ORGANIC TARGETS 4EU

TRANSFORMATION SCENARIOS FOR BOOSTING ORGANIC FARMING AND ORGANIC AQUACULTURE TOWARDS THE FARM-TO-FORK TARGETS

Deliverable D4.3 Modelling results of socio-economic impacts in the organic value chains

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Executive Summary

The importance of value chains in shaping production processes has been well-documented in academic and technical literature. While value chains in agriculture have been extensively studied, previous research has often overlooked the food industry, particularly in the context of organic production. This gap is especially notable given the growing importance of organic agriculture in global food systems. Organic production is influenced by a complex web of interactions among various actors within value chains, and factors such as long-term agreements with farmers, the strategic decisions of processors and retailers, policies regulating agricultural practices, and public support. Nevertheless, the role of food processors, especially in the organic sector, has remained largely unexamined.

This report addresses this gap by offering an in-depth analysis of the processing of organic products within value chains in France and Denmark. It provides a detailed look at the geographical distribution of organic production, the key actors in processing organic and conventional products, and their market strategies, highlighting the importance of the food industry in shaping the future of organic agriculture. The report examines this in the context of three case studies: the poultry meat sectors in France and Denmark and the dairy sector in France.

The report's methodology combines both quantitative and qualitative approaches to describe the organic food processing industry and assess its future dynamics. Data for the analysis were sourced from Eurostat, the Farm Structure Survey, PRODCOM, Comext, national statistics, and other databases specific to France and Denmark. In particular, the study utilises the French Annual Dairy Survey, the Agreste database, and various Danish national resources. Due to data limitations, especially in Denmark, a simpler data collection approach was applied. The report also employed expert interviews, workshops, and collaborative inputs from the practice partners of the OrganicTargets4EU project to supplement the data. To explore the potential impacts of different future scenarios on the organic food industry, a modelling simulator was developed, based on an input-output framework. The model simulator estimates the impact of variations in raw livestock production (animals entering slaughterhouses or milk delivered to dairies), determined in Tasks 3.2 and Task 3.3 of OrganicTargets4EU Work Package 3, on indicators such as the value added, the annual capital depreciation, the number of workers, the number of food processors, and the stranded assets in the sector. Table 1 shows the main indicators and the targets for organic production in the three case studies analysed and in two scenarios favourable to organic production, Organic in Every Table and Green Public Policy as well as in a business-as usual scenario called Reference.

The simulation results reveal varying outcomes across the different case studies and scenarios, providing crucial insights into the potential impacts of changes on organic production on the food industry. In the French poultry meat industry, both the Organic in Every Table and Green Public Policy scenarios help mitigate job losses resulting from a decline in meat production. The Organic in Every Table scenario achieves this through a higher level of processing in organic poultry, while the Green Public Policy scenario benefits from small labour-intensive firms by increasing the share of production processed by them. In contrast, the Organic in Every Table scenario in Denmark also helps reduce job losses by increasing the processing of organic poultry, but the Green Public Policy scenario fails to have a similar impact due to its emphasis on smaller, but highly automatised firms. In the French dairy industry, the Green Public Policy scenario emerges as the most effective in mitigating job losses, as it supports smaller, more labour-intensive firms,

while the Organic in Every Table scenario does not result in increased processing of milk, limiting its potential to counterbalance job losses.

Additionally, the report emphasises that on-farm processing in both the poultry and dairy industries can provide high value-added output and create employment opportunities at the farm level, helping to mitigate the decline in the number of farmers. However, this shift towards on-farm processing can lead to reduced job requirements at professional slaughterhouses and dairies, necessitating public welfare measures such as financial support, professional retraining, and psychological assistance to protect workers transitioning out of the industry.

In terms of policies for organic production, the report highlights that the geographic relocation of production in the Green Public Policy scenario in order to deconcentrate livestock production could result in a higher volume of stranded assets and cause some food processors to exit the market. This suggests the need for policies that support the transfer of jobs between regions and protect vulnerable investors from potential bankruptcies. In the French poultry meat industry, the report stresses the importance of supporting small food processors, particularly in light of their ongoing low productivity and shrinking market share. Encouraging these small processors to invest in technology and improve their productivity is essential to enhance their competitiveness and sustainability.

Furthermore, various challenges exist in the organic food industry that require targeted strategies. For instance, organic poultry meat and dairy products are typically produced for domestic consumption, with limited export activity. Policies aimed at improving logistics and coordinating food processors could help boost organic exports in these sectors. Additionally, genetic improvements in organic poultry strains are necessary to increase product yields, such as the proportion of fillet in poultry carcasses. Innovation in organic poultry products, including deboned chicken legs and delicatessen items such as hams and sausages, can open new market opportunities. To counteract the downgrading of specific organic products to conventional (e.g., organic wings and legs in the poultry meat industry and the so-called milk ingredients in the dairy industry that are sold as conventional products), public procurement strategies should be implemented. High profit margins in organic food processing are also a barrier, as they raise consumer prices and lower farmer compensation. Investigating these margins could reveal ways to remove obstacles to organic growth. Moreover, competition from alternative production standards risks confusing consumers and stalling organic progress. Lastly, a major gap exists in data quality regarding organic production flows beyond the farm gate. More comprehensive surveys and data collection on processed organic products could offer invaluable insights to improve policy and industry strategies for organic products.

This report offers a comprehensive examination of the organic food industry, specifically focusing on the processing stage of the value chain. By combining qualitative and quantitative methods, it enhances the understanding of the organic food industry and assesses the impact of various future scenarios in organic agriculture on the structure of the food industry. The report acknowledges several limitations, including data quality and the simplicity of the modelling simulator, which does not account for the full complexity of market behaviours. Future work should focus on addressing these gaps, enhancing the understanding of the organic food industry, and refining the policy approaches that can foster its growth.

