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An Analysis of the Irish Dairy Sector Post Quota

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Executive summary

This research compares the performance of the Irish dairy industry post milk quota removal against a number of leading processors in key EU dairy producing countries – Denmark, Germany, the Netherlands, France, and the United Kingdom (UK), as well as New Zealand with reference to farm gate milk price, investment, seasonality, costs of production and farm profitability. The analysis is based on milk prices published by the LTO international milk price review, costs of production as published by the Farm Accountancy Data Network (FADN), other published studies, and Irish milk processor data.

- The research finds Irish dairy farmers enjoy the best net profit margins by a considerable distance, according to the most recent data from FADN for the period 2014–2017. During this period the average net margin (excluding owned labour) in Ireland was 8 cent per litre versus 4.6 cent per litre for the UK, 3.6 cent for the Netherlands, 2.7 cent for Germany, 2.5 cent for France, and minus 1 cent for Danish farmers.
- Irish dairy farmers also enjoy the lowest production costs by a wide margin. The FADN data puts Irish production costs (excluding owned labour) at 24 cent per litre as opposed to 38 cent for Denmark, 35 cent for the Netherlands, 33 for France, 32 for German, and 30 for the UK.
- These higher production costs are only partly compensated for by higher milk prices. LTO data from 2015–2019 indicates that Friesland Campina of the Netherlands paid the highest milk price in the selected countries at an average of 5.2 cent above the Irish price. However, this only partly made up for the 11 cent per litre differential in production costs.
- The next highest price was paid by French companies at an average of between 3.6 and 4 cent more than the Irish price. Again, this only went part of the way to making up for the production cost differential of 9 cent per litre. Danish companies paid 3 cent per litre more against a cost differential of 14 cent, while German companies paid an additional 1.1 cent in comparison to a differential of 8 cent. The Irish milk price is, on average, 1.8 cent per litre above the Fonterra price paid to New Zealand dairy farmers.
- Ireland, with the lowest milk price across the European Countries studied, had a net margin that was at least 43% higher per litre, when compared to the next nearest country (UK). When compared against the Netherlands which had the highest milk price, the net margin was over 2.2 times higher in Ireland (excluding owned labour).

Seasonality

- There are limitations to the Irish production model which are largely related to its seasonal nature, which mirrors grass production. For example, in the peak production month (May), more than six times the volume of milk is processed than in January. As a result, processing plant utilisation in Ireland is far lower than in its EU counterparts leading to increased processing costs. This seasonality also results in a more limited product portfolio which is highly focused on the production of low margin storable dairy commodities, namely butter, skim milk powder (SMP), whole milk powder (WMP), cheddar, whey, and casein.
- Ireland's capacity utilisation is approximately 62% with other EU countries achieving over 92%. Based on those figures, and the Irish peak milk supply in 2019 in the month of May (1.072 billion litres), Ireland has the potential to process 12.9 billion litres per annum if operating a flat milk supply curve with 100% capacity utilisation.

- This under-utilisation of capacity results in higher processing costs/lower product portfolio values which in turn translates into a lower milk price (1.3 c/l lower based on 50%:50% spring autumn versus 100% spring with a bigger difference when spring calving is compared to all year round calving systems). However, the cost savings associated with seasonality at farm level well exceed the reduction in the milk price.
- In grass-based systems of milk production, profitability is optimised when grass growth and feed demand are matched through stocking rate and calving date and where the amount of supplementary feed purchased into the system is kept to a minimum.
- Systems of milk production built around seasonal calving versus non-seasonal calving are substantially different with differing feed budgets, labour requirements and requirements for facilities on the farm.
- An analysis of the Spring versus 50:50 Spring Autumn calving systems including the milk price paid shows a difference in profitability of 1.6 cent per litre in favour of the seasonal system. When this is scaled up to a national scenario with 8 billion litres of milk it corresponds to at least €128 million annually of an advantage to Irish dairy farmers from staying with a seasonal system.
- Looking ahead to industry requirements for 2025, the research finds that it is substantially more profitable for the Irish dairy industry to invest in additional processing capacity for expansion rather than trying to flatten the milk supply curve.

Funding Future Expansion

- There are several theories on the best model for funding additional capacity. The model of a centralised processor type of investment was the correct strategy in the Irish post-quota scenario while the vast majority of farmers were expanding. There was a collective expansion and the investment was best handled collectively. A significant advantage of this type of model is that resources are generally scarce, and this forces discipline around the investment decisions.
- What is very clear is that there is no one model that is universally suitable, and that the optimum model changes over time. There is therefore a case to review the funding model to be employed for the next phase of dairy expansion in Ireland.

Recommendations can be found in the conclusions and recommendations section of the report.

Introduction

This analysis of the Irish dairy sector post quota examines the net profitability of dairy farms in Ireland in relation to a number of leading EU dairy markets as well as New Zealand. It also examines the nature of the differential in farm gate milk prices paid in those markets.

The analysis is largely based on milk prices published by the LTO international milk price review. Price transmission from EU dairy commodity prices to these farm gate prices is also presented.

In order to provide a true comparison of the profitability of milk production it is necessary to also consider farm costs. These costs are published by the Farm Accountancy Data Network (FADN) and data for the comparison countries is presented and analysed. To help understand the differences in milk price, the impacts associated with seasonality and the expansion in the industry over the past number of years is analysed and presented.

Since the removal of milk quotas in April 2015, Ireland has increased its milk production by more than 40%. This level of expansion is exceptional when measured against the growth in production in the other main milk producing countries in the EU.

Primarily, the expansion reflects very large investment at both farm and processor level, along with the exploitation of the conditions for dairying which pertain to Ireland. In particular, the ability to produce milk from grass in a pasture-based setting at a competitive cost over a long season provides Ireland with a comparative/competitive advantage over high input/high cost systems of milk production.

This grass-fed system is in sharp contrast with most milk production in the EU where a much higher proportion of the cow's diet originates from indoor concentrate-based feeding. The Irish production model does, however, have limitations which are largely related to its seasonal nature, which mirrors grass production. For example, in the peak production month, May, more than six times the volume of milk is processed than in January. As a result, processing plant utilisation in Ireland is far lower than in its EU counterparts leading to increased processing and investment costs.

This seasonality also results in a more limited product portfolio which is highly focused on the production of low margin storable dairy commodities, namely butter, skim milk powder (SMP), whole milk powder (WMP), cheddar, whey and casein. The production of higher margin short life products is limited by the availability of milk over the trough months of winter, a small domestic market and high transport costs for fresh products.

Despite these limitations, and costs, there is often criticism that Irish farm gate milk prices are less than those achieved by farmers in other EU member states, and our main competitors in particular. International milk price comparison data is frequently used as evidence to support claims that Irish milk prices are consistently below their EU counterparts.

At the very least, it is argued, that the milk price should follow and reflect developments on dairy commodity markets. Given the seasonal nature of the Irish milk supply profile, a key question arises: is a direct milk price comparison with less seasonal milk supply profiles relevant, or should there be some cognisance given to seasonality within the comparisons? Another key issue around these comparisons, centres on investment over the past number of years for expansion and who has financed that investment.

In addressing these issues, this study outlines and analyses the expansion in milk production and Milk Solids in Ireland from 2014–2019. Following this, an analysis of profitability for a typical farmer in each country is presented. Next, the price comparison and price transmissions are presented and discussed. Reasons for variations between the Irish prices and the other series are then presented. In particular, the cost of expansion and seasonality are considered. This is followed by a discussion of the seasonal nature of Irish milk production and some of the costs and benefits associated with this production system. Finally, a discussion around the funding of the future expansion of the Irish processing sector is presented by looking at a number of other models from around the world.

The Irish dairy industry post milk quota

As 2014 represents the last full year when the milk quota applied it is considered the starting point for the following analysis. The rapid expansion of Irish milk production post quota is presented in Figure 1. From this figure, we can see that almost 8.7 billion litres of milk were processed in 2019 with more than 91.8% of this volume produced domestically. From 2014–2019 domestic production has increased by almost 41.4% with combined intake up by 41.2%. Interestingly, the industry has achieved this expansion with very little increase in net debt at either farm or processor levels.

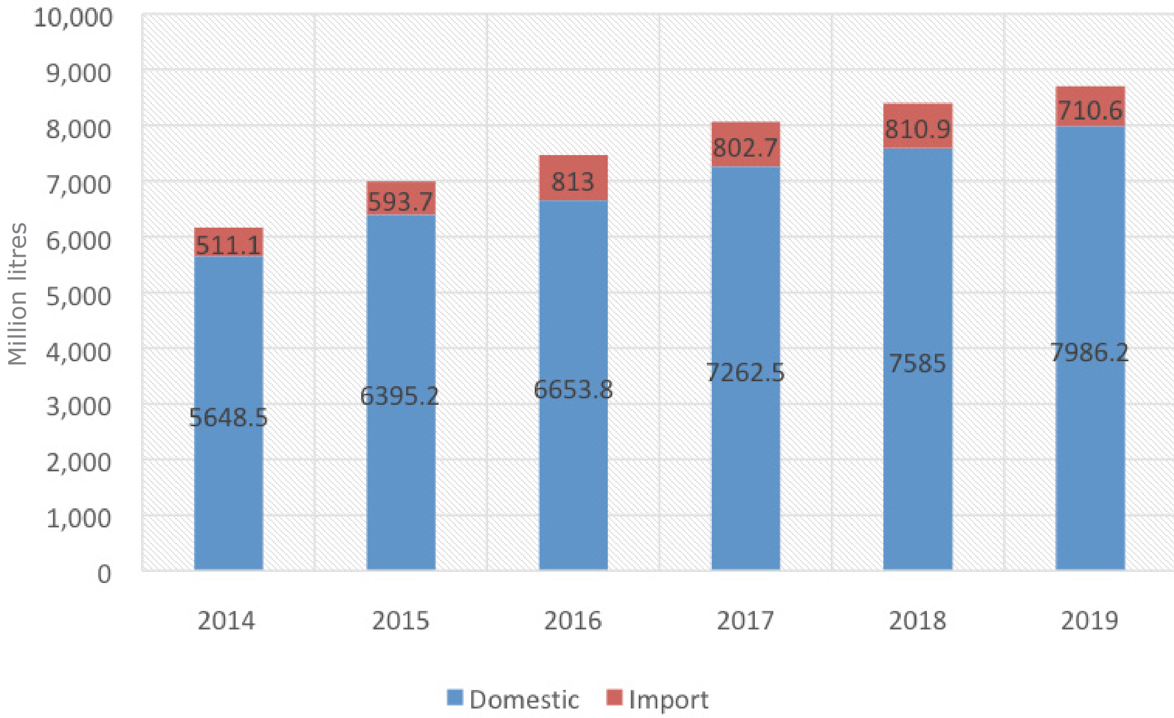

Figure 1. Total milk intake (Domestic and Imports) 2014–2019 (million litres)

Source: CSO

To place this in context, we need to consider the level of expansion in the other EU member states. In Figure 2, the percentage change in milk deliveries across the member states is presented. From this, we can see the EU-28 volume increased by more than 7%, while Ireland in green had the second largest increase just behind Cyprus. During this period the Big Six (in red) who account for approximately 70% of deliveries in 2019 displayed modest growth, with deliveries in France declining. During this period, EU-28 milk deliveries increased by just over 10.4 million tonnes with Ireland contributing just over 2.4 million tonnes of this total or approximately 23.3% (Figure 3).

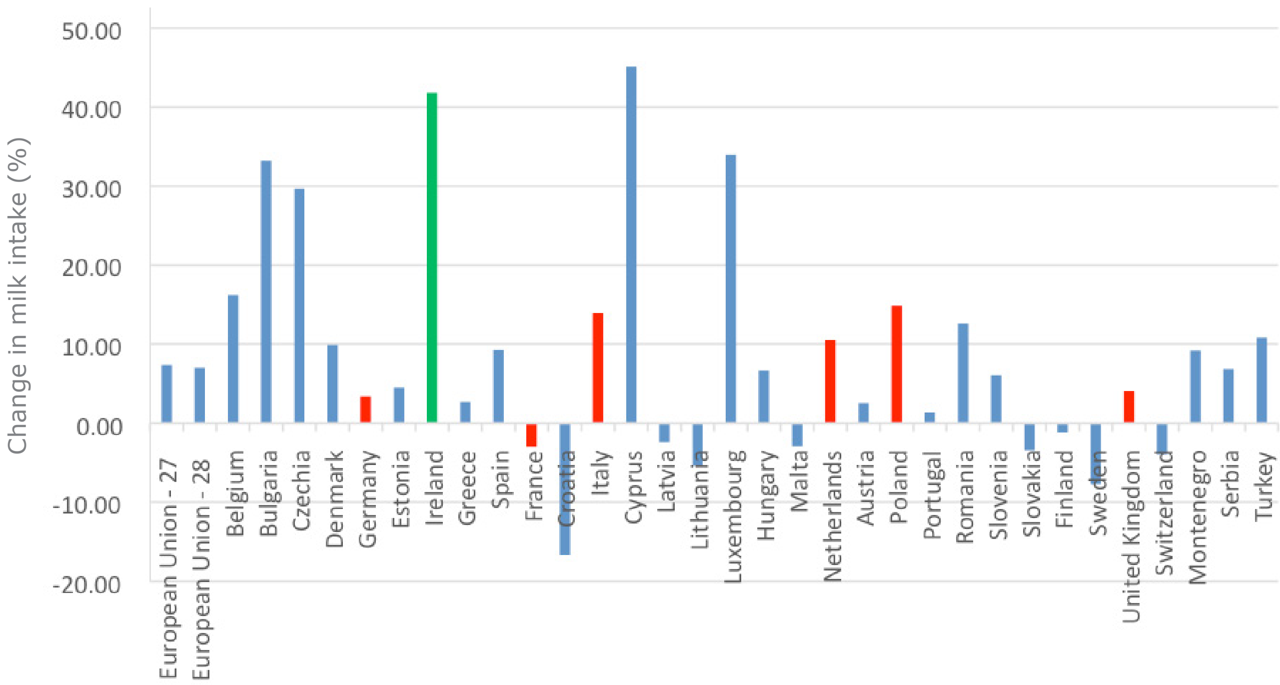

Figure 2. Per cent Change in milk intake in European (2014 Versus 2019)

Source: Own calculations based on New Cronos database, Eurostat

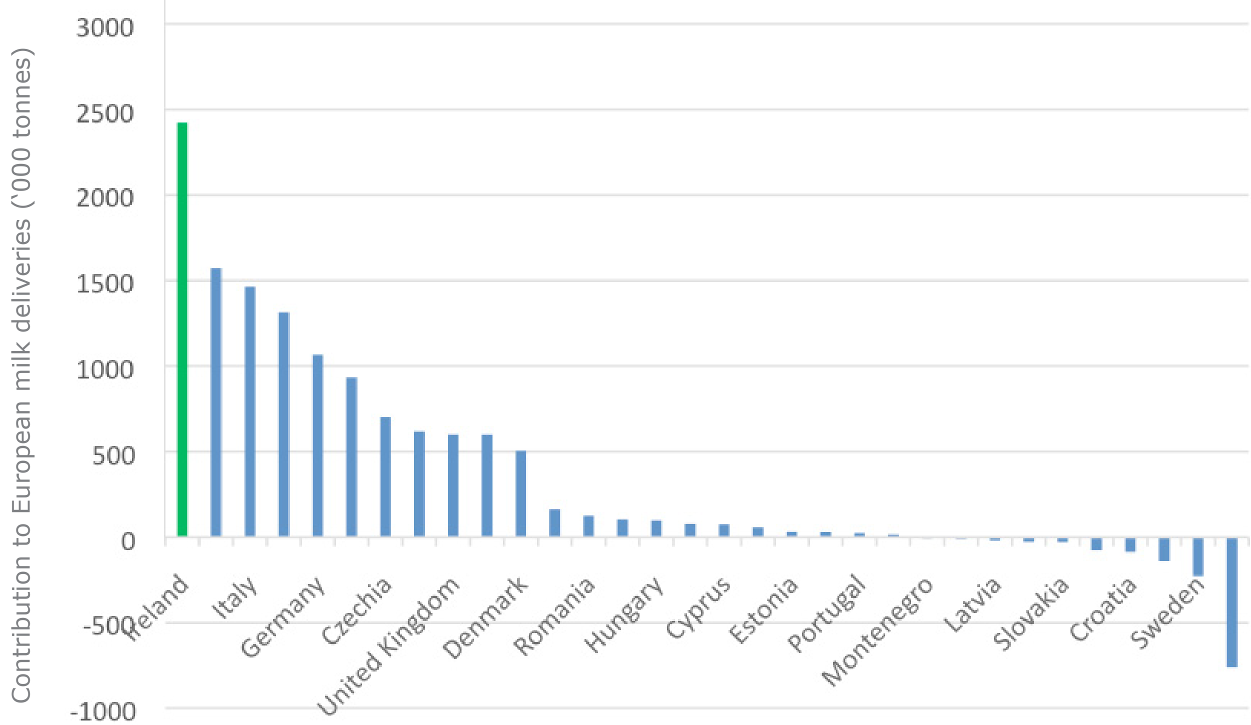

Figure 3. Contribution (000's Tonnes) to increased European milk deliveries from 2014–2019

Source: Own calculations based on New Cronos database, Eurostat

Figure 4 shows that in 2018 even with all of the expansion that Ireland is the 8th largest milk producer in the EU, approximately four times smaller than the German milk output.

