

## Market orientation: Dairy value chain in Germany, France and UK

Research Findings Brief  
September 2021

### Economic and governance analyses

*This brief summarises key findings from economic and governance analyses using a suite of tools to provide in-depth understanding of the functioning of the dairy value chain in Germany, France and the UK.*

### Producer Organizations

*Producer cooperatives and organizations dominate organizational structure on the upstream level of the EU dairy value chains.*

### The EU dairy sector

The EU dairy sector is one of the largest agricultural sectors accounting for more than 12% of the total agricultural output<sup>1</sup>. All EU states produce raw milk, but significant variations in delivered quantity and structure of producing farms are present (Figure 1). This sector is characterized by reducing number of producing farms from one side and increasing number in dairy herd size on the other. This is especially the case for the largest EU producers such as Germany, UK and France (Barling and Gresham, 2019). Most of the produced fresh milk is directly delivered to dairies and is further processed to some of the products such as cheese (37.7%), butter (29.4%), cream (11.9%), drinking milk (11%), and other products (10%)<sup>2</sup>.

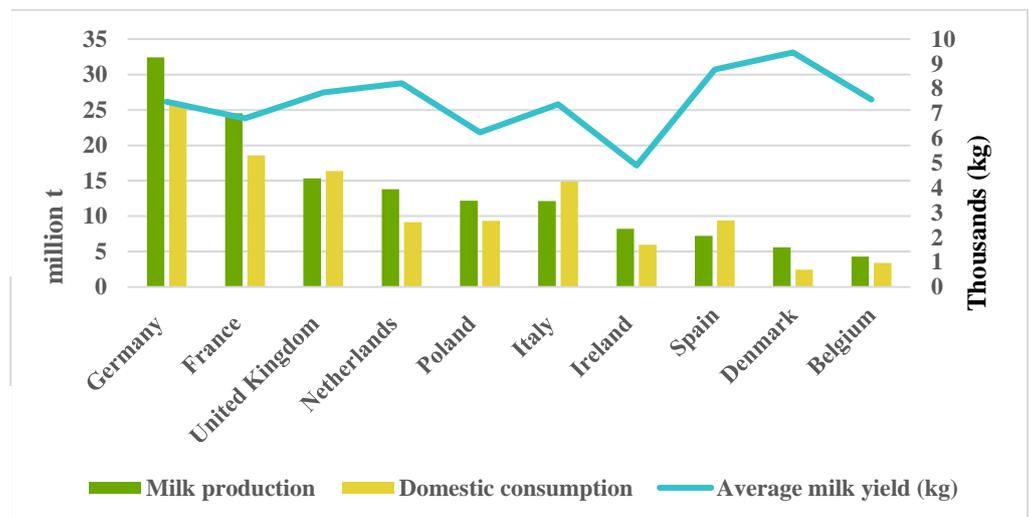


Figure 1 Top 10 milk producers in EU-28 (2019) Source: CLAL.it (2020)<sup>3</sup>.

The upstream level of the EU dairy chains is mainly organized through cooperatives that vary in size and market share. Usually, these cooperatives represent a form of Producers Organisations, whose activities are supported by the EU Common Agricultural Policy and regulations of the Common Market Organization<sup>1</sup>. It should be noted that large cooperatives may hinder the position of milk producers that are in conflict with contradictory interests. As

<sup>1</sup> Augère-Granier, M-L. (2018). The EU dairy sector – Main features, challenges and prospects. European Parliamentary Research Service – EPRS, PE 630.345, December 2018. Source: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/630345/EPRS\\_BRI\(2018\)630345\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/630345/EPRS_BRI(2018)630345_EN.pdf)

<sup>2</sup> EUROSTAT (2018). Milk products. Source: [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Milk\\_products\\_2018data-01.jpg](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Milk_products_2018data-01.jpg)

<sup>3</sup> Clal.it (2020). Dairy market data available at: [https://www.clal.it/en/?section=produzioni\\_popolazione](https://www.clal.it/en/?section=produzioni_popolazione)

milk producers, they want to sell milk for higher price. On the other side, milk producers that are shareholders of a cooperative aim to keep low costs by reducing milk purchase price<sup>4</sup>.

