.9	3.7	6	4.5	4	6	6	5.6	1.5	-3.7	-2.4	-0.4	-0.4	-1.1
Luxembourg	0.4	1.3	1.6	0.7	0.9	1.1	0.3	0.7	0.6	-0.9	1.3	0.5	-2.3	1.0
Netherlands	-0.8	0.5	-0.3	0.5	0.6	-0.1	0.3	1.3	1.4	0.4	1.2	0.5	0.4	4.0
Portugal	-0.4	-3.1	0.5	-2.6	-0.8	0	-2.8	-2.5	-4	-7.7	-10.1	-9.7	-11.8	-14.6
Spain	-3.5	-2.4	-0.5	-0.8	1.1	0.2	-1.5	-2.2	-4.2	-6.1	-4.5	-3.1	-2.9	-2.2
Sweden	-0.4	-0.2	-3	-2.5	-2.9	-4.5	-6	-11.5	-12.3	-17.7	-19.7	-21.1	-21.7	-21.4
UK	-2	-0.5	-0.8	0.2	-1.1	-1.9	-3.3	-5.3	-9.7	-12.1	-9.7	-9.8	-13.8	-10.6
Cyprus					-8.4	1.8	0.4	3.9	1.0	0.3	1.4	2.3	0.8	3.6
Czech Rep.					-8.6	0.6	-2.0	-1.4	-3.1	-12.3	-14.2	-13.2	-11.7	-11.0
Estonia					-7.0	-5.8	-6.3	-6.5	-7.6	-12.7	-11.5	-8.6	-6.5	-0.6
Hungary					-18.3	-12.3	-17.3	-10.8	-16	-22.5	-27.6	-27.6	-23.7	-27.7
Latvia					-27.3	-16.3	-11.1	-7.8	-8.6	-15.1	-11.6	-7.8	-3.6	-0.9
Lithuania					-15.0	-17.8	-14.7	-14.9	-15.8	-24.7	-23	-21.6	-21.0	-21.9
Malta					-14.0	-15.4	-15.3	-17.7	-20.7	-19.7	-17.6	-17.4	-17.5	-21
Poland						3.4		-3.6	-0.9	-4.4	-5.1	-2.1	0.1	1.7
Slovakia					-12.6	-2.4	-6.2	-6.1	-10.4	-20.7	-23.1	-20.9	-19.9	-22
Slovenia						-2.2		-5.0	-8.4	-10.4	-10.2	-9.8	-10.1	-13.8
Bulgaria								-14.9	-12.5	-14	-50.7	-52	-55.3	-53.9
Romania								-30.3	-26	-37.5	-42.9	-43.4	-47.3	-44.5

EU domestic wholesale prices for butter, SMP and cheese are shown in Figure 4.3. The key development in respect of prices is the increased volatility that has been observed in the last 10 years which reflects the gradual unwinding of the price support mechanism by the EU (lower intervention prices and curtailment of export refunds and subsidised disposal measures) and related to this the greater exposure of the EU dairy market to world dairy commodity prices.

Figure 4.3: EU Wholesale Prices 1986-2014



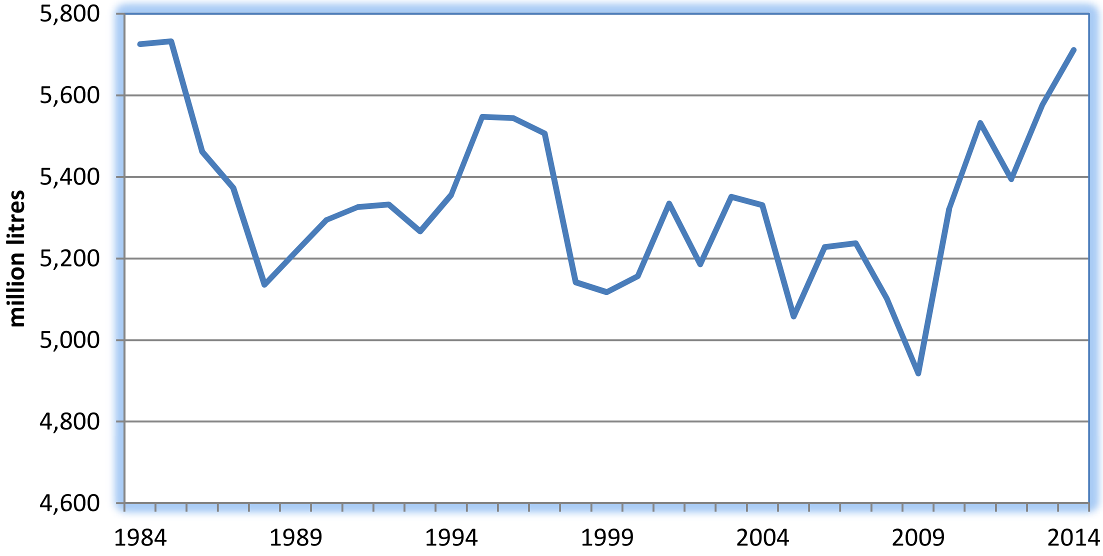
Source: FAPRI

4.2 Irish Milk Production & Utilisation and Dairy Commodity Market Price Developments

Figure 4.4 presents data on calendar year milk deliveries in Ireland since 1984. In general annual milk deliveries matched the national quota allocation quite closely. Since the milk quota was not administered on a calendar year basis, adjustments to stay within quota were usually made in the first three months of the year when cows were being fed hay, silage and other feed ingredients. However, as the Irish milk production cycle was at its lowest in these months, large scale adjustments could not be made. This became problematic in some years and led to the quota being exceeded, triggering a superlevy, the largest of these occurring in the final year of the quota system in 2014/2015. The effect of cuts in quota which took place in the early years of the quota system are evident as are the increases in quota that have been granted since 2009 as part of the movement towards milk quota abolition. Over the entire period it was only in the 2009/10 quota year when falling milk prices and rising production costs saw a serious underfill of the Irish milk quota with production dropping over 10 percent below quota in that quota year.

The strong seasonality of milk production presents a particular challenge for the export oriented Irish dairy sector and limits the production possibilities for milk utilisation. International customers ideally require product on a year round basis and highly seasonal production does not help to satisfy this requirement. The rapid growth in Irish milk production up to the point when the milk quota was introduced, meant that there was a limited time to plan for the development of new product markets. Fresh dairy products were one of the most lucrative items in the product portfolio, but limitations in shelf life meant that this was not really a feasible product strategy to pursue. At the time when the milk quota was introduced Irish cheese production was limited to cheddar and processed cheese, neither of which were particularly in demand in continental Europe.

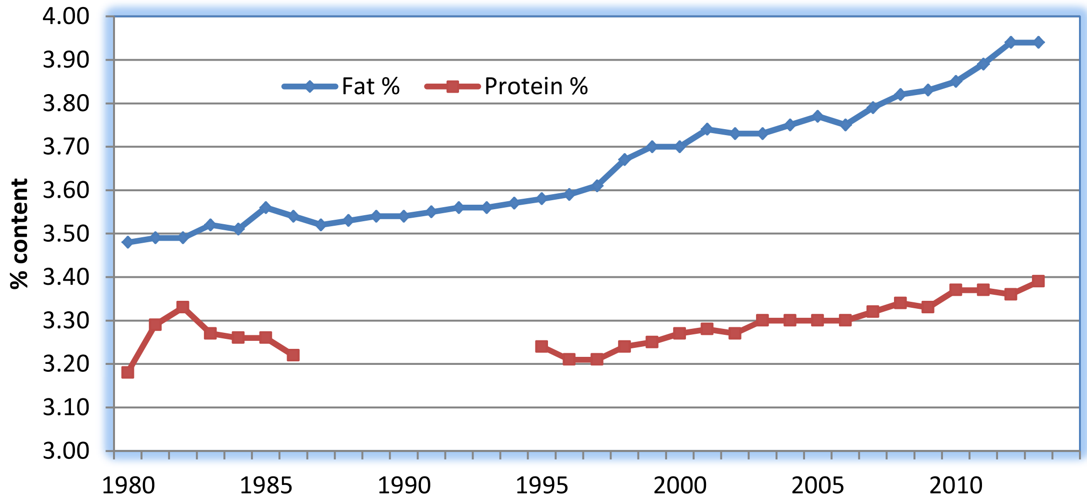
Figure 4.4: Calendar Year Milk Deliveries (mills. litres.): Ireland 1984-2014



Source: CSO

The fat and protein content of Irish milk increased through the milk quota era as illustrated in Figure 4.5. Improvements to breeding and feeding as well as economic incentives in the pricing of milk have contributed to the increase in constituents.

Figure 4.5: Milk Fat and Milk Protein Content of Irish Milk

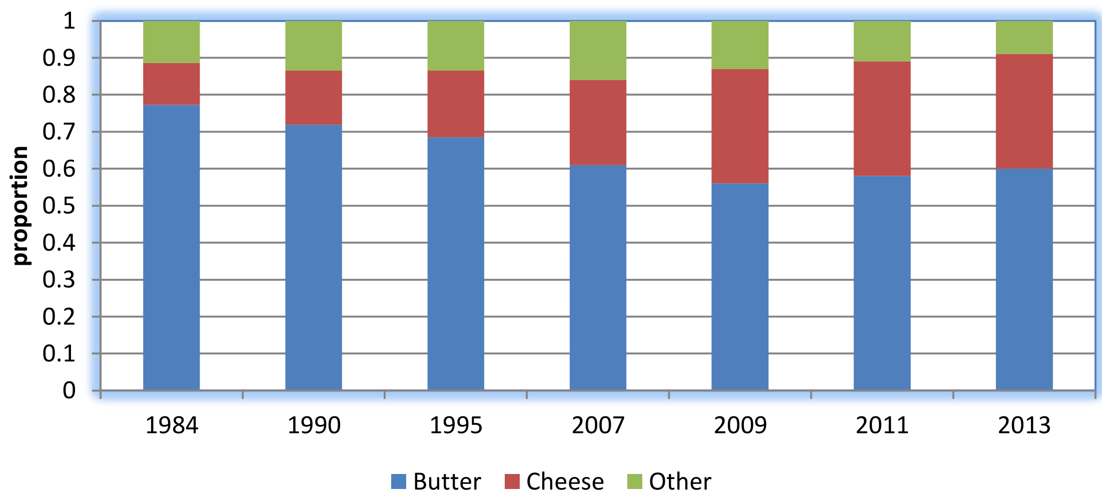


Source: Eurostat

The fat content has increased at a faster rate than the protein. From the late 1990s onwards higher fat content had the effect of increasing the butterfat adjustment since this was calculated relative to the Ireland's reference fat percentage of 3.58%. This had the effect of reducing the volume of milk that could be delivered under the milk quota system. Changes to the manner of the calculation of the butterfat adjustment in 2009 provided some relief from the restriction on production imposed by rising fat content.

For much of the milk quota era about 60 percent of whole milk was used in butter production, while over 80 percent of skim milk was absorbed in SMP and casein production. The production of butter and SMP dominated milk usage and the suitability of both products for intervention meant that there would be a market for these products, albeit at low prices. Once the processing facilities for this product mix had been put in place there was relatively little scope to vary the product mix away from butter and SMP. Casein production for export to the USA did emerge as one additional element in the product mix and became an important alternative use for the skim milk generated from butter production. Figure 4.6 shows the composition of whole milk use in Ireland from 1984 to 2013.

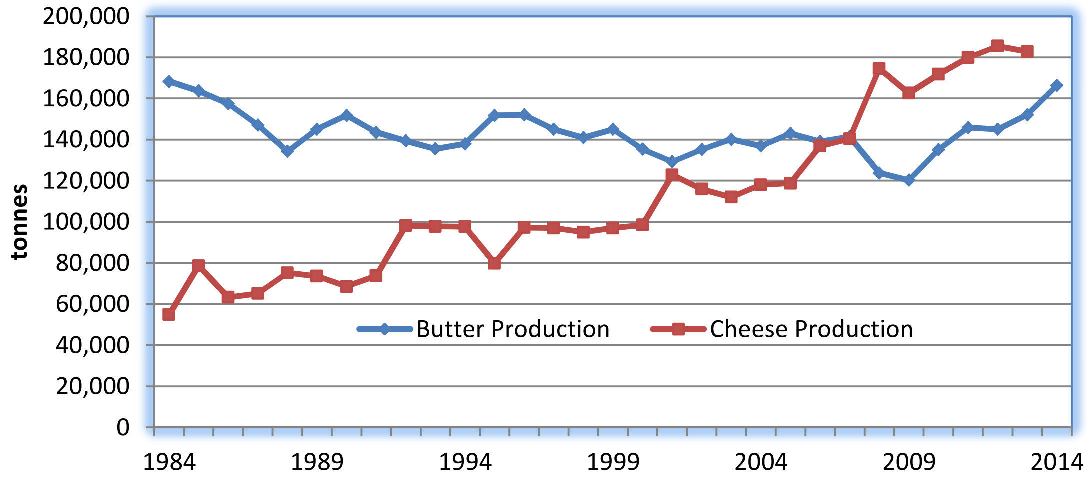
Figure 4.6: Share of Manufacturing Whole Milk Utilisation: Ireland 1984 to 2014



Source:CSO, IDB and own calculations

The percentage of milk used in liquid consumption declined steadily from over 20 percent in 1970 to less than 10 percent currently, reflecting a growth in overall milk production in a period where liquid milk consumption remained relatively unchanged. From the early 2000s the proportion of milk going to cheese production increased considerably and has now reached 30 percent of manufacturing use. The residual, approximately 10 percent, of whole milk has tended to be used mainly in the production of cream, WMP and chocolate crumb. Utilisation of whole milk in the production of these residual products remained limited mainly due to their shorter shelf life and the relative absence of institutional support historically. Figure 4.7 shows Irish production levels for butter and cheese. Whey production is illustrated in Figure 4.8 while SMP production levels are shown in Figure 4.9.

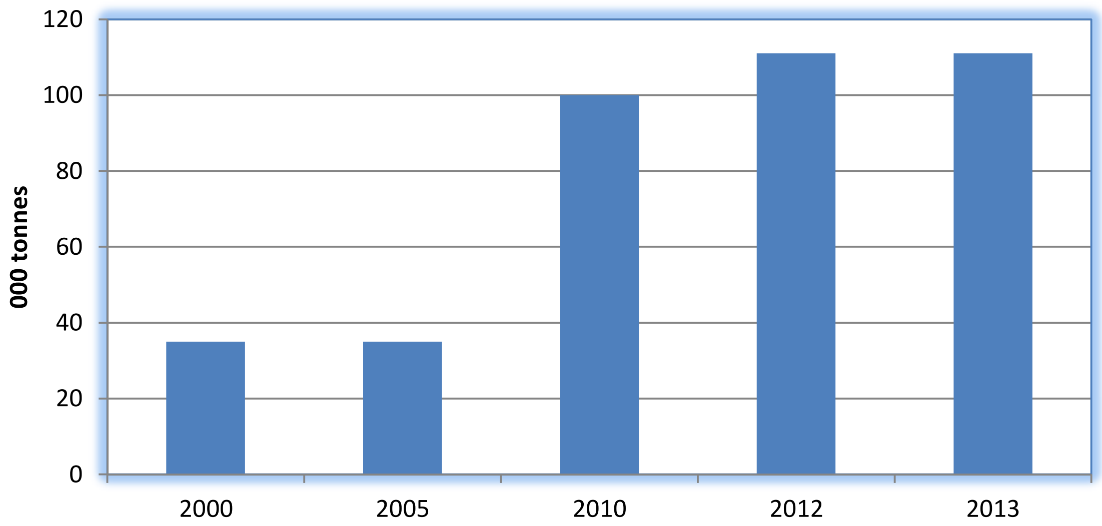
Figure 4.7: Butter and Cheese Production Ireland 1984-2014



Source: CSO, IDB and own calculations

Notable developments with respect to the product mix over the last decade include the strong growth in cheese production, increasing by more than 50 percent over the last 15 years, the growing importance of whey as a dairy ingredient and related to this the emergence of the infant formula business. Figure 4.8 shows the growth in the production of whey powder since 2000.

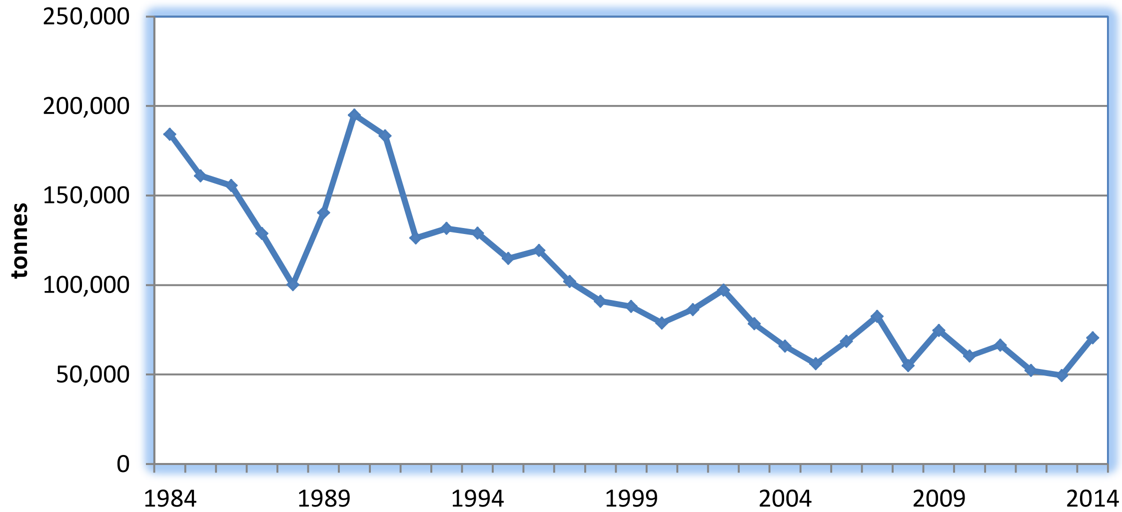
Figure 4.8: Irish Whey Production in selected years



Source: International Dairy Federation

Given that the production of butter absorbs a high percentage of whole milk, it follows that there is a substantial amount of skimmed milk available for manufacture. In 2000 over 40 percent of skim milk was used in the manufacture of SMP and a further 40 percent in the manufacture of casein. The remainder was fed to livestock and absorbed in other uses. In recent years the share of skimmed milk used for SMP production declined considerably and is now just over 20 percent. SMP production is shown in Figure 4.9.

Figure 4.9: SMP Production Ireland 1984-2014



Source:CSO, IDB and own calculations

The Irish dairy processing industry underwent considerable consolidation during the milk quota era and this is discussed in Box 4.1.

4.3 International Dairy Trade

Accounting for just over 1 percent of world milk output, Ireland is not a major producer in world terms. However Ireland's high level of production relative to consumption means that considerable surplus output is available for export. Upwards of 80 percent of milk output is exported, although no official milk equivalent statistics exist for dairy commodity exports.

Globally the international trade in dairy commodities is quite limited. Relative to total production, the international trade in dairy commodities is about 10 percent of world milk production and if EU internal trade is excluded the figure is closer to 7 percent.

In the presence of rising world demand but with its output limited by the quota system, the EU's share of the world dairy export market fell during the milk quota era, while New Zealand, Australia and latterly the United States grew their export markets. These developments are illustrated in Table 4.2. The growth in New Zealand exports is evident, increasing from 60 percent of production in 2000 to 90 percent in 2013.

Table 4.2: Dairy exports (milk equivalent terms) as a share of Milk Production

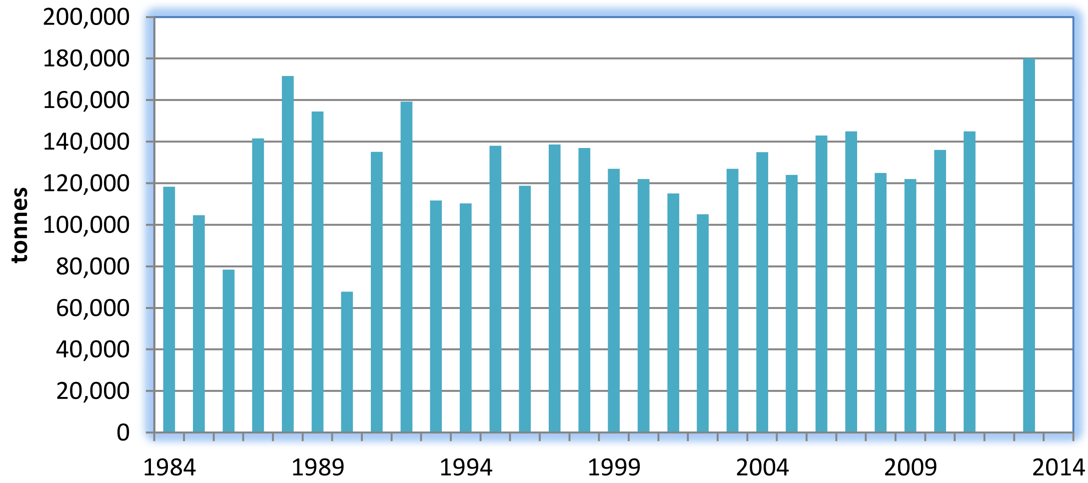
	Share of Milk Production Exported as Dairy Products	
	2000	2013
EU	12%	5%
NZ	60%	95%
AUS	35%	40%
USA	3%	15%

Source: International Diary Federation and Own calculations

Due to the continuation of the milk quota system, growing demand in the EU and the effect of EU expansion into Central and Eastern Europe, EU dairy exports to third countries has fallen to just 5 percent of milk production.

The scale of Irish dairy exports has increased and the variety of products and destination of exports has become more diverse. Figure 4.10 shows the development of Irish butter exports over the period 1984 to 2014. Over the years there has been a decline in the relative importance of the UK export market as continental EU markets have become more important.

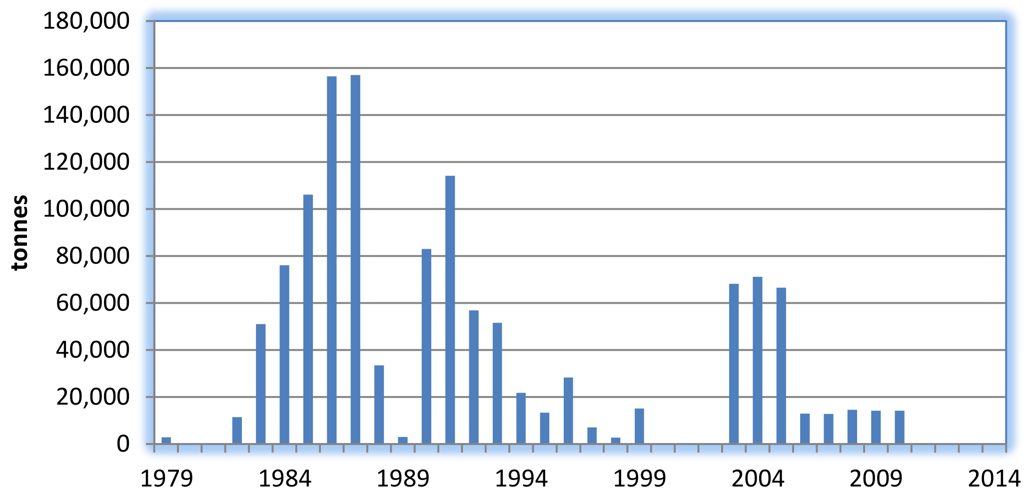
Figure 4.10: Butter Exports: Ireland 1984-2014



Source: CSO Trade Statistics

The level and variability of Irish dairy exports has been influenced by intervention activity. Figure 4.11 shows changes in Irish butter intervention stock levels over time.

Figure 4.11: Butter Intervention Year End Stocks: Ireland 1979-2014

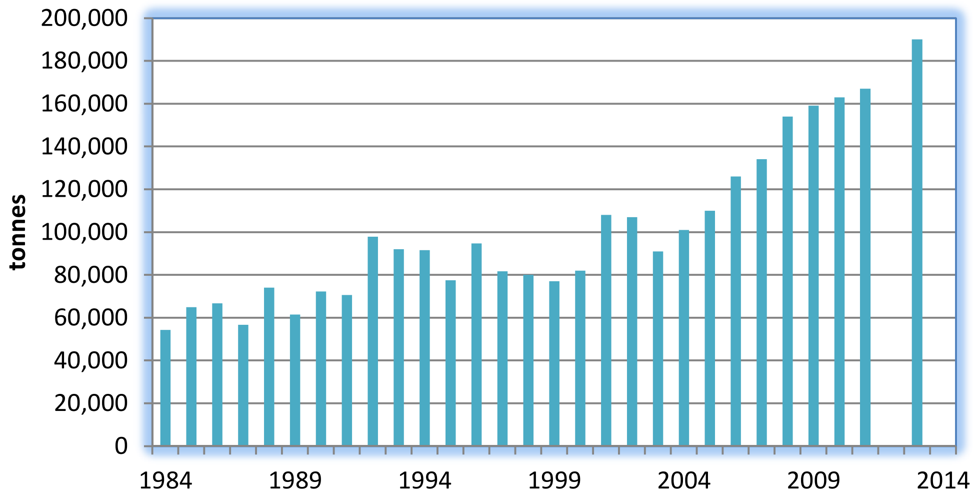


Source: Department of Agriculture and European Commission
Note: Data for 2012 and 2014 unavailable

The high levels of butter exports in 1988, 1989 reflect sales from intervention stocks, which had been built quickly in the period 1983-1986. Similarly the high level of exports in 1992 reflects large reductions in intervention stocks, which had built up particularly in 1990 and 1991. Conversely, the low level of exports in 1986 and 1990 reflect considerable sales into intervention in those years. In more recent years intervention holding has been quite limited and year on year variations in Irish butter exports now reflect variations in production which are related to market demand conditions.

Figure 4.12 shows the destination of Irish cheese exports over the period 1984 to 2014. Despite the introduction of the milk quota in 1984, Irish cheese exports (and production) continued to grow. Unlike the situation with butter, the UK remains a very important market, reflecting the fact that much of Irish cheese production is of the cheddar variety. With cheese exports to markets other than the UK continuing to show growth, emmenthal, mozzarella and gouda exports have increased. Cheese exports for ingredient use are becoming increasingly important.

Figure 4.12: Cheese Exports: Ireland 1984-2014

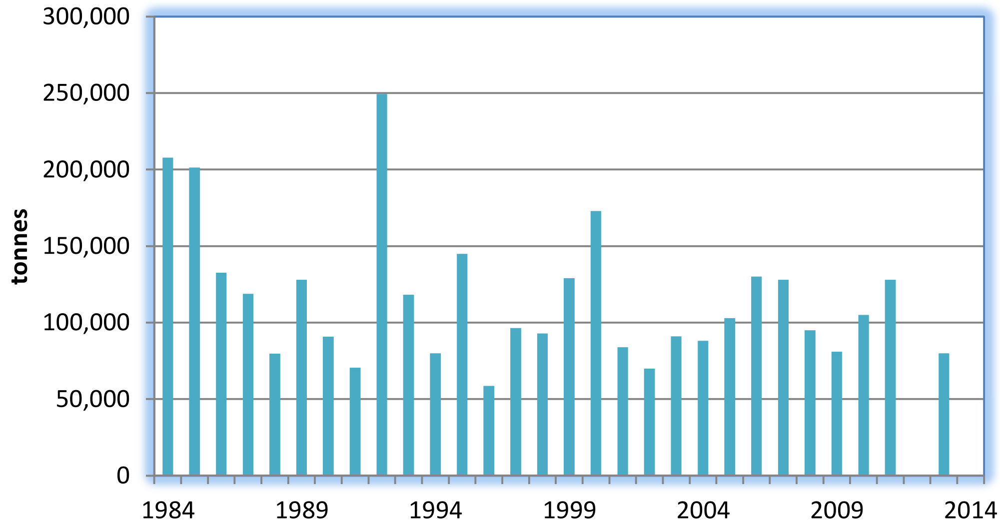


Source: CSO Trade Statistics
Note: Data for 2012 and 2014 unavailable

Figure 4.13 shows SMP exports from Ireland to the EU and rest of the World. The variability of SMP exports is quite pronounced. Unlike butter and cheese exports, the UK is not a major market for SMP.

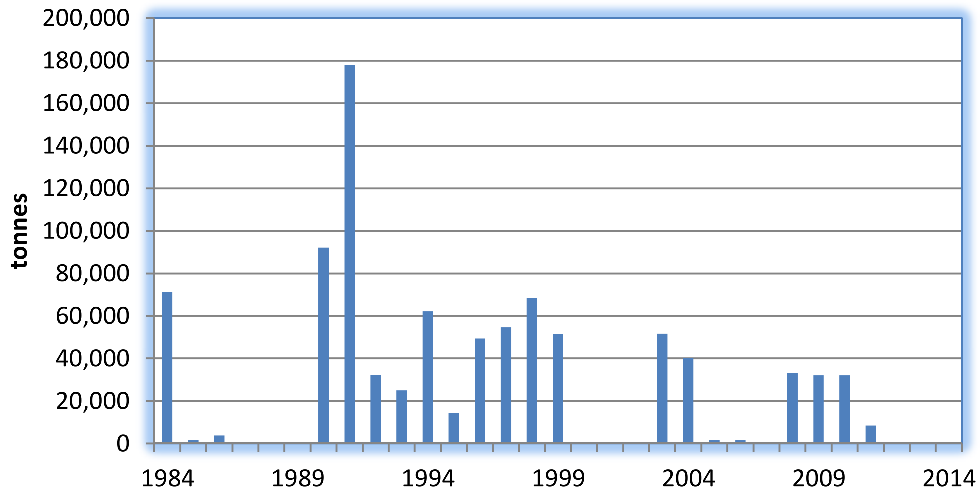
SMP is transhipped to third country markets principally through the Netherlands. Accordingly, market conditions outside of the EU are the most important factor for SMP exports. As with butter exports, the variability of SMP exports historically was linked to intervention activity. Figure 4.14 shows Irish SMP intervention stocks. The high level of exports in 1984 reflects large-scale disposals out of intervention, which had built up quickly in 1982 and 1983. Similarly, the high level of exports in 1992, reflect substantial disposals out of intervention stocks, which had built up in 1990 and 1991. In more recent years, less use has been made of intervention and therefore annual exports have reflected production decisions. The decrease in the volume of SMP produced for export reflects developments the infant formula sector as detailed in Text Box 4.1.