Table 1 Main indicators in the Initial situation, Reference, Organic in Every Table, and Green Public Policy scenarios for each food industry case study

Case Study	Indicator	Initial situation	Reference	Organic in Every Table	Green Public Policy
Broiler France	Evolution of domestic poultry meat production		-3%	-9%	-9%
	Evolution of domestic poultry meat production (*)			-6%	-6%
	Organic share of domestic poultry meat production	2.3%	2.4%	9.0%	9.0%
	Change in the number of food industry workers (*) (**)			0% (-1%)	1% (-1%)
	Change in the number of food industry workers in the organic sector (*) (**)			835% (744%)	706% (570%)
	Change in the average annual depreciation per slaughterhouse (*)			2%	-28%
	Change in value added produced in the food industry (*)			1%	-1%
Broiler - Denmark	Evolution of domestic poultry meat production		6%	0%	0%
	Evolution of domestic poultry meat production (*)			-6%	-6%
	Organic share of domestic poultry meat production	2.8%	0.5%	5%	7%
	Change in the number of food industry workers (*) (**)			-4% (-4%)	-5% (-7%)
	Change in the number of food industry workers in the organic sector (*) (**)			1130% (1130%)	1341% (935%)
	Change in value added produced in the food industry (*)			-1%	13%
Dairy - France	Evolution of domestic milk production		0%	-9%	-12%
	Evolution of domestic milk production (*)			-9%	-12%
	Organic share of domestic milk production	5.5%	5.6%	14.2%	13.2%

	Change in the number of food industry workers (*) (**)			-2% (-9%)	4% (-3%)
	Change in the number of food industry workers in the organic sector (*) (**)			265% (133%)	269% (151%)
	Change in the average annual depreciation per professional dairy processor (*)			5%	-32%
	Change in value added produced in the food industry (*)			3%	1%
(*) compared to the Reference scenario; (**) value in parenthesis without the employment in on-farm processing					

1. Introduction

The importance of value chains in shaping production processes is widely acknowledged in both academic and technical literature. Key works in this area include those by Gereffi et al. (2005), Bolwig et al. (2010), Fernandez and Stark (2011), Ponte and Sturgeon (2014), and Hernández and Pedersen (2017), which provide substantial theoretical and empirical contributions. In the agricultural sector, value chains encompass the full spectrum of activities, relationships, and actors involved in the production, processing, and distribution of both crop and livestock products. Given their central role in the dynamics of food systems, value chains are critical in shaping the future direction of the agricultural sector. This is equally true for organic production, which is particularly reliant on the interactions between various actors within these value chains (Sanders et al., 2016; Orsini et al., 2020). Factors such as long-term sales agreements with farmers, the strategic decisions of processors and retailers regarding the collection and processing of organic products, policies regulating agricultural practices, and public support from national or local authorities all significantly influence this sector. As a niche market in many EU countries, organic production is especially vulnerable to the volatility of political and economic shifts in the value chains, as evidenced by recent challenges such as the COVID-19 pandemic and inflation crises.

An often-overlooked aspect of agricultural value chains is the role of the food industry, particularly in the organic sector. The organic sector is characterised by limited data compared to the mainstream production, and the actors involved in processing organic products are fewer in number, and with less transparent communication regarding their market strategies. The present report first describes the processing of organic production within the value chain. It outlines the geographical distribution of organic production, identifies the key actors involved in processing both organic and conventional products, and examines their market strategies. Additionally, it discusses the industrial product-mix for organic products and recent trends in the development of the value chain. Secondly, the report establishes a typology of food processors based on factors such as product-mix, location, size, and the importance placed on organic production. This typology is then used to model the potential impacts of various future scenarios on the organic sector and their implications for the structural characteristics of the food industry. Lastly, the report identifies the critical changes required at the processing level to meet ambitious targets for the organic sector.

Three case studies are analysed in this report: the poultry meat sector in France, the poultry meat sector in Denmark, and the dairy sector in France. These case studies concern food productions that are currently facing multiple environmental and societal pressures in a political and societal context where the role of livestock in society is a source of debate. The analysis developed in this report in relation to these three case studies is based on work carried out in other tasks of the project. In particular, we rely on the scenario narratives on the organic sector produced in WP2 (Participatory foresight and scenario analysis) and on information regarding the evolution of farm holdings and organic agricultural production developed in Tasks 3.2 and 3.3 of WP3 (Socio-economic impact on the production side). For this last aspect, we would like to thank in particular ITAB and ICOEL for their contribution to the analysis of the French and Danish case studies.

The report is structured as follows. Chapter 2 presents the methodology used to describe the processing industry, to establish the typology of food processors, and to model the impact of future organic scenarios. Chapter 3 presents the three case studies and the modelling results.

Chapter 4 discusses the results and provides policy recommendations. Finally, Chapter 5 presents the main limitations of our analyses and concludes the report.

2. Methods

This chapter presents the methodology used to describe the processing industry in the case studies analysed in this paper, to establish the typologies of food processors, and to simulate the impact of organic scenarios on the food processing industry.

The description of the processing industry combines a quantitative and qualitative approach. From a quantitative point of view, the main data sources mobilised to carry out the work are Eurostat, the Farm Structure Survey, PRODCOM, and Comext statistics, complemented by national data sources such as the Agreste database, the Agricultural Census and the Annual Dairy Survey (Enquête Annuelle Laitière, EAL) in France, and data from the Ministry of Food, Agriculture and Fisheries in Denmark.