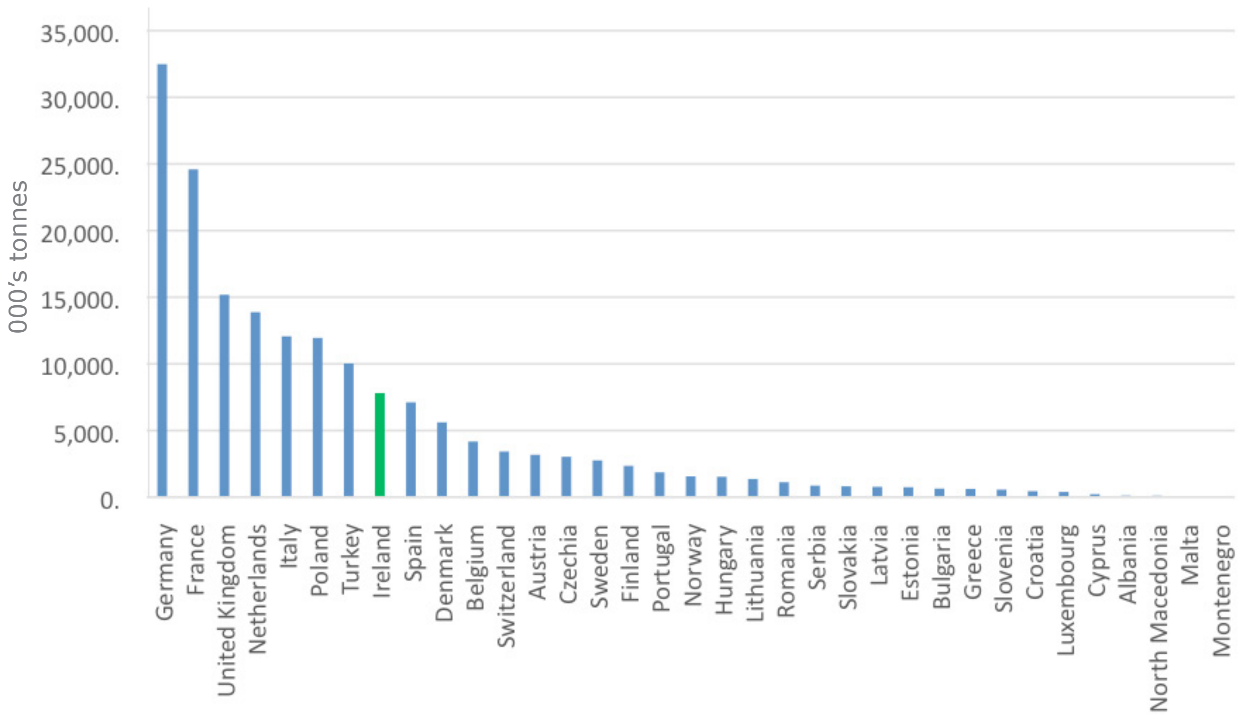

Figure 4. Contribution (000's Tonnes) to European milk deliveries in 2018

Source: Eurostat

Not alone has there been a huge increase in Irish milk deliveries but there has, more importantly, also been a corresponding huge increase in the Milk Solids content of the milk delivered. This is of significance at both farm and processor level. In Figure 5 we see that both the Milk Fat and Milk Protein of the milk delivered has increased across each month. Based on CSO data, the annual average Milk Solids have increased from 3.98% Milk Fat and 3.43% Milk Protein in 2014 to 4.17% Milk Fat and 3.54% Milk Protein in 2019.

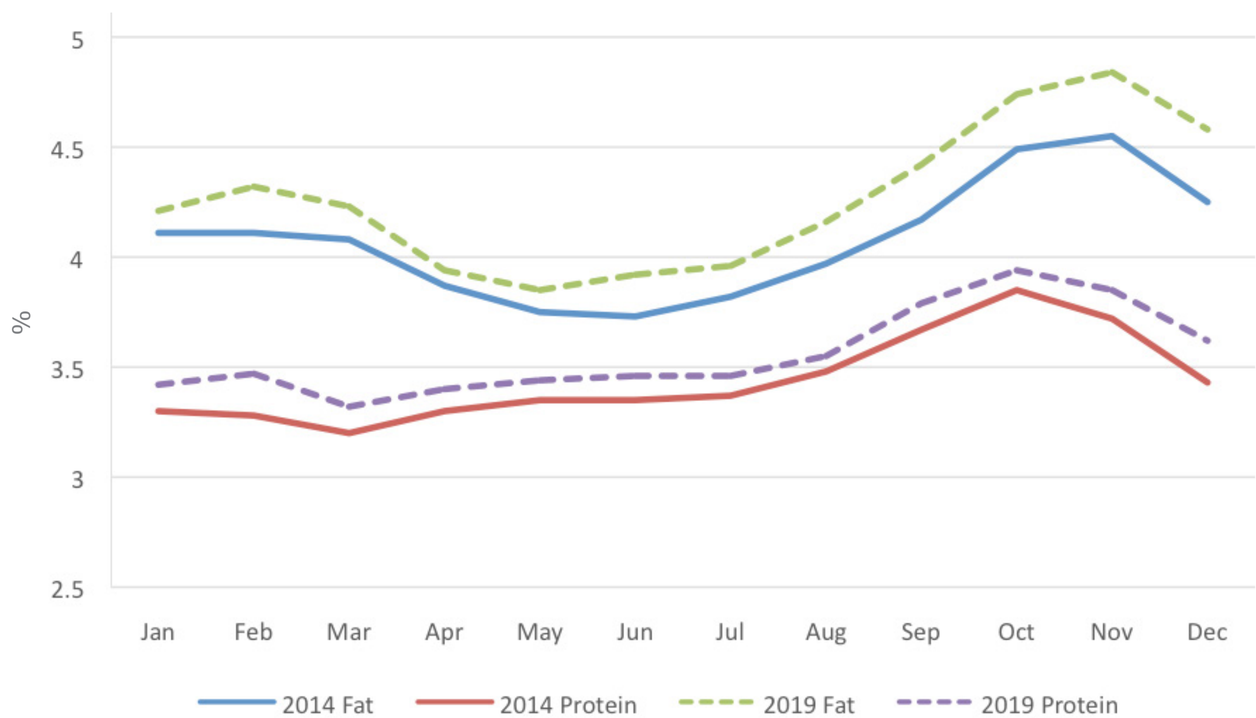

Figure 5. Comparison of 2014 and 2019 monthly Milk Solids at farm level

Source: CSO

This level of growth in Milk Solids percentages (3.5%) is impressive when considered against the growth in the main EU milk producing countries seen in Table 1. This is especially the case given that Ireland's Milk Solids percentage increases have been associated with significant increases in milk volumes. It should be noted that this data is only available up to 2018 but the pattern is clear. Ireland shows year-on-year growth in Milk Solids and its level of growth in Milk Solids is largest. The levels of Milk Solids in Ireland are now approaching the top end in this group and the gap with Denmark and the Netherlands has narrowed considerably.

Table 1. Combined annual Milk Fat and Milk Protein content 2014-2018

	2014	2015	2016	2017	2018	% increase 2014–2018
Belgium	7.42	7.47	7.49	7.54	7.54	1.62
Denmark	7.74	7.70	7.87	7.81	7.81	0.90
Germany	7.49	7.50	7.74	7.73	7.74	3.34
Ireland	7.42	7.53	7.55	7.65	7.68	3.50
France	7.33	7.36	7.37	7.44	7.40	0.95
Netherlands	7.85	7.90	7.94	7.93	7.92	0.89
Poland	7.19	7.20	N/A	7.23	7.21	0.28

Source: Eurostat

This increase in milk volume and Milk Solids content in Ireland has resulted in an increase in Milk Fat of more than 48%, Milk Protein of almost 46% and combined Milk Solids of more than 47% from 2014–2019 (Table 2).

Table 2. Annual production of selected Milk Solids (000's Tonnes)

	2014	2015	2016	2017	2018	2019	% change 2014–2019
Milk Fat	231.33	265.20	280.72	305.65	323.13	342.68	48.1
Milk Protein	199.36	230.32	236.21	260.06	271.61	290.91	45.9
Combined Milk Solids	430.69	495.52	516.93	565.71	594.74	633.59	47.1

Source: Own calculations based on CSO data

This increase in Milk Solids has resulted in an almost pro rata increase in the production of cheese and butter over the period 2014–2019 (Table 3). SMP output has doubled in this period and combined with the increased butter and cheese production highlights Irelands continued reliance on storable dairy commodities.

Table 3. Production of dairy products (000 Tonnes) by product and year

	2014	2015	2016	2017	2018	2019	% change 2014–2019
Cheese	188.4	207.1	205	259.4	269.4	278.4	47.8
Butter	166.4	187.5	198.7	223.7	237.8	250.8	50.7
SMP	70.6	99.1	117.7	119.8	133.8	142.5	101.8

Source: CSO

This increase in dairy commodity production has resulted in an inevitable increase in exports (Table 4). However, these exports are highly sensitive to commodity prices as evidenced by the 2014, 2015 and 2016 data, where we see volumes grow while export revenue drops.

Table 4. Value of exports of dairy products and birds eggs (Euro thousand)

2014	2015	2016	2017	2018	2019	% change 2014–2019
1,835,000	1,786,800	1,759,700	2,393,100	2,609,100	3,037,800	65.5%

Source: CSO

The combined increase in both milk delivered, and the solids content of that milk discussed earlier, means that the output on the average Irish dairy farm has changed considerably since the removal of the milk quota (Table 5). While the number of dairy farms has decreased slightly, the number of dairy cows has risen by more than 22%. This has led to the average dairy farm herd size increasing by more than 28%. Throughout the period the yield per cow has increased by just over 15% in terms of volume and almost 20% in terms of Milk Solids. The combined effect of these factors has seen the average dairy farm increase its milk deliveries by almost 48% with Milk Solids up by almost 54%. Of this, 54% increase in output at farm level 47.4% of the increase originated from increased milk yield per cow and 52.6% originating from increased cow numbers.

Table 5. Changes at farm level 2014–2019

	2014	2015	2016	2017	2018	2019	% change 2014–2019
Dairy cows (thousand head June census)	1,226.40	1,295.80	1,397.90	1,432.70	1,480.90	1,504.80	22.70
Number of dairy farms*	18,300	18,200	18,200	18,000	17,500	17,500	-4.37
Average herd (head)	67	71	77	80	85	86	28.31
Average yield/cow (litres)	4,606	4,935	4,760	5,069	5,122	5,307	15.23
Average yield/cow (Milk Solids)	351	382	370	395	402	421	19.89
Farm output (litres)	308,661	351,385	365,593	403,472	433,429	456,354	47.85
Farm output (Milk Solids)	23,535	27,226	28,403	31,428	33,985	36,205	53.84

**Herds with more than 10 cows*

Source: CSO, DAFM and Own calculations

This increase in scale at farm level has not translated into a pro rata increase in farm incomes. In Figure 6, the annual average family farm income for a specialist dairy farm from 2014–2019 is presented. While incomes in 2017 are a historical high and 2019 is well above pre quota values, it is clear the role milk price plays in determining this figure. However, it is also clear the role that scale (2014 milk prices were above 2017 prices) and costs (as discussed later) play on income.

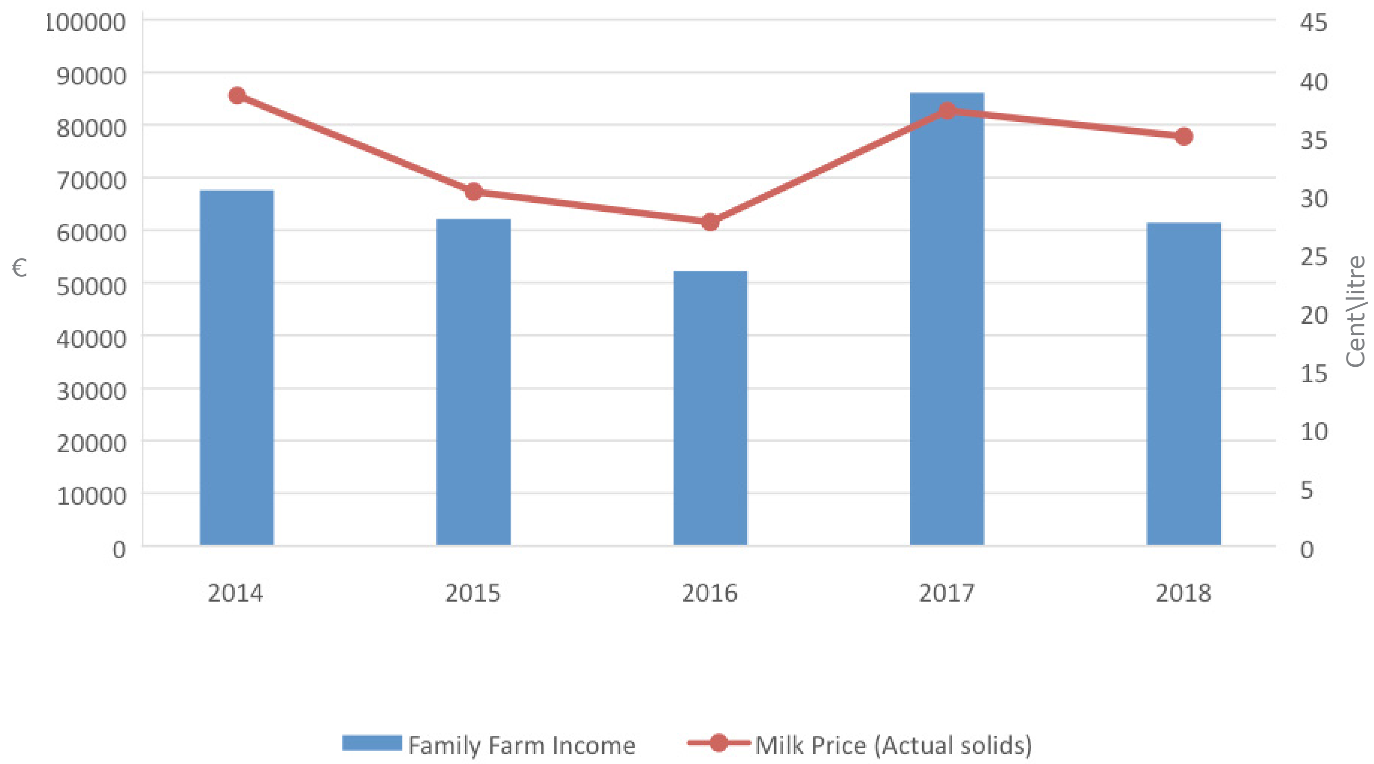

Figure 6. Family farm income and annual Milk Price

Source: Teagasc National Farm Survey and CSO

When one looks at the level of debt on farm before expansion (2008-2010) €59,622 and after (2016-2018) €64,868 representing a 9% increase, it is clear that the vast majority of the investment required for expansion has come from cashflow. When the same calculations are completed on a Milk Solids basis the corresponding numbers are €3.08 per kg Milk Solids and €2.08 per kg MS, a 32% reduction (Figure 7).