Figure 4.13: Milk Powder Exports: Ireland 1984 -2014



Source: CSO Trade Statistics
Note: Data for 2012 and 2014 unavailable

Figure 4.14: SMP Intervention End Year Stocks: Ireland 1984-2014



Source: Department of Agriculture and European Commission

4.4 The Development of Farm Gate Milk Prices

In simple terms butter and SMP represent respectively the two main constituents of milk, namely fat and protein. The farm-gate milk price is based on the components of the milk delivered. Historically a relationship could be observed between the intervention prices for butter and SMP and the target milk price. Differences existed between national prices across EU member states and the target price, with some member state milk prices being closer to the target prices than in the case of other member states. These differentials were due to several factors including: market prices for dairy products in the member state, the mix of products produced, the efficiency of processing, transport and marketing costs in the member state and the seasonality of milk supply.

Text Box 4.1: Development of the Infant Formula Sector

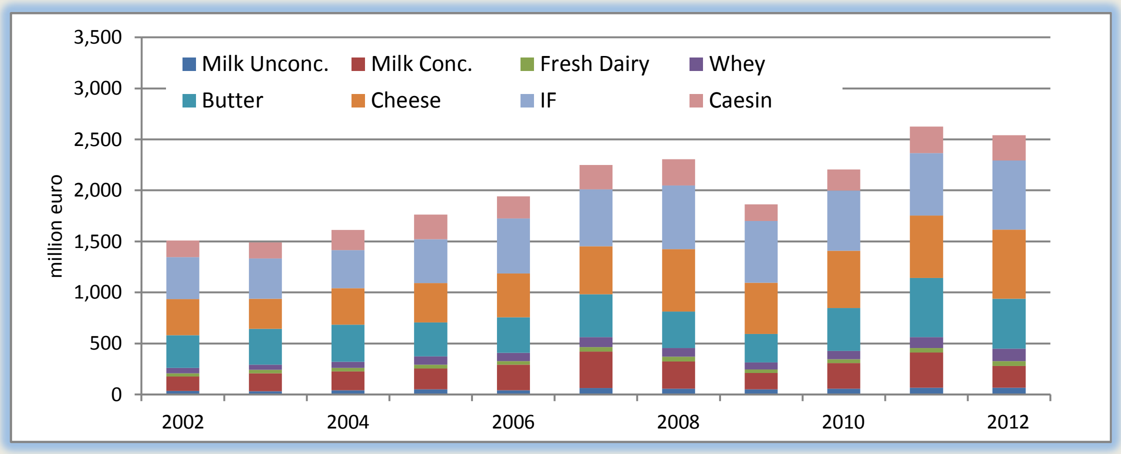
While Infant Formula (IF) may not be a very significant product in Ireland in terms of its share of milk usage, it is quite significant in terms of the value of the associated output. It is reckoned that Ireland produces about 12 percent (Teagasc 2013) of the global volume of IF that enters international trade, it is important to note that this is a percentage of product traded internationally, which is far lower than global production or consumption. Official data on the value of IF production in Ireland are not available, however, since the Irish IF market is quite small relative to Irish IF production, the volume of Irish IF exports can be taken as a good proxy for the level of production and the associated value.

Industry sources indicate that the processors' mark-up on infant formula is far higher than in the case of standard dairy commodities. Typically it will be of the order of 20 to 30 percent, whereas the mark-up on standard dairy commodities is typically a low single digit percentage. The IF industry in Ireland has benefitted from the recent growth in international demand. There has been considerable plant investment in IF production facilities in Ireland in recent years, with three of the top five major world IF manufacturers (Abbot, Danone and Pfizer) having operations in Ireland.

IF and casein accounted for more than 30 percent of the total value of dairy exports in 2012 in Ireland. Between 2002 and 2012 the value of Irish IF exports has grown at an average rate of 5.16 percent per annum from a value of approximately €400 million in 2002 to €700 million in 2012, as illustrated in Figure 4.15. Assuming that this rate of growth is maintained then the value of infant formula exports in 2020 will be over €1 billion.

While global demand for IF is growing at a rate of about 4 per cent a year, this masks the much stronger annual growth rate that is envisaged in Asia, where growth of closer to 10 per cent per annum may be possible in the medium term.

Figure 4.15: Irish Dairy Exports 2002 to 2012 in value terms



Source: Eurostat

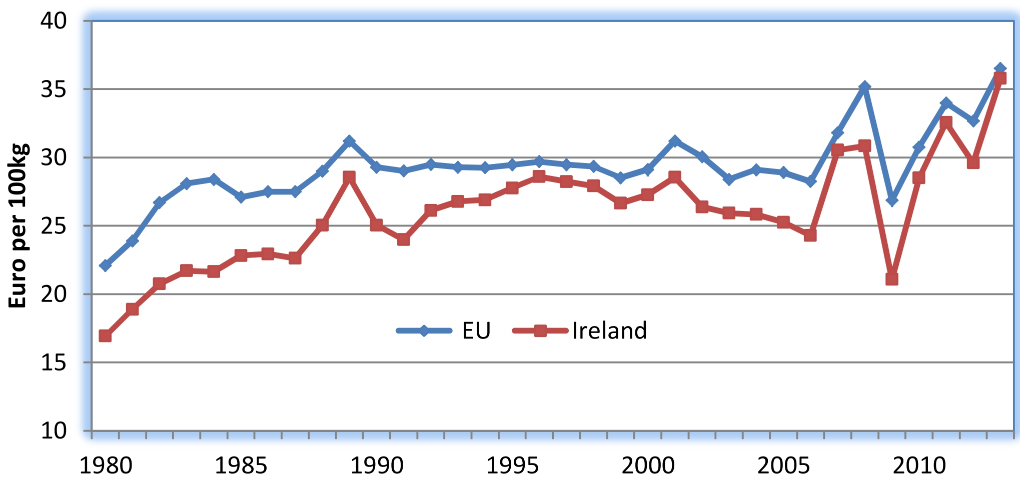
Overall we may say that the EU remains an important market for Irish butter and cheese exports with markets outside the EU being of greater significance for SMP. China has emerged as an increasingly important market, especially in value terms over the last 10 years. Intervention has decreased in importance but has been availed of in times of extreme market weakness.

In Ireland through the 1980s and 1990s the market price for milk followed the path of the target price quite closely and was generally around 90 percent of the target price. For other member states, with the exception of Denmark and Italy, the producer price was also somewhat below the target price, although the difference was generally not as pronounced as it was in Ireland.

Consequently decisions on the target price or the intervention price attracted considerable attention in Ireland, since it was considered that any reduction in these prices would be transmitted directly into a reduction in the Irish milk price. For example, this was a major issue of debate at the time of the Agenda 2000 negotiations. It was argued by some commentators that planned reductions in the intervention prices for butter and SMP would lead to an equivalent fall in EU and Irish milk prices. Others argued that the dependency on intervention was decreasing over time as EU dairy consumption was growing. It subsequently transpired that milk prices did not fall by the extent some had insisted would occur (in fact milk prices increased, but this was related to international supply and demand conditions rather than the policy change). The EU dairy sector had achieved a better market balance and international opportunities for commercial (unsubsidised) dairy exports were growing and what had previously seemed like an inevitable link between Irish milk prices and the so called intervention price equivalent had been broken.

Today EU and Irish milk prices still enjoy tariff protection, but it is increasingly the case that milk prices in the EU reflect what is happening on the global market. Figure 4.16 presents Irish farm milk prices over the period 1984-2014 along with a series which is the average of milk prices for France, Germany, Italy and the UK (EU average price). In the period around the introduction of the quota system in 1984, nominal milk price increases were much more modest than they had been in the 1970s.

Figure 4.16: Producer Milk Price (3.7% butterfat): EU Average & Ireland 1980-2014



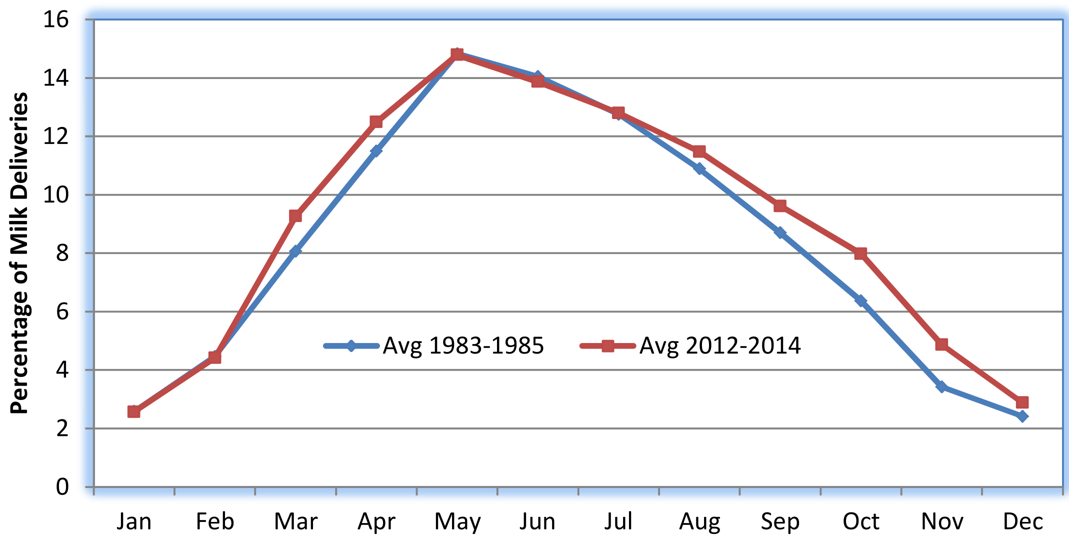
Source: CSO and FAPRI Model

It is clear that that Irish producer milk prices were below the EU average price throughout this period, but the relative difference between the series has varied over time. There has been a tendency towards convergence in Irish milk prices with those of our EU competitors, particularly over the last decade. Historically the basis for price gap would have been the intervention dependent Irish dairy product mix and the greater exposure of the Irish dairy sector to international markets. However, the closing of the milk price gap between Ireland and the EU average has been facilitated by greater diversification in the Irish product mix in recent years along with the rise in world dairy commodity prices towards European dairy commodity price levels.

4.5 Production Systems and Costs of Production

A distinct feature of the Irish dairy sector is the pattern of milk production, which is highly seasonal in nature as illustrated in Figure 4.17. This seasonality is a consequence of the preferred, predominantly grass based, system of milk production, which in turn implies a high proportion of spring calving cows. While seasonality is also found in other grass based dairy systems, it is particularly acute in Ireland where the peak trough ratio (the ratio of highest to lowest monthly milk production) is about 6:1. With the imposition of the milk quota, the emphasis was no longer on output growth but rather cost management. One would expect that this would have led to an exacerbation of the seasonal profile of milk with an even greater proportion of milk being delivered at the peak to maximise the use of grass. However as shown in Figure 4.17 the seasonal profile of milk production has changed very little from the early 1980s.

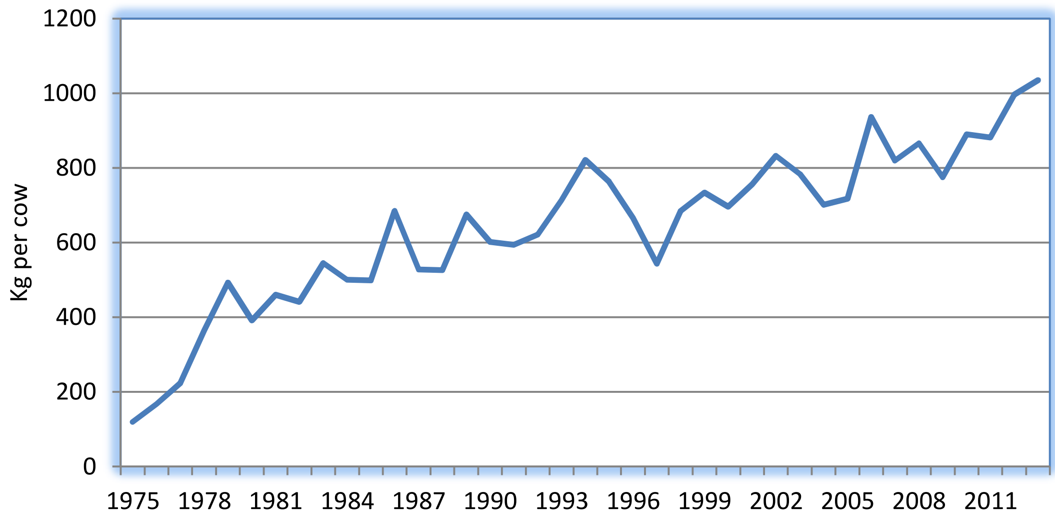
Figure 4.17: Monthly Milk Deliveries (average of 1982-1984 and 2012-2014)



Source: CSO

In the late 1970s and early 1980s the use of purchased concentrate feed to supplement grass increased substantially as farmers aimed to increase output per cow to avail of increasing milk prices. As illustrated in Figure 4.18 concentrate feed usage per cow increased fourfold between 1975 and 1984. While the trend in concentrate feed usage remained upwards, the pace of growth slowed somewhat averaging at approximately 3 percent per year, with little deviation from this trend when short-term weather related shocks are eliminated.

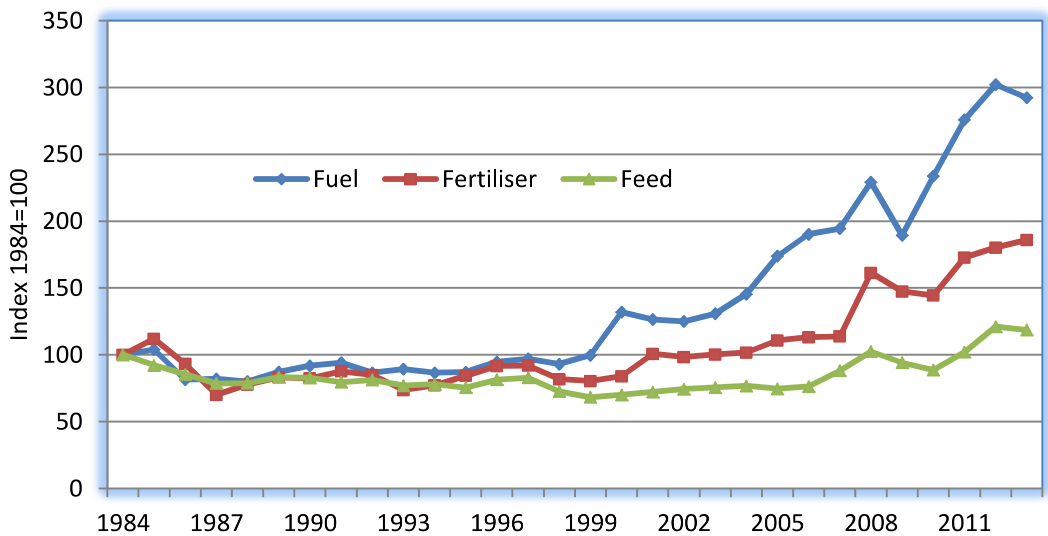
Figure 4.18: Concentrate Feed per Cow 1975 to 2014



Source: Adapted from DAFM and CSO data

Figure 4.19 presents a price index of three of the main inputs used on dairy farms, namely purchased feed, fertiliser and fuel. In a typical year, purchased feed costs comprise 20 percent of total production costs on dairy farms, fertiliser comprises between 10 and 15 percent, while electricity and fuel comprises a further 10 to 15 percent. As can be seen in Figure 4.19, the three cost indices remained relatively static, and actually decreased slightly, from 1984 to 1999. The rapid rate of inflation in the three indices from 2000 to the present day is striking. Fuel costs have increased three fold from 1999 to 2014 and this has impacted on both the price of fertiliser and feed. Fertiliser prices have almost doubled over the same period, with feed prices increasing more modestly.

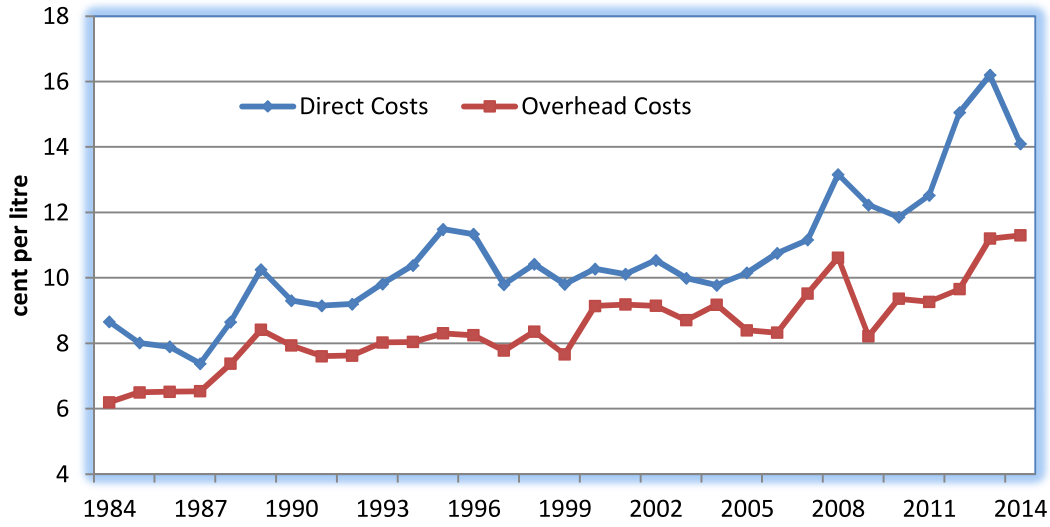
Figure 4.19: Agricultural Inputs Price Index 1984 to 2014 (1984=100)



Source: CSO and authors' estimates

The Teagasc National Farm Survey (NFS) records total costs of production on dairy farms. The NFS data reflect both movements in input prices and volumes of inputs used. Costs of production on dairy farms are allocated to two categories, direct costs which are linked to a specific farm enterprise and increase/decrease with farm output and overhead costs which apply at a whole farm basis and are incurred regardless of the level of output. Direct costs include expenditure on feed, fertiliser, contractor charges, veterinary and casual labour. Overhead costs include land rental, hired labour costs, depreciation of buildings and machinery, interest on loans and land maintenance costs. Figure 4.20 illustrates the development of these two cost measures on a cent per litre basis over the 30 year milk quota period.

Figure 4.20: Direct and Overhead Costs per litre on Specialist Dairy Farms: 1984 to 2014



Source: Teagasc National Farm Survey (various years), 2014 authors' estimates

Direct costs of production are highly influenced by weather which impacts on both the quantity and price of feedstuffs and can result in sudden shocks to the cost series. However, even when these exceptional years are removed, the slow upward trend in direct costs is apparent, especially from 2005 onwards.

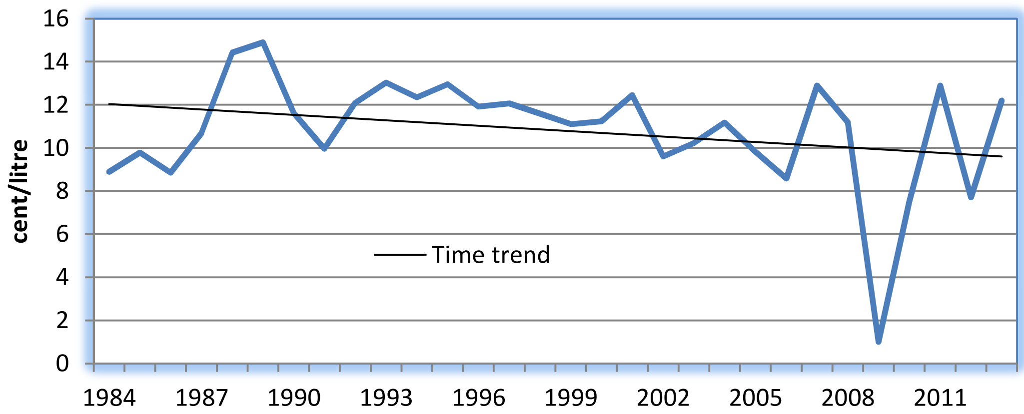
Direct costs of production on dairy farms fell in the initial years after milk quota introduction. This fall in production costs was driven by price rather than usage movements. As shown by the price indices data, fuel, fertiliser and feed prices all fell by approximately 20 percent between 1984 and 1988. The prices for these inputs increased quite sharply in 1989 and 1990 as reflected in the total direct cost series. While prices remained quite static throughout the 1990s increasing concentrate feed usage pushed total direct costs upwards. From 1984 to 2004 total direct costs increased by on average just 1 percent per year.

The rapid increase in input prices from 2005 onwards is evident. From 2005 to 2014 total direct costs increased by an average of almost 4 percent per year. Concentrate feed prices increased considerably in 2007 and again in 2008 but declined in 2009 due to increased planting rates of cereals, improved harvests and weaker demand growth internationally. The impact of higher concentrate feed prices is evident in direct costs with costs increasing to 13 cent per litre in 2008. Direct costs of production reached unprecedented levels in 2012 and 2013 due to the fodder crisis. Inclement weather led to a substantial increase in purchased concentrate feed per cow, which was at particularly high prices at the time, in conjunction with increased expenditure on purchased bulky feed.

As can be seen overhead costs of production followed a similar pattern throughout the period although such costs are not as influenced by weather and hence are not as volatile. Overhead costs apply on a whole farm basis, i.e. the individual cost items are not linked to a specific enterprise. The portion of overhead costs that is allocated to the dairy enterprise, as presented in Figure 4.20, is based on the importance of the dairy enterprise to the farm. In other words, if the dairy enterprise accounts for 75 percent of the gross output of the farm, then 75 percent of the overhead costs are allocated to the enterprise. This means that the relative value of the beef and dairy enterprises in a given year can also impact on overhead costs.

Figure 4.21 presents net margin per litre from 1984 to 2014, this series brings together both output prices and input costs. Through the 1984 to 2014 period the trend in net margin per litre has been downwards, even when expressed in nominal terms. When the exceptionally bad year of 2009 is excluded the time trend is somewhat flatter. The peak in net margin in 1989 is notable, this came at a time of a particularly high milk price and still quite low input costs. The increase in input costs after this period is apparent from the fall off in margins from 1989 to 1991. From 1992 to 2000 margins remained relatively static. The volatility in milk prices is apparent from 2006 onwards.

Figure 4.21: Net Margin per litre on Specialist Dairy Farms 1984 to 2014



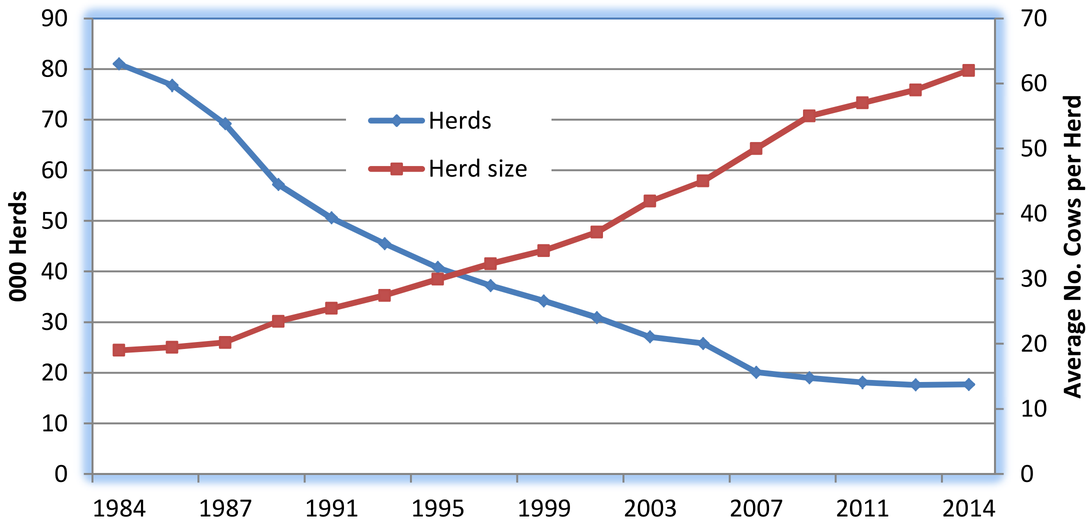
Source: Teagasc National Farm Survey (various years), 2014 authors' estimates

4.6 Irish Dairy Farm Scale and Profitability

As described in Chapter 2 output per farm grew substantially in the period up to the introduction of the milk quota. Although the imposition of the milk quota constrained production at an aggregate level, output per farm continued to grow after 1984 as farm numbers declined and quota became consolidated onto fewer holdings. In the early years of the milk quota regime, the transfer of quota between farmers in a given Member State was quite restricted. In Ireland quota was generally attached to the land and could not be freely traded. From 1995 greater flexibility was allowed and certain exceptions to the pairing of quota with land came into existence. Some EU member states, such as the UK adopted quite a liberal basis for the exchange of quota, with prices for quota determined by market supply and demand conditions. However, Ireland adopted amongst the most conservative rules for the transfer of milk quota.

Despite the various restrictions on quota trade, farm numbers declined quite rapidly in Ireland and average farm size increased. When the milk quota was introduced in 1984 there were approximately 80,000 active milk producers in Ireland, see Figure 4.22. The latest CSO data indicate that there were just less than 18,000 milk producers in 2014, an almost 80 percent reduction since the introduction of the milk quota. The most rapid exit from dairy production occurred in the first ten years after quota was introduced. Dairy farms numbers declined at an annual rate of 6 percent on average between 1985 and 1995, this pace of decline slowed to about 2.5 percent per year over the last ten years. Concurrent with the decrease in farm numbers average herd size increased. Figure 4.22 shows a tripling of the average herd size from approximately 20 cows in 1984 to just over 60 cows in 2014.

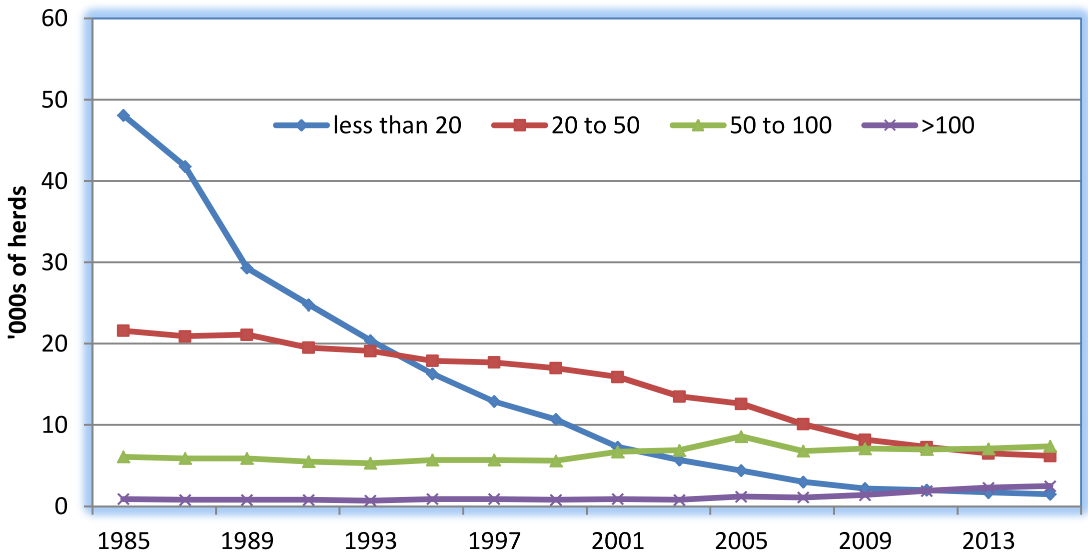
Figure 4.22: Number of Dairy Herds and Average Herd Size in Ireland 1984 to 2014



Source: Central Statistics Office and Department of Agriculture, Food and the Marine

Figure 4.23 presents the number of dairy herds by herd size from 1984 to 2014. The rapid reduction of small herds is apparent. In 1984 there were approximately 48,000 herds of 20 cows or less and there were less than 1,500 herds of the same size in 2014. At the opposite end of the distribution there were less than 100 herds of 100 cows or more in 1984 and there were over 2,500 in 2014.