## Value chain governance

*Governance analysis is a tool to identify lead actors, trading practices, inter-firm relations, and structural elements along the value chain to better understand if fairness, in terms of perceived market power and fair value distribution, is or could be an issue in the dairy value chains.*

### Governance model

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*Dual governance model present in all three countries. Captive model dominates on the upstream level and modular downstream.*

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Concerning the relations along the value chain, several governance models are present and might reflect power relations and price-setting among value chain actors. According to the VALUMICS results related to value chain governance (Barling and Gresham, 2019, Deliverable 5.1), producers and processors usually have a dual pricing system. A higher price would be achieved if the pre-contracted volume is delivered, and a lower price would be paid if pre-contracted volumes are exceeded (e.g. in France and UK). Furthermore, the duration of the contracts between producers and processors significantly vary depending on the number of regional suppliers. If supply is limited, processors tend to provide longer contracts to producers and vice versa (e.g., Germany). Information asymmetries related to delivered milk quality is another factor that might bring some additional price-setting power in the hands of processors.

In France, milk production is highly concentrated and in the hands of a couple of companies and cooperatives that account for 94% of the total milk production. On the processing level, concentration is even higher where only two actors, Lactalis (company) and Sodiaal (cooperative), account for 20% of the total collected milk in France. Smaller private dairies usually pay higher prices compared to large cooperatives. On the other side, large cooperatives justify lower purchase prices because they need to collect milk from remote producers, thus having higher costs. Overall, according to VALUMICS findings (Loveluck and Aubert, 2019)<sup>5</sup>, the governance of the French liquid milk value chain could be described as “bipolar”, as both dairy processors and retailers usually drive it.

Concerning Germany, there are mainly two types of milk producers: small family-run farms mainly situated in the north and south of Germany and large producer cooperatives mainly concentrated on the eastern part of Germany. About 96% of milk is delivered directly to dairies. After 2015 and abolishing the milk quota in the EU, the number of milk producers significantly decreased (about 47% from 200 compared to 2016 – Duric, 2019<sup>6</sup>). Nevertheless, the number of dairy cows and milk production per cow has been continuously increasing since 2015. Overall, according to the VALUMICS findings (Duric, 2019)<sup>6</sup>, the German liquid milk value chain governance consists of two parallel models: i) Captive model between dairy cooperatives and liquid milk producers, and ii) modular between retailers and dairy cooperatives and private processors.

Similar to Germany, the number of milk producers in the UK is decreasing while at the same time the number of dairy cows per farm is increasing. About 65% of the produced milk is delivered directly to private dairies and 35% to cooperatives. According to AHDB (2017)<sup>7</sup>, the top nine dairies collect almost 80% of all available milk for processing. The three biggest cooperatives account for 35% of the total drinking milk output. Abolishment of milk quota in 2015 was followed by a significant increase in milk price volatility. Overall, according to VALUMICS findings (Barling and Gresham, 2019), depending on if the milk producers are aligned with retailers or not, there are two types of governance: i) captive model for non-retail-aligned producers and ii) modular or relational model for retail-aligned producers.

### Concentration

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*Number of milk producers are decreasing while number of dairy cows per farm is increasing both in UK and Germany.*

*About 65% of the produced milk is delivered directly to private dairies and 35% to cooperatives.*

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<sup>4</sup> European Milk Board (2012). Co-operatives Between Myth and Reality – What dairy co-operatives can do to strengthen the milk producers’ position in the market and what they cannot do. European Milk Board, May 2012. Available at: [http://www.europeanmilkboard.org/fileadmin/Dokumente/Positions\\_EMB/12-02\\_Positions/Cooperatives.pdf](http://www.europeanmilkboard.org/fileadmin/Dokumente/Positions_EMB/12-02_Positions/Cooperatives.pdf)

<sup>5</sup> Loveluck, W. and Aubert, P.M., Chapter 4 “Governance of French dairy to liquid milk value chain”, in Barling and Gresham (2019)

<sup>6</sup> Duric, I., Chapter 3 “Governance of German dairy to liquid milk value chain”, in Barling and Gresham (2019)

<sup>7</sup> AHDB (2020). The Agriculture and Horticulture Development Board (UK). Available at: <https://ahdb.org.uk/>

## Pricing mechanisms

*The price transmission analysis is a tool to assess the level of transmission of price shocks between different levels of the value chain.*

The analysis for all three countries indicates that average raw milk prices are at the level of the EU-28 price average for the observed period (2005-2020). Compared to Germany and France, the UK raw milk prices are slightly lower on average and are among the lowest prices in the EU-23.