From a qualitative point of view, this data was complemented by interviews with experts in the value chain, workshops with sectoral stakeholders (in France only), and information provided by the Practice Partners during Task 3.2 of the project Typology of 2020 and 2030 organic farms.

For the French case studies, typologies of food processors were built using data from PRODCOM, EAL, FARE, ESA, and FLORES, supplemented by information from Agreste and FranceAgriMer. In Denmark, the lack of publicly available and reliable datasets on the processing industry, combined with the very small number of processors in the case study analysed, led to a simpler approach. To find information on Danish poultry processors, we manually searched for information in reports from the Ministry of Food, Agriculture and Fisheries, food processors' websites, and specialised press. The result is that the degree of heterogeneity in data quality between case studies may be important in some cases. However, we accept this limitation, as one of the main objectives of this report is to provide new information on a part of the value chain that is often neglected and not examined in impact evaluation and scenario analysis. Finally, for all case studies, this data has been supplemented and interpreted with the help of expert advice and information produced in other tasks of the project.

To measure the impact of scenario narratives on the meat industry, we built a modelling simulator that works similarly to an input-output calculator (Martínez et al. 2013; Bâ et al., 2016; Wang et al., 2019; Saget et al., 2020, Aubert et al., 2021; Fan et Liu, 2021). The modelling simulator estimates the impact of variations in raw livestock production (animals entering slaughterhouses or milk delivered to dairies) on indicators such as the value added, the annual capital depreciation, the number of workers, the number of food processors, and the stranded assets in the sector by 2035.

The main purpose of the model is to be used in a foresight analysis exercise to explore the outcomes of scenarios where many parameters are exogenous and determined by the scenarios' storylines. In this respect, it is important to stress that the model is not intended to assess the impact of scenarios on product prices, wages, or to optimise the behaviour of economic agents.

The first step in calibrating the model is to reconstruct the physical flows of the value chain, in particular the flows of production passing through the food industry. These flows are reconstructed for the baseline year of the model, which is 2020 (hereafter referred to as the Initial

situation). For the poultry meat industry, these flows are shown in Figure 1. In this industry, as most meat processors handle several types of animals in the poultry family (broilers, turkeys, ducks, guinea fowl, etc.) and to simplify the analysis, we have aggregated all animals in the poultry family and considered them as a single animal. A second simplification in reconstructing the physical flows is that we have not included imports and exports of live animals, which are very marginal in this industry.

In the modelling simulator, we explicitly consider three types of production for the poultry meat industry: conventional (symbol C in the figure), Label Rouge and European Chicken Commitment standard (symbol R), and organic. The flows of poultry production passing through each type of slaughterhouse are reconstructed as well as the product-mix of each meat processor for each type of production. In this respect, specific coefficients are used for each type of production to distinguish the share of fillet and other pieces (legs, wings and other parts) in the poultry cuts. Only in the case of the French poultry industry have we also explicitly taken into account the quantities of imported meat purchased by meat processors to produce more elaborate preparations such as poultry delicatessen (poultry products).

Figure 1 Poultry meat industry representation in the modelling simulator

The reconstruction of the flows in the dairy processing industry follows a similar approach (Figure 2). Raw milk production is divided into conventional and organic production and allocated to each type of dairy processor. Reconstructing production flows in the dairy industry is extremely complex due to the presence of several by-products that are simultaneously sold and purchased by each dairy processor. In order to reconstruct these flows, we used the following simplification based on the schematic representation presented in FranceAgriMer (2022). We assumed that all dairies specialising in milk and fresh products, cheese, milk powder and ingredients, and all other

processing plants, produce industrial cream as a by-product, which is then sold to processing plants specialising in butter production. Similarly, it is assumed that dairies specialising in milk and fresh products, butter, cheese, and all other processing plants produce various high-protein milk by-products which are sold to processing plants specialising in milk powder and ingredients. Coefficients to identify the share of by-products produced in each dairy are calculated based on EAL (2020) data. These coefficients can vary considerably between different types of dairy processors. For example, specialised cheese processors produce higher amounts of milk protein by-products (in the form of lactoserum) than other types of dairies due to their specific product-mix, in which cheese has a high share.