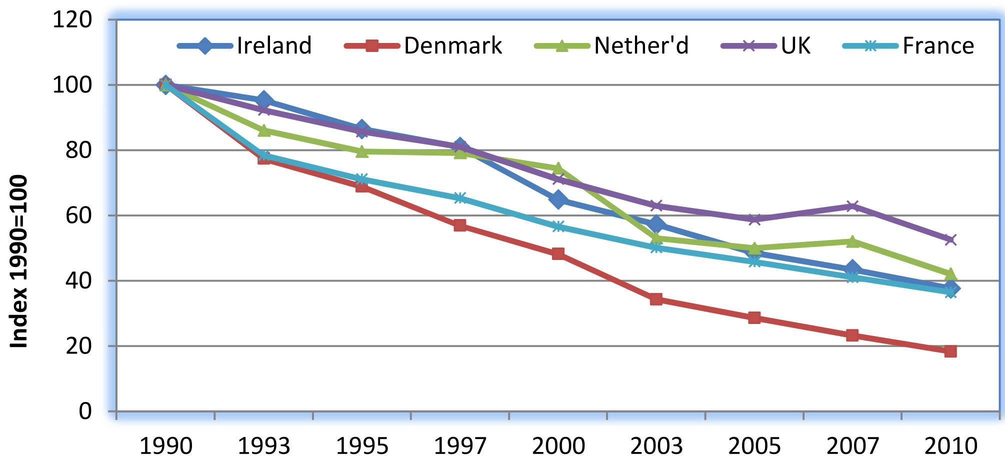
Figure 4.23: Number of Dairy Herds by Herd Size in Ireland 1984 to 2014



Source: Central Statistics Office and Department of Agriculture, Food and the Marine

Figure 4.24 shows that Ireland is not unusual with this pace of structural change as similar reductions in farm numbers occurred in other Member States of the EU since the introduction of the milk quota with dairy farm numbers falling significantly since 1990. Dairy farm numbers have fallen most rapidly in Denmark declining by over 80 percent in the 20 year period. Denmark adopted one of the most liberal approaches to milk quota trade over this period.

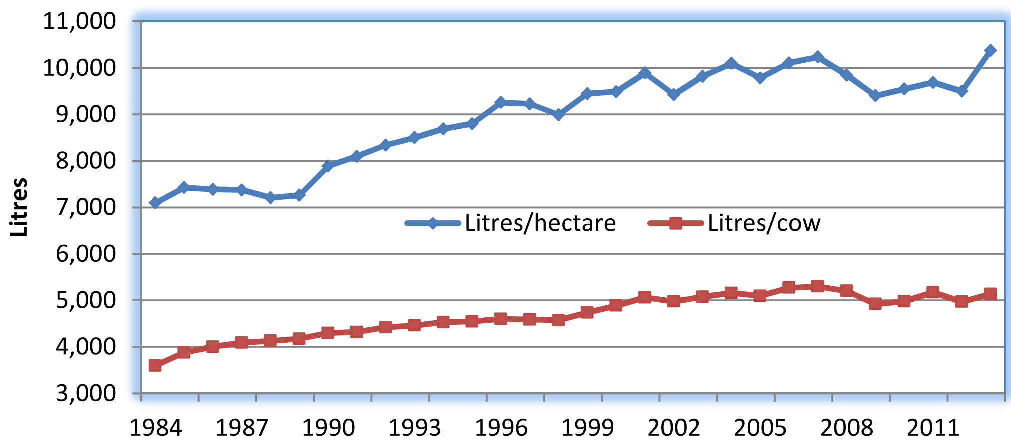
Figure 4.24: Index of No. of Dairy Herds in Ireland and selected EU Member States 1990 to 2010



Source: Eurostat

The increasing output per farm was accompanied by improvements in productivity. As illustrated in Figure 4.25, average output per cow and per forage hectare increased over the period. The average yield per cow in 1984 was approximately 3,500 litres and this increased at an average rate of 1.2 percent per year to 5,200 litres per cow in 2013, or a 40 percent increase in total over the period.

Figure 4.25: Average output litres per cow and litres per hectare 1984 to 2013

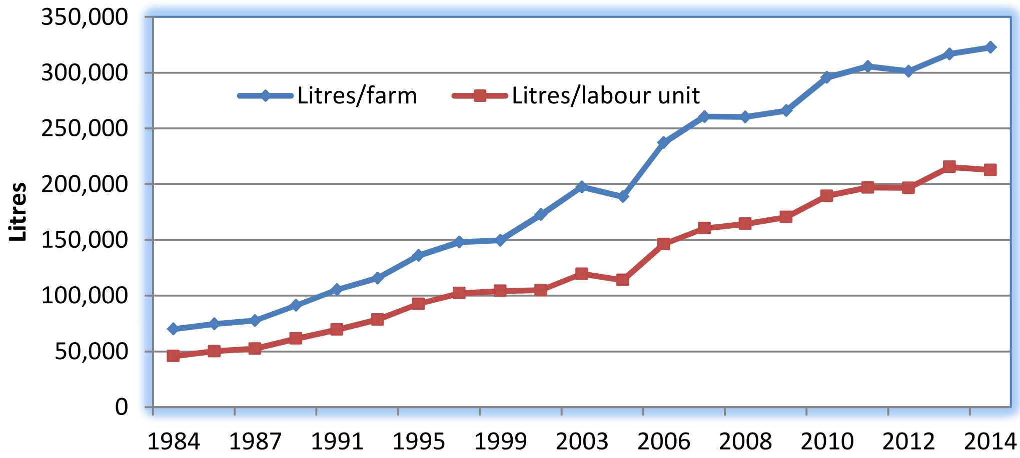


Source: Teagasc National Farm Survey (various years)

Output per hectare increased more rapidly than output per cow showing a 47 percent growth in total output per hectare from 1984 to 2013. This was facilitated by declining farm numbers and increased stocking rates on fewer, more intensive dairy farms. The more rapid rate of exit from farming in the 1989 to 2004 period led to greater productivity growth at this time with output growing by almost 40 percent in this 15 year period. The low milk price and high feed and fertiliser prices of 2009 and the fodder crisis of 2012/2013 were two events that induced farmers to cut back production and hence productivity growth rates slowed somewhat over the period.

Figure 4.26 illustrates the evolution of milk output per farm and per labour unit. The total output per farm and per labour unit, including both hired and unpaid family members, increased by 460 percent and 475 percent respectively over the period. The output per farm increased by approximately 8 percent per year over the period, with the increase in the 1995 to 2005 period being more rapid than the previous 10 years. Labour productivity grew at a similar rate with output per labour unit growing by 8.2 percent per year. The average labour unit was producing 50,000 litres of milk in 1984 compared to almost 220,000 in 2014.

Figure 4.26: Average total Output per farm and per labour unit 1984 to 2014

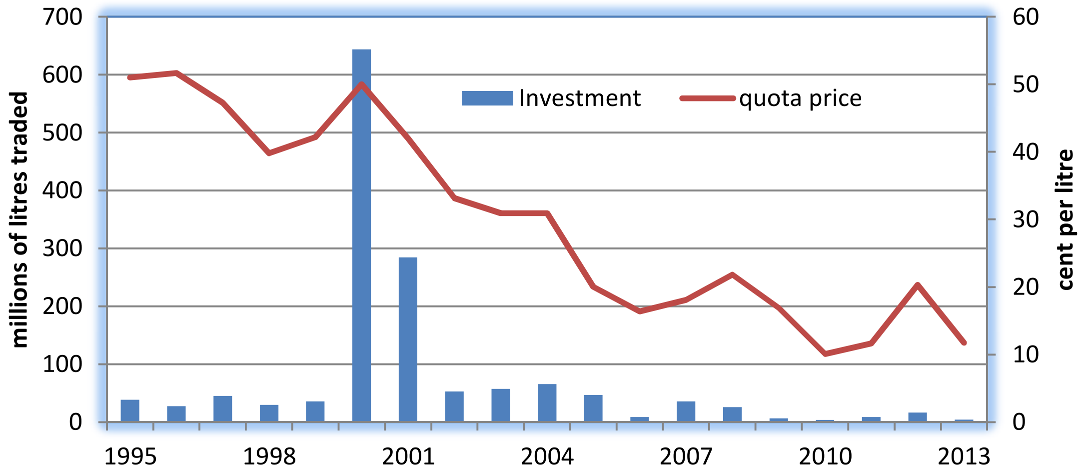


Source: Teagasc National Farm Survey (various years)

Apart from some small increases in the national milk quota granted under various policy reforms, the increase in scale at the farm level was only possible through the purchase of milk quota. In the early years of the milk quota period there was no formal exchange of milk quota and mostly quota could only be purchased when it was attached to land. From the mid 1990s the trade in milk quota became more flexible and the Teagasc National Farm Survey began to collect data on the volume and value of milk quota purchases from 1995 onwards, see Figure 4.27.

In the mid to late 1990s quota traded at a high price of around 50 cent per litre but relatively little volumes were transacted at this price with the total annual investment at farm level averaged at about €50 million per year. New milk quota management rules were introduced in 2000. The 2000 scheme provided for the part restructuring of quotas for the first time. Previously producers depended on temporary leasing and the new restructuring scheme allowed for the permanent transfer of this quota. From 1994 to 1999 approximately 70 million litres of milk were transferred each year through the predecessor to the restructuring scheme. In 2000 almost 300 million litres of milk was traded through the scheme and almost 40 percent of suppliers purchased quota. Since 2000 both the volume of quota trade and the quota price has declined.

Figure 4.27: **Total milk quota purchases and average price paid 1995 to 2013**

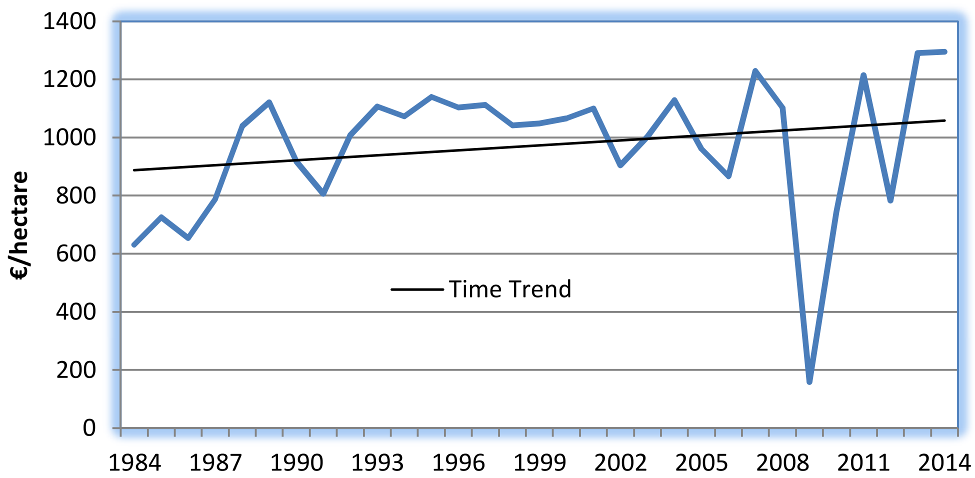


Source: Teagasc National Farm Survey

In the 19 year period from 1995 to 2013, Irish dairy farmers collectively invested approximately €1.4 billion in the purchase of milk quota with almost 2.5 million litres of quota transferring ownership over this period.

Earlier discussions of milk price and input costs concluded that on a per unit of milk produced, the net margin has followed a slow downward trend since 1984, even when expressed in nominal terms. However, given the improvements in partial productivity indicators, such as output per hectare, per cow and per labour unit, even at static profit levels on a per litre basis, profit on a per hectare or per labour unit basis increased over time. Figure 4.28 shows the average net margin per hectare on specialist dairy farms from 1984 to 2014.

Figure 4.28: Average Net Margin per hectare on Specialist Dairy Farms 1984 to 2014

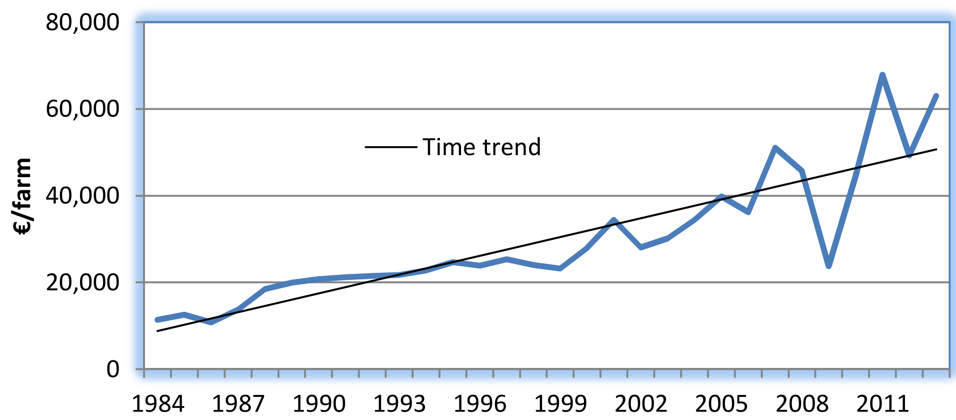


Source: Teagasc National Farm Survey (various years), 2014 authors' estimates

The most notable point on the graph of net margin per hectare from 1984 to 2014 is the collapse in profitability in 2009. Very low milk prices, combined with high production costs and depressed output all converged to produce a net margin of less than €200 per hectare, more than 80 percent lower than the average margin for the previous 20 years. Apart from 2009 the trend is moving slowly upwards, as depicted by the time trend. When 2009 is excluded the net margin per hectare grew at an average pace of 6 percent per year.

The final and ultimate measure of profitability at the farm level is family farm income. This measure includes the profitability from all of the enterprises on the farm as well subsidies, both coupled and decoupled. The data presented in Figure 4.29 represent the average family farm income for specialist dairy farms. The definition of a specialist dairy farm and the sampling frame of the National Farm Survey have changed over this 30 year period. The data presented in Figure 4.29 uses a consistent definition of dairy farming throughout the period, all farms where the dairy enterprise comprises at least 50 percent of gross output on the farm are included in the sample.

Figure 4.29: **Average Family Farm Income on Specialist Dairy Farms 1984 to 2013**

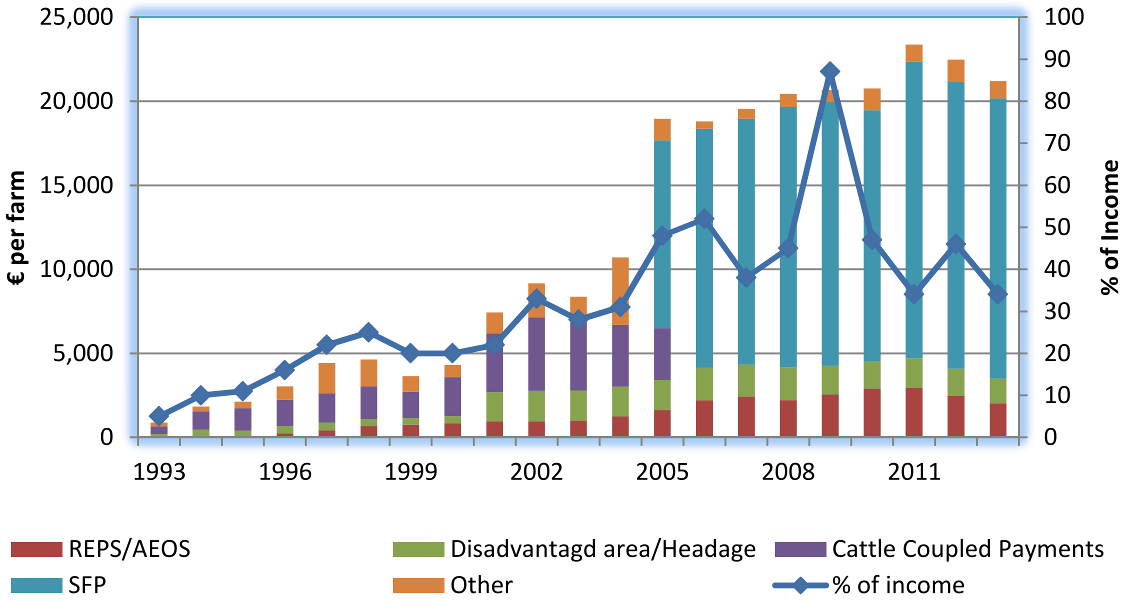


Source: Teagasc National Farm Survey

Family farm income increased from an average of about €11,000 in 1984 to €63,000 in 2013. The average annual growth rate over the 30 year period was 9 percent per year, which outpaced inflation meaning that dairy farmers are better off now than they were in 1984. It is important to note that this growth in farm income is entirely scale driven. Even though farms have grown, and output per cow and per labour unit has increased, the per unit profit of production measured on a cent per litre basis has not improved. In other words, farms that have remained at a static volume of output over this period would show declining incomes. Only by growing the size of the farm business, increasing the specialisation in milk production and increasing output per hectare have dairy farmers managed to increase income.

The total value of subsidies on dairy farms increased substantially in the 1993 to 2013 period as illustrated in Figure 4.30. In the late 1990s dairy farms began to receive subsides under a number of schemes. These included direct payments coupled to cattle enterprises, disadvantaged area payments and REPS. Throughout the late 1990s total subsidies on dairy farms averaged less than €5,000 and comprised about 20 percent of farm income. The subsidies paid to dairy farmers increased significantly in the mid 2000s. In 2004 a coupled milk premium of 1.2 cent per litre was introduced to compensate farmers for reductions in intervention prices. By 2006 this premium had tripled to 3.6 cent per litre, worth approximately €8,700 to the average dairy farmer, and was paid as part of the Single Farm Payment.

Figure 4.30: The Value of Subsidies on Dairy Farms as a Share of Income 1993 to 2013



Source: Teagasc National Farm Survey (various years)

Since 2005 total subsidies have comprised approximately 40 percent of dairy farm income, with the exception of 2009 where subsidies comprised almost 90 percent of income. In 2013 the average dairy farmer received €21,191 in subsidies.

4.7 Developments in the Dairy Processing Sector

Side by side with developments at the farm level there were some significant developments in the processing sector during the quota era.

The Dairy Processing Sector in the pre-quota period

The Irish dairy processing sector has its roots in the co-operative movement. In the 1960s there were over 200 co-operative operated creameries in Ireland, dispersed across the country allowing farmers to bring milk short distances for processing. Milk output was anticipated to expand substantially following entry to the EU and a number of studies throughout the 1960s and 1970s recommended the amalgamation and rationalisation of these creameries in order to establish larger processing plants. But many co-operatives were resistant to amalgamation as they feared local job losses and loss of control of their co-operatives especially to their rivals (Breathnach, 2000). Some rationalisation occurred over this period, although not at the rate that had been expected, and in 1973 there were 52 co-operatives processing milk.

The Dairy Processing Sector in the quota era

The imposition of the milk quota in 1984 curtailed any expansion opportunities for dairy processing companies. Against the backdrop of the milk quota regime, overseas expansion (particularly in the UK and the US) through the acquisition of existing facilities as well as product diversification became the principal focus of the larger processors, Quinlan (2013). Kerry Group, for example, opened UK and US headquarters in 1983 and diversified into convenience meat products and specialist food ingredients.

Concurrent with international expansion and diversification, some Irish cooperatives restructured their capital base by forming Public Limited Companies (PLC). Some saw this development as necessary to provide access to additional capital resources in order to allow the processing sector to expand, allowing the businesses to raise equity in a situation where farmers were unable or unwilling to provide capital. The first public offering of Kerry Group shares occurred in 1986. Avonmore Foods PLC was floated in 1988 with Waterford Foods PLC following just one month later. In 1997 the two PLCs merged and were rebranded as Glanbia in 1999.

A large number of small butter plants closed throughout the 1990s and by 2000 there were just 23 processing plants in operation. In the early 2000s, the Prospectus Report was commissioned by government and industry to examine the structure and efficiency of Irish dairy processing. The Report concluded that despite the reduction in the number of processing companies and plants that occurred through the 1990s and early 2000s, the Irish dairy processing industry remained fragmented compared to international competitors. Table 4.3, taken from the Prospectus report, shows the fragmented nature of Irish dairy processing with up to 6 companies involved in the processing of 80 percent of the national milk pool in 2003, compared to just one company in New Zealand and Denmark.

Table 4.3 : Structure of the dairy processing sector Ireland and selected countries

	Ireland	Denmark	Netherlands	New Zealand
No. of companies processing 80% of the milk supply	6	1	2	1

Source: Promar Report (2003)

The Prospectus Report concluded that the small scale of dairy processing in Ireland meant that processors were not in a position to exploit the economies of scale being enjoyed by larger operators in competing countries. The Prospectus Report recommended plant rationalisation and consolidation to achieve economies from increased scale and to realise savings.

The Report concluded that this rationalisation would provide scale and capacity to allow the industry to reduce the dependency on commodity products, invest and avail of existing and emerging product and market opportunities. Farmers were resistant to this rationalisation as they believed that healthy competition between cooperatives, in terms of services and the milk price paid was required to guarantee efficiencies and to ensure farmer influence. Little rationalisation has occurred since the publication of the Prospectus Report. In 2015 there are 19 dairy processing plants. The three largest processors, Glanbia, Dairygold and Kerry, have five processing plants and processed approximately 70 percent of the total milk pool in 2014.

The Dairy Processing Sector planning for expansion post-quota

The elimination of quotas and the expected increase in milk production, provide the Irish dairy processing sector with the opportunity to expand production for the first time in 30 years. Some significant investment in processing capacity has taken place in the years leading up to milk quota removal.

Dairygold remains Ireland's largest farmer owned business and the country's second largest dairy processor, processing 950 million litres or 20 percent of Ireland's milk pool. Dairygold expects its suppliers to increase annual milk production by more than 50% by 2020 following milk quota removal. This equates to an increase of 500 million litres per annum and therefore requires an expansion in Dairygold's peak processing capacity. In 2013 Dairygold invested €33 million to expand and upgrade its milk processing facilities at Mitchelstown.

Glanbia expects the 4,800 farmers supplying their business with milk to increase production by 63 percent by 2020. In preparation for this expansion, Glanbia restructured its operating model in 2012 when the Co-operative acquired 60 percent of Glanbia's Irish dairy processing business, Glanbia Ingredients Ireland, and reduced its shareholding in Glanbia PLC from 54 to 41 percent. In March 2015 Glanbia opened the Belview plant. Investment in the plant, which will process more than 700 million litres of milk per year, is estimated to have been in the region of €235 million. The investment, which was supported by grant aid through Enterprise Ireland, is estimated to be one of the largest infrastructural investments to have been made by an Irish company in Ireland.

In 2012 Kerry Group announced the investment of €100 million in a new Global Technology and Innovation Centre in Ireland. The Centre, which will become the focal point for all scientific research, technology and product development and innovation within the Kerry Group, is expected to employ up to 800 people. Around this time Kerry Group also announced that it had sufficient processing capacity to accommodate the 20 percent expected increase in milk supplies following the removal of the milk quota.

4.8 Conclusions

The gradual increase in EU aggregate milk production was mainly due to the series of enlargements that took place to bring the EU from 10 to 27 member states. Since 2007 there has been a growing deficit between milk deliveries and the milk quota in many EU member states. EU dairy commodity prices and EU milk prices have become considerably more volatile over the last 10 years in comparison with the first 20 years of the quota regime. The EU dairy market is now much more exposed to the effect of changes in world market supply and demand conditions. This is because the gap between world and EU prices has declined and because the EU is less willing to provide support to the dairy sector in times of lower prices.

The milk quota has generally been a binding constraint on Irish milk production. There have been years where the Irish quota was slightly underfilled, but this relates more to weather and quota management than to the profitability of milk production in Ireland. The one exception to this was 2009 when extremely low prices and high production costs led to a dramatic reduction in the profitability of Irish milk production and a 10 percent deficit between Irish milk deliveries and the Irish milk quota.

Over the last 30 years the Irish dairy product mix has evolved with an increase in the production of cheese and whey and the emergence of an infant formula business which is particularly important in value terms. The presence of the milk quota and increased EU dairy consumption have both contributed to a substantial reduction in the share of EU dairy production that is exported to non-EU countries. Significant consolidation has taken place at farm and processing level over the lifespan of the quota regime. Limitations on the volume of milk available in Ireland have led to investment by Irish milk processors internationally.

Over the first ten years of the quota regime costs of production remained relatively static or even declined slightly. Throughout the mid 1990s the cost of production increased and due to relatively static milk prices, farmers were exposed to a price-cost squeeze. In general the net margin from milk production has been on a downward trend on a per litre basis over much of the last 20 years and has become more volatile over the last 10 years. In spite of this, increases in the scale of production at the farm level have been the main driver of higher dairy farm income. Farm incomes have increased by 9 percent on average in nominal terms over the 30 year quota period, outpacing inflation. The average dairy herd size has more than tripled in Ireland since the milk quota was introduced and milk output per hectare has increased by about 50 percent over the same. Only through increased scale of production, has the average Irish dairy farm been able to increase farm income levels. However, this increase in scale has come at high investment costs. Irish dairy farmers have collectively invested more than €1.4 billion in the purchase of milk quota since 1995.

5 Dairy Advisory Services since the Introduction of EU Milk Quotas[2]

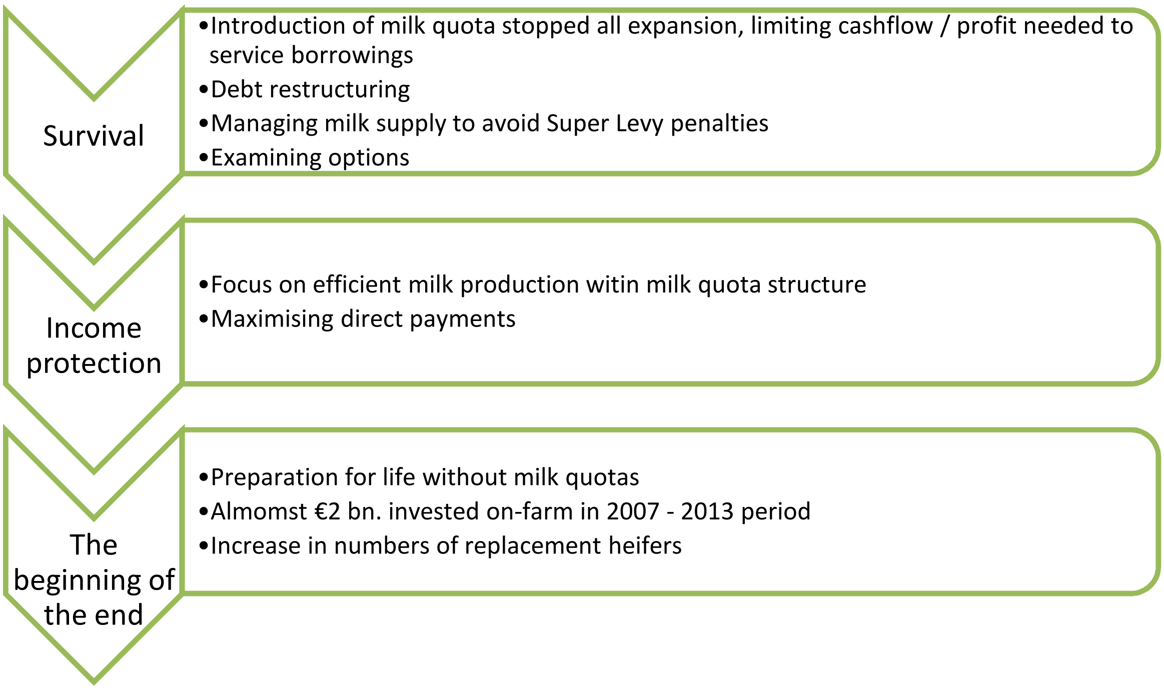
Tom O' Dwyer

The past 30 years has seen significant changes in how advice has been delivered to dairy farmers. Before examining the changes which occurred, it is useful to consider three identifiable phases of the EU milk quota era as set out in Figure 5.1. These three phases have impacted on the main messages delivered by the Advisory Service in Ireland.

5.1 Changing Advisory Priorities

Many Irish dairy farmers were in the midst of development plans at the time milk quotas were introduced and therefore faced severe financial challenges. Milk output was capped, yet development loans had to be repaid. At the same time, interest rates increased from 7 or 8 per cent to between 18 and 22 per cent. Through ACOT[3], the predecessor to the Teagasc advisory service, specialists and advisers worked with dairy farmers in financial difficulty to restructure loans and develop 'rescue packages' to submit to the financial institutions. Around this time also, ACOT specialists developed an 'Advisory Casebook' of options for dairy farms at different stages of development. So the initial years of milk quotas tended to focus on survival.

Figure 5.1: The three phases of milk quotas



The CAP Reforms of 1992 introduced a range of new income support measures including Area Aid and the Rural Environmental Protection Scheme (REPS). The advisory focus during this phase was on income protection and the demand for advisory services grew as farmers sought assistance in maximising their direct payments. The research focus had also changed and clear messages had been developed around maximising income from milk production under a milk quota regime.

[2] The author has sourced material for this article from 'Growing Knowledge: fifty years of research and development in Irish farming and food', edited by Michael Miley, as well as contributions from current and former Teagasc colleagues.
[3] An Chomhairle Oiliúna Talmhaíochta/The Agricultural Training Council

The final phase of the milk quota regime commenced with the CAP Health Check of 2006 which clearly signalled the phasing out and removal of milk quotas. This period – the beginning of the end – has seen significant on-farm investment (in infrastructure and livestock) as dairy farmers prepared for a return to life without milk quotas. Dairy farmers have invested almost €2 billion on-farm in the 2007 to 2013 period and the number of 0- 1 year old replacement heifers increased from less than 250,000 in the mid-2000s to over 350,000 in 2014; both of these trends were supported by the work of dairy advisers.