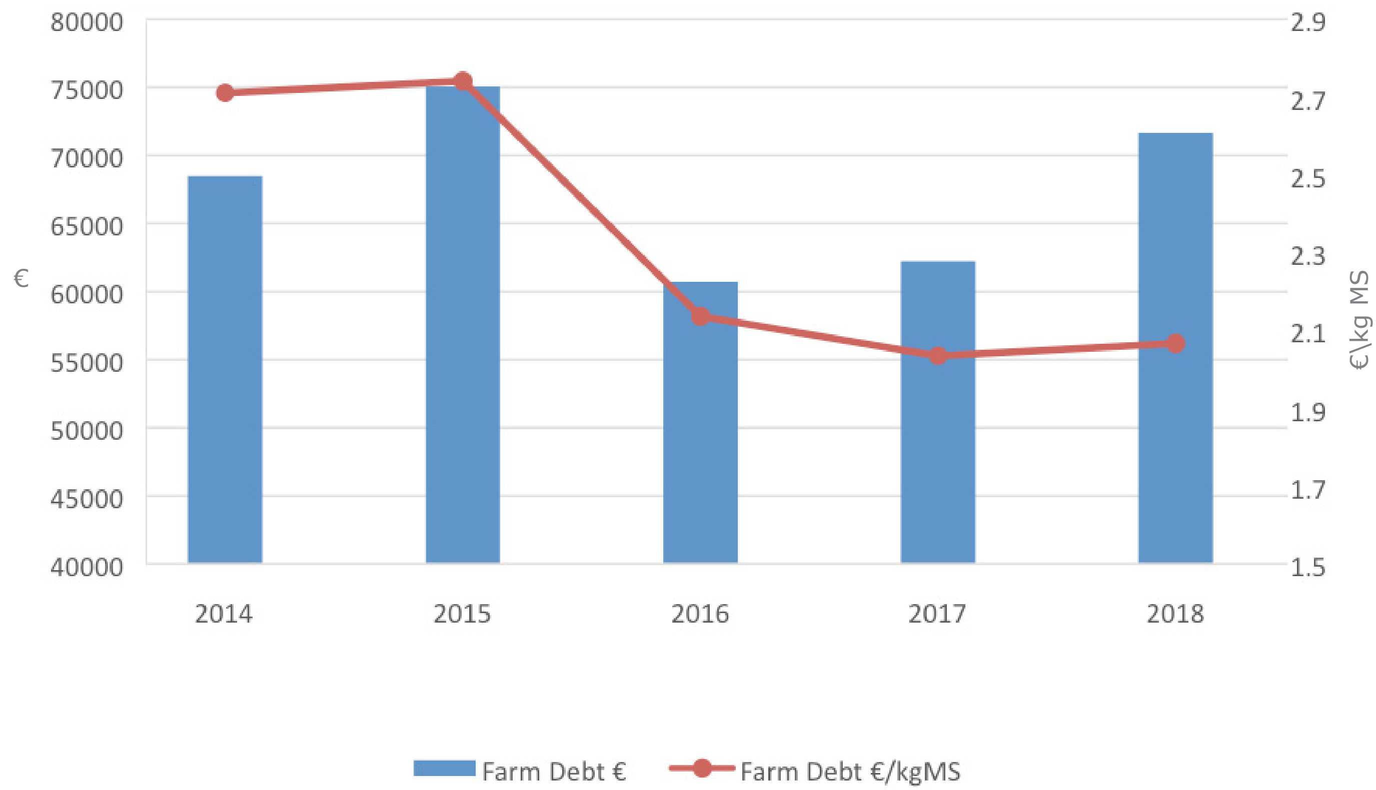

Figure 7. Farm debt and debt per kg Milk Solids

Source: Teagasc National Farm Survey and CSO

Milk price

In Ireland, two national series of milk price are published by the Central Statistics Office (CSO), one standardised at 3.7% Milk Fat and 3.3% Milk Protein and a second based on actual Milk Solids delivered. These are presented in Figure 8. It is clear that milk prices in Ireland are volatile and the standardised solids of 3.7%/3.3%[1] are no longer reflective of the typical farmer, as the actual price is above the standardised price in all months due to the increases in Milk Solids at farm level. However, due to the seasonal nature of Irish milk production, which will be presented later, it is better to consider the annual variations as outlined in Table 6.

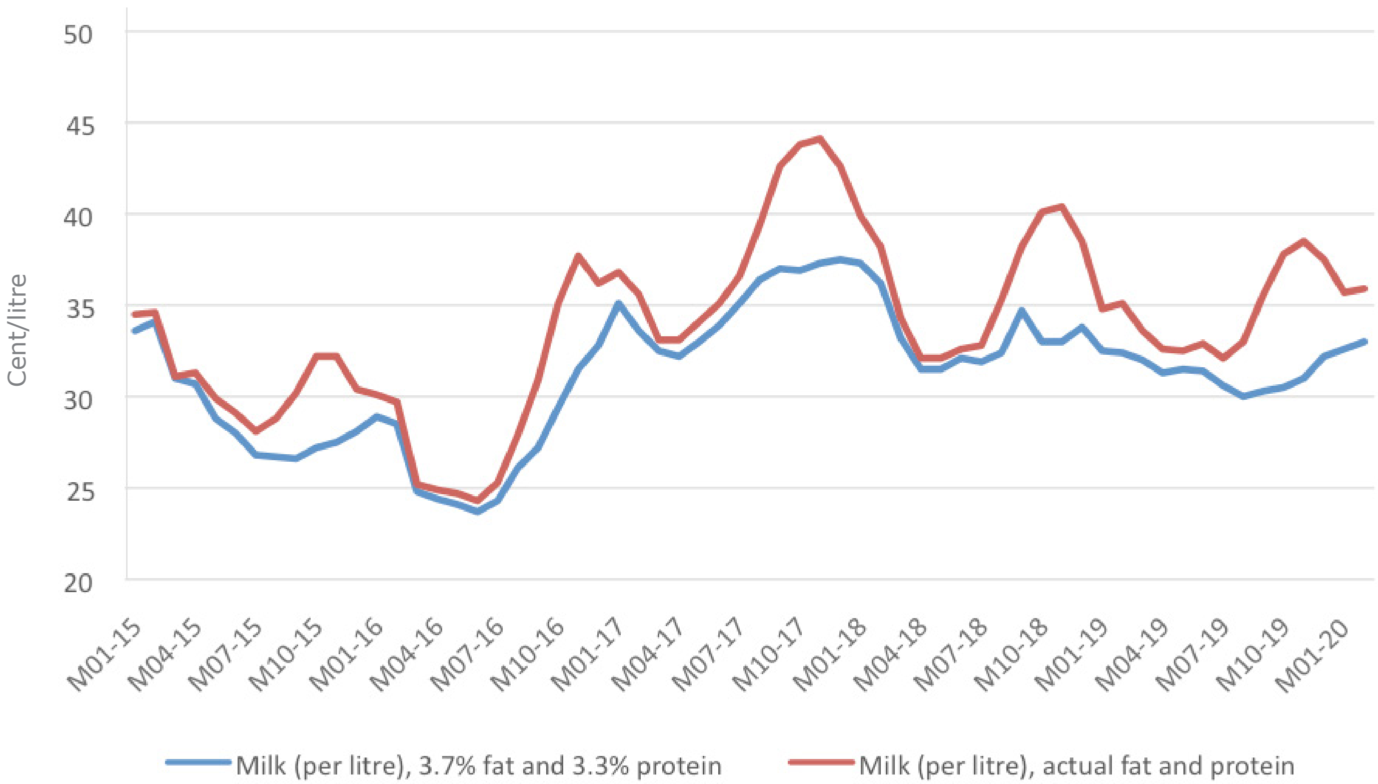

Figure 8. Irish monthly milk prices, cent per litre (actual and standardised)

Source: CSO

Table 6. Annual manufacturing milk prices 2014–2019

	2014	2015	2016	2017	2018	2019
Standardised	36.8	28.4	25.9	34.6	32.7	31.1
Actual	38.5	30.3	27.7	37.2	35.0	33.9
% difference between actual and standardised	4.6	6.7	6.9	7.5	7.0	9.0

Source: CSO

LTO International Milk Price Comparison

The LTO International Milk Price Comparison is published every month at the request of the Dairy Committee of the Dutch Federation of Agriculture and Horticulture (LTO Nederland) at www.milkprices.nl. As described by the LTO, this is a comparison of prices paid for milk by large European companies and is completed in co-operation with the European Dairy Farmers (EDF). EDF collects the milk price data and makes them available. Calculations are undertaken by ZuivelNL. The method chosen for the calculations shows the price a dairy farmer would

1 *It should be noted that many industry sources use standardised solids of 3.6%/3.3% and monthly base prices are based on these lower constituents.*

receive if milk of a specific (standard) composition, quality and quantity were delivered to the different dairy companies. In this report the following characteristics of the standard milk are taken as a basis:

- 4.2% Milk Fat and 3.4% Milk Protein;
- Total bacterial count of 24,999 per ml;
- Somatic cell count of 249,999 per ml;
- Annual delivery 1,000,000 kg[2]

The prices are exclusive of VAT, ex-farm and inclusive of certain supplementary payments. LTO emphasizes that this is not a comparison of the average milk prices paid. The average price paid by a dairy company for milk is dependent on the actual composition, quality, quantity, etc. of the milk delivered. Furthermore, LTO states no conclusions can be drawn about the performance of dairy companies on the basis of the milk prices paid. Many other factors play a role in assessing performance. For example, it is typically based on the data supplied by a single farmer. As a consequence, certain supplementary payments and bonuses paid by a processor may not be included in their milk price as quoted by LTO. The individual farmer sampled may not qualify for these payments and thus they would not appear on their monthly return. For example, in an Irish context these payments include Special Calving Bonuses and certain sustainability bonuses. If a payment is not universal it may not appear on the statement and not form part of the published milk price.

LTO currently reports monthly milk prices for 20 dairy companies. Three Irish milk processors, Kerry, Glanbia and Dairygold, form part of the monthly price comparison with the latter only included from February 2016. These processors represent three of the big four national processors and in 2019 processed approximately 67% of the national milk pool. In order to create a comparison relevant for the Irish industry a weighted average price, based on volumes processed, was created. It should be noted that this calculation does not include certain bonuses and supplementary payments and in particular, does not account for the recent Kerry payment (January 2020), which alone would inflate the Irish weighted price by approximately 0.125 cent per litre. Similar caveats may apply to the other prices quoted by the LTO which form part of the following analysis. This weighted series along with a selection of prices paid by leading EU processors is presented in Figure 9. While this is primarily an EU based comparison, Fonterra is also included by LTO and considered here[3]. In reality, the grass based seasonal nature of the New Zealand production system which is export focused, most closely mirrors the Irish system and should be a natural comparator. From Figure 9, it is obvious that there is wide variation in prices during any given month and indeed from month-to-month. Ireland, represented by the dashed line, tends towards the bottom of this group for many months, with Fonterra taking bottom position in most months. There are exceptions, Ireland performed well from April 2017 to March 2018, while Fonterra's position improved from mid-2016 to mid-2017.

2 *Note milk prices based on annual deliveries of 500,000 kg and 1,500,000 kg are also reported.*
3 *The monthly Fonterra prices are based on the most recent forecast at that point in time.*

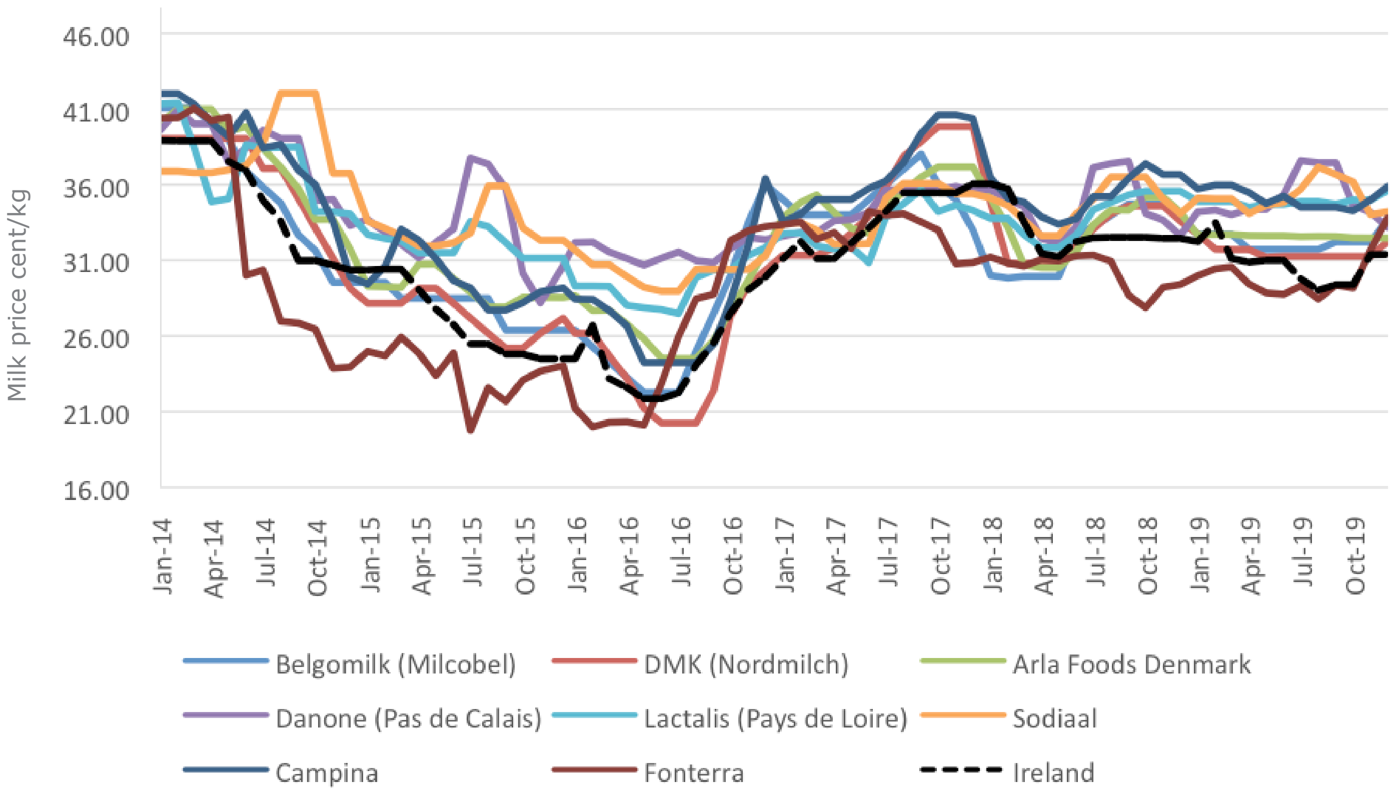

Figure 9. Selected farm gate milk prices

Source: LTO

It should be noted that the prices stated in this figure relate to the prices reported in that particular month and do not always reflect subsequent adjustments. Given the lagged payment of some of these adjustments, great care should be exercised in comparing prices between processors in any given month. In addition, it would appear, that no allowance is made for fixed price/forward contracts. These contracts have become more popular in recent years amongst some processors, and the Irish ones in particular. A priori one would expect that these would have the effect of raising a farmers' returns when the spot price is low and decreasing returns when the spot is high. For example, if a farmer has 20% of their supply fixed in a given month at 32 cent per litre and the spot monthly return is 27 cent this farmer will receive a return of 28 cent for that month. Finally, due to the highly seasonal nature of Irish milk production, discussed in detail later, monthly comparisons can be misleading.