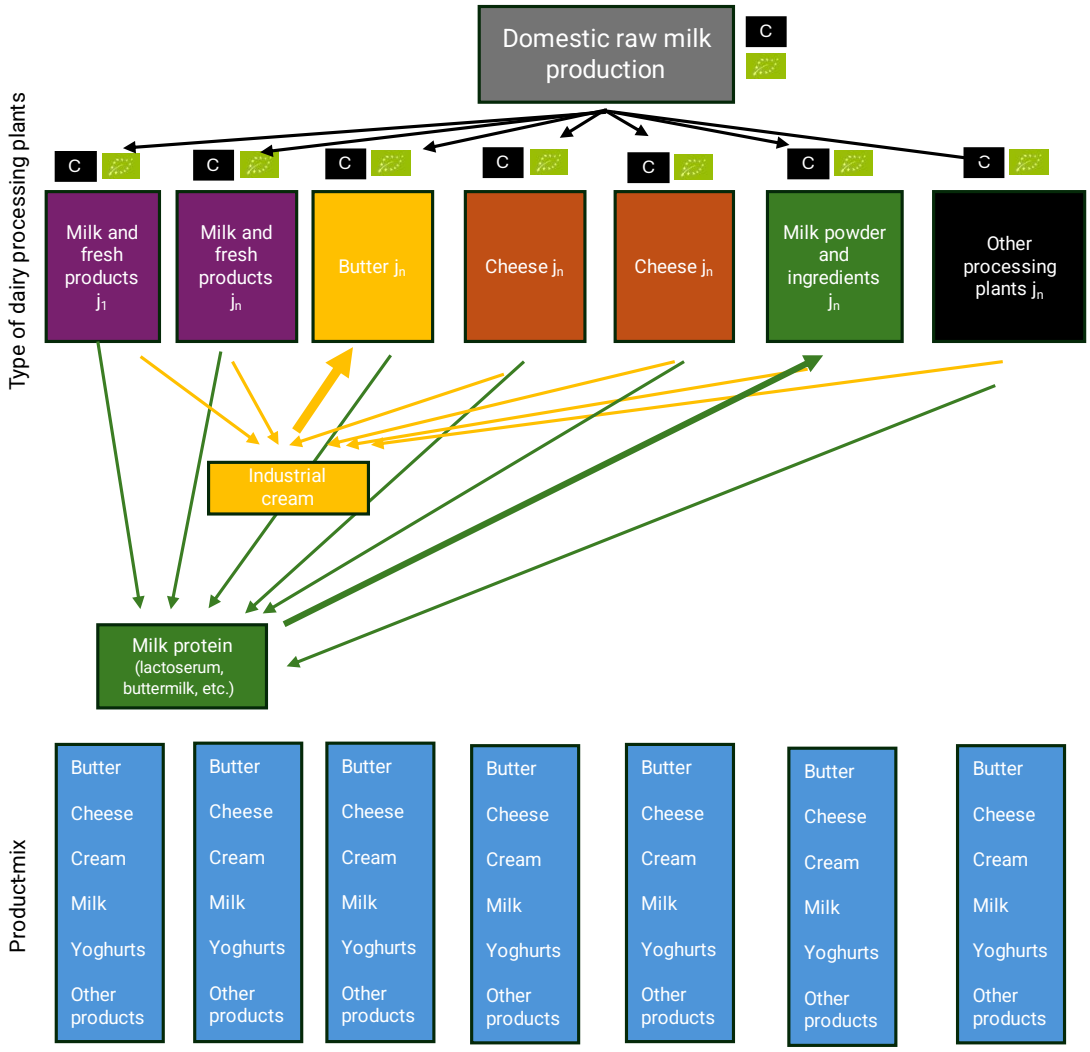

Figure 2 Dairy industry representation in the modelling simulator

After having calibrated the physical flows in the food industry, the modelling simulator begins with considering the organic and non-organic livestock and dairy production at the farm gate, as determined by the scenarios. In this report, changes in the volumes produced and the share of organic production are exogenously taken directly from the results of Deliverable D3.2 “Socio-economic impact assessment of scenarios, at sectoral and focus country level”. Then, the modelling simulator transforms this production based on a product-mix defined by the modeller. Finally, it calculates multiple indicators using exogenous coefficients that may vary for each food processor (j), product (p), type of production (t), and scenario (s).

The first indicator to be calculated is the value added produced by the meat industry, as shown by Equation 1, where V represents the volumes of production in carcass weight or milk equivalent and θ is a coefficient.

$$Value\ added_{j,p,t,s} = V_{j,p,t,s}\ \theta_{j,p,t,s} \quad (1)$$

In estimating θ for organic production, we make the following simplification. Following UFC Que Choisir (2017) and the advice of stakeholders and experts in France and Denmark, we assume that food processors charge a higher margin for organic food products. This may be a consequence of their monopsony power in the organic value chain, or as a form of insurance against the potential risks and additional logistical costs associated with selling goods in a niche market.

Equations 2 and 3 show respectively the second and third indicator calculated by the modelling simulator: the annual capital depreciation and the amount of workforce needed for production.

$$Depreciation_{j,s} = (\sum_{p,t} V_{j,p,t,s})\ \lambda_{j,s} \quad (2)$$

$$Workforce_{j,p,t,s} = \frac{V_{j,p,t,s}}{\sigma_{j,p,t,s}} \quad (3)$$

As for Equation 1, λ and σ are exogenous coefficients. In the poultry meat industry, in estimating σ, we assume that, all things equal, organic production has the same value as conventional production.

In the dairy industry, we make a further simplification. We assume that σ is indexed only with respect to j (food processor) and s (scenario). We make this choice as estimating physical labour productivities (σ) specific to a product (p) in the dairy value chain can be quite challenging. Unlike the poultry meat industry, the dairy industry has many cycles and interactions between a multitude of different products and many by-products. Dairy products are very heterogeneous (just think of the variety of cheeses made from skimmed milk, whole milk, or lactoserum, the different methods of processing, maturing, and storing cheeses, etc.). In addition, each dairy can buy or produce the raw or semi-processed materials needed to make the final dairy products. Since this level of detail is not present in data, we have adopted the modelling simplification of considering a single labour productivity per type of food processor j, aggregating all the different products in its product-mix. This simplification precludes the possibility of modifying the product-mix of dairy processors in scenarios without obtaining biased results regarding labour requirements. Therefore, for each type of dairy processor, we assume that its product-mix is fixed in all scenarios[1].

As all dairy processors in the model are mixed (processing both conventional and organic milk), this also means that we have assumed that the organic and conventional product-mix is the same for a given type of dairy processor (Table 17 in the Annex shows that this assumption is rather confirmed by real data observations).

[1] This modelling choice implies that we implicitly assume that there is an internal closed loop of the physical flows of milk and dairy products within each type of dairy processor except for the aforementioned exchange of industrial cream and milk proteins. This means that, for example, if specialised milk and fresh products processors produce a certain quantity of skimmed milk, the milk fat by-product is partly sold to specialised butter processors and partly used for the internal production of cream and butter, and that the share of these two outlets remains unchanged in all model simulations.