5.2 Evolving Structures

The Advisory Service itself has also changed in the years since the introduction of milk quotas in 1984. The key changes are listed in Figure 5.2. Charges for Teagasc Advisory Services were introduced in September 1987 for the first time with a decision taken to require all farmers to make a contribution to the cost of providing the service, with larger, commercial farmers paying higher fees to reflect the higher level of service provided. The objective was, and still is, to maintain contact with the maximum number of farmers by keeping fees at a reasonable level. The fee structure is reviewed on an annual basis with changes approved by the Teagasc Authority and Minister for Agriculture. Currently, Teagasc Advisory Service fees account for between 35 and 40 per cent of the cost of service delivery.

The second significant change was the formation of Teagasc in 1988 through the merger of ACOT and AFT[4]. Teagasc was established under the Agriculture (Research, Training and Advice) Act of 1988 as the national agency with overall responsibility for the provision of research, training and advisory services to the agriculture and food industry. It incorporated the research functions of AFT and the advisory and education functions of ACOT. It was believed that the creation of a single entity would lead to improved co-ordination and integration of the research service with the training and advisory services.

The organisation of the Teagasc Advisory Service has also changed during the milk quota era. No longer is the Advisory Service organised on a county basis (28 units, each with a Chief Agricultural Office (CAO) as manager); it is now streamlined to 12 Regional Units, each with a Regional Manager. This is partly as a result of reduced numbers of advisers and also due to the more widespread public sector reform. Accompanying this change in management structure, a specialisation of advisers took place in 2007 with a corps of approximately 80 Dairy Advisers identified to work with commercial dairy farmers.

Teagasc Advisory Service staff numbers have varied widely during the quota era. Numbers were at their highest at the time of quota introduction (615 in 1980) before falling to 350 by 1990. The reduction in the late 1980s was largely due to budgetary constraints that accompanied the formation of Teagasc. The introduction of REPS saw an increase in numbers to 550 by 2000, with a subsequent reduction to current levels of approximately 250. For the last number of years, the number of dairy advisers has settled at around 80.

[4] An Foras Talúntais/The Agricultural Institute (AFT)

5.3 The Adaption to Milk Quotas

The introduction of milk quotas forced dairy farmers and their advisers to examine options for alternative enterprises (beef, sheep, tillage) on their farms. ACOT specialists developed an 'Advisory Casebook' which was widely used by advisers to guide decisions by their clients. Advisers also had a significant role in promoting appropriate quota management strategies and guiding their clients through the various quota leasing and quota exchange schemes.

One of the consequences of milk quota introduction was the increased interaction between milk processors and ACOT (subsequently Teagasc) advisers and specialists in an effort to figure out best practice in terms of farming under this new constraint. In the early 1990s, a number of Joint Programmes with milk processor partners were initiated (many of which are still in operation today), building on the close working relationships established. The Joint Programmes were focussed on lifting dairy farm incomes in a quota environment. Early programmes focussed on improving product quality (improved protein content and reduced SCC) and grassland management practices (extended grazing, grassland measurement). For example, Teagasc and Kerry Agribusiness have collaborated in a joint programme titled 'Focus on Profit' since 1994. In reviewing, the various programmes, Courtney (2012[5]) referred to how the success of the programme was 'due to how farmers, processors, advisers and researchers all worked together with a common goal of improving the standard of living and quality of life of dairy farmers'.

5.4 The Evolution of Service Delivery

While the work of the dairy adviser is still largely a 'contact sport[6]', the nature of contact between the adviser and farmer has changed. There is less one-to-one contact now than previously; an increasing amount of the adviser's time is spent engaged in group activities. There has also been a decline in the number of farm visits with an increase in the number of significant consultations (office-based or by phone). O'Loughlin (2013[7]) has estimated that in the 1970s farm visits accounted for 60 per cent of an adviser's time whereas currently farm visits and one-to-one consultations account for 40 per cent and discussion groups 35 per cent of an adviser's time.

The appointment of a Teagasc Discussion Group specialist in the mid-1990s to drive the formation and facilitation of discussion groups by dairy advisers was significant. Discussion groups have become an important means of transferring technology, and more importantly of increasing the likelihood of practice adoption by farmers. The Teagasc Dairygold Joint Programme provided support for discussion groups as did the Department of Agriculture with the launch of a financial incentive for group membership in 2009. The Dairy Efficiency Programme (DEP) ran for three years (2010 to 2012) and this period saw an increase in both the number of groups (approximately 100 additional groups) and group membership (approximately 2,500 additional group members). However, there has been a slight drop-off in both group numbers and membership since the conclusion of the DEP; it is expected that the new Knowledge Transfer Groups which are planned as part of Rural Development Programme 2014 – 2020 will help to stimulate further interest in dairy discussion groups by dairy farmers.

[5] http://www.teagasc.ie/publications/2012/1590/Ger_Courtney_KTConference_2012.pdf
[6] http://www.teagasc.ie/publications/view_publication.aspx?PublicationID=1590
[7] http://www.teagasc.ie/publications/2012/1590/Larry_OLoughlin_KTConference_2012.pdf

5.5 Promotion of Core Technologies

Notwithstanding the changes discussed above, the Teagasc Dairy Advisory Programme has been built around three core technologies during the milk quota era: grassland management, breeding/ herd fertility and cost control. Research and the development of appropriate, farmer-friendly support tools have enabled Teagasc dairy advisers to lead the dissemination and adoption of these three technologies during this period.

The current principles of grassland measurement were developed in a landmark study conducted on commercial dairy farms by Teagasc in the mid-1990s. Further research in the intervening years has refined the targets and simplified the decision support tools. Dairy specialists and advisers have led many demonstrations of this new skill and the comparison of grassland measurement figures is now a staple of the majority of discussion group meetings. The new technology was used extensively on the network of demonstration/ monitor farms with results highlighted at the public events held on these farms. A specific focus network of 17 discussion groups (17 'host farmers' and approximately 200 'support farmers') was established in 2008 and ran for three years with the support of industry partner, Germinal Seeds[8]. This project aimed to improve the grassland management skills of the participating farmers leading to an increase in grass utilisation and a consequent reduction in production costs. Over the three years, the 'host farmer' group increased stocking rate, grass grown and milk solids per hectare while reducing the level of concentrates fed. Similar trends were observed in a matched sample of 'support farmers'.

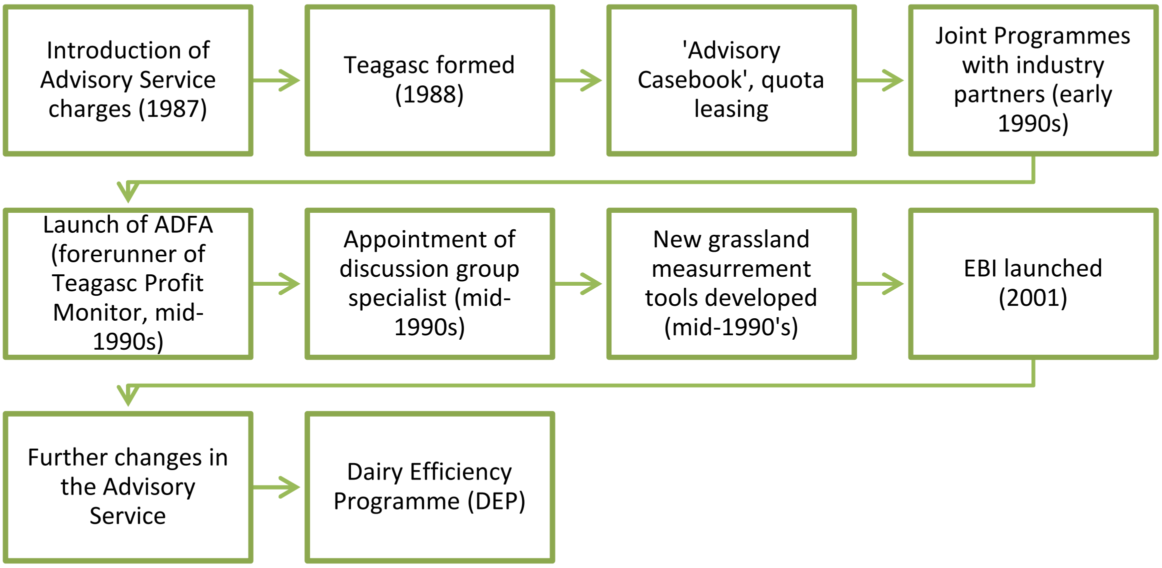
The launch of the Economic Breeding Index (EBI) in 2001 has been highly significant in stemming the decline in herd fertility – a vital component of a compact, seasonal calving milk production system. Teagasc dairy specialists and dairy advisers were central to the rollout of the new breeding index using a variety of communications channels. The annual EBI competition (2005 to 2010, initially individual farmer based before moving to a group based competition) was a key element of the knowledge transfer strategy. This competition was promoted widely by dairy advisers and publicised in the media. The winning farmers and groups hosted breeding events where the 'EBI message' was confirmed by the host farmers and by analysis highlighting the performance of 'high EBI' and 'low EBI' cows in the host farmer's herd. This knowledge transfer campaign was also a very clear demonstration of the importance of industry alignment around a clear message; dairy specialists worked closely with other industry stakeholders to ensure that there was one clear message delivered to dairy farmers regarding breeding choices.

Profit Monitor is an online financial analysis package used by the Teagasc Advisory Service. It was launched as an online database in 2003 (replacing the earlier Annual Dairy Farm Analysis - ADFA). It is widely used by dairy advisers as a means of identifying strengths and weaknesses of current performance. Discussion groups have also adopted this technology with many groups now including an annual 'Profit Monitor' meeting in their meeting schedule. Key figures from Profit Monitor are also used at all public events. Dairy specialists have facilitated the completion of Profit Monitor by arranging an electronic data transfer of relevant data from the Irish Cattle Breeding Federation database. Profit Monitor completion was one of the tasks to be completed by farmers participating in the DEP. This led to an increase in the numbers of Profit Monitor analysis completed in 2011 and

[8] http://www.teagasc.ie/publications/2012/1590/Abigail_Ryan_KTConference_2012.pdf ; O'Dwyer, T. and Ryan, A. (2011) *BSAS Best Practice Knowledge Transfer*, Thursday 3 March, Worcester.

2012. In 2014, almost 2,100 Profit Monitor analyses were completed by dairy advisers for their farmer clients.

Figure 5.2: Significant events in the delivery of Advisory Services, 1984 - 2014



5.6 Conclusion

In summary, there have been significant changes in the delivery of Advisory Services to Irish dairy farmers in the past 30 years. The Advisory Service is now ready for a return to a milk production environment without milk quotas. It is ready to play its part, in conjunction with other industry stakeholders in supporting Irish dairy farmers to sustainably expand their dairy businesses. Farmers are now looking forward to the potential opportunities for increased milk production. The challenge for the next few years may very well be to influence dairy farmers to adopt innovative grassland management, breeding and cost control technologies that will underpin sustainable milk production into the future.

6 Evolution of the International Competitiveness of Irish Dairy Farming

Fiona Thorne, Trevor Donnellan and Thia Hennessy

Following on from previous chapters where the main focus has been on how the sector has evolved within Ireland, this chapter assesses the international competitiveness position of Irish dairy farms through the milk quota period. This chapter contains an extensive review of the literature on international competitiveness and productivity and draws conclusions on the development of these indicators.

6.1 Background

Attention is increasingly focused on the importance of maintaining and improving the competitiveness of the agricultural sector. Several studies over the last 30 years have compared the performance of the dairy sector at farm level in Ireland with that of other countries. The majority of these studies were undertaken during the milk quota era when relatively stable input and output prices prevailed and the EU agricultural sector was largely insulated from variations in world market supply and demand conditions. Increasingly, it is the case that these factors no longer apply. While the abolition of milk quota opens up new potential opportunities for the Irish dairy sector, these opportunities, as outlined in the Food Harvest 2020 report, will be dependent on our international competitiveness positions (DAFF 2010). It is therefore now timely to review the competitiveness of Irish dairying at the farm level over the past thirty years and to provide an indication as to how the sector might perform in the medium term.

Historically, much of the research in respect of the Irish dairy sector's competitiveness focused on comparisons with other EU MS. As we move towards quota removal, the EU milk sector will become more integrated with the global dairy market. There are several reasons why an increasing focus on competitor countries outside of the EU is now needed. As outlined in chapter 4, EU and world milk prices are beginning to converge. Non-EU countries have managed to grow their exports more than the EU over the milk quota period and farm size has grown more rapidly in these countries. With the expansion of Irish milk production following milk quota elimination, there is increased likelihood that competitors outside the EU will be as, or more important, than those within the EU. This will be particularly the case if Irish dairy processors heavily target increased powder production for non-EU countries rather than looking to grow their presence in the UK or continental EU cheese markets.

This chapter draws on numerous national and international literature sources which focused on relative costs and returns in Irish dairying. For the most part, the EU countries chosen for comparison, within the European Commission's Farm Accountancy Data Network (FADN), include: Belgium, Denmark, France, Germany, Italy, the Netherlands, the UK, and Ireland. Furthermore, additional literature sources reviewed costs and return data in a number of major non-EU milk producing countries.

A section focusing on the measurement of competitiveness is outlined next in the chapter, followed by the results of the literature review and finally some conclusions and implications for future competitiveness of the sector are outlined.

6.2 Concept of Competitiveness

Competitiveness is a much debated term. For the purpose of setting the scene, it is important at the outset to identify what one means by the term. Earlier work by Pitts and Lagnevik (1998) accepted that "*a competitive industry is one that possesses the sustained ability to profitably gain and maintain market share in domestic and/or foreign markets*". For the purpose of this study, profitability is considered as a leading indicator of competitiveness; hence both costs and returns are important in determining competitive position.

Understanding the different measures of cost is also vital in assessing competitiveness. While it is possible to focus on the *cash costs* of production, the wider definition of *economic costs* also includes an estimated value for own land, family labour and non-land assets. To measure competitiveness, costs can be expressed relative to output value, per unit of product or per hectare. The focus of the report is at the farm level. While there are also issues of competitiveness further along the production chain, these are not considered in this report.

Another important issue in measuring competitiveness is the distinction between the different levels of competitiveness. All too often research on the topic of competitiveness tends to focus on indicators of competitive performance and indicators of competitive potential are ignored (Harrison and Kennedy, 1997). Consequently, the indicators presented in this chapter go some way towards identifying the sources of competitiveness in addition to presenting results of competitive performance. The individual measures such as costs as a percentage of output and costs per kg of product volume provide an insight into the competitive performance of the countries examined. However, they do not provide an insight into the sources of competitive advantage or disadvantage. Given that competitive potential is concerned with the availability, quantity and quality of inputs and how they are formulated to produce superior performance (Pitts and Lagnevik, 1998) productivity indicators are considered indicators of competitive potential. However, it is important to highlight the significance of not examining indicators of competitive potential and performance in isolation. For example, indicators of low physical productivity can not necessarily be inferred to mean low competitive potential without reference to comparative indicators of costs of production or profitability, as low production costs may more than compensate for low physical productivity.

Productivity can be examined using partial productivity indicators or Total Factor Productivity Indicators (TFP). Partial productivity indicators by definition examine single inputs relative to outputs, given that these indicators are partial in nature, they only tell part of the story. It is therefore necessary to exercise caution in assessing these indictors since they do not tell the story about substitution between alternative production inputs. An alternative indicator, referred to as Total Factor Productivity (TFP), does take account for substitution between inputs and is probably a more reliable indicator of productivity change over time. However, interpretation and measurement of TFP indicators can be complex. Hence it is still insightful to gauge the relative change in partial indicators over time in order to assist ultimately in the understanding the change in competitiveness.

A total factor productivity (TFP) index compares total outputs relative to the total inputs used in production of the output (with both the output and the inputs expressed in term of volumes). Thus, a TFP index reflects output per unit of some combined set of inputs, so that an increase in TFP reflects a gain in output quantity, which is not originating in an increase of input use (Coeilli at al., 2005).

6.3 Main Findings

6.3.1 Productivity in Irish dairying since 1984 (An Indicator of Competitive Potential)

Agricultural policy in the EU has traditionally focused on farm income improvements and on maintaining the numbers of people working and living in rural areas. Matthews et al., (2007) emphasised that improving productivity has not traditionally been a policy goal of the CAP. Through successive CAP reforms, starting with the MacSharry reforms, the income objectives of agricultural policy have been pursued through direct payments policies. The role of productivity growth and policies to promote productivity, as means of achieving income and other objectives have received less emphasis. However, the policy and market environment within which European and Irish agriculture operate, may now be changing. The budgetary resources for agricultural income support are, for the foreseeable future, going to be (at best) fixed in nominal terms. Increasing policy emphasis will be placed on the environmental impact of agriculture. The challenge for Irish agriculture is how to maintain and increase incomes arising in agriculture, while minimising the environmental impact of agricultural production. This is particularly the case given that evidence from the literature suggests that, in the past, Irish agriculture has fared badly in terms of technology-based productivity growth, a key component of competitiveness, unlike the majority of other EU countries where productivity growth improved after joining the EU (Leetmaa *et al*., 2004).

In this section, recent research analysing various aspects of the productivity performance of the Irish dairy sector are presented. While these studies have not yet been extended to incorporate data following the significant policy changes of recent years, the trends observed allow some interesting insights into how Irish dairying has responded to policy changes in the past thus allowing us to hypothesise as to how the sector might fare in the future.

Productivity studies 1984 - 2000

Newman and Matthews (2004) measured total factor productivity growth in the Irish dairy sector over the period 1984-2000[9]. The analysis was based on econometric modelling which used Teagasc National Farm Survey data to provide estimates of TFP over the time period and to decompose TFP growth into three elements:

- technical change, or the movement in the production frontier over time as a result of research and innovation;
- technical efficiency change, or the change in the gap between the efficiency of the 'average' farm and the efficiency of best practice farms;
- scale efficiency change, or the change in efficiency brought about by changes in the scale of operations on farms.

Table 6.1 presents the overall trend in TFP and the decomposition of the index for the 1984 to 2000 period. Productivity performance is also presented in terms of linear growth rates, estimated by fitting a linear regression line to the productivity trend, for the sample period as a whole and for three sub-periods, <1984-1989>, <1989-1995> and <1995-2000>.

[9] The results presented in this review are based on a synopsis provided in Matthews *et al.,* (2007).

Table 6.1: Productivity change and decomposition on Irish dairy farms 1984-2000[a]

	Technical change	Efficiency	Returns to scale	Total Factor Productivity
Dairy	122.91	99.15	99.82	121.65
	Linear growth rates (%)			
1984-2000	1.42	-0.19	-0.01	1.20
1984-1989	0.65	0.24	-0.01	0.89
1989-1995	1.48	-0.49	-0.01	0.95
1995-2000	2.32	0.18	-0.01	2.48

[a] Base = 1984 (100.00)

Source: Newman Matthews (2004)

Table 6.1 shows that TFP grew slowly in the dairy farm system at the beginning of the period with productivity gains of approximately 0.9 per cent per annum. However, in more recent years of the sample period productivity grew at a linear rate of almost 2.5 per cent per annum yielding an overall increase in total factor productivity of almost 22 per cent for the period from 1984 to 2000 as a whole.

The overall growth in productivity in the dairy system was driven by technical progress at an average rate of 1.42 per cent per annum, increasing over the time period. The efficiency gap between the average farm and the best practice farm on the whole remained despite a widening in the gap between 1990 and 1997. This may reflect the quickening pace of technical progress observed where leading-edge farmers innovate more quickly than average farmers. It may also reflect the growing impact of direct payments following the MacSharry CAP reform on the ancillary enterprises on dairy farms, which removed any incentives for efficiency improvements in these enterprises. A noticeable result is the improvement in average efficiency levels evident in the third period while the best practice frontier shifted outward at a linear rate of 2.32 per cent per annum. This result is indicative of the fact that not only did the 'best' dairy producers adopt more efficient technologies at an increasing rate, but also the average producers increasingly managed to keep up. Matthews et al., (2008) surmised that this may reflect structural change in the system with the more rapid exit of less efficient producers from the industry in the period between 1995 and 2000.

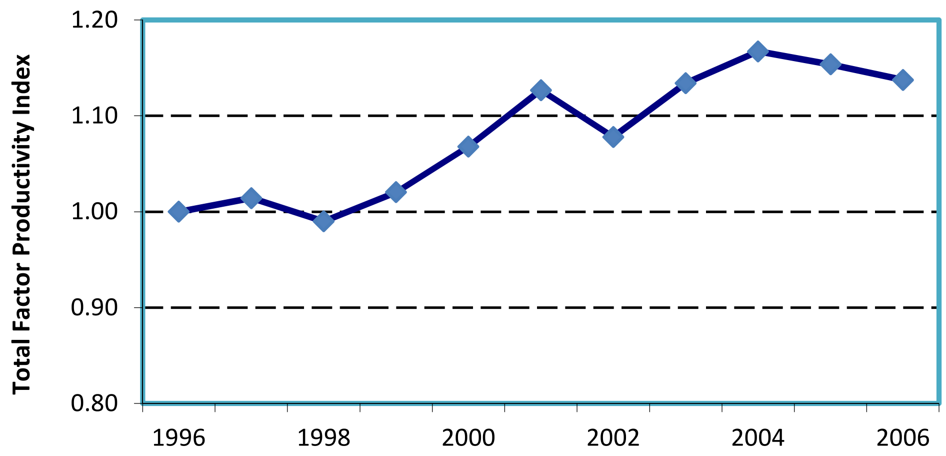
Overall the results in Newman and Matthews (2004) showed that productivity grew at a linear rate of just over 1 per cent per annum between 1984 and 2000. Boyle (1987) estimated a total productivity growth rate of just over 1 per cent for the 1960 to 1982 period (for all of Irish agriculture) suggesting that productivity growth between 1960 and 2000 remained fairly steady. On a more positive note for the dairy sector, the Newman and Matthews (2004) study showed that productivity rates increased as time progressed from 1984 to 2000, whilst the results for agriculture as a whole showed that productivity increases were at a slower rate in later periods. This later finding relating to the wider agricultural sector is consistent with other estimates of slowing productivity growth in wider agriculture derived using other methodologies. For example, Matthews (1999/2000) found an annual rate of total factor productivity growth in Irish agriculture of 2.3 per cent per annum in the 1980s falling to 0.8 per cent annually in the 1990s. O'Neill *et al*. (2002), using farm level data and an aggregate model of Irish agriculture, found that productivity growth slowed from an estimated 2.3 per cent annually between 1984 and 1989 to an annual average rate of 1.5 per cent between 1990 and 1998. It must be remembered however that whilst dairy farming did show improved productivity performance throughout the period, this is from what Matthews et al., (2008) says might be considered a weak performance in the second half of the 1980s. Newman and Matthews (2006) suggest that relatively poor productivity growth in the 1984-90 period may reflect the productivity cost of the dislocation and adjustments required on dairy farms immediately following the introduction of the quota regime. On this interpretation, the acceleration of productivity growth in subsequent sub-period may reflect the re-establishment of more 'normal' growth rates as farmers learned to live with the quota regime and as the regime in more recent years became less restrictive.

Productivity studies since 2000

Carroll et al (2008) revisited the issue of TFP change in Irish agriculture using econometric models again based on Teagasc NFS data for the time period 1996 to 2006. This research used a number of different econometric models and compared results between them, with the overall trend in TFP similar in each model. The average of the four econometric models examined showed an increase of 15 per cent over the time period for specialist dairy farms, which was equivalent to approx. 1.5 per cent average annual growth rate over the period (see Figure 6.1). Whilst, the methodologies employed in previous studies by Boyle (1987) and Newman and Matthews (2004) were not directly comparable to the Carroll study, it does appear that annual TFP growth levels are not dissimilar for the more recent time period.

Similar to Newman and Matthews (2004) the main driver of overall TFP in the Carroll study was technical change. Furthermore, it was also apparent that farms became more scale efficient over the period 1996 – 2006 (i.e. producing at a more optimal size). This was depicted by the scale efficiency index (sub component of TFP) which increased by around 4.5 per cent (average) for the entire sample period. Finally, no major increases in mean technical efficiency (otherwise referred to as managerial ability) over the entire period were observed.

Figure 6.1: Weighted Cumulative TFP Change for the Dairy sector (1996-2006)



Source: Carroll et al., (2008)

International Productivity Comparisons

Harmonised data are not available on the TFP performance of other EU and non EU countries on a sector specific basis which would be necessary to come to a conclusion on how relative productivity has changed. However, it can be said that in absolute terms the overall productivity performance of Irish agriculture, including the dairy sector, in general between 1984 and 2006 was poor. Hadley (2006), for example, reported rates of technical change for England and Wales, for arable farms in the range 3.7 to 5.2 per cent annually, and for livestock farms (excluding pigs and poultry) of between 2.0 and 3.3 per cent.

Further evidence of the poor relative productivity performance of Irish agriculture in recent years has been shown by Haniotis (2013) where TFP change between 2000/2002 and 2009/2011 was examined for the EU-27. While this analysis was not dairy specific, the conclusions made in the afore mentioned study relating to poor relative land and labour productivity are consistent with the trend in partial productivity indicators found in various studies of competitiveness outlined later in this chapter. For example, Donnellan et al.(2011), found that compared with key competitor EU MS, namely, Belgium, Denmark, France, Germany, Italy, the Netherlands and the UK, Irish milk production was characterised by low yields. On average, productivity per ha and per labour unit in dairying in Ireland was low relative to competitors in the EU15 over the period 1996-2010. Even when adjustment was made for farm size, productivity in Ireland was below the average of key competitors in the EU15. This is a reflection in part due to the low input system of production in Ireland compared to the EU average. Donnellan et al., (2011) also examined the trend over time in relation to the various partial productivity indicators for the years 1996 to 2010. Whilst partial productivity indicators for Ireland did increase over time, for example milk yields per cow increased; this significant trend did not translate into relative terms, with other important EU milk producing countries also exhibiting increases in partial productivity indicators over time. Hence, Ireland continued to remain below average productivity over time relative to other important EU milk producing countries.

6.3.2 Studies on the Competitive Performance of Irish dairying

In 2000, the national agricultural strategic vision document, co-ordinated by the Department of Agriculture, Food and Rural Development, which outlined the vision of the sector for the next ten years, made a recommendation relating to '*the collection and publication on a regular basis of key competitiveness indicators, with appropriate international comparisons*" (DAFRD, 2000, p.40). In response to this recommendation, economists within Teagasc, initiated a new research project which identified appropriate indicators of competitiveness and calculated them for the period 1996 – 2000. These indicators provided a baseline upon which competitiveness of Irish agriculture has been examined on a regular basis ever since. The results from this indicator work (1996 – to date), coupled with a literature review covering the period 1984 – 1995, are outlined in detail in the remainder of this chapter.

Whilst Teagasc initiated regular monitoring of competitiveness of the sector in the early noughites, there were also a number of studies that were published before this time and since milk quotas were introduced. The methods and data employed in these studies differ which makes direct comparability of the results difficult. One of the major differences in terms of how competitiveness was measured in the studies reviewed here relates to the definition of production costs, particularly around the inclusion of imputed costs for owned resources such as land, labour and capital. For the purpose of comparability, where possible, the definition of costs in previous studies have been re-estimated in this section to conform with the cost classification adopted by Boyle (2002) and Thorne (2004) to allow cash costs and total economic costs to be evaluated separately. A brief summary of how alternative levels of costs are defined here:

(i) Total cash costs, which include all specific costs, directly incurred in the production of a given commodity, for example fertiliser, feedstuffs, seeds etc. plus external costs such as wages, rent and interest paid.

(ii) Total economic costs, which includes all of the cash costs identified above, except interest charges, plus imputed resource costs for family labour, equity capital and owned land.

The valuation methods adopted for the measurement of opportunity costs for family labour, owned land and other non-land capital were as follows:

- Family labour was assigned an opportunity cost equal to the cost of hired labour.
- Owned land was assigned an opportunity cost equal to the cost of rented land in each of enterprises studied. This approach follows the methodology adopted by Boyle et al., (1992), Boyle (2002), and Fingleton (1995).
- Non-land assets were valued using a nominal interest rate plus economic depreciation for each of the countries for each relevant year.

Sources of Data

The Farm Accountancy Data Network (FADN) was the primary source of data used in the literature for examining costs and returns of the dairy enterprise within the EU. The aim of the network is to gather accountancy data from farms for the determination of incomes and business analysis of agricultural holdings. The network consists of an annual survey carried out by the Member States of the European Union. Derived from national surveys, the FADN is the only source of micro-economic data that is harmonised, i.e. the bookkeeping principles are the same in all the countries. The information collected, for each sample farm, for each member country is transmitted by Liaison Agencies (FADN, 2015). Teagasc is the liaison agency for Ireland.

Currently, the FADN annual sample includes approximately 80,000 holdings. They represent a population of about 5 million farms in the EU Member States, which cover approximately 90 per cent of the total utilised agricultural area (UAA) and account for more than 90 per cent of the total agricultural production of the Union.

FADN data itemises costs on a whole farm basis only, and there some cost allocation methods were employed in this analysis. For the majority of cost items, whole farm costs were allocated to the specific enterprise activity according to the share of specific enterprise output in total farm output. A number of exceptions to this general rule were adopted for individual cost items at the enterprise level. This allocation method was based on that used by Fingleton (1995) and further developed in a similar study carried out by the FADN (Vard, 2001). Further details on these allocation methods can be obtained in Thorne (2004).