After each calendar year has ended, a report is presented with the calculated milk prices paid for that year reported. This annual report appears when the supplementary payments of the preceding calendar/financial year are known and can thus be incorporated into the milk prices. The amounts of the supplementary payments are not corrected for the date of payment. The monthly milk prices are weighted on the basis of national monthly milk deliveries (source: LTO). These prices can be considered a more accurate reflection of milk returns, again noting that fixed price forward contracts may not be included. Again, it should be noted that not all supplementary payments are included.

From Table 7 we see that prices paid by all companies have dropped in the second half of the time frame shown. The overall mean is larger than the mean for 2015-19. Next it is clear that Friesland Campina has paid the best prices, averaging more than €0.02/l above the others over the entire period, dropping to €0.015/l in the latter period. In this latter period the Irish prices are between €0.035/l to €0.04/l behind the French companies, just over €0.03/l behind the Danish companies and about a €0.01/l lower than the German companies. In contrast the Irish series is €0.018/l above the Fonterra price.

Milk equivalent prices and market indicators

One means of evaluating whether milk prices track market returns is to calculate a milk equivalent price based on markets returns. This approach has a long history in the EU, where the Intervention Milk Price Equivalent (IMPE) was used as a basis for determining the floor to the milk price provided by the intervention system as well as an indicator of how well the target price was met.

The IMPE was calculated from intervention prices for butter and SMP, the cost of converting the raw milk into butter and SMP and the yield of these products. A criticism of this measure was the processing costs used were a general/average measure and not reflective of the costs encountered by many processors. These costs are often site specific and reflect the age of plant, the scale of the plant and location specific factors such as labour and energy costs. For this reason, there is a tendency to favour price equivalents which report the gross return on commodities (excluding processing costs or margin) rather than a net return. In the following section, we will consider two milk equivalent price series. The first is based on the returns associated with a butter and SMP portfolio with the second based on cheddar returns.

Table 7. Selected Annual Milk Prices (cent per kg)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	Mean 2011-19	Mean 2015-19
FrieslandCampina NL	37.74	35.6	41.42	41.61	33.69	31.27	38.56	36.07	36.49	36.94	35.22
Arla Foods DK	35.55	34.62	38.75	39.57	30.66	28.44	36.46	34.89	34.02	34.77	32.89
Sodiaal (Pas de Calais) FR	34.56	33.78	36.34	38.42	33.41	30.48	34.37	33.69	35.50	34.51	33.49
Danone (Pas de Calais) FR	34.55	33.66	35.99	37.95	33.07	31.57	34.47	34.55	35.04	34.54	33.74
Lactalis (Pays de la Loire) FR	34.17	32.82	35.42	37.83	31.82	29.6	33.55	34.41	34.89	33.83	32.85
Muller (Leppersdorf) DE	35.14	31.32	37.43	36.68	28.26	26.2	35.38	32.66	33.46	32.95	31.19
DMK DE	34.12	31.31	37.14	36.88	27.52	24.96	35.65	32.75	32.33	32.52	30.64
Ireland*	33.97	30.76	37.53	36.12	27.31	23.85	34.30	32.66	30.86	31.93	29.80
Fonterra NZ	30.15	29.99	35.54	28.71	21.05	27.62	31.63	29.01	31.19	29.43	28.10

*Source: LTO *Own Calculation (based on all 3 processors from 2015-18 and Kerry and Glanbia 2011-2014)*

Butter and SMP equivalent

In the following analysis a gross return based on the EU wholesale dairy commodity prices is calculated. A similar measure is often used to gauge where the milk price should be for a particular month. Prices based on butter and SMP returns, and are often stated as VAT exclusive and net of an assumed processing cost which they estimate to be between €0.05 and €0.065 per litre and is referred to as the farm gate price equivalent. However, it is unclear which precise costs are included in this processing cost figure or whether they are subject to periodic revision to capture for example increased labour and energy costs or investment in additional capacity. Industry, for example, claim that the true current cost of processing a butter/SMP portfolio is in the region of €0.075-0.080 per kg, allowing for full costs which include a depreciation charge for plant, etc. It also should be borne in mind that most processors have a product portfolio which is quite different from the butter/SMP portfolio assumed here. However, as a means of comparison, the Ornua PPI which is based on a broad basket of commodities assumes a processing cost of €0.065/l which will increase to €0.07/l from August 2020. For these reasons, it is best to view these equivalent prices as assessing how well and quickly transmission of price changes feed down the milk supply chain rather than absolute measure of a processors' performance.

A gross milk equivalent based on the LTO solids (4.2%/3.4%) and EU commodity prices is presented in Figure 10 along with the weighted Irish milk prices as discussed above[4]. A priori, one might expect the gross equivalent price to be well above the farm price, as the former must cover the farm gate price, all processing costs and a margin for the processor. In this instance, while the milk equivalent price and farm prices tend to track each other there are instances where the gap appears to widen, early 2017, and actually inverts in January 2018.

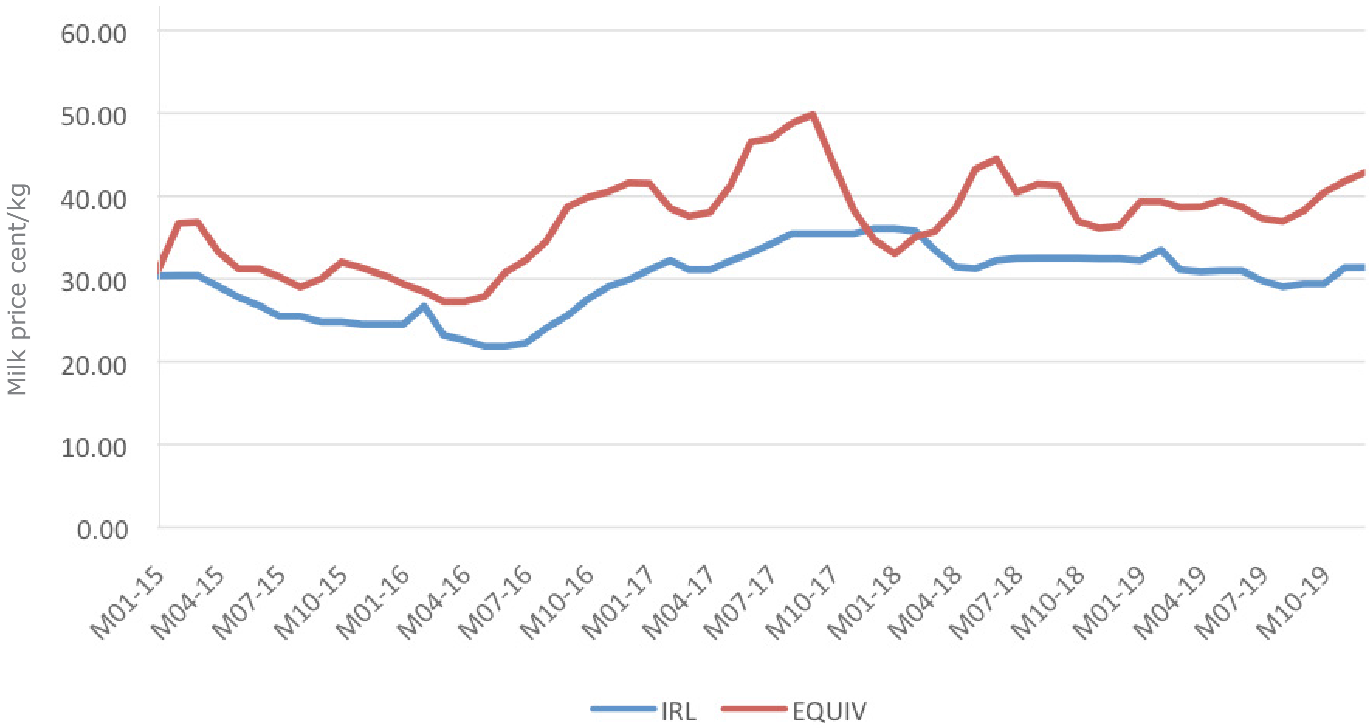

Figure 10. Irish and milk equivalent prices cent/kg

Source: Own calculations

The difference between the series is presented in Figure 11. From this chart we see the difference between the series differs considerably over time. This may in part be explained by the following. Returning to Figure 10, it is clear that the Irish farm gate price is smoother than the equivalent series. This suggests that Irish processors try to refrain from passing large price changes (both positive and negative) on to their suppliers, thereby reducing the volatility at farm gate. In addition, dairy commodities are often sold a number of months forward. This facilitates a smoother running of the supply chain and allows buyers to plan and budget more effectively. A simple correlation analysis bears out this latter point. The contemporaneous correlation between the Irish and Equivalent series is 0.710, however, when the Irish and equivalent series are lagged by three months the correlation rises to 0.858.

4 *This equivalent is based on Dutch wholesale butter and SMP prices and the EEX whey price with a 15% premium as a proxy for Lactose prices. In this model, Buttermilk powder prices as estimated as the SMP price minus a discount of €100. This latter adjustment follows the ADHB in their calculation of their AMPE (Actual Milk Price Equivalent). https://ahdb.org.uk/dairy/ampe-and-mcve*

Figure 11. Difference between Irish and gross milk equivalent (cent/kg)

Source: Own calculations

These factors suggest that a simple comparison of the farmgate price and milk equivalent in any given month may be misleading. In reality, a longer time frame is required and in Figure 12 the annual returns from 2015–2019 are presented. The milk equivalent returns are weighted by volume in order to reflect the seasonality inherent in milk deliveries in Ireland. These are then compared with the annual returns presented in Table 7. The performance from year-to-year varies, with for example a small margin to cover procesing and profit of €0.043/l in 2015, suggesting that processors supported milk prices in that year. While the corresponding margin in 2017 was €0.09/l, suggesting a replenishment of reserves for future years. Over the entire periods the average margin is estimated to be just in excess of €0.074/l.

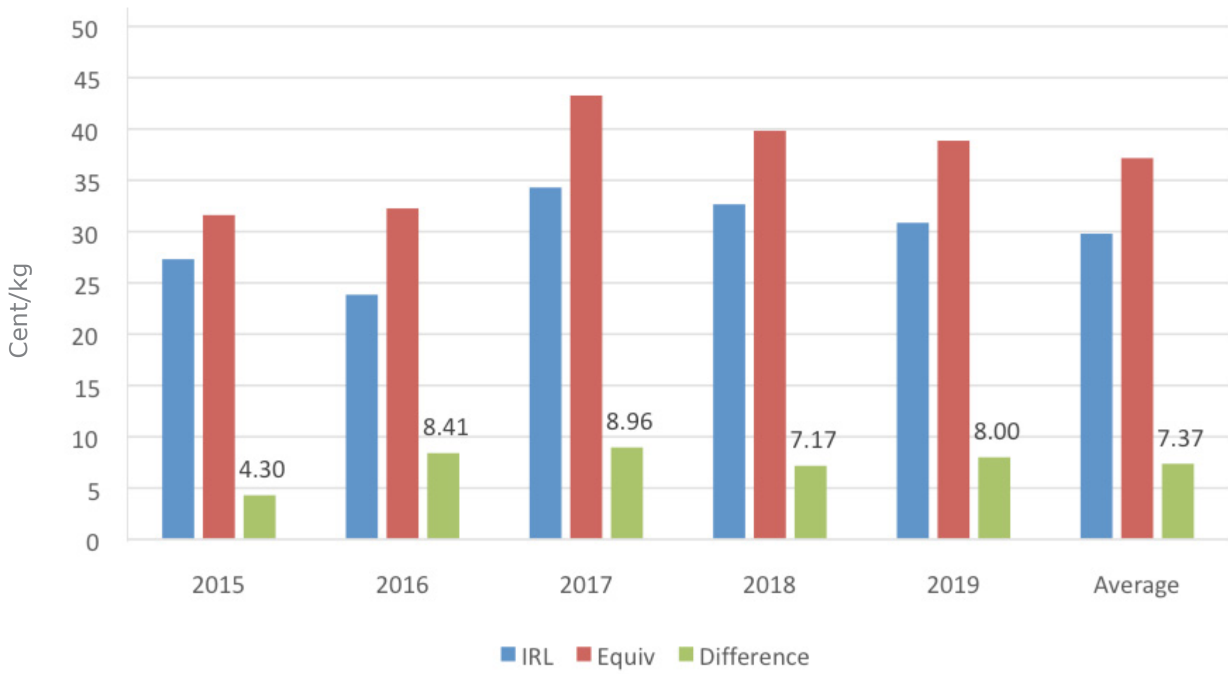

Figure 12. Annual Irish and milk equivalent prices (cent/kg)

Source: Own Calculations

Cheddar cheese equivalent price

A cheddar cheese equivalent price was also calculated based on the returns from the products associated with the production of cheddar. In this case an average EU cheddar price, as published by the EU milk market observatory, was used along with Dutch butter prices and EEX average monthly settlement prices for whey. In this model two further joint products are produced, whey butter and buttermilk powder. The former is priced as a discount of €330 to the Dutch butter price, while the latter is priced at a discount of €100 to the Dutch SMP price.

This equivalent series along with the weighted Irish milk prices are presented in Figure 13. It is noticeable that both series broadly move in lockstep. This reflects a correlation coefficient of 0.840 with a slightly stronger relation at a lag of one month of 0.842.

The gross difference between the series is presented in Figure 14. This difference is quite stable and is between €0.10 and €0.14/kg for most months. However, given the seasonal nature of Irish milk production, a weighted return based on monthly volumes is required to capture the actual level of this margin over time. These returns are then annualised and presented in Figure 15. Again, note the annual milk prices are those presented in Table 7.