The two final indicators calculated by the modelling simulator, the number of food processors (N) and the amount of stranded assets (S) are provided respectively in Equations 4 and 5.

$$N_{j,s} = \frac{\sum_{p,t} V_{j,p,t,s}}{d_{j,s}} \quad (4)$$

$$if\ (N_{j,"baseline"} - N_{j,s}) > 0, then\ S_{j,s} = (N_{j,"baseline"} - N_{j,s}) * f_j * k_j,\ else\ S_{j,s} = 0 \quad (5)$$

In this equations, d is the average amount of tonnes processed by a food processor j, f is the amount of tangible assets detained by a food processor j and k is the share of its assets which has not yet been amortised.

More information regarding the typology of food processors (j), the processed products (p) and the scenarios (s) can be found in the dedicated sections of each case study.

3. Case studies

The following chapter presents the three case studies analysed in the report: the French poultry meat industry, the Danish poultry meat industry, and the French dairy industry. For each case study, the first section describes the sector and presents the typology of food processors. The second section examines how the project scenario narratives are interpreted in the case study. Finally, the third section presents the modelling results.

3.1 The French Poultry Meat Industry

3.1.1 Description of the sector

3.1.1.1 Geography of production

In 2020, French poultry meat production was 1.67 million tonnes in carcass weight equivalent (Eurostat). Of this total, 2.3% was organic. French poultry production is mostly concentrated in the west of the country (Figure 3) especially in Brittany and Pays de la Loire, which represent respectively 33% and 23% of total poultry production (ITAVI from SSP). A second smaller production hub is present in the south-west of the country, in the Nouvelle Aquitaine region, which represents around 9% of national poultry production and is specialised in duck production. This high concentration in the west is mostly explained by geographical reasons. Proximity to ports (and therefore to the arrival of soybeans from the American continent) and road links to the main market favoured the emergence of livestock farms and meat processors, which developed economies of scale over the years.

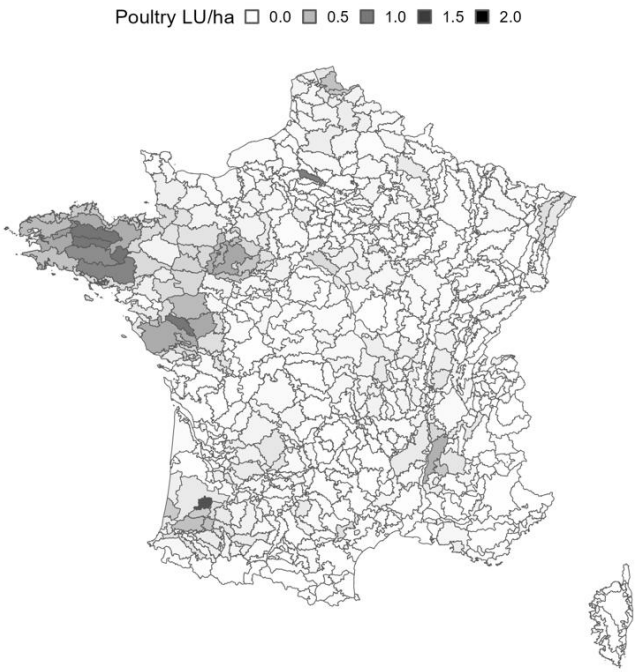

Figure 3 Poultry Livestock Units (LU) per hectare of agricultural land in France (source: French Agricultural Survey, 2020)

The geographic distribution of organic production is slightly different than that of conventional production. Pays de la Loire remains the region where most of organic poultry is produced. However, relatively more poultry organic production can be found in the central and southern areas of the country where a higher share of poultry farmers has decided to convert to organic production methods (Figure 4).

Species diversity is a strong feature of French conventional poultry farming, whereas in almost all other EU countries (except Germany, Hungary, Italy, and Bulgaria) production is generally dominated by broilers (>80% of production) (Eurostat, 2020). In 2020, broilers accounted for 65% of total (conventional and organic) French poultry meat production, turkeys for 19%, meat ducks for 5%, guinea fowls for 2%. The remainder is split between other members of the poultry family, such as fattening ducks, hens, and roosters, and other less represented species. Despite this diversity, organic production is dominated by broiler production: broilers account for 96% of organic poultry (Synalaf, 2023).

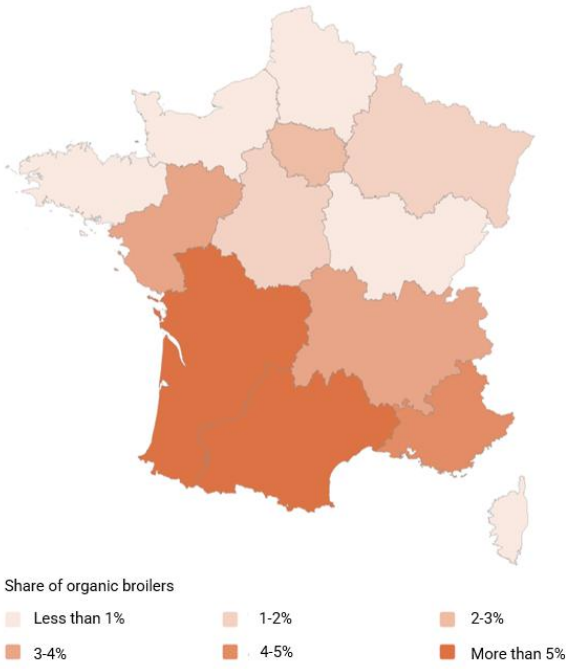

Figure 4 Share of organic broilers in France (source: Agence Bio, 2020)

Another specific feature of French poultry production is the high proportion of non-organic production that complies with quality labels (*Label Rouge*, Compliance Certification (CCP)[2], and protected geographical indications (PGI) and protected designations of origins (PDO)). Around 20% of poultry production is sold under one of these labels. The most widespread is the *Label Rouge*, which guarantees consumers higher standards than conventional production in terms of animal welfare and organoleptic qualities.