In addition to the comparison of costs within Europe, international cost competitiveness was examined in a number of studies using harmonised data from the International Farm Comparisons Network (IFCN) (Hemme et al., various years). The IFCN is a world-wide partnership that links agricultural researchers, advisors and farmers to create a better understanding of milk production and the costs and returns of production worldwide. The cost calculations within the IFCN network are based on individual representative farms, rather than on the results from stratified random samples of the population as is the case with FADN data. Nonetheless, IFCN data provide a source which can be used to examine the relative international competitiveness of 'representative' Irish milk producers. Like the methods outlined above, IFCN data also presents costs as total 'cash' costs and total 'economic' costs with opportunity costs calculated for farm-owned factors of production.

Studies from 1983/84/85

One of the most comprehensive and earliest studies on the topic of dairy competiveness in the EU was published by Butault et al (1993) based on EU FADN data for the years 1983/1984/1985. A detailed review of the methods used in this study will not be outlined here[10] but some features are identified in order to contrast the results with other studies reviewed:

- Two measures of competitiveness were used in this study, estimated expenditure on farm inputs expressed per 100 kg of product output and as a percentage of output value.
- The Butault et al., (1993) study does not base their cost of production estimates on specialist farm categories as do most other analyses reviewed below. This study used a statistical procedure to allocate production costs to the different farm products produced, hence resulting in product rather than enterprise based production costs.
- No imputed costs were estimated for owned land or the opportunity cost of capital which was financed from own resources.

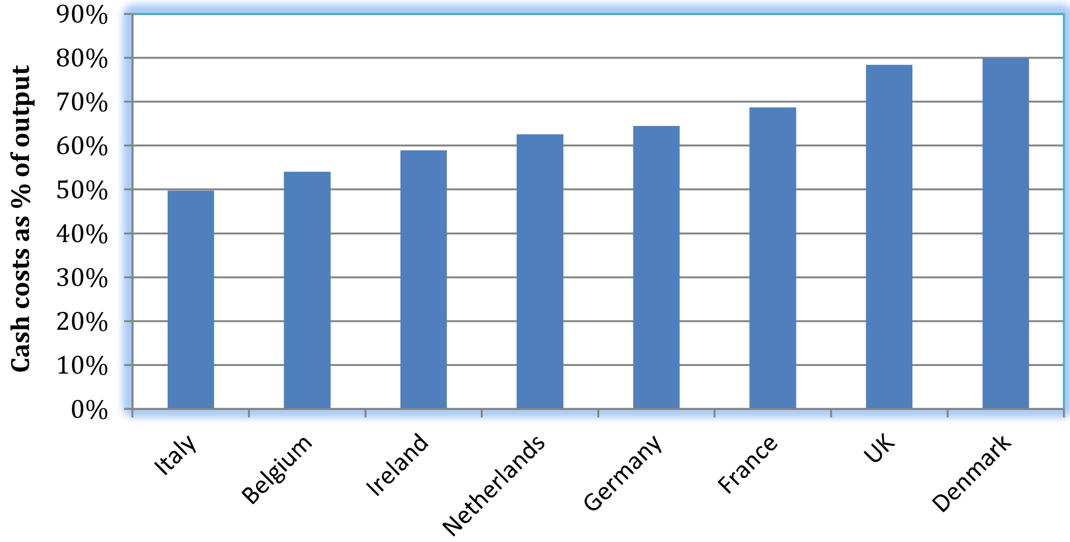
Given the level of detail provided in the original paper the only competitiveness indicator that was possible to compute, based on the cash and economic cost definitions provided previously, was cash costs as a percentage of output value. Figure 6.2 shows that Butault et al. (1993) clearly indicated that on a cash cost basis Ireland had a significant competitive advantage around the time milk quota was introduced in Ireland, compared to other important EU milk producing countries, with cash costs as a percentage of output 9 percent lower than the average of other EU countries examined. However, further discussion in the Butault paper indicated that the inclusion of family labour eroded some of the competitive advantage in milk production in Ireland.

Murphy (1987) also examined the impact of imputed costs on the competitiveness of the Irish dairy sector at the farm level using data from the 1984 FADN dataset. Murphy developed an index of comparative advantage which was measured as the ratio of 'Domestic Resources Costs' to 'Domestic Resource Value', which implied the lower the ratio, the greater the comparative advantage. All costs of production, including an opportunity cost for owned resources were included in the Murphy (1987) analysis, which led Boyle (2002) to conclude that '*these findings based on total costs would not lead one to conclude that Ireland has a competitive advantage over our European counterparts*'.

[10] A discussion of the statistical procedure and its shortcomings can be found in Bureau and Cyncynatus (1991).

When Murphy excluded costs associated with land and family labour the competitiveness ranking for the Irish dairy sector improved.

Figure 6.2: Cash Costs of Production: as a per cent of output (1983/84/85)



Source: Authors' own analysis based on data presented in Butault et al., (1993)

1989

Boyle (2002) cited the Kelly and Fingleton (1983) study as one of the very early competitiveness analysis of the EU dairy sector. This research used FADN data for specialist dairy farms across a range of EU countries to estimate variable costs per 100kg of milk output produced using data from 1977. Boyle et al., (1992) updated the original work by Kelly and Fingleton, using 1989 exchange rates, to arrive at 1989 cost levels. This exercise indicated that Ireland had the lowest variable costs per unit of raw milk when compared with Germany, France, the Netherlands, Belgium, the UK or Denmark (see Figure 6.3)[11].

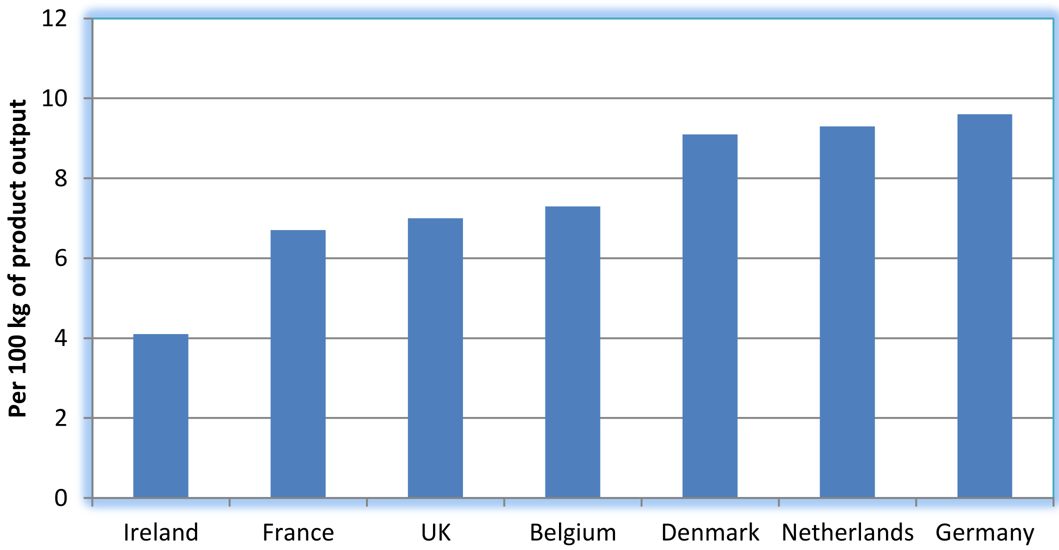
Boyle (1989) also looked at variable costs of production across EU dairy producing regions using FADN data, based on original data from 1979 to 1984, and updated to 1989 based on movements in exchange rates. Unlike Kelly and Fingleton, output values were considered by Boyle (1989) producing two indices of competitiveness; the "ratio of variable costs to gross margin" and the "difference between the milk price and variable production costs" per unit of milk output. Both Boyle's 1989 results suggested a clear-cut competitive advantage relative to the average of European producers when variable costs and output value were considered.

Other studies examined the costs of milk production in a non-EU setting[12]. Baker *et al,* (1990) examined total "economic" production costs (inclusive of imputed costs for family labour, owned land and capital (including an estimate of quota values)) per unit of output. Total "economic" production costs were assembled for 1986. The countries included in the analysis were Canada, the former West Germany, France, Ireland, the Netherlands, New Zealand and the US. The data were

[11] Kelly and Fingleton (1983), updated by Boyle et al., (1992), only examined variable costs of production and not cash costs of production. Furthermore, the value of milk output was not considered.
[12] This review of non-EU studies is based on the review by Boyle (1992).

generated from individual countries and harmonisation was attempted by the authors. On the basis of their analysis Ireland emerged as strongly competitive even on a global basis. New Zealand appeared to have only marginally higher total economic costs of production per 100kg of product output. When variable costs were considered Irish and New Zealand variable costs appeared to be identical. Boyle (2002) did caution about the absolute magnitudes of the costs reported in this study, in particular the fixed costs for Ireland appeared to be relatively low when compared to the FADN dataset.

Figure 6.3: Variable Production Costs: (1989 – based on original data from 1977)



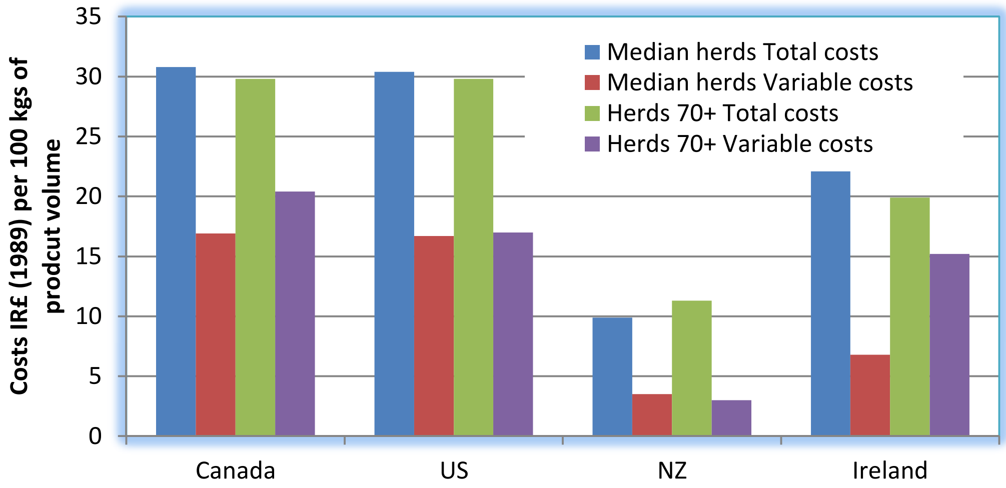
Source: Boyle et al., 1992, based on Kelly and Fingleton (1983)

On the contrary, Boyle (2002) refers to the approach followed by Isermeyer (1988) as one of the most authoritative and thorough studies of its kind to that date (relating to global dairy costs of production). Comparative global costs of milk production which included Ireland, examined total "economic" costs of production, including estimates of family labour, owned land and capital, for the year 1983, and subsequently updated using the 1989 IR£/ECU exchange rate by Boyle (1992). Isermeyer (1988) is his original study compared total costs per 100kg of milk output in Canada, US, New Zealand, Ireland and a range of other EU countries (Figure 6.4).

Figure 6.4 shows that for the median-size production unit, total costs in Ireland were significantly lower than other high volume producing countries, such as Canada and the US. However, total costs in Ireland appeared to be over twice those in New Zealand. For farms with 70 and more cows a similar trend was observed; with New Zealand's variable costs less than a third of Ireland's and total costs in New Zealand about half those recorded for larger farms in Ireland.

The final study which examined the competitiveness of the Irish dairy sector using 1989 as the reference year was Boyle et al. (1992). This study also used FADN data to examine costs as a percentage of total output and costs per kg of milk output volume for Ireland compared to a range of EU countries. In the original study costs were expressed according to what the author refers to as 'explicit costs' and 'explicit costs plus imputed costs for owned resources'. This costing was reworked for the current exercise to define cash costs and economic costs as explained earlier in the methods section of the chapter, to make the results comparable with later studies. Figure 6.5 shows, similar to previous studies, that cash costs were lower in Ireland than competing milk producing countries within the EU, whilst the opposite was the case when total economic costs were considered. Ireland had cash costs as a percentage of output 11 per cent below the average of all countries examined, whilst total economic costs as a percentage of output were 9 percent above the average.

Figure 6.4: IRL vs non-EU milk producers: Variable & Total Costs of Production

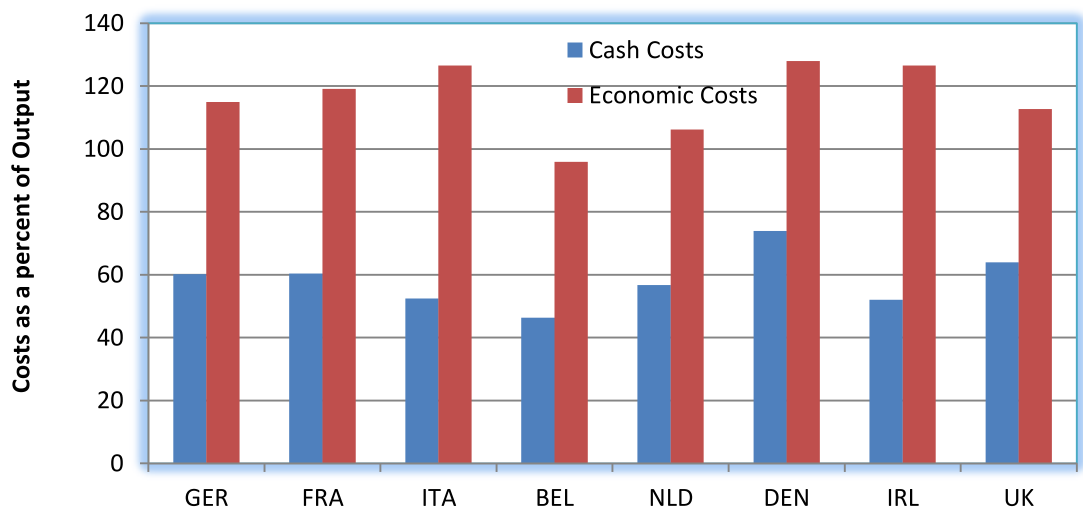


Source: Boyle et al., 1992, based on Isermeyer (1988)
Note: (1989 – based on original data from 1983)

<u>1989-1993</u>

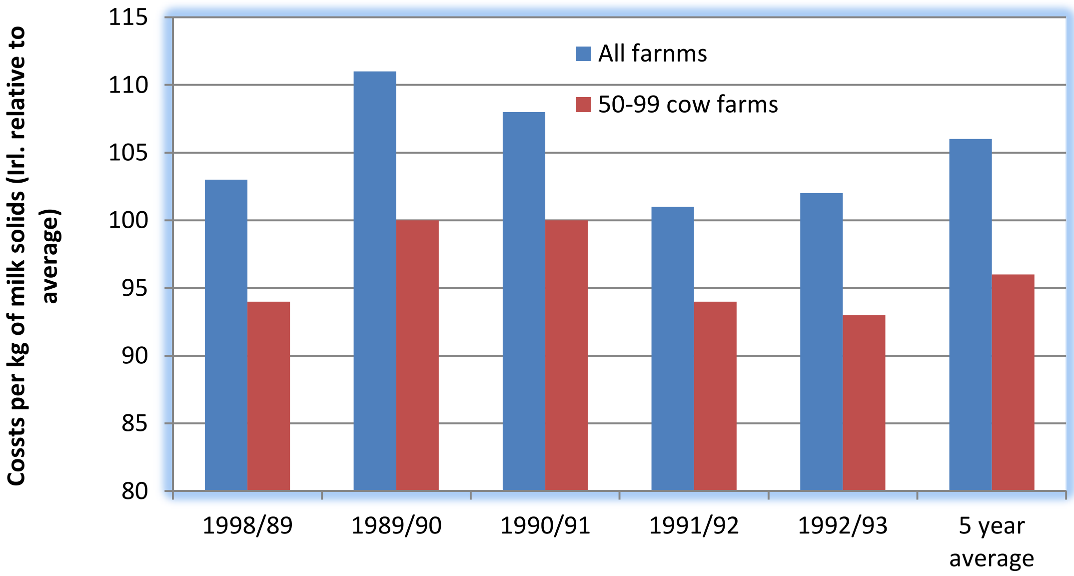
Fingleton (1995) also used the FADN to examine the cash and economic cost position of Irish dairy farms in an EU context, using data from 1988/89 to 1992/93. Similar to previous studies the relative position of the average Irish dairy farm was positive when cash costs were considered and slightly less so when economic costs were examined. What was most noteworthy from the Fingleton (1995) study was the position of the larger size Irish dairy which exhibited a relatively strong competitive performance in economic cost terms (Figure 6.6).

Figure 6.5: Cash and Economic Costs of Irish and EU producers as a percentage of output (1989)



Source: Based on Boyle (1992) and authors' re-calculations to reflect cash and economic cost definitions

Figure 6.6: Ireland versus EU milk producers: Economic Costs per kg of Milk Solids (1989)

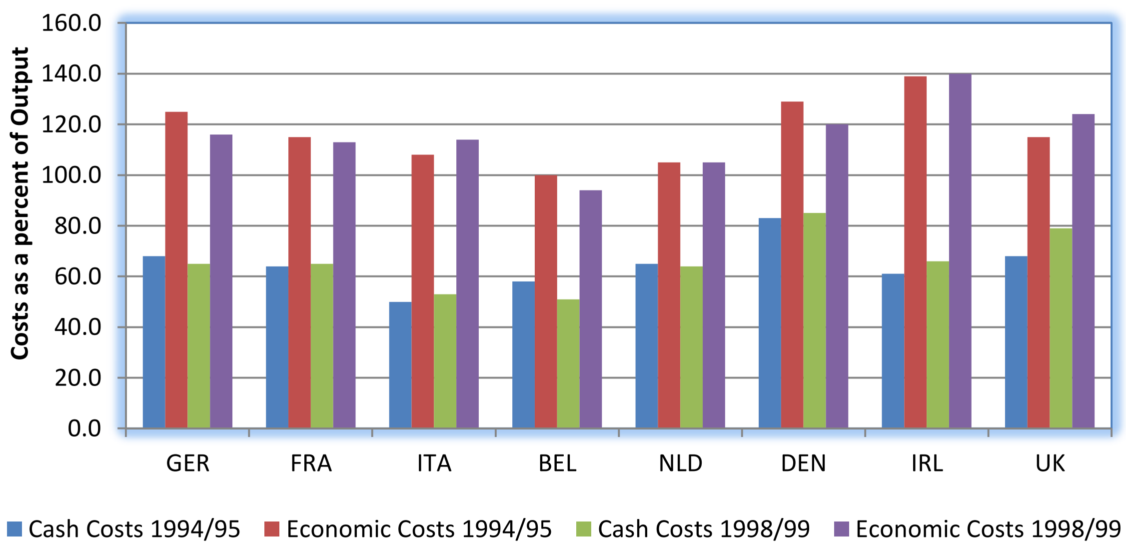


Source: Fingleton (1995) [13]

<u>1994-1999</u>

Boyle (2002) revisited the issue of competitiveness in the diary sector. This analysis used cash and economic costs again to compare the relative competitiveness, based on FADN data for 1994/95 and 1998/99. The results outlined in Figure 6.7 show a slight deterioration in the costs (both cash and economic) as a percentage of output for Ireland relative to the 1992 study presented above.

Figure 6.7: Cash & Economic Costs of Irish & EU as a % of Output (1994/95 and 1998/99).



Source: Boyle (2002)

[13] Boyle (1995) examined the relative position of Irish dairy farms to comparator EU counties, including and excluding Italy. On a costs per kg of milk solids basis Fingelton said it was probably more useful to use the indicator excluding Italy, which is what is presented in this figure.

In 1988/89 the cash cost index for Ireland was just under 90 percent of the EU average but by 1998/99 the position had deteriorated and Ireland was just about the average EU level. Boyle attributed part of this decline in Ireland's relative positioning to a decline in product prices. This finding did cause some concern at the time, as to whether or not this trend might continue into the future. Consequently, the initiation of the monitoring of competitiveness indicators for the sector by Teagasc in the early 2000's was considered timely.

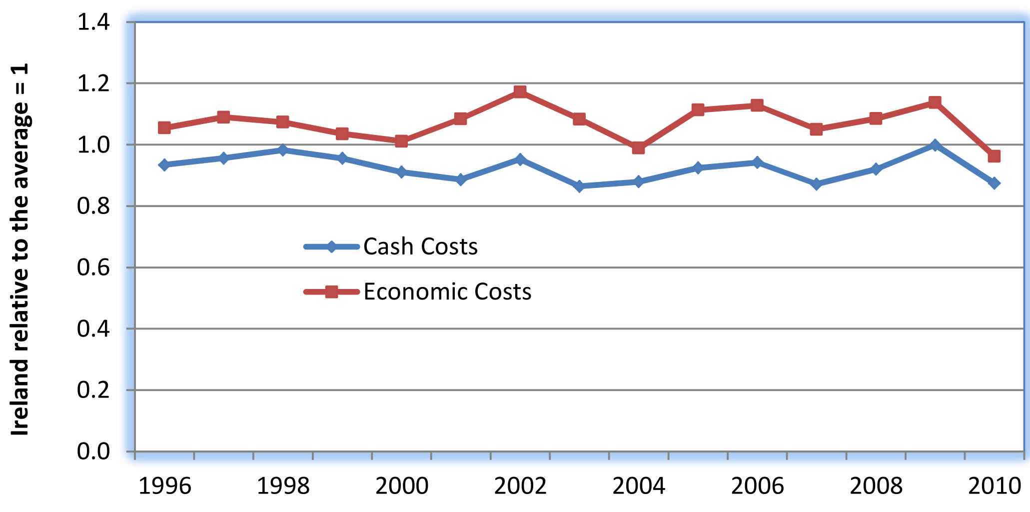
1996- to date

As explained earlier in the chapter Teagasc initiated a process of regular monitoring of the competitiveness of the sector in the early 2000s and a summary of the time line of results from its base period 1996 to the latest available data is provided in this section. A detailed overview of the results of this research can be found in Thorne (2004), Carroll et al. (2008) and Donnellan et al. (2011).

Whilst the Boyle (2002) study showed that there was a slight deterioration in the competitive position of the average Irish dairy farm in the second half of the 1990s, the results from Thorne (2004), Carroll et al, (2008) and Donnellan et al.(2011) did not show a continuation of this trend. Using the cost relative to output value approach, on a cash costs basis, Ireland continued to appear quite competitive from 1996 through to 2010, when compared against key competitor EU MS, namely, Belgium, Denmark, France, Germany, Italy, the Netherlands and the UK (Figure 6.8). Consistent with the story from previous studies, when total economic costs were considered, the competitive position of the average Irish dairy farm was not as positive.

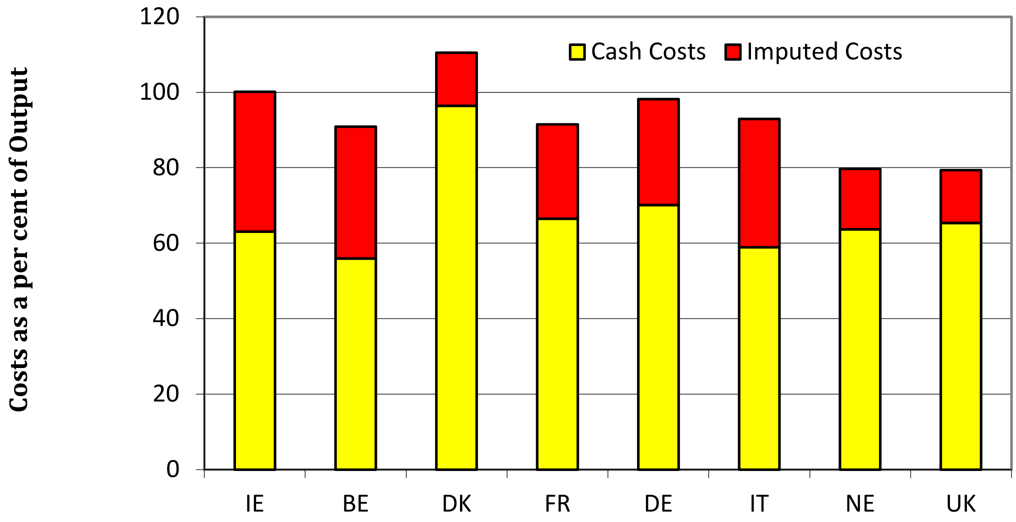
The most significant imputed cost that contributed to the relatively high total economic costs experienced in Ireland over the period was that for owned land. This was due to the relatively high rental charge used to calculate the imputed value for owned land, coupled with high levels of land ownership in Irish dairy production. (Note that if land is rented, it appears as a cash cost, whereas if it is owned it appears as an imputed cost). The relatively low stocking rates and milk yields per hectare on Irish dairy farms over the period must also be considered as a contributing factor.

Figure 6.8: Cash & Economic Costs as % of Output Value: IRL vs average of selected EU15 MS



Source: Thorne, 2005; Carroll et al., (2008) and Donnellan et al., (2011) To gain a deeper understanding as to what countries within the EU poses a competitive challenge for Ireland, Figure 6.9 shows the actual data for Ireland compared to the key comparator countries based on data provided in Donnellan et al. (2011). Consistent with the story outlined to date, it is apparent that Ireland had relatively low cash costs as a percentage of output for the period 2008-2010.

Figure 6.9: Cash & Economic Costs for specialist Milk Producers in EU (2008-2010)



Source: Donnellan et al. (2011)

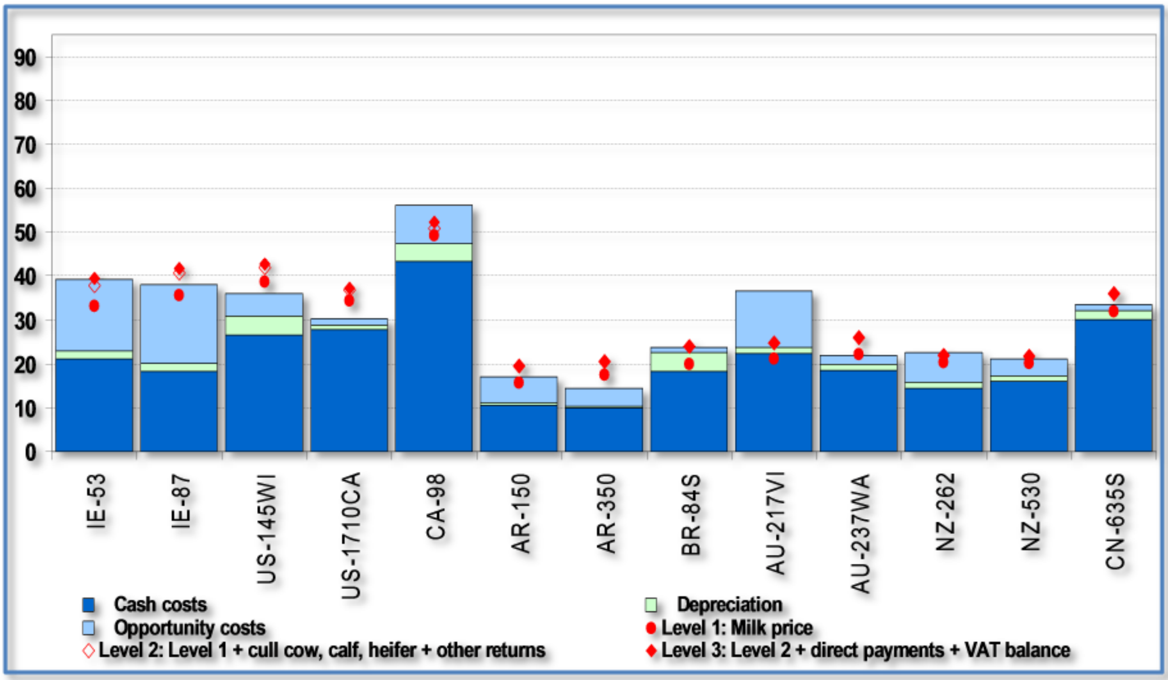
Belgium had the lowest cash costs as a percentage of output, but the cost structure in Italy and Ireland were only slightly higher. The highest cash costs as a percentage of output was experienced in Denmark. When total economic costs were considered the competitive advantage experienced by Irish producers deteriorated when all imputed charges for owned resources were taken into consideration. Total economic costs as a percentage of output were highest in Denmark where costs were 111 per cent of the dairy enterprise output (2008-2010). Ireland followed with the second highest total economic costs at 103 per cent of output (2008-2010). The lowest total economic costs were experienced in the Netherlands, where 20 per cent of dairy output remained as profit for dairy producers on average over the period (i.e. total economic costs were 80 per cent of total dairy output).

On a cost per unit product basis, Ireland also tended to be above the EU15 comparator country average when full economic costs were determined. High land prices are seen to have adversely affected the competitiveness of the Irish dairy sector. When farm size is controlled for, the variation in total economic costs per unit output across MS was much reduced.

Also consistent with previous studies by Boyle (2002) and Fingleton (1995) when larger specialist dairy farms were examined, total economic costs for this sample of farms were generally substantially lower than the average EU farm position. For example in Ireland for the period 2008-2010, total economic costs as a percentage of output were reduced by just over 20 percent, when the larger size farm were compared to the average size farm. While Ireland still remained as a comparatively high total economic cost producer for farms with 50-99 dairy cows, the gap with other EU countries was narrowed for these larger specialist producers.