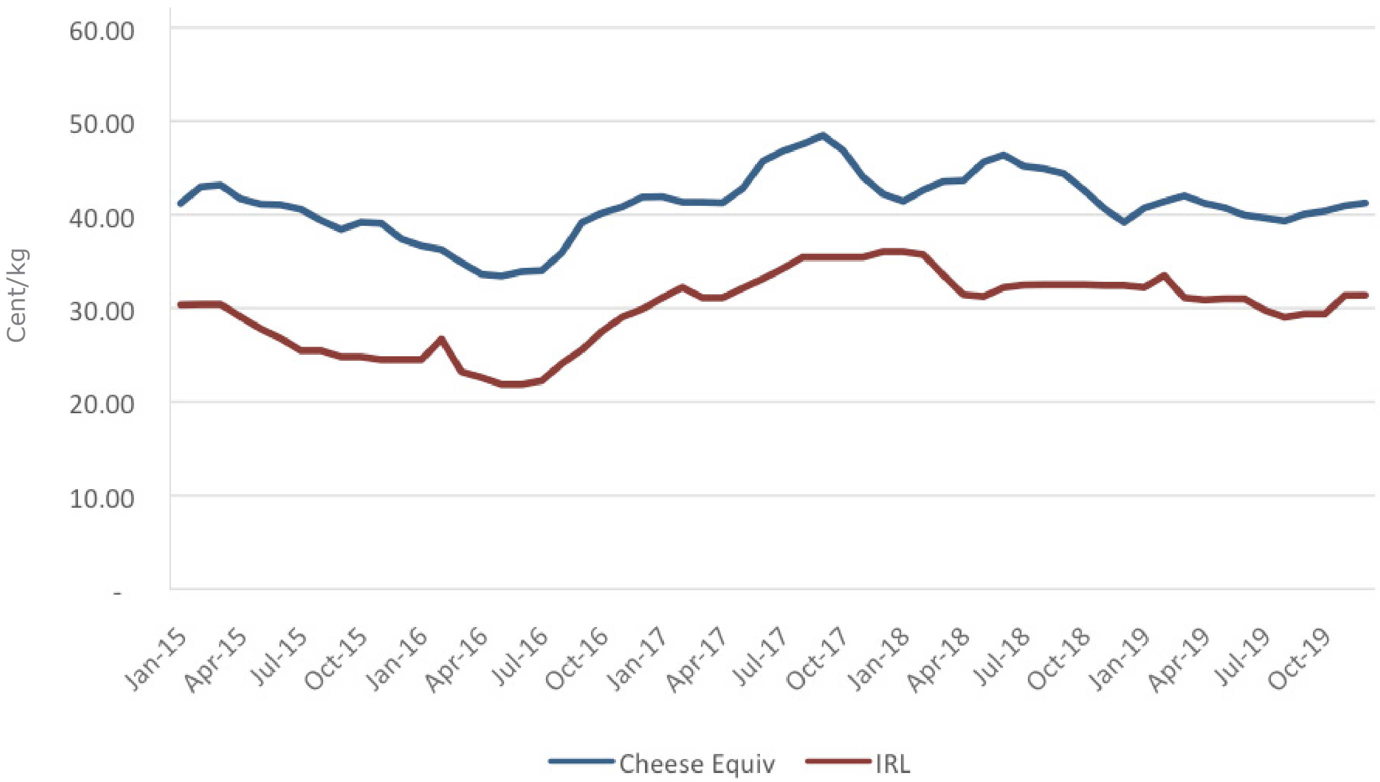

Figure 13. Irish and cheese equivalent prices cent/kg

Source: Own Calculations

Figure 14. Difference between Irish and cheese milk equivalent (cent/kg)

Source: Own Calculations

From Figure 14, it is clear that the margin is more stable than is the case for the butter/SMP mix. Three of the five years are very close to the five year average of €0.113/kg. This value is a little over €0.015 above the industry based processing cost estimate of €0.097/kg of milk destined for cheddar production.

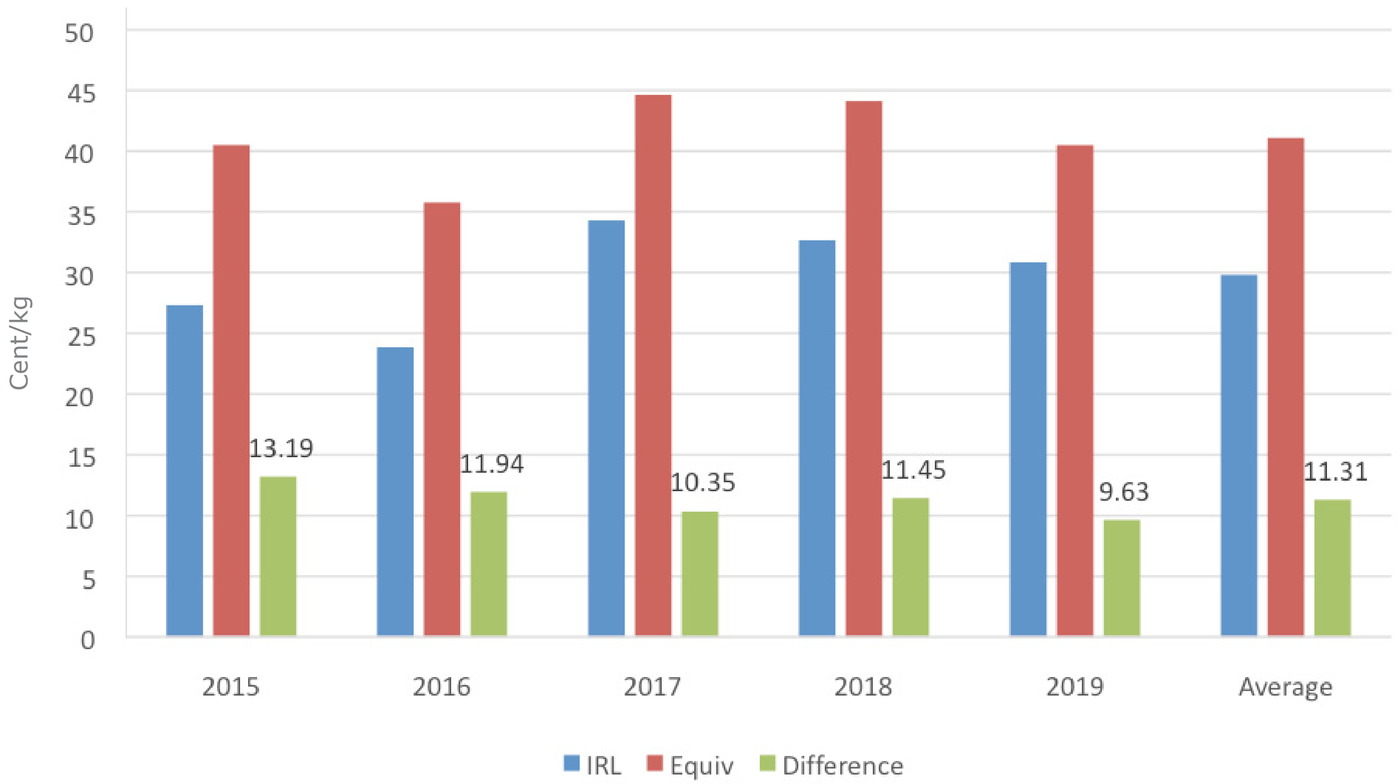

Figure 15. Annual Irish and cheddar cheese equivalent prices (cent/kg)

Source: Own Calculations

The LTO EU Milk for Cheese Value Equivalent (MCVE)

Each month the Agriculture and Horticulture Development Board (AHDB) publishes its EU Milk for Cheese Value Equivalent (MCVE). The purpose is to understand how the UK is performing against a number of other main milk-producing nations in the EU. To this end, the AHDB has developed unique MCVE calculations for France, Germany, the Netherlands, Ireland and Denmark, based on typical cheese production in those countries. For the UK and Ireland, the MCVE assesses net returns from mild cheddar, whey powder and whey butter. Note that the milk equivalent discussed above also includes butter and buttermilk powder so these indices are not directly comparable. In addition, the milk to product conversion ratios differ as the Milk Solid content of the milk used in this equivalent is assumed to be 4.07% Milk Fat and 3.48% Milk Protein. It should also be noted that the prices used to value cheddar, whey powder and whey butter in both series also differ.

As cheddar is not a commonly produced cheese in the other reference countries, gouda returns are used for Denmark, Germany and the Netherlands while emmental returns are used in the case of France. The purpose of this analysis is to allow comparisons between the countries and provide indication of why milk prices may be different between those countries Figure 16.

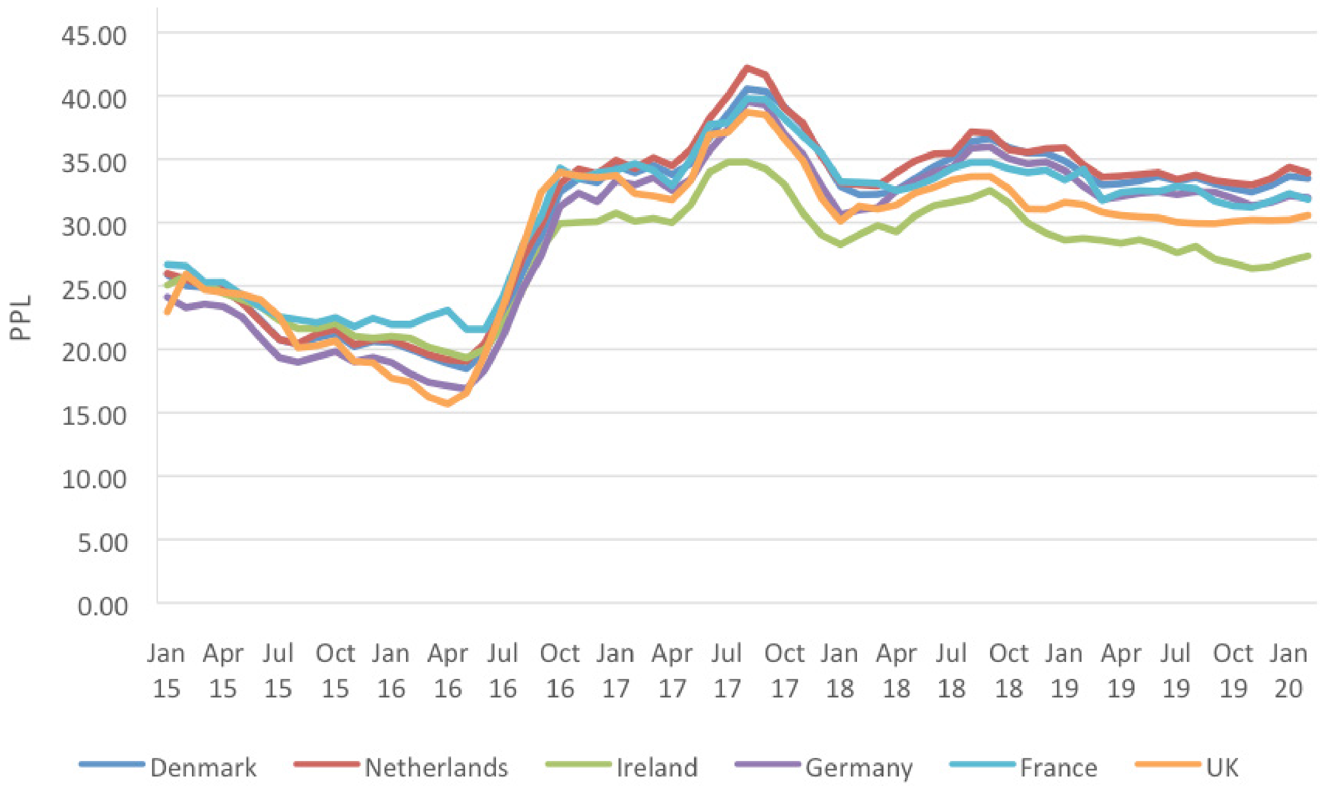

Figure 16. MCVE country comparison (pence per litre)

Source: AHDB

From Figure 17, we can see that the return on cheddar as represented by the UK and Irish series are somewhat below the returns for gouda and emmental from the summer of 2016 to-date. Prior to this, cheddar returns could be considered as competitive relative to the other cheese types. From Table 8 we see that Dutch returns were approximately 3.5 pence per litre above Irish returns across the entire period but are 5 pence per litre greater from July 2016 to-date. While returns in the UK are ahead of Irish returns these still are lower than their continental counter parts.

Table 8. Average monthly cheese returns (pence per litre)

	Denmark	Netherlands	Ireland	Germany	France	UK
Jan 15 to Feb 20	30.4	30.9	27.4	29.1	30.6	28.8
Jan 15 to June 16	21.5	21.8	22.1	20.0	23.2	20.6
July 16 to Feb 20	34.0	34.6	29.6	32.9	33.6	32.1

Source: Own calculations based on AHDB data

It should be noted that while the production of these commodity cheeses is somewhat uniform in most countries, there is a seasonal pattern to cheese production in Ireland (Figure 17). Only a small quantity is produced between December and February, so to reflect this, the existing prices should ideally be weighted, with annual returns rather than monthly numbers being considered.

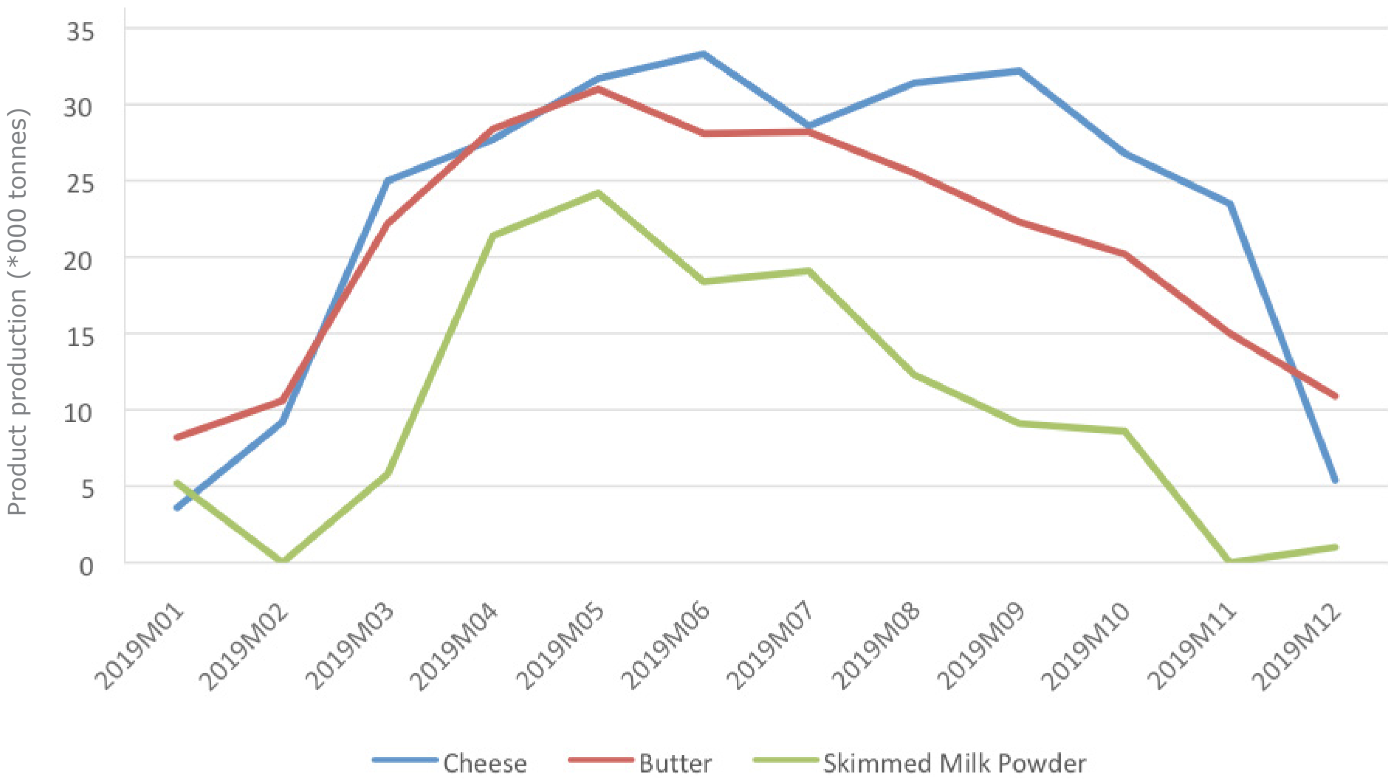

Figure 17. Monthly production of dairy products in Ireland in 2019 (000 tonnes)

The seasonality of butter and SMP production is even more pronounced and as such any analysis of Irish dairying should consider both the seasonality and the cost/benefits associated with this production system.