3.1.1.2 Main actors

About 500 processing plants slaughter poultry. Most of these slaughterhouses are semi-professional processing units, handle a marginal part of the national poultry production, and are often located on a farm with the purpose of supplying meat for direct sale on the farm market. Professional slaughterhouses are much less. Only 80 processing units slaughtering more than 2.5 million chicken equivalent[3] currently operate in the market (ITAVI, 2023). Secondary meat processors are about a hundred. They produce poultry delicatessen and other more elaborated products. Often, they combine in the same facility the processing of poultry with that of other meat (mostly pig).

Of the poultry processing plants, 66 slaughter organic production (treatment from BDD ONAB-TYPOBIO, 2021). Within this group, 19 plants slaughter more than 2.5 million chicken equivalents. Almost half of them is in the Pays de la Loire. Nouvelle Aquitaine and Auvergne Rhône Alpes are also regions where an important part of the organic production is processed (6 slaughterhouses). It is important to note that in almost all these cases the processing plant is mixed, i.e., both conventional and organic production is processed in the same production lines during the year.

Poultry meat processors employ around 25,000 people and generate a turnover of around €5.6 billion (ITAVI, 2023). Three-quarters of this turnover is generated by the five largest holding groups, reflecting the high level of concentration in the sector. Among these five holding groups,

[2] A French quality label for broilers raised with stricter regulation on animal welfare.
[3] A measure used to sum broilers, ducks, turkeys, etc. For example, 1 duck is 2 chicken equivalent.

Terrena and especially LDC are the dominant players in the market controlling the vast majority of poultry production in France (Table 2Table 2).

Table 2 Share of turnover of the five largest holding groups (source: ITAVI from Chambre d'Agriculture Pays de la Loire, 2018)

Holding group	Share of sales
LDC	54%
Terrena	16%
Euralis Gastronomie	5%
MVVH-Delpeyrat	5%
Moy Park France	4%

The existence of such a high market concentration in the poultry sector weakens the decision-making power of farmers. There are two organisational models in France. In the first, the farmer is independent with a contract with the slaughterhouse. The farmer can choose which hatchery to supply and which feed supplier to use. The selling price is not indexed but linked to the contract. The second is integration. In this model, the farmer takes the investment risk, but all other decisions are made by the integrator. Regardless of the organisational model, however, in most cases the farmer is perceived by the meat processor as a dedicated contractor whose job it is to rear broilers to the company's specifications. There is a real imbalance of market power between industry and farmers. The only card the latter can play is the threat of withdrawal. In this case, the industry might fear that it will no longer be able to find the workforce to manage the agricultural production chain (given the social pressure against livestock farming, the decline of agriculture, the difficulty of renewing buildings, etc.).

Despite the high market concentration at the holding group level, certain forms of competition between and within holding groups persist. For instance, within LDC, each processing unit is often associated with a particular brand (e.g., Le Gaulois, Maître Coq, Loué, etc.) and is managed with a high degree of autonomy. This arrangement gives rise to a situation in which the managers of each unit are engaged in a cycle of competition, driven by the overarching objective of enhancing the group's overall competitiveness. The model offers slaughterhouses within LDC a dual benefit: first, access to the group's financial resources in times of need, and second, the opportunity to benefit from centralised services such as planning, investments made by the group, and the redistribution of funds.

3.1.1.3 Product-mix

The product-mix of the French poultry industry can be divided into four main product categories, each with its own specific characteristics: frozen whole poultry, fresh whole poultry, cuts, and poultry products.

Frozen whole poultry: Frozen whole poultry, often called export broiler, is a conventional broiler with specific genetic characteristics (it is smaller than other conventional broilers intended for domestic consumption). As the name suggests, this product is mainly intended for export markets, in particular Middle Eastern countries. The market relationship between France and these countries was established in the 1970s, with France exporting poultry and other food products in exchange for oil supplies. This relationship has remained strong ever since. However, the sector suffered a crisis in the 1990s following the liberalisation of trade and the arrival of new countries such as Brazil or Thailand to the broiler market, and after 2013 with the end of export

refunds. Today, production remains important (around 100,000 tonnes in carcass weight equivalent) but is much lower than a decade or two ago.

Fresh whole poultry: Fresh whole poultry, often referred to as ready to cook, is a type of production that is mainly intended for domestic consumption and is often purchased for special occasions such as family meals. Fresh whole poultry is often cooked directly by the final consumer, without any prior industrial cutting. More than half of the production has a quality label (data from Synalaf), such as *Label Rouge* and organic quality signs. As *Label Rouge* and organic birds are larger than conventional birds (because they are slaughtered later), they are well suited for this product, which requires larger birds to be consumed in group meals.