Thorne and Fingelton (2006) and Donnellan et al. (2011) also examined the competitiveness of the average and larger Irish dairy farms in comparison to key non-EU dairy producing regions using data from the International Farm Comparisons Network (IFCN). The comparisons based on the IFCN data were based on a 'two-tiered' basis, (i) cash costs and (ii) economic costs compared to milk price received. The US dollar was chosen as the common currency measure for all countries' results. Thorne and Fingleton (2006) in Figure 6.10 showed that cash costs per unit of milk production were reasonably positive for the Irish farms examined. Canadian dairying was shown to have by far the highest cash costs (and also the highest total economic costs) followed by farms in the US which also had relatively high cash costs, whereas the Australian, Brazilian and Irish farms had a similar intermediate level of cash costs. Furthermore, unit cash costs were substantially lower on Argentinean farms and also somewhat lower on the farms in New Zealand. However, Ireland's comparative position deteriorated very substantially when total economic costs were compared. Canada continued to have the highest costs when total economic costs were considered, but the Irish farms occupied the next highest position, with the Australian-Victoria and the US-Wisconsin typical farms at a slightly lower level. Typical farms in Argentina, New Zealand, Brazil and Western Australia exhibited the strongest long term competitive position in 2004. Finally, as in the Irish situation, there were only a few countries where the price of milk was greater than total economic costs per unit. These farms were in the US, Argentina and Western Australia. Perhaps surprisingly given the size of the dairy farms in New Zealand neither the 'average' nor the 'larger' typical farms could show a positive economic margin over milk price.

Figure 6.10: Cash, Economic Costs & Returns per 100kg of milk: IRL v selected countries (2004)

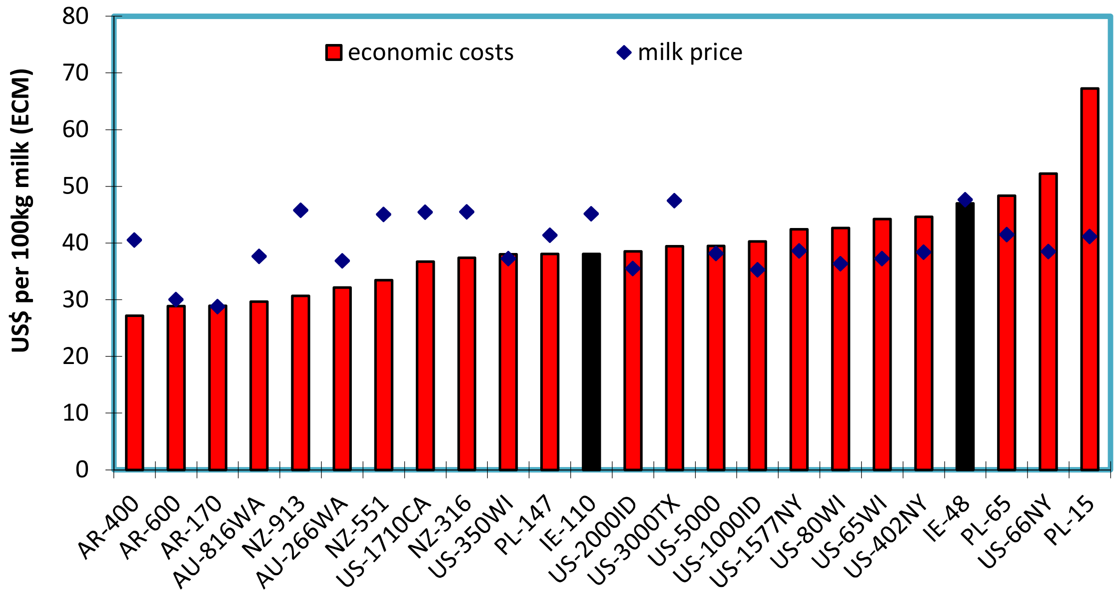


Source: Thorne and Fingleton (2006) based on IFCN data for 2004

Donnellan et al. (2011) revisited the IFCN dataset and compared two representative Irish farms, a 48 cow farm (IE 48) and a 110 cow farm (IE 110) to typical farms in Australia, New Zealand, America, Argentina and Poland, based on data from 2008-2010. Consistent with the previous story, typical Irish dairy farms appeared to have a relatively good position compared to most other dairy countries examined in the analysis with only New Zealand and the larger size farms in Argentina showing comparable profit margin levels (i.e margin over cash costs). The typical US farms in Wisconsin, California and Texas and the larger size typical farm in Poland were in intermediate positions in terms of margin over cash costs. But the results from typical farms in Idaho and the North East of the US and the small family run farm in Poland were reported to have significantly higher cash costs per kg of milk than farms in competing countries. This meant that for the years 2008-2010 the afore mentioned typical farms struggled to maintain a positive margin over cash costs. Therefore, those farms would be most vulnerable to a cost-price squeeze.

When Donnellan et al., (2011) examined total economic costs relative to milk price, the competitive position of the Irish dairy sector beyond the EU15 deteriorated very substantially for the smaller size Irish dairy farm (Figure 6.11). However, the larger size Irish dairy farm did exhibit somewhat lower total economic costs than the average size Irish farm, appearing about midway in terms of total economic costs amongst the typical farms examined. The lowest per unit total economic costs were in Argentina, Australia and New Zealand for 2008-2010. From an Irish perspective, it is reassuring to note that for the years 2008 to 2010 the larger size Irish dairy farm did manage to receive a margin over total economic costs, which is noteworthy given that a large proportion of typical farms in the countries examined did not derive a positive margin over total economic costs.

Figure 6.11 Milk Price & Economic Costs of Production: IRL vs selected countries (2008-2010)



Source: Donnellan et al.,(2011) based on IFCN data and authors own estimates

6.4 Concluding Remarks and Implications for Future Competitiveness

In this concluding section we attempt to summarise the results from the alternative sources consulted in this chapter in so far as is feasible given the differences in data sources and methods used. The timeline graphic in Figure 6.12 summarises the evolution of competitive performance indicators for the Irish dairy sector at farm level over the milk quota period.

Within the EU, we have seen that the Irish dairy sector began the era of milk quotas in the early 1980s with a relatively low cash cost position relative to its main competitor countries within the EU. Over the next 15 years or so various studies confirmed the relatively low cash cost position of Ireland within the EU context. However, issues associated with relative total economic costs for the average Irish producer were highlighted by a number of these studies. When the larger size Irish dairy farm was examined within the EU context the outlook for longer term competitiveness was more re-assuring, with total economic costs on a par or slightly lower than the EU average.

In the mid to late 1990s there was some concern that there was an apparent decline in the relative competitiveness of the average size Irish producer whereby the competitiveness index based on cash and economic costs declined. However, later research published in the 2000s showed that throughout the late 1990s and 2000s that Ireland continued to maintain a relative advantage in cash cost terms within the EU. Furthermore, the larger size Irish dairy farm also continued to maintain a relatively healthy competitive position amongst important international dairy producing regions, albeit not at the lowest cost level.

In summary, the results from this review of competitiveness indicators indicates that given the removal of milk quotas there are likely to be greater opportunities to increase farm size, which may improve the competitive position of the dairy sector. However, the review of productivity suggested that the Irish dairy sector has struggled to achieve growth rates witnessed elsewhere in the EU and beyond. However, without the constraints of milk quota policy, which in part was attributed to the relative evolution of productivity over time in Ireland, it is expected that productivity gains will contribute more so to longer term competitiveness of the sector in the post quota period.

Finally, authors such as Rabobank (2015) have highlighted various structural and organisational factors which may impact on the pattern of milk production within the EU post quota. Whilst this chapter has provided a strong economic argument as to why Irish dairy farmers enjoy a relative competitive position within the EU, especially the case for the larger Irish farm, it must be remembered that additional factors, other than those outlined in this chapter will contribute to dairy prospects. Further details of such factors are provided in chapter 7.

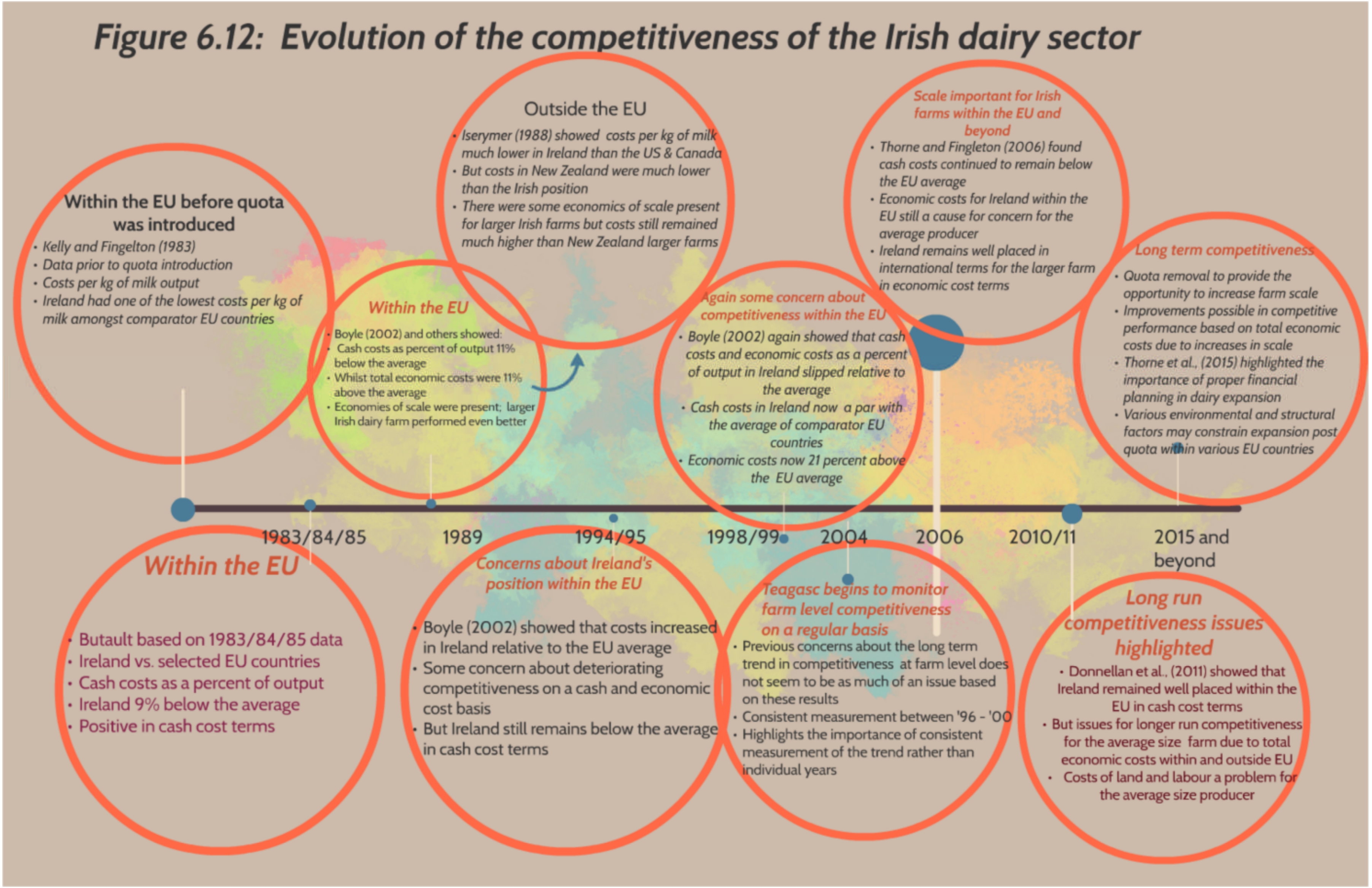


Figure 6.12 Evolution of the competitiveness of the Irish Dairy Sector

7 The Dairy Sector Post Milk Quotas and the Impact on the Economy

Trevor Donnellan and Thia Hennessy

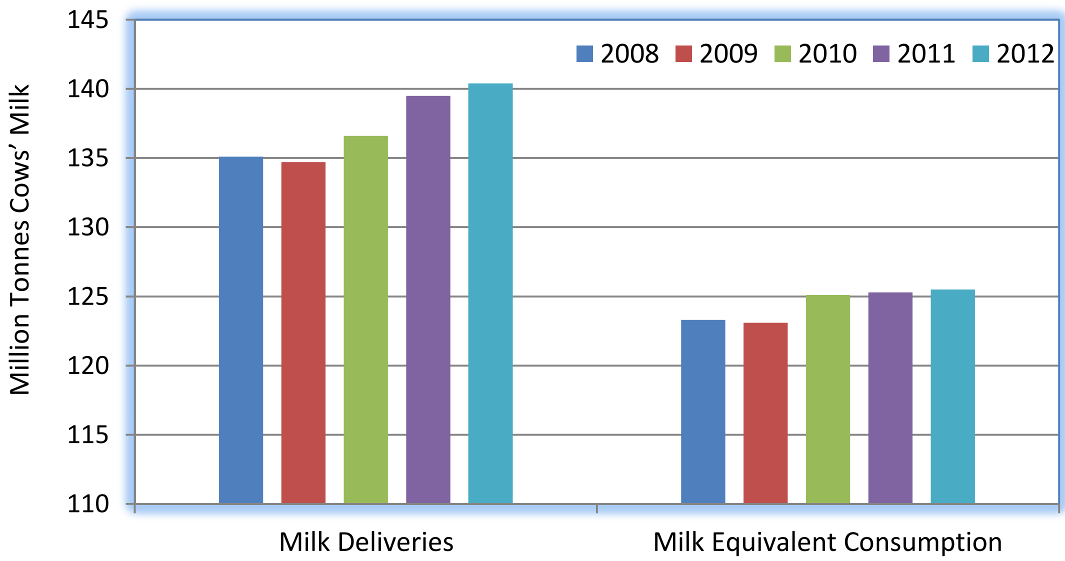
The EU dairy sector has now reached a point where milk quotas have been removed. In this chapter the current EU dairy market situation is described, the regions of the EU where milk production is most likely to grow are identified and the constraints to dairy expansion that will exist after milk quotas are discussed. At an Irish level, expansion prospects for the dairy sector over the medium term are explored along with a discussion of the associated investment requirements.

7.1 Factors that will influence EU level dairy prospects at a Member State level to 2020

The global dairy market has been subject to strong consumption growth in recent years, driven by a growing world population, rising real incomes and consumer trends in developing countries which favour the increased consumption of dairy products. Dairy products also have a relatively limited number of less expensive substitutes.

Consumption growth is strongest in regions globally where dairy production is not traditional and producers in these regions have been unable to expand production at a rate that is in line with the growth in local demand. This has created increased international export opportunities for dairy products and has led to an increase in international dairy product prices over the last decade. Regions of the world with a surplus in milk production such as the EU, US and Oceania have benefitted from these export opportunities, albeit in the case of the EU relatively static production surplus has limited the capacity to exploit these opportunities. EU milk production and consumption (in milk equivalent terms) are shown in Figure 7.1.

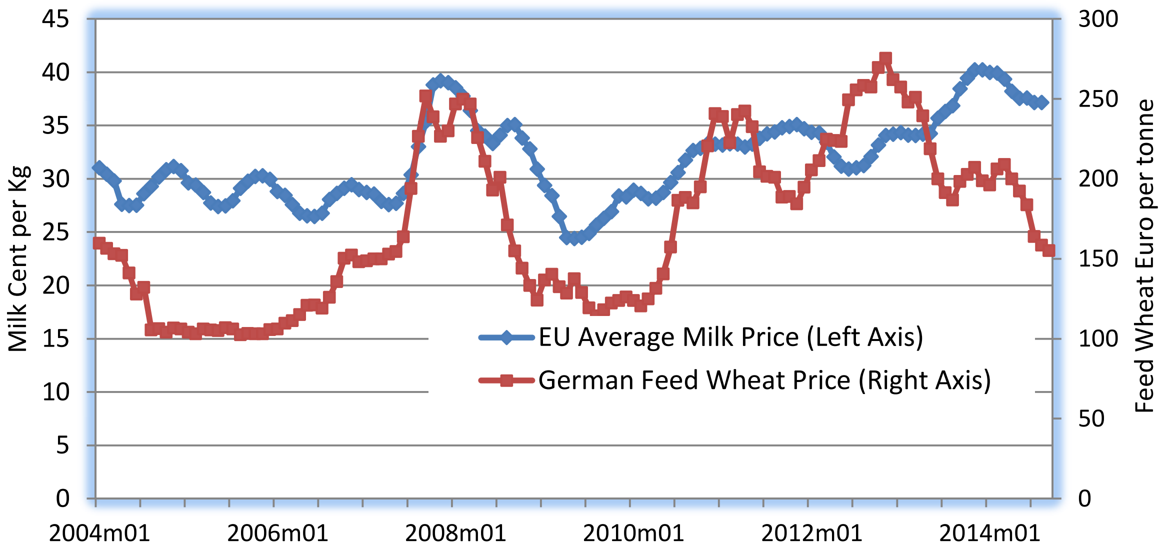
Figure 7.1: EU 27 Milk Production and Consumption



Source: European Commission

Farm milk and feed prices are presented in Figure 7.2. Over the last 12 months global dairy markets have been coming down from a price peak. A favourable milk to feed price ratio in 2013/2014, combined with favourable weather led to a strong increase in milk production in key export regions, such as New Zealand. There was also a substantial increase in much of the EU, with annual milk production up by close to 5 percent in 2014. This increase came from a combination of production growth in Member States (MS) where the quota has not been binding and production in excess of quota in other MS.

Figure 7.2: Milk Price and feed cost volatility in the EU



Source: FAPRI

The removal of the milk quota in 2015 is being greeted with mixed sentiment across the EU. It is regarded as a growth opportunity by some MS and is considered a threat to domestic production in other MS. Quota elimination is occurring against a backdrop of international market volatility, with considerable year to year variations in dairy product, farm milk prices and farm production costs. There is therefore also some concern that quota elimination will exacerbate milk price volatility within the EU.

We have already seen that EU milk production has grown while the EU has expanded over the last decade. MS milk quotas have been increased annually in the run up to elimination in 2015. But milk production levels have been static or declining in some MS for a number of years, notably, Bulgaria, Greece, Hungary, Portugal, Romania, Slovakia, Slovenia, Sweden and the United Kingdom. This failure to fill the milk quota at the MS level is due to exits, lack of new entrants, and limited production growth from the remaining producers. EU dairy consumption has been flat in contrast with the growing market globally. At the processing level dairy product portfolios also differ considerably, with considerable volumes of milk devoted to higher value added and specialised dairy products in parts of the EU15 and production directed almost entirely towards generic dairy commodities elsewhere. In general the EU15 has more modern, larger scale, more efficient milk processing facilities than that rest of the EU28.

Variations in farm scale across the EU are detailed in Table 7.1. Farms in the traditional EU15 are much larger on average and have higher yields than in the EU10, the 10 Member States that joined in 2004, and EU2 (Bulgaria and Romania). In 2011, the average specialist dairy farm in the EU15 had about 54 dairy cows, with a milk yield of 7,337 kg/cow. Overall, many differences exist across the MS on both the production and consumption side. All of these factors suggest that quota elimination will not have a uniform impact across the EU.

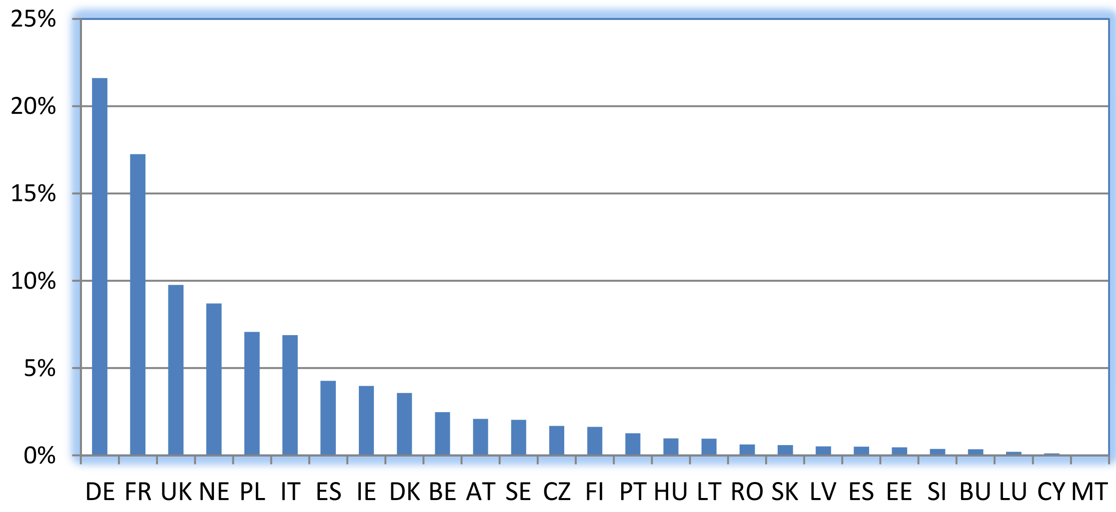
Table 7.1: Herd Size, Milk Yield and Average Milk Production per Farm in the EU in 2011

	Average Herd Size	Average Milk Yield	Average Production
	cows	kg	litres
EU15	54	7,337	380,000
EU10	19	5,665	105,000
EU2 (Bulgaria & Romania)	< 5	3,445	15,000

Source: FADN

The distribution of milk production across the EU27 is not uniform, with larger MS and MS located at a central latitude, with a climate that favours grass production, typically having a higher share of EU milk production. As illustrated in Figure 7.3 over 70 percent of milk production is produced in six MS; Germany, France, United Kingdom, Netherlands, Poland and Italy.

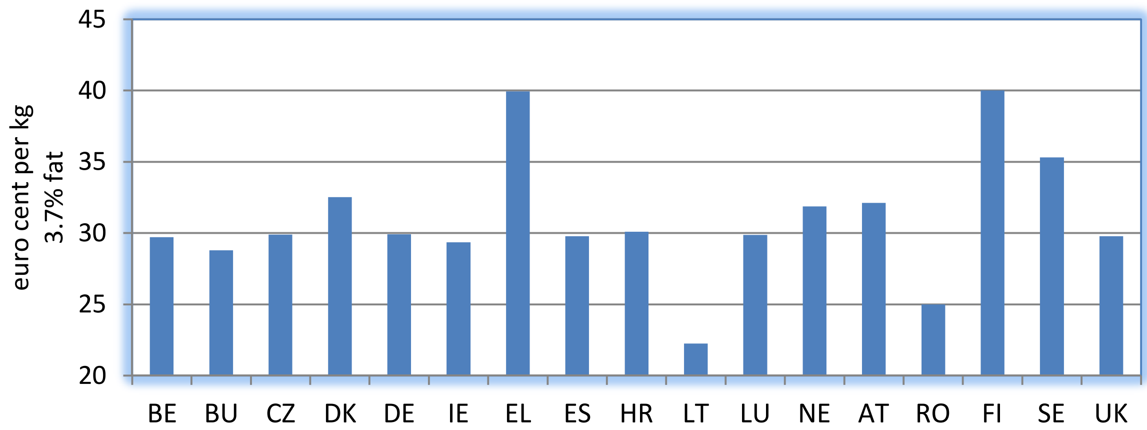
Figure 7.3: Share of EU27 Milk Production 2013



Source: European Commission

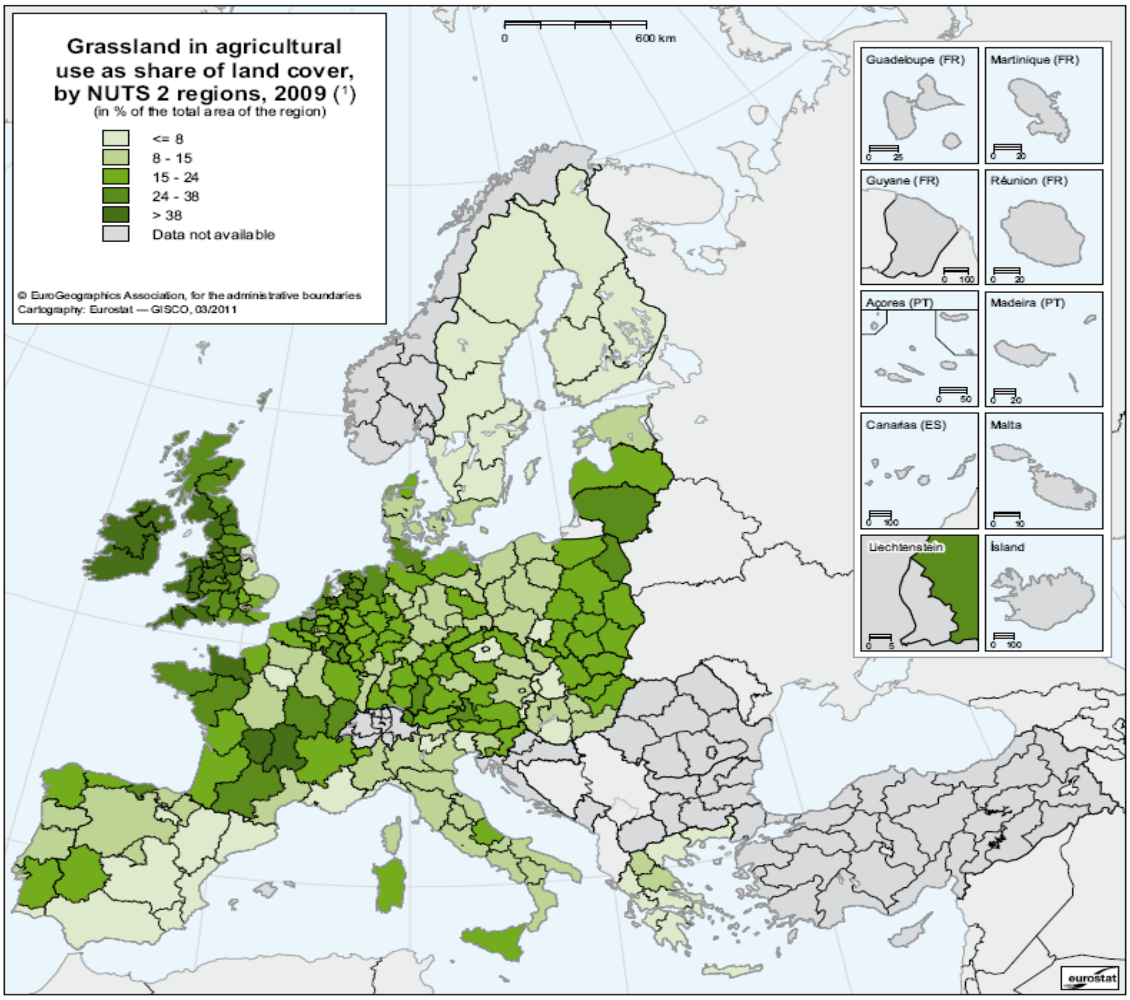
Most EU milk production is strongly dependent on concentrate feed, with cows housed for much/all of the year. But there are also regions where grass is the main portion of the diet. Such regions typically have lower production costs, since grass is a cheaper feed than concentrates. Production is likely to expand where costs of production are lower i.e. regions that favour grass production. But as outlined in chapter 6 the milk price farmers receive is also a critical consideration in determining competitiveness. The EU dairy sector is quite diverse across the MS at both the farm and processing level. There is a large range in farm milk prices across MS, with for example average prices typically ranging from 25 to 40 cent/kg in 2014, Figure 7.4.

Figure 7.4: Farm milk prices 5 year average for selected member states (2009-2013)



Source: European Commission

Figure 7.5: Grassland in Agricultural use as a share of land cover by NUTS2 Regions 2009



(¹) Bulgaria, Cyprus, Malta and Romania were not included in the LUCAS 2009 survey.

Source: FADN

Euope's grasslands are mainly concentrated in regions with less fertile soils and across the Atlantic seaboard of northwestern Europe, with high concentrations of grassland in Ireland, the United Kingdom, parts of France and Denmark, the Low Countries, Austria and parts of Poland (see Figure 7.5). In these regions, typcially there is higher rainfall and a milder winter. Harsher climate conditions in northern and southern Europe are less suited to grassland as the climate is either too arid or too cold.

There is a considerable variation in margin per hectare in dairy farming across the EU as illustrated in Figure 7.6. The best performing regions have either:

- high levels of coupled support (e.g. Finland which domestically funds additional support to the dairy sector),
- higher average milk prices than elsewhere in the EU (e.g. Italy)
- favourable milk price/production cost combination (e.g. Spain and Ireland)

The costs of milk production at the farm level are influenced by the production system in the MS (concentrates vs grass) and the rate of technological adoption by farmers and farm size (in terms of milk volume). Small farms across the EU will remain under pressure and are amongst the most likely to exit production.