Understanding milk price differences - Dairygold

In order to evaluate the milk price paid by any processor, one must also look at all of the factors that affect that milk price. In this context, and looking at the Irish dairy industry as a whole, and Dairygold in particular, some of the context of the investment in expansion should be considered. The vast majority of the expansion investment has occurred across the period 2008–2020 and was funded through a range of different approaches including shareholder funds, revolving funds, government grants, bank debt and with probably the largest single component coming from cash flow from within the business. Table 9 shows that in total over the period 2008–2019 there has been €389 million invested by Dairygold across a range of different projects related to expansion and renewal (assuming all of this investment was associated with expansion – note approximately €50 million of the €389 million was for other projects but an additional €50 million will be required over the next five years). This investment has resulted in an increase in processing capacity at peak of over 90% and provides Dairygold with adequate capacity up to 2025 at least. The investment in the business has resulted in debt levels being 231% of what they were in 2008 but still within the ratio of 3:1 for EBITDA calculations. When the debt levels are expressed relative to the processing capacity and EBITDA, it shows that the debt ratios have not increased or decreased respectively. Furthermore, interest payments have not increased in line with debt levels with depreciation only increasing by 44%. Over that same period, the net assets of the business have increased by 81%.

Table 9. Financial breakdown of Dairygold's performance over the period 2008–2019													
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
EBITDA	€'000	16,648	28,657	41,700	38,147	38,379	46,021	47,085	41,239	39,009	52,780	48,638	56,616
Operating profit	€'000	2,267	13,459	26,236	22,164	20,854	27,932	28,627	19,213	17,456	32,402	28,856	35,751
Investment capital exp (Net of Grants)	€'000	19,759	19,301	7,582	15,473	16,485	32,142	53,264	49,838	16,538	13,815	59,801	84,776
Net assets	€'000	205,628	220,724	241,289	244,300	251,266	273,854	296,146	315,535	307,621	335,470	337,898	373,013
Debt	€'000	68,204	77,886	62,332	67,242	56,832	60,904	71,611	96,150	88,731	79,648	111,357	157,934
Depreciation	€'000	15,324	16,002	16,301	16,823	18,592	19,450	19,886	23,428	23,167	22,174	20,980	22,016
Interest	€'000	4,069	4,253	4,817	4,989	4,609	4,404	4,716	5,174	6,094	5,783	5,733	6,903

Source: Dairygold Annual Report

Table 10 shows the expansion costs relative to the 2019, and projected 2025, milk supply for both the additional milk associated with expansion as well as for all milk processed in Dairygold. The total expenditure is expressed in a per litre basis assuming a 5% depreciation rate and an opportunity cost (based on 3.5% charge on the investment assuming a 20 year repayment pattern) for the total investment. This allows the investment costs to be expressed in a euro per litre per annum basis. Depending on whether you take the 2019 milk supply or the projected 2025 milk supply the additional processing capacity has a capital cost of €0.72/l or €0.50/l, respectively. When the same numbers are expressed for the total milk production in 2019 or 2025 the corresponding figures are €0.28 or €0.24/l for the additional processing capacity, respectively. The corresponding depreciation and an opportunity cost on finance (based on 3.5% charge on the investment assuming a 20 year repayment pattern) amount to €0.049/l, €0.034/l, €0.019/l and €0.016/l respectively. These costs do not take into account any potential economies of scale achieved through the expansion process which are likely to be achieved as the facilities are getting closer to full utilisation. These scenarios show the costs when expressed on annual basis with a 20 year timeframe. But in reality the bigger effect is seen on a cash basis, which is shown in Table 11.

Table 10. Total investment costs, investment costs annualised (depreciation and opportunity costs) and capacity (additional and total) in litres					
		Additional		Total	
		2019 vs 2008	2025 vs 2008	2019 vs 2008	2025 vs 2008
Investment	€'000	388,774	388,774	388,774	388,774
Milk	M Litres	541	774	1,390	1,623
Cost per litre	€/l	0.719	0.503	0.28	0.24
Depreciation charge for additional milk capacity	€/l	0.036	0.025	0.014	0.012
Opportunity cost of capital of finance	€/l	0.013	0.009	0.005	0.004
Combined cost per litre	€/l	0.049	0.034	0.019	0.016

Source: Dairygold accounts and own calculations

Table 11 shows the investments made in additional processing capacity by Dairygold over the period 2008–2019 and how these investments were funded. The analysis shows that over the period of the investment that €279.3 million of the investment came from cash flow, sharing up by members and investment in the revolving fund by members with the remainder coming from bank debt. On average, over the period, the cash flow effect of the investment in additional capacity works out as €0.021/l. When this figure of €0.021 is compared with the depreciation and opportunity costs of additional investment, it is clear that the investment has put pressure on the cash flow of the business. It should be noted that there is no assumption included in this analysis for increased economies of scale associated with expansion. It would be expected that economies of scale would counteract the additional investment somewhat, but that these economies would only become apparent as the facilities become fully utilised. Given the fact that much of the aggressive expansion investment is now in place, there will be a much lower requirement for further investment into the future. This will mean that the cash pressures will be lower. This is particularly the case when the debt levels are brought comfortably below the EBITDA 3:1 ratio. Ultimately over time this will mean that there will be more cash to use for other purposes (e.g. milk price or investment in higher margin businesses).

Table 11. Sources and application of funds for investment in Dairygold over the period of 2008–2019

Investment		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Investment	€'000	19,759	19,301	7,582	15,473	16,485	32,142	53,264	49,838	16,538	13,815	59,801	84,776
Milk	M Litres	849	838	926	941	916	959	975	1,157	1,205	1,305	1,340	1,390
Cash	€'000	-10,102	9,619	23,136	10,563	26,895	28,070	42,557	25,299	23,957	22,898	28,092	38,199
Debt	€'000	29,861	9,682	-15,554	4,910	-10,410	4,072	10,707	24,539	-7,419	-9,083	31,709	46,577
Milk price effect	€/l	(0.012)	0.012	0.025	0.011	0.029	0.029	0.044	0.022	0.02	0.018	0.021	0.028

In summary, when looking at the milk prices and comparing across countries, a key element of the comparison should take into account investment that has been made (e.g. increased capacity) which has a significant milk price effect in the short term but allows producer members to expand their business without having to invest in processing facilities. When looking at Figure 3, it is clear that the expansion has been greatest in Ireland since the relaxation of milk quotas and obviously this means that the investment has been greatest also. This, coupled with a more seasonal milk profile (discussed later) has resulted in greater requirements for additional processing capacity in Ireland and hence that investment has had a negative influence on milk price over the period. The majority of that investment has come from cash flow, resulting in a lower milk price being paid.

Costs of production and profitability at farm level

Cost Comparison with Main EU Dairy Producing countries (Pre and Post Quota)

The issue of the competitiveness of the EU dairy sector has been addressed in a number of studies conducted over the last 20 years (Vard, 2001, Boyle *et al.,* 1992, Fingleton, 1995, Boyle, 2002, Thorne, 2004, Donnellan *et al.,* 2011, Thorne *et al.,* 2017). Generally, these studies took place in a period when milk quotas applied in the EU, hence, it is therefore appropriate to return to this issue in a post quota environment. For the purpose of this study, costs per litre of milk produced are used as a measure of competitiveness. The focus of this analysis is at the farm level. While there are also issues of competitiveness further along the production chain, these are not considered in this study. In the FADN all costs are specified on a whole farm basis. However, in this study, methods were devised whereby the costs were apportioned to the dairy activity.

Data from the FADN for the accounting year 2017, is currently the latest available data on costs on specialised dairy farms across the EU. Two periods were compared, 2012–2014 and 2015–2017 which reflect pre and post milk quota removals. The countries studied included Denmark, Germany, France, Netherlands, the UK and Ireland. The analysis does not include owned labour or land.

The analysis shows that costs reduced in all countries post quota (Figure 18). Denmark had the highest costs of production as well as the highest reduction in costs post quota. The average reduction in costs between the pre and post quota period was 13% with a reduction of 17% in Denmark and the Netherlands, and 15% in Ireland, while costs only reduced by 7% in France. On average, costs of production (excluding owned labour) were €0.38/l in Denmark, €0.35/l in the Netherlands, €0.33/l in France, €0.32/l in Germany, €0.30/l in the UK and €0.24/l in Ireland over the period 2012–2017. When Ireland is compared to the other countries, the biggest differences in costs were in purchased feed €0.067/l versus €0.043/l, contract work €0.024/l versus €0.013/l, depreciation €0.045/l versus €0.021/l, interest €0.013/l versus €0.003/l. While costs such as fertiliser were higher in Ireland €0.019/l versus €0.009/l. All of these costs exclude family labour which would be different by country and therefore the returns reflect returns to owned capital and labour. The milk price was highest in the Netherlands over the period at €0.39/l, Denmark €0.37/l, while France, Denmark and the UK averaged €0.35/l and Ireland average €0.32/l. All countries had different Milk Solids percentages (Figure 18) which is why the prices are different to what was achieved in the LTO comparison.

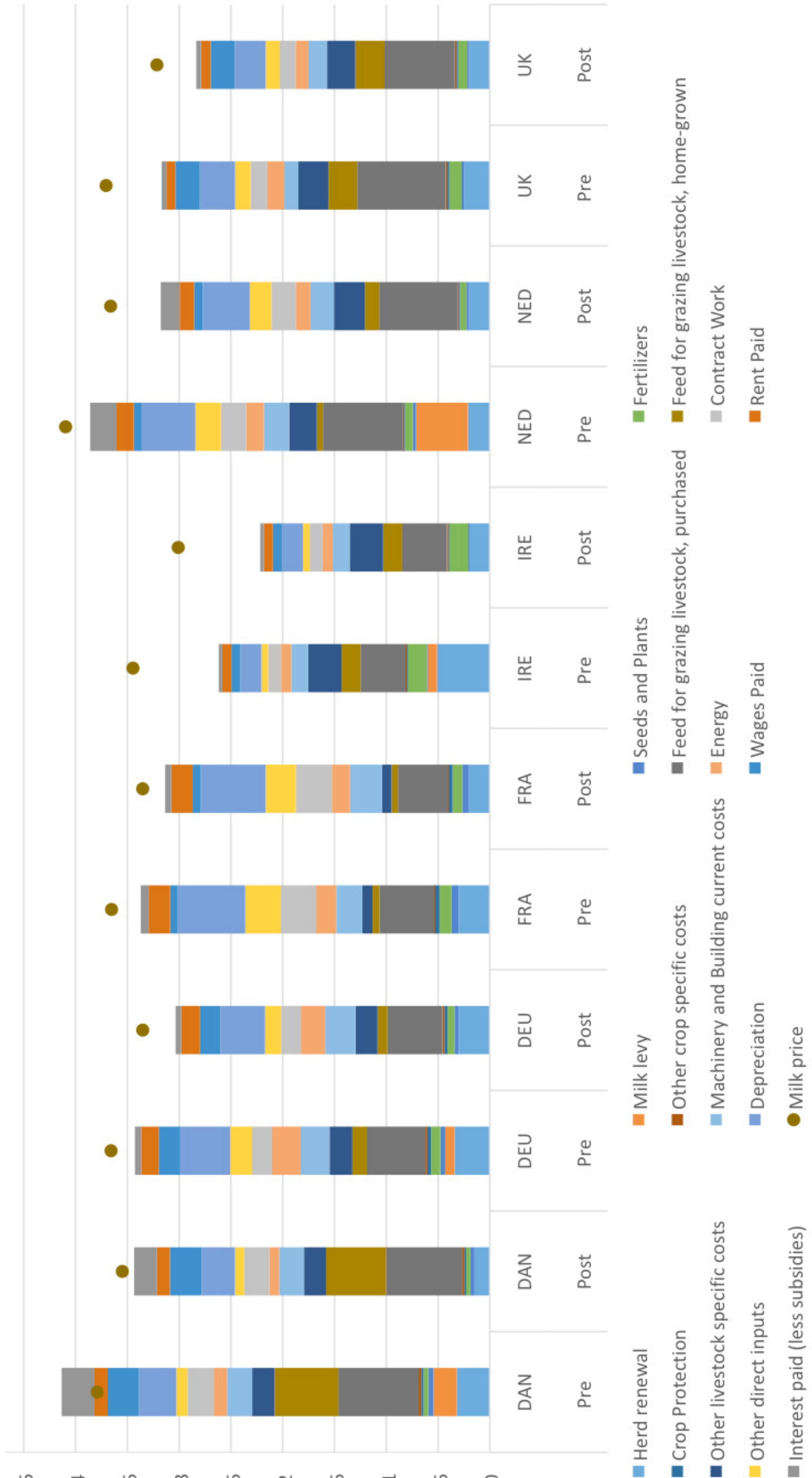

Figure 18. Costs per litre pre and post quota fopr selected EU countries

Source: Cele, Hennessy and Thorne (2020) and FADN (2018) based on FADN data

Figure 19 presents the net margin per litre of milk produced, based on the costs and, milk price outlined previously. Whilst some other EU countries achieve higher milk prices, the lower unit costs of production in Ireland mean that net margin per litre is consistently higher in Ireland compared to the countries in the comparison. The average net margin (excluding owned labour) in Ireland over the period was €0.08/l with the corresponding figures for Denmark, Germany, France, the Netherlands and the UK being -€0.01/l, €0.027/l, €0.025/l, €0.036/l and €0.046/l, respectively. With the lowest milk price across the countries, Ireland's net margin was still at least 43% higher per litre when compared to the next nearest country in relation to net margin (the UK). When compared against the Netherlands (which had the highest milk price), the Irish net margin was over over double what was achieved.