Cuts: Cuts are the product with the highest volume in the poultry meat industry. Cuts are divided into fillet and other cuts (wings, legs, and other parts). Fillet is the most important product in the poultry meat industry and is sold at the highest price per kilogram of meat. In recent decades, genetics have been developed to maximise the proportion of fillet in birds. The other parts of the carcass are considered by-products, destined for consumers with low budgets or public canteens (for legs and wings), exports, or pet food (for the other part of the carcass). As organic (and *Label Rouge*) birds have a lower proportion of fillet in the carcass than conventional birds, they are not well suited for this type of production, which values the breast meat. For this reason, the share of organic meat in cuts is currently quite limited, and a proportion of wings and legs is downgraded to conventional (almost all wings and other components excluding fillet, and around 10% of legs).

Poultry products: Within the category of poultry products, we consider a wide range of products. Firstly, we consider poultry delicatessen products, which in recent years have gained some market share at the expense of pork products and today represent about 9% of the total volume of delicatessen products on the market (treatment from FICT, 2018). Secondly, there are a large number of other processed products that require a second stage of industrial preparation after the first stage of slaughtering and industrial cutting (tinned chicken, sauces, pâté, etc.). All these products consist mainly of poultry fillet, with a very limited proportion of wings and legs. Organic production is generally absent from this type of production, as it would probably increase the price of these already expensive poultry preparations.

3.1.1.4 Recent trends

More than other meat sectors, the poultry meat industry has followed a strong path of standardisation in bird genetics in recent decades. A few selection breeders control almost the entire market, providing farmers with highly standardised birds. For broilers, there are only three genetic types.

- Conventional genetic type: strain bred for rapid growth, high feed efficiency and high chicken yield. It requires an energy-rich, optimised feed without poor quality raw materials to exploit its energy potential. Gives rise to birds with fragile health.
- Traditional genetic type: traditional strains that have been around since the 1960s and are currently used for quality production (*Label Rouge*, organic). They are less efficient in terms of production, but more tolerant of raw material quality and give rise to birds that are able to live outdoors. It is important to note that the organic sector is currently experimenting across Europe with two-purpose strains of chickens (based on traditional genetic type) to improve the value and welfare of males shed from the egg production (Biofil, 2024).

- Intermediate genetic type: variety with characteristics between traditional and conventional, used to give a different texture to the meat compared to strictly conventional production.

The high degree of standardisation of birds is particularly true for broilers. This standardisation has shortened the production cycle, reduced the amount of feed needed to produce a unit of meat and lowered the price paid by the consumer. The result has been an unprecedented increase in world production, which has increased 15-fold since 1960 (FAO). In France, this has been accompanied by an increase in the share of broiler production in relation to other poultry species. This share rose from 54% in 2000 to 65% in 2020.

The low relative price of poultry compared to other meats and its ease of preparation have led to an increase in poultry consumption in recent decades (Table 3). This increase is pushed by broilers while the other species experience a reduction in per capita consumption.

Table 3 Poultry consumption per capita in France (source: ITAVI from SSP and French Customs)

kg/capita	2000	2005	2010	2015	2020
Total poultry	***24,7***	***23,2***	***24,7***	***24,9***	***28,0***
Broiler	12,1	12,6	14,9	16,8	20,6
Turkey	6,8	6,0	5,1	4,6	4,4
Meat duck	3,1	3,5	3,1	3,1	2,6
Guinea Fowl	0,9	0,7	0,5	0,4	0,3

The increase of consumption mainly concerned cuts and processed poultry products (Figure 5). Fresh whole (ready to cook) chicken represented only 18% of household purchases in volume in 2022, compared to 33% in 2010 and 52% in 1998. Looking at poultry products, products without nitrites are becoming the new standard in a context where consumers are paying more attention to the nutritional quality and healthiness of food. Production sold under quality signs (*Label Rouge* and organic) remained fairly stable in terms of volume but declined in terms of share.

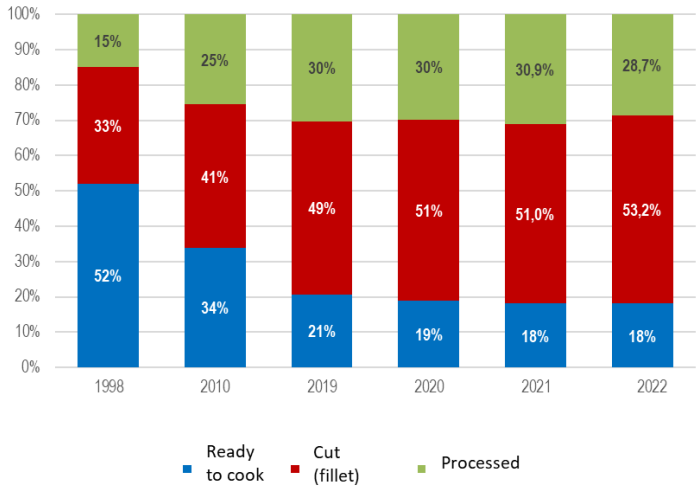

Figure 5 Chicken meat purchases by French consumers in volume (source: ITAVI)

A final crucial aspect affecting the French poultry industry is the increasing dependence on imports. In the face of declining production, dragged down by falling turkey and duck production

(Figure 6), the trade balance for poultry has deteriorated sharply, with a reduction in the volume of meat exported and an increase in the volume of imports (Figure 7). There are several reasons for this increase.

- The increased competition from European countries, notably Poland, that modernised their production plants and can benefit from lower production costs (salaries in particular).
- The recent episodes of avian influenza, combined with old livestock buildings and difficulties in setting up new farms due to social opposition that have declined French poultry production and weakened the poultry industry.
- The behaviour of the French consumer who has a low awareness of the origin of meat in processed poultry products (around 73% of meat used for second processing is imported, AND 2021) and that is less favourable to pay a higher price for domestic high-quality production (*Label Rouge* and organic).
- The oligopolistic concentration in the meat industry, which has led some retailers to look for foreign partners in order to diversify the origin of their supply.