### Price formation

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*Raw milk price changes are completely transmitted to consumer-ready dairy products in the long run.*

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Concerning possible price margins obtained on the upstream level of the value chain, there are different patterns in price margin development observed between raw milk prices and wholesale prices of different dairy products in all three countries. In Germany and the UK, the price margin between raw milk prices and wholesale Skim Milk Powder (SMP) and cheese prices has constantly decreased in the last 15 years. Only in France, this price margin is on a constant level during the observed period.

The price transmission analysis indicates almost complete transmission of price changes from raw milk prices towards wholesale butter and cheese prices in Germany and the UK in the long run. On the other side, the results indicate almost complete transmission of price changes from SMP prices towards raw milk prices in Germany. In France, the transmission of price changes is way lower (only about 23% compared to 80-85% in Germany and UK, respectively). When it comes to short-run price dynamics, the results indicate faster adjustments of SMP prices towards the price disequilibrium than prices of butter and raw milk in France and the UK. In contrast, the wholesale cheese prices in Germany adjust much faster in the short run compared to butter and raw milk prices.

### Dominant marketing channel

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*More than 80% of dairy products are sold through retailers.*

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The domination of retailers characterizes the downstream level of the dairy value chain in all three countries as the primary marketing channel for selling dairy products (e.g., 87% of dairy products is sold through retailers in Germany). As liquid milk (fresh milk) has a very short shelf-life, retailers always keep milk prices on a very low level, putting significant pressure on processors price margins.

## Market competitiveness, efficiency and technical change in the dairy value chain

*The analysis of competitiveness, efficiency and technical change are tools to provide an in-depth understanding of the underlying factors driving the competitive advantage of German, French and UK dairy value chains.*

The VALUMICS study on the “Assessment of price formation and market power along the food chains” (Svanidze et al., 2020) investigates market power for the German, French and UK milk processing industries. The values of Lerner<sup>8</sup> indices suggest that the input market of the milk processing industry is characterized by a considerable high degree of market imperfections in Germany and France. On the other hand, the UK input market indicates a low degree of market imperfections. The opposite patterns can be observed for the output processing market. That is, a low degree of market imperfections is exercised in the German and French output market, and a higher degree of market imperfections is indicated on the UK output market, evaluated on the sample means. Moreover, the distributions of Lerner indices are relatively narrow and skewed toward smaller values in all countries, suggesting that only a small number of companies in all countries are characterized by a considerable high degree of non-competitive behavior on input and/or output processing market. Finally, we cannot observe a positive association between the

### Market power

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*Considerable high mark downs are observed in German and French milk processing as compared to the UK.*

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<sup>8</sup> Lerner index is an estimated measure of a firm's output (and analogically for input) market power (the ability to charge markups (markdowns) of price over marginal costs), ranging from a low value of 0 (representing perfect competition where price is equal to marginal costs) to high value of 1 (representing monopoly).

## Scale efficiency

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*Scale efficiency provides considerable space for productivity improvements in milk production.*

*Milk processing indicates optimal size of operations.*

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## Technical efficiency

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*High overall technical efficiency in milk production and processing.*

*Majority of milk producers and processors operates near to the production frontier.*

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## Productivity growth

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*Size adjustments in the direction of optimal size were the main source of productivity growth in milk production in the analyzed period.*

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## Trade duration

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*Stable and long-term raw milk and cheese trade with EU partners compared to non-EU.*

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size and the Lerner indices in the majority of cases. The only exception is the French output market. In this case, the larger is the processing company, the higher is the Lerner index. The observed high values of Lerner indices for small processors indicate the operation in the niche market.