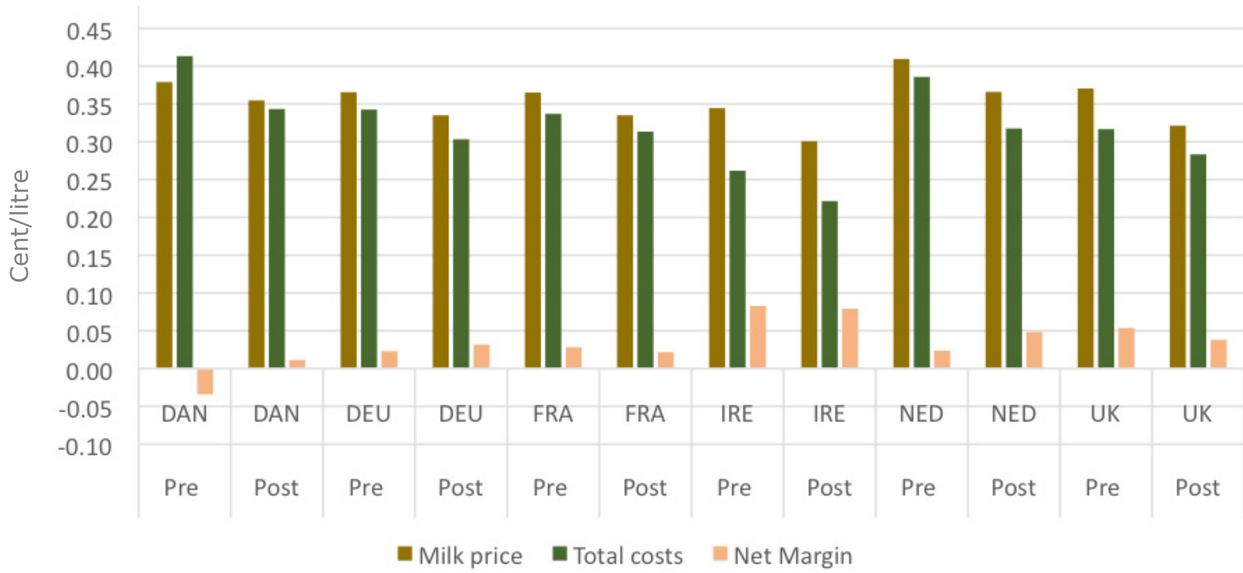

Figure 19. Costs, milk price and net margin per litre pre and post quota for selected EU countries

Source: Cele, Hennessy and Thorne (2020) based on FADN data

Seasonality

Milk deliveries in Ireland are highly seasonal (Figure 20). From 2014–2019 the domestic monthly deliveries at peak have increased by 287 million litres while the peak to trough ratio (as measured by the month of highest volume divided by the month of lowest volume) has increased slightly from 5.95 to 6.12.

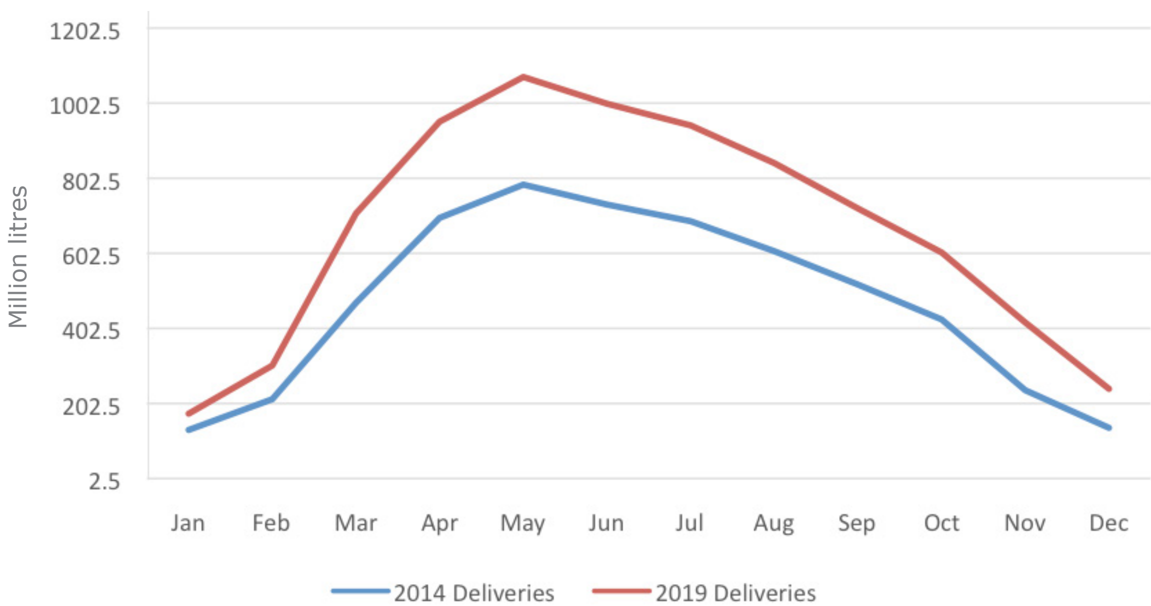

Figure 20. Comparison of 2014 and 2019 domestic milk deliveries (million litres)

Source: CSO

Based on those ratios, and the Irish peak milk supply month in 2019 (1.072 billion litres), if this level of processing was available for all 12 months of the year, Ireland has the potential to process 12.9 billion litres per annum (1.072*12) based on 100% capacity. Given that approximately 8 billion litres were processed in 2019 this leads to a capacity utilisation of just less than 62.1%. Based on a similar calculation we can see that other selected EU countries have a far greater utilisation of plant (exceeding 92%), (Table 12).

It should be noted that capacity utilisation in 2014 in Ireland was just 61.4% and has therefore improved. This is reflected somewhat in Figure 20 with a slight flatting of the milk curve in relative terms from 2014–2019. In the former year 13.9% of the milk was processed in the peak month of May falling to 13.4% for 2019 Figure 21. It should be noted that the more rapid fall off in production at year end in 2014 probably in part reflects farmers anxiety of exceeding quota in that year. It should also be noted that these numbers reflect domestic supply. In reality, milk from Northern Ireland helps to increase capacity utilisation of the Irish milk pool.

Table 12. Plant utilisation 2019 (%) and peak to trough ratios

	Utilisation %	Peak to trough ratio
Denmark	95.2	1.12
Germany	94.1	1.14
Ireland*	62.1	6.12
France	92.4	1.19
Netherlands	95.2	1.11

*Source: Own Calculations Eurostat Data * Based on CSO data*

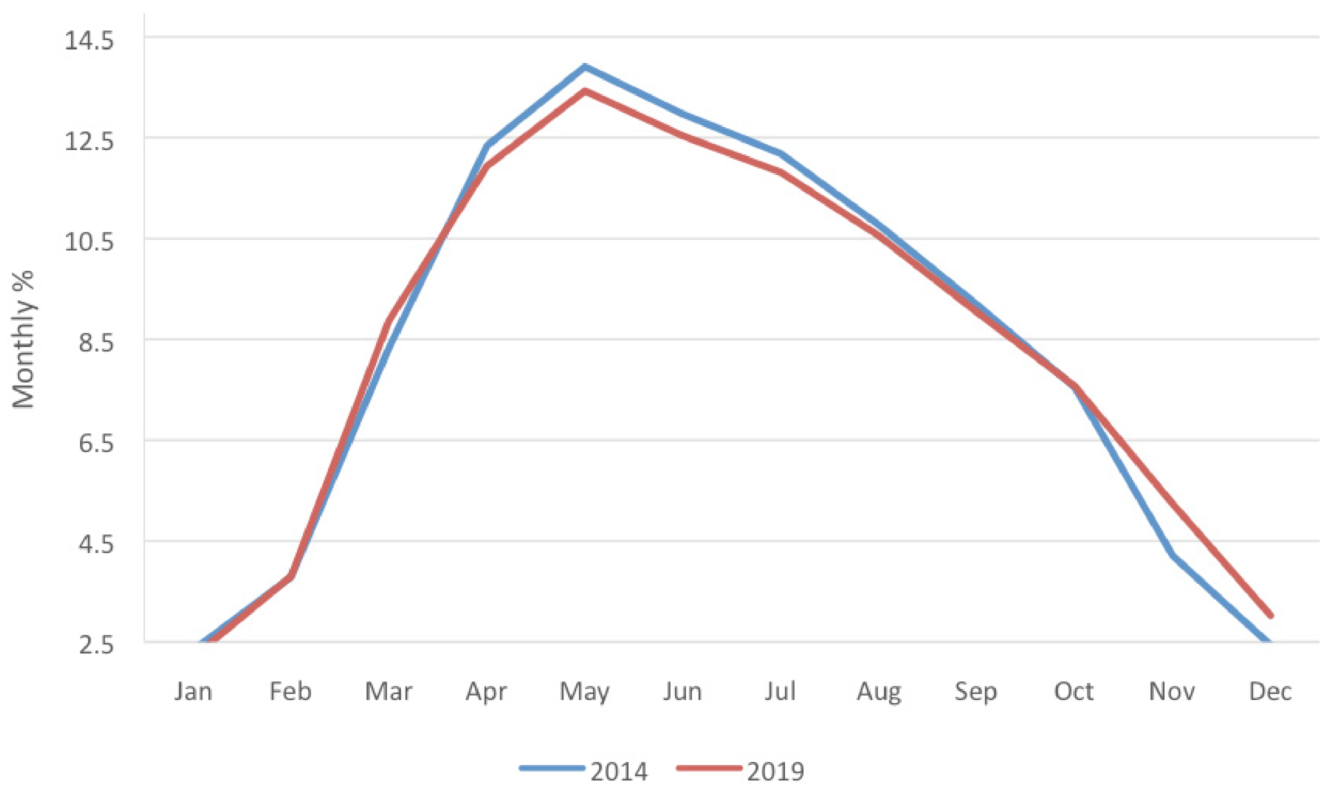

Figure 21. Per cent of milk delivered each month

Source: CSO and Own calculations based on CSO data

The seasonality in milk production is somewhat the opposite of the seasonality in Milk Solids production. As a result, we see a greater proportion of Milk Solids produced in the second half of the year Figure 22.

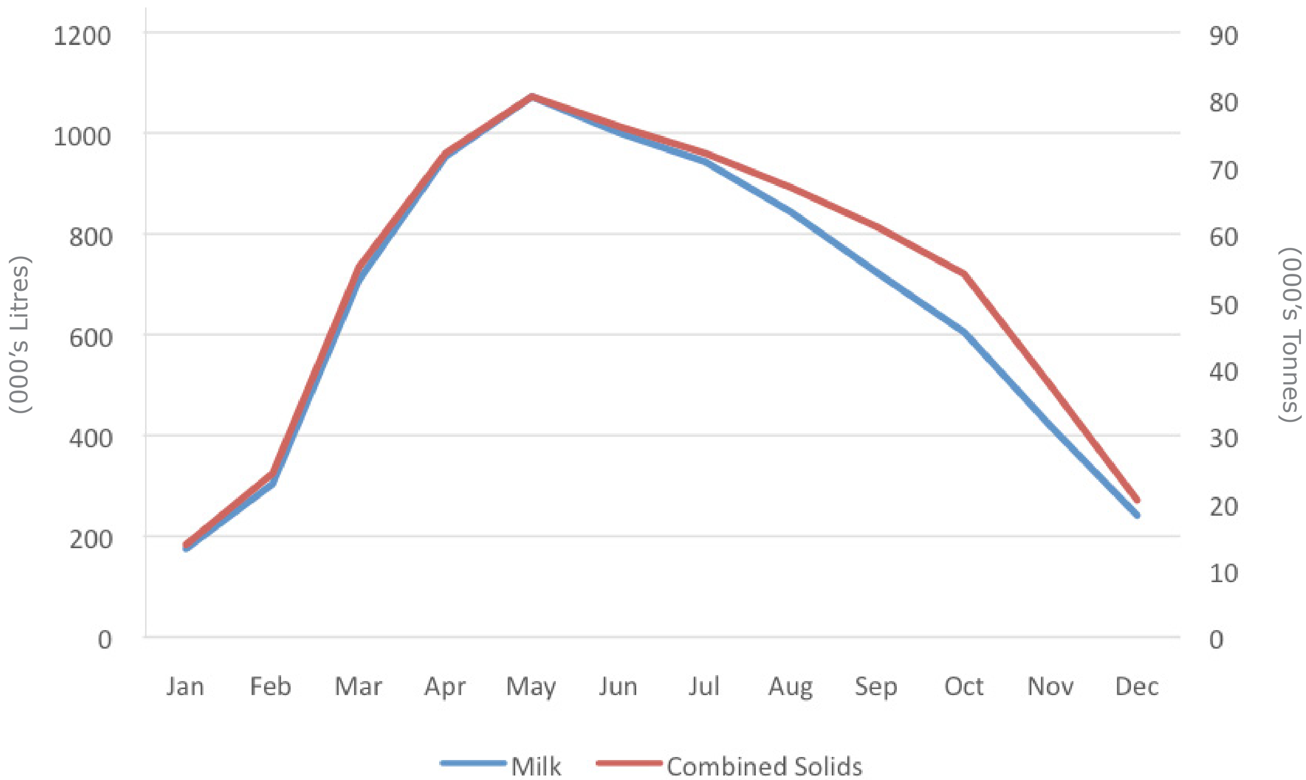

Figure 22. Milk deliveries and Milk Solids deliveries in 2019

Source: CSO and Own calculations based on CSO data

In grass based systems of milk production, profitability is optimised when grass growth and feed demand are matched through stocking rate and calving date and where the amount of supplementary feed purchased into the system is kept to a minimum. This means milk production will be seasonal which results in lower costs of production at farm level as grazed grass is a cheaper feed than feed purchased but it also results in higher processing costs and a lower product portfolio value. If the cost advantage at farm level is greater than the additional costs at processor level as well as the lower product portfolio value then this strategy is best for the sector as a whole. However, the opposite is also the case if the advantage at farm level is less than the additional costs at processor level then the strategy should be to flatten the milk supply curve.

Farm level costs of production

Systems of milk production built around seasonal calving versus non-seasonal calving are substantially different with differing feed budgets, labour requirements and requirements for facilities on the farm. Table 13 shows the full breakdown of costs and receipts for a seasonal and non-seasonal system on a 40 ha farm (Geary *et al.*, 2014). The analysis shows that the system results in costs of production that were 19% higher in total on the farm. These cost differences were attributed to higher feeding, labour, livestock replacement and contractor costs. This difference in cost was €0.042/l, with the seasonal calving system having lower costs. Some of this difference was reduced through higher livestock sales on the non-seasonal calving system. However, even with this in place and with a higher milk price paid in the non-seasonal calving system of €0.013/l, due to lower processing costs, and a more valuable product portfolio the difference in profitability was €0.016/l in favour of the seasonal system.