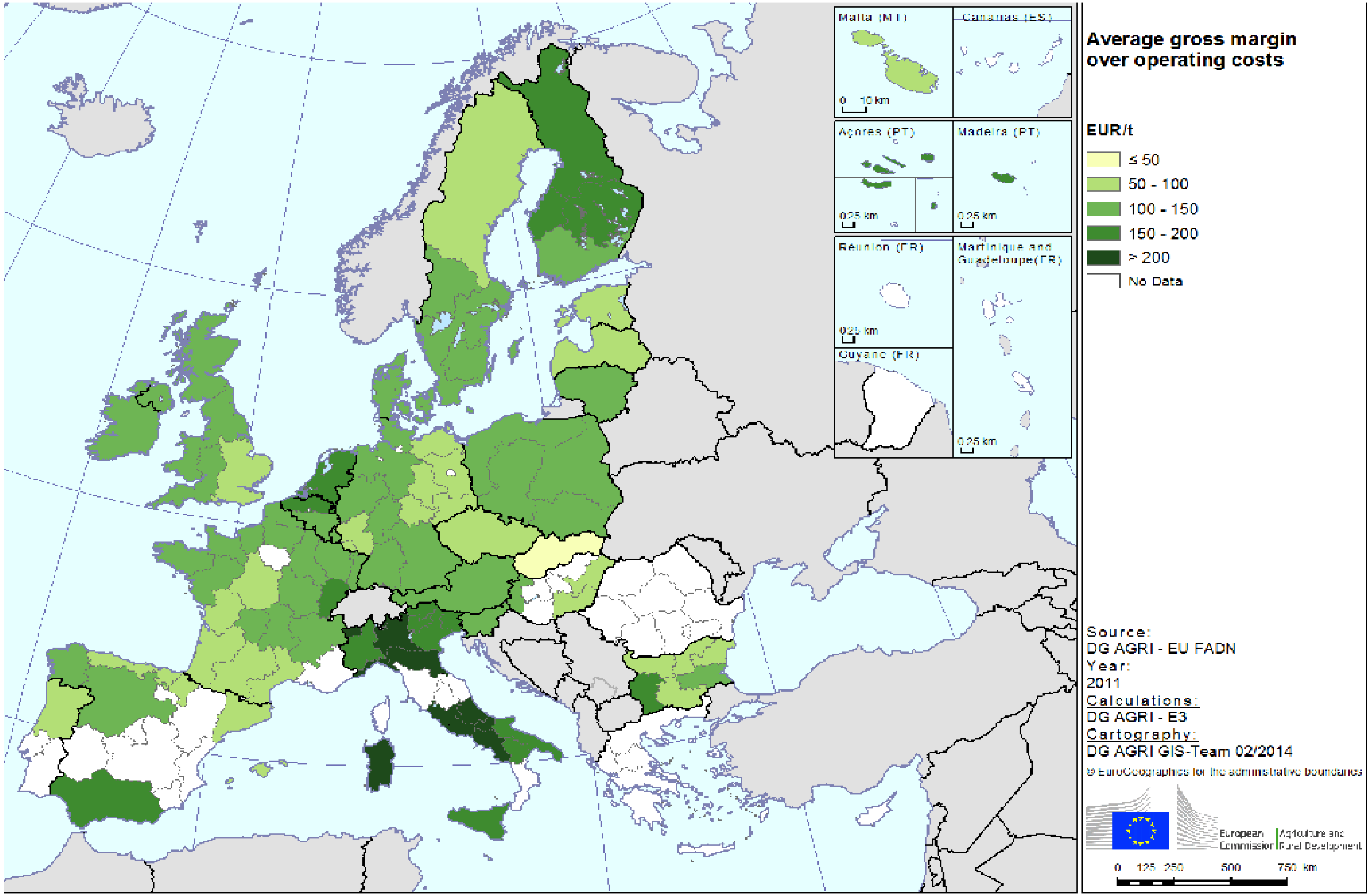
The status of the milk processing industry will also influence how milk production will evolve at the MS level. More modern processing plants can process milk at lower costs. Other things being equal, higher international dairy prices or lower processing costs would increase the value added achieved by processors for their dairy products which in turn may lead to improved farm milk prices. However, whether the benefits of such developments are passed on to milk producers will depend in part on the type of ownership structure that exists in the processing sector and whether dairy farmers are a part of that ownership structure.

Whether the processing industry in the MS has exclusively domestic milk processing operations or whether it has a presence internationally will also be important. Processors with a multinational processing business may be less inclined to invest in additional domestic processing capacity, especially if they consider that they can access additional milk for processing in locations that are closer to markets which they wish to serve.

Another important consideration in terms of the future development of milk production is the economic performance of the dairy sector relative to other agricultural sectors and the performance of the dairy sector in comparison with the wider economy in rural regions. In some regions dairy will face competition for land from other agricultural sectors and for labour from other sectors of the wider economy. While it should be expected that milk production will contract in high cost regions, production will persist in such regions where no other agricultural or non-agricultural opportunities exist.

Environmental constraints will also be an issue in some regions. For example, the intensification of production may be limited due to policies aimed at limiting greenhouse gas emissions and nitrate levels. This will be considered in further detail later in the chapter.

Figure 7.6: Milk: Average Gross Margin over operating costs per tonne 2011



Source: FADN

7.2 Outlook for milk production in the EU to 2020

Volatility in milk prices, production costs and farm margins is likely to continue, driven by global supply and demand conditions. Milk quota elimination will have relatively minor market implications at the EU28 level where EU milk production is expected to grow but at a slow pace. However, at the MS level and at the regional level within MS impacts could be more appreciable. Milk production will be reoriented towards regions with production advantages. This will see a movement of milk production to latitudes which have mild, short winters, with longer grass growing seasons. These grass growing regions are predominantly found in Ireland, western regions of England and Wales and coastal regions in Northern Europe with milder climates and higher rainfall.

Over next 5 to 10 years across the EU we should see a contraction in milk production in high cost regions. Expansion should take place in lower cost regions not constrained by environmental factors or competition from other sectors of agriculture for land and labour. A dramatic increase in overall EU milk production appears unlikely but the EU's self-sufficiency in dairy products should increase. Expansion is likely in Ireland, Austria, Belgium, Denmark, Germany, France, the Netherlands and Poland, with a contraction likely in most MS in Southern and Eastern Europe.

The expansion in milk production will need to be managed. The milk quota will be replaced by other limiting factors which will include issues at the farm level and beyond the farm. Difficulties will emerge such as access to additional land, labour and capital and these will impede expansion for some producers. Processing, storage, distribution and marketing will require both forward planning and investment. There will be a need to secure new markets for additional products, so that additional milk can achieve prices comparable with those for existing milk production.

In some regions of the EU quota elimination may generate increased competition for milk between processors, especially if production growth rates differ between neighbouring processor catchment regions. Quota elimination may also have implications for milk trade between countries allowing processors to find more milk locally, reducing milk or dairy product import requirements and/or increasing milk or dairy production export capacity. Processors in some MS may move up the value chain. This reflects the fact that the EU dairy market is mature. Growth potential is limited to cheese, fresh products and specialist dairy products (e.g. infant formula, athlete performance drinks). Exporters must therefore seek opportunities outside of the EU. Traditionally commodity products were regarded as a bargain basement activity but it should be noted that demand for commodities is strong in developing countries.

The following section of this chapter focuses on a selection member states, giving emphasis to those with large existing levels of milk production and those which compete most directly with the Irish dairy sector. These country summaries are based on official data and expert opinion.

France

France is the EU's second largest milk producer with production of 24 million tonnes produced by close to 4 million dairy cows and 70,000 dairy farmers. About 40 percent of French milk production is exported. France has a strong tradition of mixed farms and the average dairy herd size is slightly smaller than Ireland. However, there is a drive to increase farm size, particularly at the upper end, with the number of herds of over 100 cows increasingly rapidly. On French dairy farms locally produced forage remains a significant source of feed and this limits the sector's dependency on purchased feed.

Milk production has been in decline in more marginal regions and is becoming more concentrated in regions with higher populations. Profitability levels suggest that expansion is possible in some regions, but competition from the crop sector for land is also a challenge. Provision of coupled support under the new CAP should assist marginal producers to stay in production.

The ownership structure of some parts of the processing sector may militate against expansion. France has five multi-national dairy groups. In contrast to farmer owned co-operatives, multinational businesses may not encourage expansion and may be unwilling to invest in expanding milk processing capacity in France, preferring instead to access additional milk internationally and possibly closer to the intended export market.

Expansion should lead to an increase in French milk production, aimed at the export market with milk powders for the infant formula industry an area that is attracting investment. French dairy exports to China have already increased considerably.

It remains to be seen whether France will expand its milk production when quotas are eliminated. Increased production in the northwest, which has the best climate for grass production, may be offset by lower production elsewhere in France, leaving aggregate French production unchanged.

Netherlands

Relative to Ireland, Dutch dairy farming is quite intensive on a per hectare basis. At 18,500, the Netherlands has a similar number of dairy farmers to Ireland but has a dairy cow population of about 1.5 million head, about 40 percent greater than Ireland. Milk production in the Netherlands is more than double the level in Ireland, as dairy cow milk yields are just over 8,000 litres per cow. About 70 percent of production in the Netherlands is currently exported. In 2013/14 the Netherlands had a milk quota overshoot of 4 percent and farmers faced a super levy of over €130m.

High productivity and low feed prices contribute to high gross margins in the Dutch dairy system. On the flip side fixed costs in the Netherlands are comparatively high. While cows are grazed in the Netherlands, the system is gradually moving away from grazing and towards housing.

Friesland Campina processes about 75 per cent of the country's milk production and is keen to process additional milk when the milk quota system expires. Expansion would be profitable for Dutch dairy farmers but they face some significant constraints. Land prices are high and are anything from €50,000 to €100,000 per hectare in some regions. At such prices establishing a greenfield operation would be prohibitive. Existing operations have expansion potential but also face environmental constraints due to the need to process manure. In the past the Netherlands has been creative in dealing with environmental challenges but phosphate levels are likely to impede plans for intensification of production. In the period to 2020 it is anticipated that the Netherland will expand by about 1 percent per year.

Germany

The German dairy sector is the largest in the EU with milk production of 30 million tonnes delivered by 80,000 milk producers and over 4 million dairy cows. Milk yields average around 7,000 litres per cow. Production is concentrated in the North West and in Bavaria in the south. In the North West production is more focused on bulk commodity type products and associated with this, milk prices tend to be lower. However, fixed costs in this region are also low. There is a growing trend towards housing cows and away from grazing systems. By contrast in Bavaria, dairy products are more specialised and farm milk prices are higher. The largest dairy herds are to be found in the eastern states of Germany where typically herds of 150 to 200 cows are common.

Around two thirds of the milk delivered in Germany is processed by co-operatives. Consolidation in the German dairy processing industry has been considerable and has been driven by mergers.

German dairy cow numbers have increased in 2014 to their highest level in 10 years. Over the medium term expectations are that German milk production can increase by about 1 per cent per year, with stronger rates of expansion anticipated in coastal regions and in the lower Rhine and in mountain areas.

Poland

Among the MS that have joined the EU since 2004, Poland is by some distance the largest milk producer, with milk deliveries of 10 million tonnes, accounting for more than 8 percent of EU milk production. The country has 2.5 million dairy cows on 153,000 dairy farms. Milk yields are low by EU15 standards but are on a par with Irish yields. Average herd size is extremely small but the sector is developing and seems to have the capacity to compete internationally. The proportion of milk that is produced which is delivered for processing has increased steadily since Poland joined to EU and is now considerably higher than at the time of EU accession.

In 2004 the Polish milk quota was set at 7.5 million tonnes whereas production (a large share of which was not delivered for processing) was estimated at close to 12 million tonnes. It was argued that the quota allocation would seriously limit the development of the Polish dairy sector but Poland now exports 30 percent of its milk production. Nevertheless Poland had lobbied for the retention of the quota system until at least 2020, arguing that delaying abolition would allow more time for global demand to grow sufficiently to absorb increased EU milk production.

Due to mergers and closures there has been considerable consolidation in the dairy processing industry in the decade since Poland joined the EU, improving the processing sector's international competitiveness. Farmer and industry sentiment is quite positive in Poland. Production in 2014/15 could exceed the milk quota by 5 percent. At price levels consistent with the average over the period 2009 to 2014 expectations are that production could increase by 1 to 2 percent per annum in the period to 2020. If future prices average at 2013 or 2014 levels, then expansion rates of up to 4 percent per annum are anticipated. With decreasing farm consumption and feed use, deliveries to dairies should increase at a faster rate than production. Estimates as to the level of existing on farm consumption vary from 18 to 23 percent at present.

United Kingdom

The UK is the EU's third largest milk producer with deliveries of about 13.5 million tonnes, about 10 percent below the UK milk quota. The dairy sector in the UK has seen a rapid reduction in the number of dairy farms over the last decade falling from 23,000 in 2003 to a little over 13,000 in 2013. The average herd size in the UK is 126 cows with average milk yields of about 7,500 litres per cow.

Production systems vary with grazing dominating in Northern Ireland and in western coastal regions of England and Wales, but with more feed intensive housing operations becoming increasingly common elsewhere. The UK's liberal quota trading regime facilitated the intensification of the UK dairy sector at the farm level in the 1990s and 2000s. Low milk prices have caused producers to chase scale to maintain profitability. Many producers increasingly found themselves land constrained and increasingly dependent on feed supplementation in their grazing system. However, higher stocking rates have led to increasing use of concentrate feeds and this has led to an increase in production costs and falling dairy farm incomes.

Over the medium term milk prices are expected to average lower than they have been in recent years. However, these lower milk prices are expected to be offset by lower input prices. Expectations therefore are that UK dairy margins will remain flat in the period to 2020.

The liquid milk market absorbs about half of the UK's milk production and liquid milk prices therefore remain an important determinant of profitability in the sector. Some UK milk producers now have contracts to directly supply supermarkets at prices determined on a margin over cost basis. In general these farmers achieve better prices for their milk. However, about 60 percent of producers continue to supply their milk to the processing industry, obtaining lower prices than producers who have direct contracts with supermarkets. Those without direct supermarket contracts are vulnerable in times of weak market conditions when their prices can fall to very low levels. Consequently, in December 2014 there was an almost 12 pence price gap between the lowest and highest milk prices received by UK dairy farmers. This latter group of producers, those receiving very low prices, seem poorly placed to undertake any expansion in the medium term.

In comparison to 2014, UK milk production is expected to decline slightly by 2020, mainly arising from the contraction taking place in 2015 in response to the low level of profitability that has emerged due to the sharp fall in UK milk prices. However, there is also a contrary view that milk production can stabilise or even expand slightly in the medium term. In spite of the challenging environment, confidence among many UK dairy farmers in prospects over the medium term remains solid, with over one third of producers planning to expand milk production post quota removal.

Other EU MS

The MS covered in detail above account for approximately 70 percent of EU production at present. Across the rest of the EU, production at the MS level is likely to either remain static or to decline further. These MS are already in a situation where the national quota is no longer filled, so removal of the MS milk quota will have no direct impact. The dairy sector in these less competitive MS could be adversely affected by imports from MS in the EU which are expanding their production.

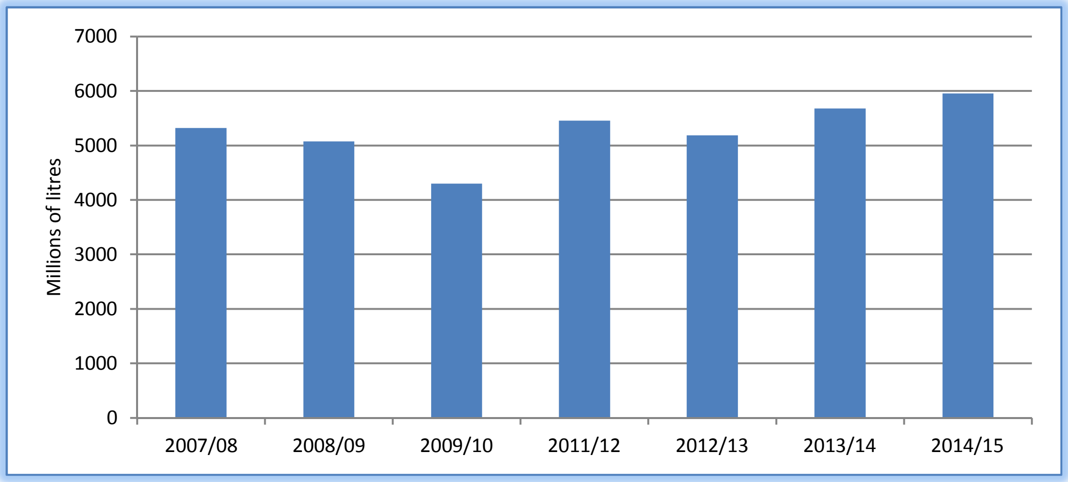
7.3 Irish Dairy Sector Prospects to 2020

Ireland laid its cards on the table soon after the milk quota elimination was confirmed, with ambitious targets set for expansion, followed by considerable investment at the farm and processing level in the run up to milk quota removal. In this section the feasibility of achieving the growth targets for the dairy sector in the period to 2020 are discussed. Estimates of the associated investment cost at the farm level are provided and domestic policy considerations which may inhibit future dairy expansion are discussed.

Food Harvest 2020 Targets for the Irish Dairy Sector

The Irish government published an ambitious plan for the agricultural sector in July 2010 (DAFF, 2010). The plan was aimed at growing the value of the agricultural sector's output, with a view to the agri- food industry playing a key role in the overall recovery of the Irish economy. The Food Harvest 2020 report set a target of increasing the value of primary agricultural output by 33 percent by 2020, relative to the average position in the 2007 to 2009 period. This sector level goal was supported by a number of detailed targets for key agricultural sub-sectors, the most ambitious of which was for the Irish dairy sector. The target for the dairy sector was to increase the volume of milk production by 50 percent by 2020 from the 2007 to 2009 base. This represents an approximate 2.6 billion litres of additional milk production. It is important to note however, that some of this expansion in milk output has already occurred as illustrated in Figure 7.7.

Figure 7.7: Irish Milk Deliveries (fat adjusted) on a quota year basis



Source: Donnellan and Hanrahan. (2014)

In the 2013/2014 milk quota year, total milk deliveries had already increased by 480 million litres or a 9 percent increase over the 2007 to 2009 Food Harvest base. It is estimated that on the back of very good milk prices and excellent production conditions that milk deliveries increased further in the 2014/2015 quota year to 5.96 billion litres of milk or 14.6 percent above the Food Harvest Committee report base of 2007 to 2009. Although aggregate milk production has increased since the publication of the Food Harvest 2020 report, another 1.8 billion litres of milk is required to fully achieve the 50 percent target by 2020.

Likelihood of Achieving Food Harvest 2020 Targets

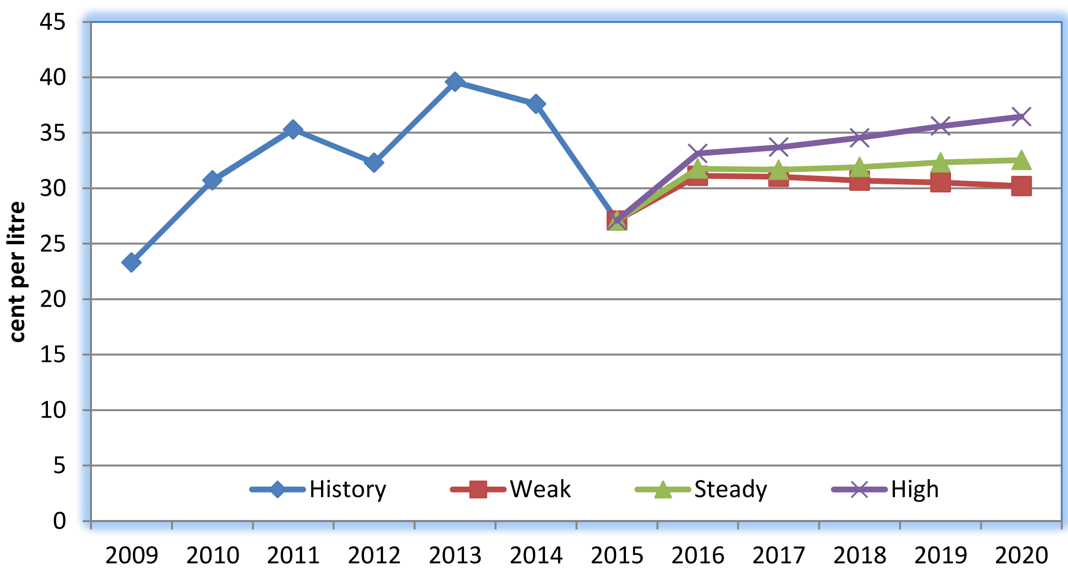
The likelihood of the Irish dairy sector achieving, or possibly exceeding, the Food Harvest 2020 production targets largely depends on future milk price and production costs. Irish dairy farmers face uncertainty with regard to the future level of input and output prices and consequently with respect to margin per litre of milk produced. The experience of the last 10 years, with both historically high (2013) and historically low levels of profit (2009), has taught the Irish dairy industry that volatility in prices and incomes will be a feature of the new dairy industry. No one can predict with perfect foresight when price and income shocks will occur, how severe such shocks will be, or how long these shocks will persist.

To explore the future development of the Irish dairy sector three milk price scenarios are considered here. These scenarios are based on contrasting visions of how international demand for dairy products could evolve over the near to medium term.

- Under the first scenario international demand for dairy commodities grows steadily and underpins relatively **stable Irish milk prices** over the period 2015 to 2020.
- Under the second scenario analysed, stronger growth in the international economy leads to strong growth in the demand for dairy commodities. Strong growth in the global demand for dairy commodities leads to **an increase in the milk prices received** by Irish farmers (effectively a positive output price shock).
- Under the third scenario analysed weak growth in the global economy leads to weak growth in the demand for dairy commodities from the global dairy market place. This weaker growth in demand is reflected in **low dairy prices over the period 2015 to 2020.**

The three milk price scenarios are presented in Figure 7.8. Beyond 2015, milk prices are expected to recover, but the milk price path for the three scenarios differs in subsequent years so that by 2020 the milk price ranges from about 30 cent per litre in the low scenario to over 36 cent per litre in the high scenario. The low scenario would see projected milk prices below the medium term historical average. The Steady scenario would see projected milk prices similar to the medium term historical average and the strong scenario would see prices surpass the medium term historical average.

Figure 7.8: Historical Irish Milk Prices and three projected milk price scenarios to 2020



Source: FAPRI Ireland Model

The impact of the three milk price scenarios on milk production levels, farm investment and farm income in Ireland is examined using the FAPRI-Ireland farm level model. The model is used to estimate the level of expansion that the existing population of dairy farmers could undertake profitably under the three milk price scenarios, see Table7.2.

Table 7.2: Milk production and investment under the three price scenarios

	Weak Scenario	Steady Scenario	Strong Scenario
Pre-Existing Dairy Farms			
Production increase on existing farms in 2020 vs2007-09 level (%)	31	43	65
Investment Required (€million)	1,066	1,241	1,942
Food Harvest 2020 shortfall (%)	19	7	-
Food Harvest excess (%)	-	-	15
New Entrants			
Number Required	1,346	511	n/a
Investment Required (€million)	612	232	n/a
Increase in National Milk Production by (%)	**50**	**50**	**65**
Total Investment (€million)	1,678	1,474	1,942

Source: Thorne et al (2015)

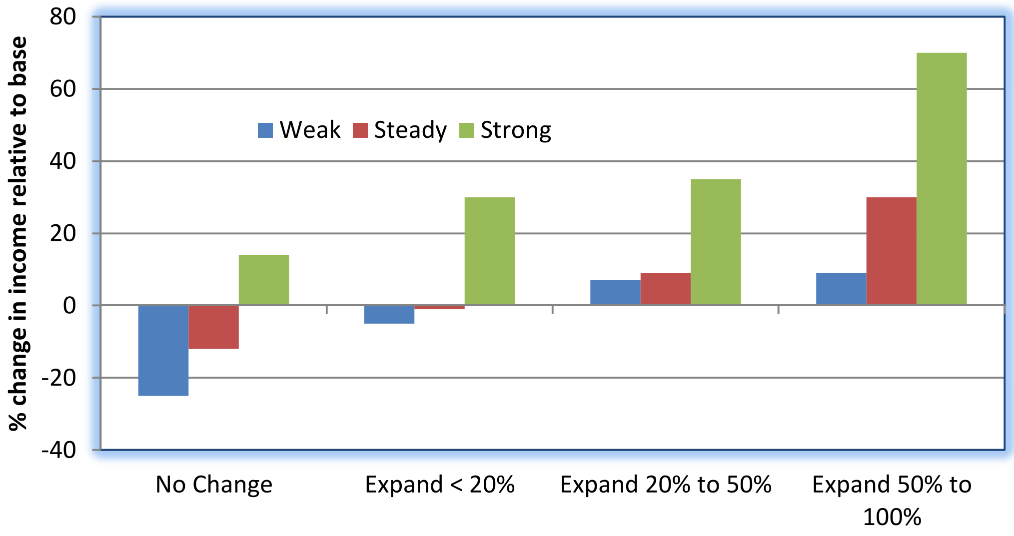
The analysis underlying the data presented in Table 7.2 is described in detail in Thorne et al (2015). In short, the main conclusion is that under the weak price scenario, the existing population of approximately 17,500 dairy farmers could increase national milk production by 31 percent by 2020, that is less than the Food Harvest 2020 targets. The 31 percent expansion would require a collective investment of €1 billion to be made by these farmers.

Under the steady price scenario, it is estimated that the current population of dairy farmers could increase national production by 43 percent relative to the Food Harvest base, that is just 7 percent behind the Food Harvest target. Under this scenario an investment of €1.2 billion would be required to achieve this scale of expansion. Finally, under the strong scenario, existing farmers could increase national milk production by up to 65 percent exceeding the Food Harvest 2020 targets, although it should be noted that this is a very optimistic milk price scenario.

It is difficult to predict with certainty the number of new entrants that are likely to enter the dairy sector following the removal of milk quota. There are a large number of complex issues that are likely to impact on the number of new entrants such as access to and the cost of land, start-up investment costs and the availability of financing, as well as the factors affecting existing farmers such as future milk prices, production costs and so forth. Instead of predicting the future number of new entrants here we focus on the number of new entrants required under the various milk price scenarios to achieve the Food Harvest 2020 targets. Under the weak price scenario 1,346 new entrants are required to meet the Food Harvest 2020 target and this brings the total investment required by the farm sector to €1.678 billion. Under the steady price scenario 511 new entrants are required and a total sector investment of €1.474 billion.

Figure 7.9 presents the impact of expansion on dairy farm income. Projected farm incomes under the three milk price scenarios are compared to a base income which is the average of the 2009 to 2013 period for each farm group examined.

Figure 7.9: Projected income changes under three milk price scenarios: 2009 to 2013 vs 2020



Source: Authors' Estimates

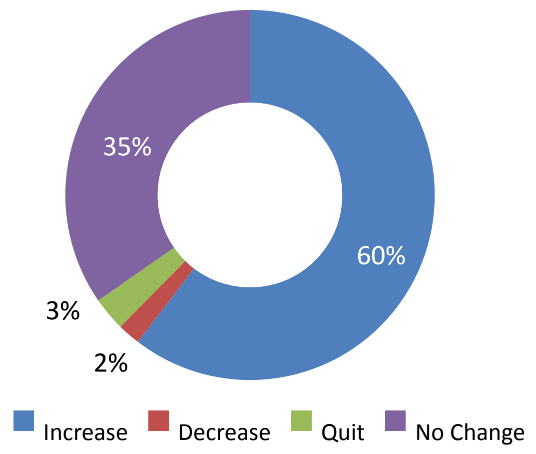
As can be seen, farmers that do not expand production are projected to experience income losses in both the weak and steady milk price scenarios. Indeed even those by expanding by up to 20 percent cannot maintain income levels in the weak and steady scenarios. Under the weak milk price scenario farmers need to expand by at least 20 percent to maintain current income levels and need to expand by at least 50 percent to increase incomes by 10 percent or more. Under the steady scenario, the one that is most similar to the recent past, farmers expanding by 20 percent or more can increase their farm income by 9 percent and those expanding by 50 percent or more can increase income by 30 percent. It may seem that the outlook is bleak given that farmers need to expand production by such significant levels just to maintain incomes, but it is pertinent to compare this to recent developments. Over the 2007 to 2013 period the average output per farm has increased by 30 percent.

The analysis presented uses economic models to project future production and income levels. However, such models cannot account for farmers' attitudes towards expansion, their personal situations and their preference for growth. In order to supplement the projections produced by these economic models, we have also ascertained farmers' views on their future production levels.

Farmers' Expansion Plans in the short term up to 2017

A special supplementary survey of the Teagasc National Farm Survey was conducted in the second half of 2013. A representative sample of existing Irish dairy farmers was questioned about their production plans from the point of quota elimination in 2015 through to the end of 2017. The aggregated results of the survey shown in Figure 7.10 indicate that 60 percent of dairy farmers, or 11,000 farmers, plan to expand milk production in the 2015 to 2017 period. A further one-third of farmers plan to maintain their current production level, while a small proportion, 5 percent, planning to either decrease or exit milk production. The average current herd size of those planning to increase production was 79 cows, while those planning no change in production had an average herd size of 51 cows at the time of the survey.

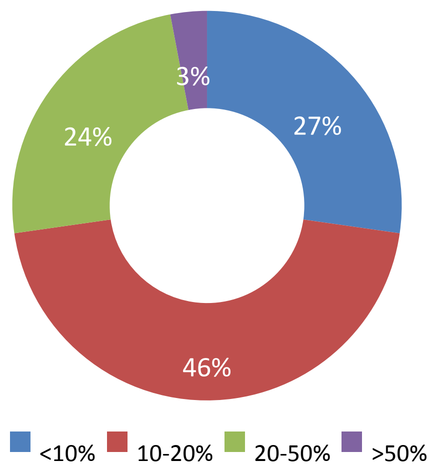
Figure 7.10: Existing Dairy Farmers' Production plans to 2017



Source: Teagasc National Farm Survey

Figure 7.11 illustrates that almost three-quarters of the 11,000 farmers planning to expand production in the 2015 to 2017 period plan to expand by less than 20 percent relative to their existing level of production. Only 3 percent of farmers plan to expand production by 50 percent or more during the period 2015-2017.