Another component of the study on scale/size efficiency investigates whether a firm operates at its “optimal size” (Čechura et al., 2020 Deliverable 5.6) (the study included the countries in VALUMICS consortium: Austria, Belgium, Czechia, Germany, Finland, France, Italy, Ireland, Romania, Spain, Sweden, the United Kingdom). The analysis revealed considerable heterogeneity in farm production structure and production technology. We found considerable diseconomies of scale that differ among the countries substantially. These findings suggest a significant space for productivity growth by increasing scale efficiency, i.e. the scale of farm operations. On the other hand, we found a technological regress in milk production in most of the countries. Then, milk production is characterized by high overall technical efficiency. In addition, the efficiency distribution is narrow and skewed to higher values, suggesting that most producers operate near the production frontier. The persistent part of overall technical efficiency shows little room for improvements up to 10% suggesting that we cannot observe considerable systematic failures in the efficiency of input use in most of the analyzed countries. Finally, total factor productivity shows an increasing trend in most countries. Two main drivers with opposite patterns were identified – technological change and scale efficiency. Since the technological change was predominantly negative, the scale component was the main source of productivity growth in milk production. In particular, the farms improved the scale efficiency by increasing the scale of operations. This finding supports the expectation that milk quota abolishment has led to farm size adjustments in the direction of optimal size.

Milk processing is characterized by constant returns to scale; that is, the milk processors are scale efficient and produce in optimal size of operations. The overall technical efficiency is high for all analyzed countries, with only little room for efficiency improvements. Moreover, the efficiency distributions suggest that majority of milk processors are operating close to the production frontier. Finally, the results indicate technological progress in the majority of analyzed countries. That is, we may observe technological improvements in the analyzed period in the milk processing industry.

## Trade duration of selected dairy products

*Trade duration analysis is a tool to assess the length of trade relationships, i.e. the speed with which firms enter and exit dairy-product trade and the risk associated with this activity. The trade survival rate indicates how likely the export activities survive over time with the same trading partner (e.g. importing countries in this case).*

The results of the VALUMICS study (Jaghdani et al., 2020, Deliverable 5.3) show that for the period 2001-2019, Germany, France and UK are active producers and exporters of dairy products at the global market. However, considering the annual average of the size of milk production for the periods 2008-2019, Germany by 30 MT, France by 24 MT and UK by 14 MT are active producers in this market. They have a consistent level of production for that period. All 3 countries have a stable level of export of raw milk which mainly goes to EU countries. Germany exports 8% of its fresh milk products, France 5% and UK 5%. The production and export of cheese as the main non-fresh milk dairy product has a different pattern compared to milk production and export. For the period 2008-2019, Germany, by producing 2.17 MT, France by 1.92 MT and UK by 0.4 MT are active cheese producers. Their cheese export is almost consistent for the same period. Germany exports 52% of its fresh milk products, France 34% and the UK 34%. All these countries also important vast amount of cheese which is due to love of variety in this products. The main export of milk and cheese are to EU countries.

The results of the duration study on the country level aggregated milk and cheese export shows a stable milk and cheese trade relation at the country level. The aggregate of all trade relations for milk export shows that survival rate after two years is about 56%, after five years is about 44%, after ten years is about 38% and after eighteen years is about 35%. The trade duration of

milk for France is more stable than Germany and more stable than the UK. In all cases, the trade relationship with EU countries is more stable than non-EU countries. The same pattern on trade duration is observed by cheese export. However, the cheese trade is more stable. The aggregate of all trade relations for cheese export shows that survival rate after two years is about 62%, after five years is about 52%, after ten years is about 46% and after eighteen years is about 43.6%. Our study shows that as the size of milk and cheese trade increases, the possibility of trade duration also increases. As more spells are observed between partners, the possibility of trade termination is higher. To summarize, these results show that the milk and cheese value chain does depend on stable trading partners at the country level.

## Concluding remarks

This research aims at getting an in-depth understanding of price dynamics and market imperfections for the three largest milk producers in the EU. Thus, the analysis considers dairy value chains in Germany, France and the UK. Understanding developments in these markets would greatly reflect the EU dairy sector in general.

The results indicate that milk producers face a negative price/cost ratio, in the long run, suggesting that they don't have strong bargaining power towards processors. One of the reasons might be that producers could act as shareholders of the cooperatives. They can be involved in milk processing and thus have completely different incentives for the purchased milk price level.

Concerning price dynamics along the value chain, the results indicate that changes in raw milk producer prices are almost completely transmitted towards wholesale butter and cheese prices. The short-run price dynamics show that raw milk prices are faster in adjusting the disequilibrium with the SMP prices than other dairy products.

The results of market imperfection analysis indicate a certain level of bargaining power at different levels of the dairy value chains in all three countries, especially between producers and processor.