Table 13. Financial performance of a 40 hectare farm operated under seasonal (spring calving) and non-seasonal (50% spring/50% Autumn) calving systems

Financial outputs	Calving pattern	
	Seasonal supply profile*	Less seasonal supply profile†
Receipts		
Milk returns, €	178,365	195,227
Livestock sales, €	28,843	32,049
Total farm receipts, €	207,208	227,276
Costs		
Selected costs		
Concentrates, €	*12,516*	*19,049*
Replacement costs, €	*25,887*	*40,408*
Machinery hire, €	*1,968*	*2,897*
Silage making, €	*5,629*	*7,026*
Labour €	*34,667*	*40,247*
Depreciation charges, €	19,062	18,996
Total farm costs, €	149,193	177,786
Profit		
Net farm profit, €	58,299	49,868
Margin per cow, €	562	486
Margin per kgMS, €/kg	1.31	1.06
Margin per hectare, €	1,457	1,247
Margin per litre, €/litre	0.101	0.085

(Seasonal 100% Spring calving, Non Seasonal 50% Spring and 50% Autumn calving)
Source: Geary et al., 2014

Table 14 shows the impact of changing milk supply profile on processing capacity requirements based on Dairygold data. An analysis of the average Dairygold milk supply profile over the period of 2016–2019 showed a peak milk supply of 13.8% in May (the peak month). This supply profile is a typical supply profile of a spring calving system with a mean calving date of the first week of March. Based on this milk supply profile the average capacity utilisation of the milk processing sites at Dairygold corresponds to 60%. Actually when one looks at the Dairygold milk supply profile over the past number of years, it has shown that since milk quotas were removed that the capacity utilisation has increased with the peak milk supply dropping relative to the overall supply. When the current supply profile is compared to a scenario where 50% of the cows calf in the spring and 50% in the Autumn, the peak supply drops to 12% in June with capacity utilisation increasing to 69.5%. It might have been thought that a 50% Spring/Autumn system would have resulted in a flatter supply profile. However, to achieve a curve similar to what is achieved in mainland Europe the calving pattern would have to be closer to all year around calving as is practiced on the continent. Table 14 shows a Dairygold scenario with 2008 milk supplies and a projected 2025 milk supply with seasonal and non-seasonal supply curves. The analysis shows the milk produced in each month under the different scenarios and therefore shows the processing capacity requirement under the different scenarios. It is clear that under the spring calving scenario there is a requirement for more processing capacity to process the milk and therefore that means that there is a difference in the investment requirements.

Table 15 shows the additional capacity requirement under the differing seasonality scenarios. The additional capacity requirement is based on expansion assumptions up to 2025 in Dairygold and it links to the investment made to get to that extra capacity. Under the seasonal scenario there is a requirement for monthly capacity increases of 107 million litres relative to the 2008 capacity. This investment corresponds to €388.7 million over the period 2008–2019 and provides capacity until 2025 at least. As stated previously when this is costed and an opportunity cost placed on the capital it corresponds to €0.016/l. In the non-seasonal system (50% spring and 50% Autumn), the additional monthly capacity is reduced to an additional 76.5 million litres to process the same total milk. When the same expansion cost assumptions per litre are used as in the seasonal scenario, the investment costs would correspond to €276.2 million. So, the investment saving would correspond to €112.5 million or 29%. The corresponding depreciation and opportunity costs of the investment would be closer to €0.011/l. Therefore, on an annual basis the investment/depreciation cost differences between seasonal and non-seasonal systems corresponds to €0.005/l.

Table 14. Milk supply profiles and milk volumes supplied in Dairygold under differing seasonal scenarios

	January	February	March	April	May	June	July	August	September	October	November	December
Milk supply profile DG 16-19	1.3%	3.9%	9.0%	11.9%	13.8%	12.6%	11.9%	10.9%	9.3%	7.9%	5.1%	2.3%
Milk supply profile 50%Spring/50% Autumn	6.2%	6.8%	11.5%	12.0%	11.7%	10.0%	8.5%	6.1%	4.9%	6.8%	8.3%	7.4%
Monthly milk supply for 2008 seasonal (*000)	11,130	33,247	76,622	101,002	117,525	106,764	101,312	92,589	79,060	66,855	43,713	19,179
Monthly milk supply for 2008 Non-seasonal (*000)	52,252	57,712	97,523	101,529	98,946	85,000	72,067	51,500	41,674	58,007	70,236	62,552
Monthly milk supply 2025 seasonal (*000)	21,272	63,542	146,440	193,035	224,613	204,047	193,627	176,957	151,098	127,773	83,544	36,656
Monthly milk supply 2025 Non-seasonal (*000)	99,864	110,300	186,386	194,041	189,104	162,451	137,735	98,427	79,648	110,863	134,235	119,550

Table 15. Total investment costs to 2019, investment costs annualised (depreciation and opportunity costs) under seasonal and non-seasonal calving scenarios		
	Seasonal	Non-seasonal
Additional capacity required l	107,087,955	76,516,737
Investment costs per litre peak month €/l	3.61	3.61
Investment required €	388,744,000	276,225,420
Depreciation for the additional milk €/l	0.012	0.009
Opportunity cost on money €/l	0.004	0.003
Investment processing costs €/l	0.016	0.011

When evaluating the seasonal versus the non-seasonal scenarios, the milk price paid is lower under the seasonal scenario to the tune of €0.013/l (Geary *et al.*, 2014). This is based on the difference in depreciation and interest costs as well as differences in product portfolio, product storage, financing costs, etc. associated with seasonal calving systems. However, when the profitability of the seasonal system is compared to the non-seasonal system there is an advantage of greater than €0.016/l (including lower farm costs and price in the seasonal versus non seasonal scenarios). When this is scaled up to a national scenario of 8 billion litres it corresponds to at least €128 million annually of an advantage to the Irish dairy industry from staying with a seasonal system, even though the processing costs are higher and the milk price is lower in the seasonal calving systems. The lower farm costs and the higher farm profitability associated with these systems far outweighs the differences at processor level (Table 16.). It must also be noted that this comparison is based on a 100% Spring calving system compared with a 50% Spring/50% Autumn calving scenario resulting in a capacity utilisation that is close to 70%. To achieve a capacity utilisation over 90%, all year round calving would be required. This would have a far greater impact on costs of production and prices possible.

In reality these differences are the minimum differences as other factors such as drudgery, requirements for higher quality facilities and a movement away from grazed grass (and all its advantages including marketing advantage) would mean that these differences would actually be bigger. When this analysis is coupled with the section on costs of production and profitability at farm level Internationally, both analysis complement each other. In summary, in the context of seasonality, seasonal calving results in lower milk prices due to higher processing costs as well as lower value product portfolios. However even with these effects included, it is still more profitable at an industry level to maintain seasonal calving because of the cost advantages at farm level from seasonal calving when compared to non-seasonal calving systems. Therefore, it makes sense to continue building additional processing capacity rather than flattening the milk supply curve. It is also important to note that any comparison of milk prices across countries should take into account this seasonal effect on prices. A higher milk price may not mean higher profitability at farm level if associated with a shift away from seasonal calving low cost grass based systems of milk production. The focus should be on profitability at farm level for farmers.

Table 16. Industry profitability (farm and processor) of seasonal (100% spring calving) and non-seasonal (50% spring and 50% autumn calving) systems			
	Seasonal supply profile*	Less seasonal supply profile†	Differential
Processors milk price, €/l	0.284	0.297	-0.013
Dairy farm margin per litres, €/L	0.101	0.085	+0.016
Net industry returns, €m (8 billion litres)	808	680	128

Adapted from (Geary et al., 2014)

Funding expansion

The vast majority of the finance that has been invested in order to increase processing capacity in Ireland has been sourced from within existing processor resources. There have been some increased shareholding funds, some investment instruments, like revolving funds and some increased debt across the industry to a lesser extinct. When money is invested in the expansion of facilities, it is not available for other uses like paying a higher milk price. In reality, there are a number of theories on the best model for funding additional capacity. For example, there are arguments that the farmers who expand production should solely pay for the expansion costs. Others argue that the processor should pay for it and it should be reflected in the milk price as there are economies of scale, etc. that all suppliers secure benefits from whether they expand or not. When one looks at the Irish scenario with the vast majority of farmers expanding in the past number of years, the model of a centralised processor type of investment makes sense. There is a collective expansion and that investment is best handled internally. A significant advantage of this type of model is that resources are generally scarce which forces discipline around the investment decisions. What is extremely clear is that there is no one model that is suitable, and that the optimum model changes over time. It is also clear that if a new model were to be devised to fund further expansion the farmer who invests needs to be singled out for a return for that investment. There would need to be two types of return to the farmer based on milk price and return for investments made. In this scenario there would be a constant struggle on how to generate an equitable milk price relative to return for investment. There are a number of different models of how milk processors fund/deal with their suppliers/ shareholders as discussed in the following sections.

Fonterra

Farmer shareholders are required to hold the number of shares needed to meet the share standard. The share standard requires that as a minimum, one share is held for every kilogram of Milk Solids supplied. For these purposes supply is based on a three season rolling average of the farms overall production. For a new farm, supply is based on estimated production, farmers can apply to have their expected level of production changed based on changes to a system of production etc. Shareholders requirements are determined on the measurement date (being the first day of the season (June 1st)). New farmers joining Fonterra, or farmer shareholders increasing supply, may apply to have up to ten seasons to buy the necessary shares (which would result in a requirement to buy a minimum number of shares in each season). At least 1000 shares must be registered in your name before milk will be collected. Farmer shareholders may hold up to 200% of the shares they must hold under the share standard. A contract supply enables shareholders to supply milk that is not backed by shares. A contract milk price is set by the board and has a reference to the farm gate milk price (lower). An existing Fonterra farmer shareholder may have up to three seasons to sell their shares (a minimum of one third per season). The board may make distributions to shareholders via dividends. Shareholders will receive any dividend declared by the Board on all the shares they hold. The Fonterra share price peaked at $8 in May 2013, it dropped to $3.17 in December 2019 and trades at $3.90 in June 2020. Therefore, a farmer with 100 cows @420kg Milk Solids per cow would require 42,000 shares. These would cost $163,800 in June 2010, they would have costed €336,000 in May 2013 and they would have costed $133,140 in September 2019. A farmer that invested in May 2013 has taken a significant hit on their investment.

Campina Friesland

The Campina Friesland (Dutch) model is somewhat different to Ireland as the level of expansion since milk quota removal was relatively small and thus the requirements for investment limited. In order to supply milk to Campina Friesland for the first time you require an investment of 9.71c/l for each litre of milk you supply (previously 4c/l) which can be paid up front or over a three year period. For existing suppliers who change ownership there is no requirement for investment. Farmer investment in Campina Friesland are called fixed member bonds, instead of shares, to move away from a connotation of shares and investment. A farmer that supplied Campina Friesland receives a milk price as well as a yearly 13th payment that reflects the profit of the company with a certain proportion of the profit paid out to members and the rest retained (these percentages operate on three year cycles). Of the money paid out a certain proportion is in the form of fixed member bonds and a certain proportion is in the form of cash. Member bonds have a nominal value of €50 each. When a farmer retires fixed member bonds are converted to free member bonds and are tradable 6 times a year. The value held in Campina Friesland by members in the form of member bonds has increased significantly over the past number of years.

Dairy Farmers of America

Dairy Farmers of America operate a Co-Op. New producers invest $0.10/cwt per year until that reach $1/cwt for annual production. The money is taken directly from the milk cheques. The maximum investment allowed is $1.75/cwt. Investment can be redeemed upon reaching an age of 67yrs and can take 10-12 years to fully recover. The rules change over time around the level of Co-Op profit pay-out in the form of a dividend annually (i.e. 20-30%). The remaining profit is reinvested in the Co-Op over time.

Summary of funding expansion

The model of funding expansion as the industry moves to a new phase of slower and steadier growth after the step change since milk quotas ceased needs to be revaluated. Is the current model of centralised investment appropriate for the future? Would a model where the expanding farmer or milk supplied paying for the additional capacity be suitable? There are many different arguments for and against both models that needs to be teased out with member shareholders. It is important also to consider the simplicity of the current model, where the investment is handled centrally. The most complicated part of deciding funding going forward sits around rewarding shareholders/owners with a return for their investment versus paying the highest milk price possible all of the time. This becomes extremely evident with the PLC structure where achieving a smaller margin at any one point in time is not acceptable in favour of paying a higher price. It even becomes illegal for one side of the business to be subsidising another side of the business. In reality, there is potentially a case for ensuring that the shareholding in the processor is set to a minimum and that all of the suppliers achieve that minimum. What is clear is that milk price comparisons need to reflect the investments that are made by producers versus by the processor itself. Clearly milk price comparisons should be more nuanced than just looking at the milk price alone. They should also take into account the industry structure ownership and funding structure as well as the seasonality of the industry as a whole if different across the comparisons.

Conclusions and Recommendations

International farm gate milk prices should not be used in isolation when benchmarking dairy farm returns. A much more accurate measure is net margin expressed in terms of profit on a litre of milk. In this respect, Irish farmers enjoy the highest net margin of all the countries covered by this study. FADN data shows that costs of production (excluding owned labour) are lowest in Ireland for the countries compared. Over the period 2012–2017 (the most recent FADN data available) the net margin in Ireland was highest across EU countries analysed. This is despite the milk price in Ireland being the lowest among the EU countries covered in the study.

However, the higher milk prices paid only partly compensate for the higher costs of production incurred by dairy farmers in those countries. The Irish dairy industry has expanded significantly since milk quota abolition. This was achieved through a focus on grass-based production systems, the adoption of technology by farmers and a very significant investment at both farm and processor level. The investment made in additional processing capacity has resulted in a lower milk price paid to farmers. This investment has allowed dairy farmers to grow their business with their individual investments largely limited to within the farm gate.

National milk price comparisons should be done based on an agreed set of rules agreed across the industry on an annual basis. This should involve the previous year's average Milk Solids concentrations and milk quality parameters. All processors should be compared using the same Milk Solids concentrations and milk quality parameters with the same seasonal profiles.

Other investment models may be considered for future expansion. However, these may place significant investment burden on expanding farms. In addition, this may require a new model on how milk price is set as the investment will need be rewarded separately. Notwithstanding these considerations, there is certainly a case to re-evaluate the funding model to be employed for future dairy processing capacity expansion.

The seasonal nature of Irish milk production and its reliance on grazed grass in the diet of the dairy cow has implications at farm (positive) and processor (negative). For processors it results in a more limited product portfolio which is highly focused on the production of low margin storable dairy commodities. There is a clear relationship between dairy commodities prices and the farm gate milk price once time lags and seasonality are included in the analysis. On the other hand, the cost saving at farm level well exceeds the reduced milk price. It is therefore substantially more profitable for the industry to invest in additional processing capacity for expansion rather than trying to flatten the milk supply curve.

This report has not discussed the social or environmental benefits associated with the seasonal nature of the Irish dairy industry. For example, many studies have shown the reduced environmental negative externalities associated with grass based dairy production relative to indoor systems, as well as the animal welfare implications. Other advantages over indoor/all year-round systems include definitive seasonal profiles of labour requirements. The grass-fed nature of Irish dairy should also have natural marketing advantages when compared to other products.

This study has not included economies of scale associated with the expansion at processor level. In reality, the real benefits of these economies of scale may only become apparent as the levels of expansion stabilise and the investments are utilised to their potential.

Based on the analysis above and the conclusions we have drawn we now make the following recommendations.

- Evaluation of industry performance should be extended beyond milk prices to include investments in processing capacity relative to who makes the investment and seasonality in order to take cognisance of profitability.
- The Irish dairy industry should now use higher Milk Solids when reporting the base milk price. Consideration should be given to using the LTO (European) standard of 4.2% milk Fat and 3.4% Milk Protein. In the future there is a need to move to reporting a price per kg of Milk Solids replacing the current practice of reporting a price per litre.
- Any International milk price comparison should be more focused on annual rather than monthly milk price. A weighted 12 month moving average should now be published alongside monthly prices to facilitate this comparison.
- National milk price comparisons should be completed based on the previous year's national weighted average Milk Protein and Milk Fat concentrations
- The predominantly seasonal model should continue to be the direction of travel for the industry as it the most profitable, meets customers' preferences, and is best in terms of welfare and environmental grounds.

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Notes

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