Figure 7.11: Planned Milk Production increase to 2017 for expanding Dairy Farmers



Source: Teagasc National Farm Survey

Taking existing production levels, as recorded by the Teagasc NFS in 2013, and applying each farmer's stated production plans for the 2015 to 2017 period, it is possible to estimate the change in aggregate planned production that would result. If farmers follow through on their stated plans to increase, exit or maintain production levels, the total milk production of this group of farmers would increase by 14 percent in this two year period over the level produced in 2013.

In order to arrive at some estimate of the number of new entrants to dairy farming, non-dairy farmers were also questioned in the same survey about their intentions to enter dairy farming. Just 902 farms or 1 percent of the non-dairy farms represented by the Teagasc NFS expressed an interest in entering dairy farming in the 2015 to 2017 period. However, only 40 percent of those with intentions of entering dairying had engaged in active planning by discussing their dairy start-up plan with a bank manager and only 25 percent had completed a business plan. It is therefore likely that the number of new entrants in the 2015 to 2017 period will be closer to 360 than the 902 that had expressed an interest. The 360 non-dairy farmers that are estimated to have discussed a dairy business start-up plan with their bank manager collectively plan to stock 40,000 cows or an average herd of 130 cows, almost double the current national average herd size. Assuming these cows produce the average national milk yield, the milk production of these new entrants add a further 3 percent to the Irish national milk pool.

Combining the additional production of existing farmers with the production from new entrants would lead to a 17 percent increase in national milk production in the 2015 to 2017 period over the 2013 level. With 17 percent expansion achieved in the first 2 years following milk quota removal, the further 20 percent would need to be delivered between 2017 and 2020 in order to reach the Food Harvest target of a 50 percent increase over the base period.

7.4 Dairy expansion, GHG emissions and sustainable milk production

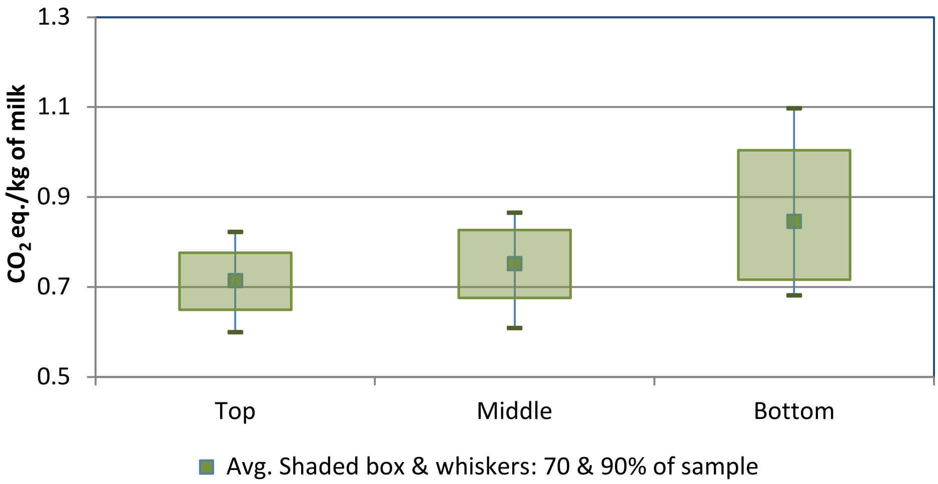
A potential threat to Ireland's ability to grow dairy sector output is the requirement to reduce the negative environmental externalities associated with agriculture. The EU is committed to a reduction of 20 percent in its GHG emissions by 2020. In the Non Emissions Trading Scheme (Non ETS) sector, of which agricultural emissions are an element, the targeted reduction at the EU level is 10 percent. However, Ireland, due to its higher GDP per capita, faces a non ETS reduction target of 20 percent by 2020. Negotiations are ongoing at EU level to establish MS reduction target for 2030. It cannot be assumed that Irish agriculture's ability to continually grow animal numbers will be unconstrained over the longer term.

In 2012 over 30 per cent of Ireland's GHG emissions came from the agriculture sector whereas the corresponding average for the EU in 2010 was just over 10 per cent (Donnellan 2014). Generally, ruminant agriculture (dairy and beef) is more emissions intensive than other forms of agriculture. These gases consist of methane (CH4) which is generated as a by-product of the natural ruminant digestive process (enteric fermentation); and nitrous oxide (N2O) which is generated from both animal waste and from the use of nitrogen fertilisers. The heavy reliance on beef and dairy production in Ireland accounts for the high proportion of agricultural GHG emissions in Ireland (Breen et al. 2010). However, on a like-for-like product basis, GHG emissions generated as a result of agricultural production in Ireland are among the lowest internationally. A study by the European Commission has shown that Irish agriculture has the lowest carbon footprint in the EU for milk, and the fifth lowest carbon footprint in the EU for beef (Leip et al. 2010).

Recent research by Hennessy et al (2013) has shown that some of the most profitable dairy farmers are also the farms with the lowest GHG emissions per unit of product produced. The efficient use of resources on these farms, the adoption of environmentally friendly practices and the higher levels of productivity per cow all have positive effects on both the economic and environmental performance of these farms.

Figure 7.12 shows the average carbon dioxide equivalents per kilogram of milk produced on Irish dairy farms. Farms are split into three groups on the basis of gross margin per hectare; the best performing one-third of farms (Top), the middle performing one-third of farms and the poorest performing one-third of farms (Bottom).

Figure 7.12: Emissions CO_2 eq. /kg. of milk by profitability category on Irish dairy farms 2012



Source: Hennessy et al (2013)

As can be seen the best performing one-third of farms from a profit perspective also have the lowest on average GHG emissions per kilogram of milk. In addition to having the lowest average GHG emissions per kilogram of milk, the Top performing farms also have the smallest distribution around the mean, indicating that they have consistently low emissions per unit of product. Conversely, the poorest performing farms from a profit perspective (Bottom) have the highest emission per kilogram of output. The data presented in Figure 7.12 suggest that profitable and intensive farms can also be very efficient from a GHG emissions perspective. This is an important message for the future development of the Irish dairy sector. Farmers can increase output per cow and grow their farm businesses while still controlling their emissions production by adopting the right technologies.

7.5 Conclusions

In July 2010 the Irish Government set the ambitious target for the Irish dairy sector to expand milk production by 50 percent in the first five years following milk quota removal. Production had already begun to increase since the publication of this report, albeit under the threat of the super levy. The analysis presented in this chapter suggests that given a moderate outlook for milk price such an expansion is achievable, with the existing population of dairy farms expanding milk production by 43 percent and with 500 new entrants required to produce the remainder. Furthermore, a recent survey of Irish dairy farmers' future production intentions confirms that the sector will be on track to achieve the 50 percent increase.

While the removal of the milk quota presents an exciting new opportunity of expansion of the dairy sector in Ireland, this is not generally the case across all of the EU. A large number of EU member states, especially those in the southern and eastern regions, have not filled their national milk quotas in recent years and as such are unlikely to significantly expand production in the coming years. France, Germany, Poland and the Netherlands are the member states most likely to increase output in the coming years. In general output growth is expected to be in the order of 1 to 2 percent per year from each of these countries.

8 Benefits to the Irish Dairy Expansion for the wider economy

Corina Miller, Trevor Donnellan, Alan Matthew and Cathal O' Donoghue

The agri-food sector makes a substantial contribution in terms of output and employment in Ireland. The sector comprises two main elements, primary agriculture which is the activity that takes place on farms and food processing, which ranges from basic dairy and meat processing through to the production of higher value-added products such as convenience foods. Outside of these activity in the agri-food sector also provides wider benefit to the overall economy.

8.1 Defining the Contribution of the Agri-Food Sector to the Economy

Typically, when we refer to the economic importance of a sector we refer to the direct contribution of that sector to the economy. That direct effect of can be expressed in terms of:

- **Output:** the total value of what is produced by the sector;
- **Gross value added** (GVA): the contribution of the sector to national income (GDP) or;
- **Employment:** the number of persons actively engaged in the sector.

So, for example, when we say that the primary agriculture sector in Ireland has an output value of about €7 billion, income of €2.6 billion and employment of 120,000, we are talking about its direct economic effect.

However, the economic impact of the sector goes further. According to multiplier theory, the economic activity of one sector generates further economic activity in other sectors of the economy through knock-on or multiplier impacts. These effects can be categorised into both indirect and induced multiplier effects which are described in more detail below

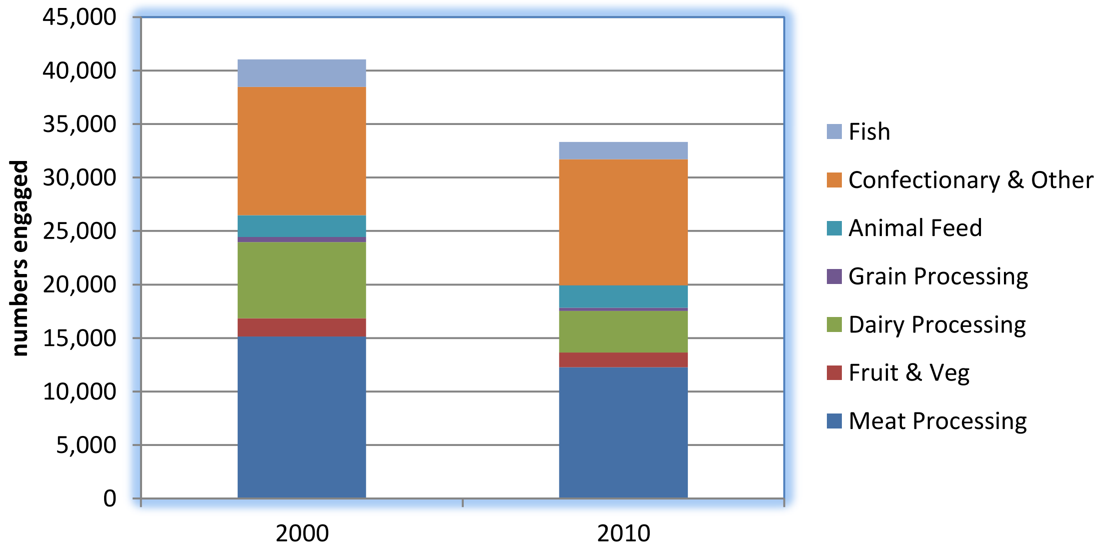
Indirect Multiplier Effects: The agri-food sector makes purchases from other sectors of the economy in order to produce output. This subsequently stimulates activity in a diverse range of sectors, including animal feed, fertiliser, fuel, building and construction, professional services etc. In turn, all of those industries must make their own input purchases from sectors they are linked to in the wider economy in order to provide the products and services required by the agri-food sector. So for any initial increase in the level of activity in the agri-food sector there will be a wider multiplier effect as business activity is also stimulated in other related? sectors. This is referred to as the indirect multiplier effect of a sector's economic activity.

Induced Multiplier Effects: Households throughout the economy earn income in the form of wages, salaries and income from self-employment. This income is then spent on a range of goods and services (food, clothing, transport, leisure activities etc.) in the wider economy. The purchase of these goods and services results in the creation of wages and salaries for others employed in a range of sectors right across the economy. Hence, an increase in household income due to growth in economic activity in one sector (e.g. the agri-food sector) will also lead to an increase in consumption of locally produced/traded goods and services. Thus the induced multiplier effect is the impact on the economy of spending this additional income.

Total Effect: The total economic effect of a sector's activity is therefore the sum of the direct, indirect and induced effects. Like the direct effect, the total effect can be expressed in terms of output, GVA or employment. Dividing the total effect by the direct effect gives what is referred to as a multiplier and in establishing the total effect of a sector on the economy we are measuring the multiplier effect.

About 130,000 people are engaged in primary agriculture in Ireland at present and while this figure has been in decline, it has stabilised during the recession. The number of persons engaged in food processing in Ireland declined over the period 2000 to 2010, as illustrated in Figure 8.1. Most likely this is due to increased labour productivity in the specific subsectors within food processing. It is notable that the numbers engaged in relatively labour intensive meat processing fell by 19 percent over the period, while the numbers engaged in the increasingly automated and scale focused dairy processing sector fell by 45 percent.

Figure 8.1: Persons engaged in Food Processing in Ireland 2000 and 2010



Source: Adapted from CSO data

8.2 Why Sectoral Multipliers are Important

We can easily appreciate that the direct effects of one sector of the economy can be larger than another. However, that does not necessarily mean that the total effect of the larger sector will be greater than the total effect of the other sector. This is because multiplier effects typically differ across sectors.

What affects the size of a multiplier? One factor affecting the size of a sectoral multiplier is the extent to which a sector is related in economic terms to other sectors in its local economy. Depending on the unit of analysis, local can mean the economy of a county or region or it can mean the national economy. The greater the extent to which a sector imports its inputs from outside its local economy, the lower the multiplier effect tends to be for the local economy. For example, the chemical sector is a prominent sector in the Irish economy, but tends to have a low multiplier effect due to the fact that it imports much of its inputs from abroad. By contrast food processing sectors in Ireland are generally quite dependent on domestically produced inputs (from sectors such as agriculture). Imports from other countries are typically referred to as leakages of economic activity from the economy, because when a sector produces output, some of the potential knock on benefit leaks away from the local economy to the economies of other countries. Through import activity some of the multiplier effect of the local business is then captured by the economy of the exporting country.

The spending behaviour of households is the second factor that can influence the size of multipliers. The greater the extent to which households consume goods and services from the local economy, the greater the induced multiplier effect will be. The desire to maximise this aspect of the multiplier effect forms the economic argument for initiatives such as 'Buy Irish' campaigns.

Ireland is commonly referred to as a small open economy, by which is meant that it engages in a high level of trade relative to its GDP. Open economies tend to have lower multipliers due to this high level of trade. This is one of the reasons why it can be more difficult to derive the maximum benefit from an economic stimulus package in an open economy. Rather than being retained in the domestic economy, the knock on effects of a stimulus package in a small open economy can be quickly dispersed to other countries, through leakages (import activity, savings and taxes etc.), unless the stimulus package can be targeted towards sectors which have lower levels of leakage from the domestic economy. The agri-food sector can be cited as an example of a sector which has relatively high multipliers compared with many other sectors of the Irish economy (Miller et al., 2011). This means that an initiative that creates growth in the sector, such as FH2020, has the potential to create higher multiplier effects throughout the wider economy.

Typically, multipliers are obtained from the national Input Output (IO) table which is produced by the CSO at five year intervals to provide a snapshot of the interconnectivity between the economic sectors of the economy in a given year. To create the IO table, the size and the relationship between over 50 sub-sectors of the economy (from agriculture, manufacturing and services) is mapped in a matrix structure. This is an onerous task and hence the table is not produced annually. This matrix can then be manipulated to provide an estimate of the multiplier for each sector in the economy.

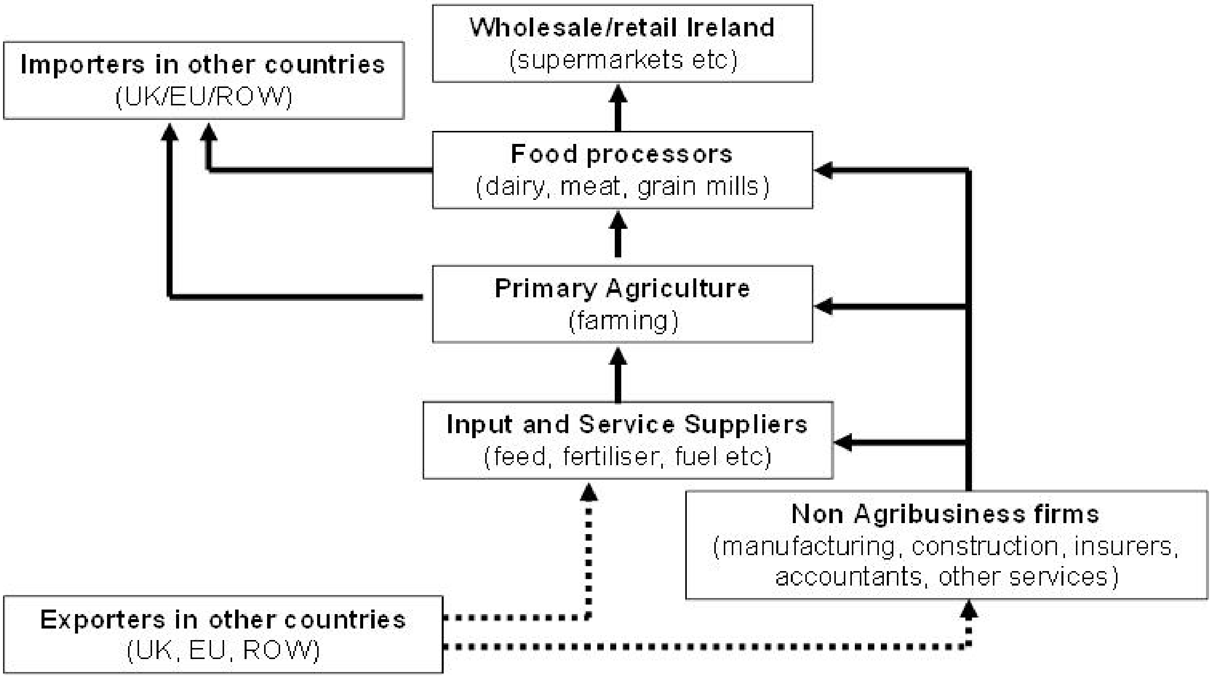
8.3 Economic Impact of Expansion under Food Harvest 2020

The total number of jobs that would be created in the Irish economy arising out of FH2020 can be thereby estimated. The estimate should be seen as long term job opportunities as opposed to the temporary employment that might be created, for example, due to the construction of a factory or a motorway.

Given multiplier effects, jobs created in agriculture and food processing, will benefit related sectors also such as suppliers of feed and fertiliser, suppliers of professional services, and a whole range of sectors unrelated to agri-food production (sectors which benefit from the additional spending in the Irish economy brought about from the growth in the agri-food sector) as illustrated in Figure 8.2.

It should be noted that some parts of the Irish agri-food sector are more efficient in their use of labour than are others. Therefore we should not expect a one to one relationship between the output growth and jobs growth in the agri-food sector. Actual job creation arising out of the FH2020 targets will depend on how labour productivity (the value of what each worker produces) increases over time. While FH2020 emphasises growth targets, it also acknowledges the need to remain competitive and this requires increased labour productivity (e.g. increased volume of milk produced or numbers of animals managed by each worker).

Figure 8.2: Mapping the relationship between agri-food and the rest of the Irish economy



Source: Own Diagram

The focus of this analysis is on the four main growth targets contained in FH2020, namely the growth targets for milk, beef, sheep and pigs and the resulting jobs arising from growth in these sectors. In order to implement those 'shocks' in the SAM multiplier model the FAPRI-Ireland partial equilibrium model is used to simulate the sectoral activity level associated with the Food Harvest 2020 targets. This simulation interprets the value and volume targets set out in Food Harvest 2020 so that volume shocks for four of the main agricultural sectors can thus be defined. The FAPRI simulation assumes that for three of the main targets set in the FH2020 (beef sheep and pigs) the value growth targets are met as well as the milk output target.

As illustrated in Table 8.1, to obtain a 50% increase in output value in the dairy sector (€800 million) a final demand shock of €1,369 million is required in dairy processing output. A €250 million increase in cattle output requires an increase in final demand of €442 million in beef processing. While a €16 million decrease in sheep output requires a final demand decrease of €39 million in sheep processing. A €90 million increase in pigs output requires a final demand increase of €374 million in pigs processing.

Three potential scenarios for jobs creation based on various assumptions associated with the employment intensity assumptions are examined here. Using the three different employment intensity scenarios it is found that a minimum of 18,989 jobs, a maximum of 38,430 jobs and an intermediate numbers of 24,719 jobs could be created in the economy as a result of achieving the four main volume targets in the FH2020. Ultimately the intermediate scenario is deemed to be most representative of the real world situation. Summary results of that scenario are reproduced in Table 8.2 below. Due to data limitations, the reference year for the work is 2005, so the results should be thought of as indicating how many additional jobs would exist in 2020 compared with 2005.

Table 8.1: The volume shocks implemented in the model

Sector	Volume Shock 2020 relative to 2007-2009 (%)	Value shock (€ millions)	Final demand shock (€ millions
Milk Output	+50	+800	+ 1,369
Cattle Output	+9	+250	+442
Sheep Output	-7	-16	-39
Pig Output	+30	+90	+374

Source: Miller at al. (2012)

Table 8.2: No. of Job Created Under FH2020

	Milk	Cattle	Sheep	Pigs	Total
Primary (farm level)	4,691	633	-15	537	5,847
Food Processing	2,520	1,635	-139	1,306	5,323
Other Sectors	7,337	3,795	-251	2,672	13,552
Total	**14,548**	**6,063**	**-405**	**4,515**	**24,722**

Source: Miller at al. (2012)

8.4 Conclusions

Overall, the analysis indicates that almost 25,000 full-time jobs would arise out of the achievement of FH2020 as indicated in Table 8.2. Across the agri-food sector we can expect that the greatest area of job creation will relate to milk production and processing where almost 15,000 jobs could be created across the economy due to the 50 percent increase in milk production. The potential growth in employment associated with the drystock sector is more modest largely because the relevant FH2020 targets do not involve as large an increase in the volume of production as in the case of milk. Similarly, under the scenarios, although the sheep sector would grow it would still be associated with less employment in 2020 than in 2005. It is however important to remember the dramatic contraction that this sector experienced right through the 2000s, so considerable growth in the sector is required to bring it from its current position to where it was even 5 years ago.

Multiplier analysis assumes that prices are static and that resources are freely available. These assumptions imply that if a sector grows the additional demand it generates for labour and inputs does not generate inflation in the price of these inputs or in wages. In the current high unemployment environment in Ireland this is probably a reasonable assumption in the case of labour, but the assumption could be a weakness in the case of inputs. The expansion of Irish agriculture of itself is not likely to generate inflation in the case of imported inputs (because demand from Ireland is small in a global context) but it could generate inflation in the price of domestically produced inputs such as replacement animals and land rent etc.

9 The Legacy of the Milk Quota Era

Trevor Donnellan, Thia Hennessy and Fiona Thorne

What can be said about the impact of milk quotas on the development of the Irish dairy sector over the last 30 years? In attempting to answer this question it is tempting to extrapolate from the high rate of growth in Irish milk production in the pre-quota period or to look at the growth achievements of the New Zealand dairy sector since 1984. With this frame of mind, it could be concluded that had milk quotas not been introduced, Irish milk production would have continued to grow and that by now the volume of Irish milk production could have been comparable to that of New Zealand. However, such inferences ignore the wider set of factors that affected the development of the Irish dairy sector over the last three decades.

At the time when milk quotas were introduced, the Irish dairy sector had come through a period of very high profitability and rapid production growth. But the high milk prices at the time were an artefact of EU dairy policy rather than a reflection of international dairy market supply and demand conditions. The EU was producing too much milk and the policy support system was too costly. The alternative to the milk quota would have been lower levels of EU dairy market support and lower milk prices. Economic analysis published at that time identified the supply control mechanism as being *"less damaging"* to the future development of the sector than the milk price reductions that would have been required to correct the market situation.

Other things being equal, in the absence of milk quotas, lower milk prices would have reduced the profitability of dairy production and would have reduced the incentive to expand milk supply. It is still possible that milk production would have increased across the EU and in Ireland. However, EU dairy exports were not competitive on international markets and the sector would have continued to rely on political goodwill to remove surplus dairy products from the EU dairy market. Further growth in milk production might then have caused the EU to further examine the level of dairy support. In effect, as an alternative to milk quotas, the EU could have imposed an economic constraint on EU milk production through manipulation of the dairy market support measures.

The decline in Irish producer numbers during the milk quota era cannot be attributed to the presence of the milk quota, as farm level consolidation has been a feature common to most milk production regions around the world over the last 30 years and indeed is a feature of the farm sector of most developed countries. On the contrary, it may be argued that the milk quota system served to dampen the rate of exit from dairy farming. The level of profitability in the dairy sector was higher than would have prevailed had the quota not been introduced. Furthermore, the highly regulated manner in which the quota system in Ireland was managed for much of the milk quota era may have affected the rate at which producer numbers decreased and it may have influenced which individual producers ultimately continued in milk production or exited the sector. It is most likely that had the milk quota not been in place, or had quota rights been traded more freely, large, profitable farmers may have acquired smaller, less profitable holdings at a faster rate than actually occurred.

One of the lasting and possibly most negative legacies of the quota system has been the barrier it has placed on new entrants to the sector over the last 30 years. Throughout the quota period it has not been possible for new entrants to establish a dairy farm business without inheriting milk quota rights or investing substantially in milk quota. This has inhibited the flow of *'new blood'* into the farm sector and has resulted in an ageing, and possibly less innovative, population of dairy farms than would have existed otherwise. Indeed investment in milk quota in general may be seen as a somewhat dead weight loss to the sector. In the period since 1995, when the trade in quota became more flexible, the total value of quota traded was €1.4 billion. These are funds that were transferred between farmers and in many cases acted as a retirement type payment to exiting farmers, but nonetheless it represents a considerable investment by the remaining farmers for the right to produce more milk.

The evolution of the Irish dairy sector in the milk quota era was also influenced by the other support mechanisms available to the dairy sector and also the wider suite of measures available in the CAP to support agriculture generally. In marked contrast to the policy environment in New Zealand, the CAP supports provided to other less profitable agricultural enterprises ensured that income levels were sufficient to allow unviable drystock and tillage farmers to remain in production in Ireland. The MacSharry Reforms of 1992 led to a large increase in suckler cow numbers, and in the absence of a milk quota at that time it is difficult to speculate quite how the national dairy and suckler herds would have evolved through the 1990s. Additionally, the CAP payments available in the drystock sector have also slowed the pace of structural change and land mobility in the Irish farm sector in general. It is therefore unlikely, that in the absence of the milk quota system that milk production in Ireland would have expanded at a rate similar to that of New Zealand.

Dairy productivity along with the management of milk quota transfer in Ireland, led to spare capacity on many dairy farms. This in turn led to an increase in the presence of drystock on some dairy farms and dairy farmers also received support payment for these drystock. In time, these drystock payments would secure dairy farmers a higher decoupled single farm payment than would otherwise have been the case. That decoupled payment is now a valuable buffer for Irish dairy farmers against the dairy income volatility, that has become more common in recent years, caused by extreme movements in milk prices and production costs.

The imposition of the milk quota also had implications for the Irish dairy processing industry. The volume of milk available for processing was suddenly limited, but the point again needs to be made that this could also have been the outcome had the alternate policy decision been made to reduce dairy support prices. The imposition of milk quotas removed the need for the Irish processing industry to engage in further investment in processing capacity and arguably reduced the pressure to source new dairy markets for Irish dairy products. This meant that the Irish dairy processing industry had to look to other strategies for growth, such as consolidation via mergers and the increasing import of milk for processing from Northern Ireland. A number of large dairy processors continued to expand throughout the milk quota era by diversifying their product mix and expanding operations overseas. These strategies, which were stimulated by the quota system, led to the subsequent development of some of the largest international food companies. The milk quota system also placed greater emphasis on adding value to the fixed Irish milk pool as a means to drive profit in the sector.

Certainly for the first 20 years of its existence it is unclear whether the quota system made a radical difference in how the Irish dairy sector would have evolved. But would the Irish dairy sector have benefitted from an earlier removal of milk quotas? There are a number of reasons to believe that this would have been the case. In the last decade or so there have been changes at the farm level, in the underlying policy environment and in international dairy market conditions which mean that the Irish dairy sector is now better placed to grow upon quota removal.

At the farm level, on-going developments in grazing technology and animal breeding and their ultimate adoption by Irish dairy farmers have made the Irish grass based dairy system more cost competitive relative to concentrate based systems. Numerous studies, as reviewed in this publication, identify Ireland as being one of the lowest cost producers of milk in Europe and even globally. It is only when Ireland’s low productivity rates of output per hectare and labour unit, which is also a legacy of the quota system, are considered does our international competitiveness position slip relative to competitors.

The introduction of decoupling and its reaffirming in the most recent CAP reform provides Irish dairy farmers with a support payment, largely derived from their drystock enterprise, without the need to run that drystock enterprise. In the early stage of dairy expansion at least, this has given many dairy farms the capacity to increase dairy cow numbers, without the requirement to increase stocking density. At the market level, strong global economic growth has generated a high level of international demand for dairy products, which cannot easily be satisfied by other major dairy exporters. The result has been rising international dairy product prices, which has brought these international prices much closer to EU prices levels than was the case in the 1980s and 1990s. In turn this has made unsubsidised non-EU exports from the EU increasingly feasible; making non-EU markets an attractive proposition for EU dairy exporters. Given that the EU is self-sufficient in dairy products, third country markets will be an important future outlet for increased Irish dairy production.

In conclusion, the milk quota system was not the straitjacket on dairy expansion which it is sometimes characterised to have been. Many farmers have expanded milk production and increased income levels throughout the quota period at milk prices higher than would have prevailed otherwise. Milk quotas served a purpose in an era when the EU produced an excess of dairy products for which there was little unsubsidised demand. However, that time has thankfully now passed.

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