Furthermore, the results indicate diseconomies of scale for most countries in milk production, suggesting considerable space for farm productivity growth. Moreover, scale efficiency improvements were identified as the main source of productivity growth in most countries in the analyzed period. This is in line with the expectation that milk market deregulation has been supposed to positively affect the farm size adjustments in the direction of optimal production size. On the other hand, the milk processors operate in optimal size. The overall efficiency in milk production as well as milk processing is high and do not provide considerable space for productivity improvements. Technological change was the main source of productivity improvements in milk processing. The milk and cheese trade duration analysis suggests that France, Germany, and UK exports are long-term and stable, especially with EU partners. This is mainly due to the perishability nature of dairy products and barrier-free trade possibilities inside the EU.

## Key Outcome of economic and governance analysis of the dairy value chains in Germany, France and the UK

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- *Milk producers don't have a strong bargaining power towards processors (there is a long-term negative price/cost ratio);*
- *Dual pricing system between raw milk producers and processors;*
- *Raw milk price changes are completely transmitted to consumer-ready dairy products in the long run;*
- *Adjustments in the scale of operations provide considerable space for productivity improvements in milk production despite the fact that the size adjustments in the direction of optimal size were the main source of productivity growth in milk production after milk quota deregulation/abolishment;*
- *The majority of milk producers and processors operate near the production frontier;*
- *Technological change was the source of productivity improvements in milk processing;*
- *Stable long-term trade with EU partners compared to non-EU (no intra-EU trade barriers and perishability of the end product play a crucial role).*

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## Key sources for further information

This brief summarises results from the VALUMICS dairy case study on economic and governance analysis as reported in the deliverables listed below.

To discuss the research presented in this brief, please contact [duric@iamo.de](mailto:duric@iamo.de) or respective authors:

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- Leibniz Institute of Agricultural Development in Transition Economies (IAMO), *Contacts:* Ivan Đurić: [duric@iamo.de](mailto:duric@iamo.de); Tinoush, J. Jaghdani, [jaghdani@iamo.de](mailto:jaghdani@iamo.de), Miranda Svanidze, [svanidze@iamo.de](mailto:svanidze@iamo.de)
- Czech University of Life Sciences Prague, *Contact:* Lukas Čechura, [cechura@pef.czu.cz](mailto:cechura@pef.czu.cz)

### Deliverable reports:

Barling, D., & Gresham, J. (Eds.) (2019). *Governance in European Food Value Chains. European Union's Horizon 2020 research and innovation programme GA No 727243. Deliverable: D5.1.* <https://doi.org/10.5281/zenodo.4956324>

Čechura, L., Žáková Kroupová, Z., Rumánková, L., Jaghdani, T.J., Samoggia, A., Thakur, M. (2020). **Assessment of Economics of scale and technical change along the food chain.** The VALUMICS project funded by EU Horizon 2020 G.A. No 727243. **Deliverable: D5.6**, Czech University of Life Sciences, Prague, 169 pages. DOI <https://doi.org/10.5281/zenodo.5161347>

Svanidze, M., Čechura L., Đurić, I., Jaghdani, T. J., Olafsdottir, G., Thakur, M., Samoggia, A., Esposito, G., and Del Prete, M. (2020). **Assessment of price formation and market power along the food chains.** The VALUMICS project funded by EU Horizon 2020 G.A. No 727243. **Deliverable: D5.5**, Leibniz Institute of Agricultural Development in Transition Economies (IAMO), Germany, 114 pages. DOI <https://doi.org/10.5281/zenodo.5161247>

### Published scientific papers:

Čechura, L.; Žáková Kroupová, Z. Technical Efficiency in the European Dairy Industry: Can We Observe Systematic Failures in the Efficiency of Input Use? *Sustainability* **2021**, *13*, 1830. <https://doi.org/10.3390/su13041830>

Čechura, L.; Žáková Kroupová, Z.; Benešová, I. Productivity and Efficiency in European Milk Production: Can We Observe the Effects of Abolishing Milk Quotas? *Agriculture* **2021**, *11*, 835. <https://doi.org/10.3390/agriculture11090835>

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## H2020 VALUMICS – Understanding Food Value Chains and Network Dynamics

Coordinating partner: University of Iceland, Dunhagi 5, Reykjavik, Iceland – <https://www.valumics.eu>



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