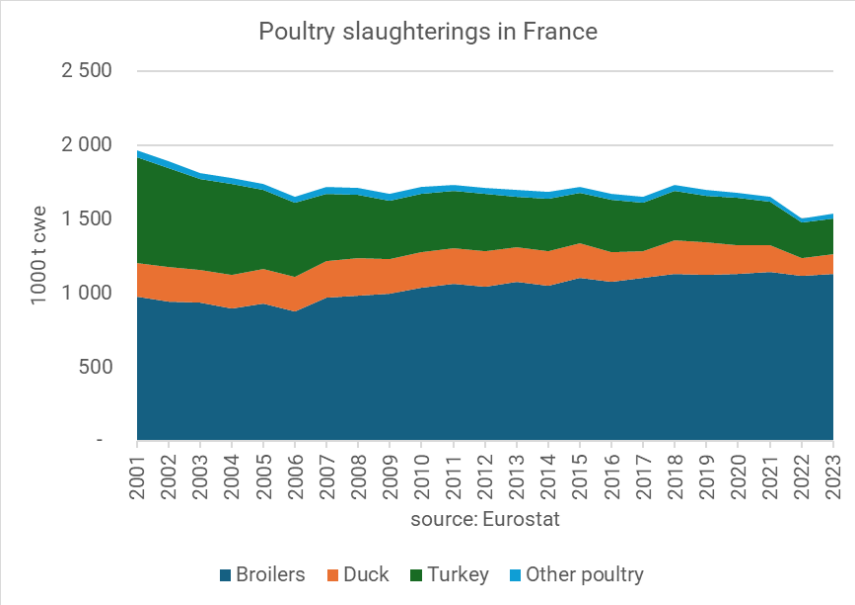

Figure 6 Poultry slaughters in France (source: Eurostat)

In terms of production sold under quality signs, including organic, exports and imports remain rather marginal. Possible future outlets could include the export of processed poultry meat or deboned leg meat to be grilled as chicken fillet or used as a raw material in delicatessens.

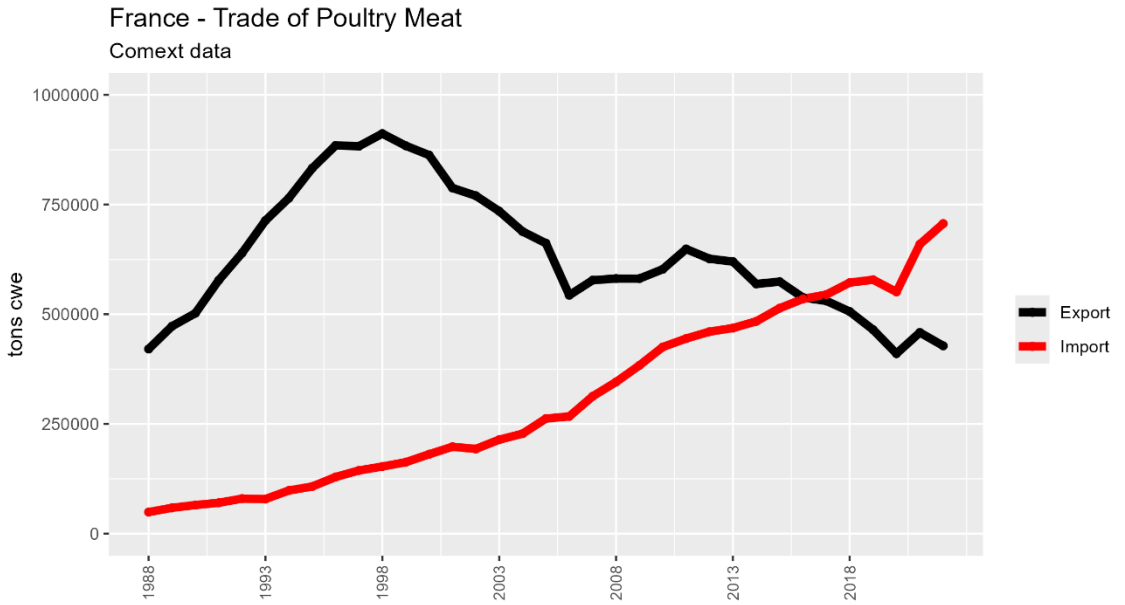

Figure 7 French poultry trade in tonnes of carcass weight equivalent (source: Comext)

Finally, a last trend in the most recent years is the emergence of the European Chicken Commitment (ECC). This new quality sign introduces higher welfare standards for conventional broilers and broilers issued from intermediate genetic strains[4]. With animal welfare requirements closer to those of organic production, this new quality sign could lead to increased competition for organic production to attract the choice of a partially committed consumer, thus becoming a new barrier to the development of organic production.

3.1.1.5 The typology of meat processors

French meat processors were divided in 5 different groups based on different criteria: the geographical location, the size, the presence of on farm-slaughtering, and the specialisation in second processing products. Their main structural characteristics are summarised in Table 4.

- **Large slaughterhouses in the West:** Large slaughterhouses slaughtering more than 22 000 tonnes carcass weight equivalent (cwe) per year located in the most livestock concentrated areas of the country (Brittany, Pays de la Loire, and Lower Normandy). The slaughterhouses in this group are the most productive in the country, benefiting from economies of scale and economies of agglomeration. Their product-mix includes a large proportion of cuts, and they produce whole frozen poultry for export to Middle Eastern countries.
- **Large slaughterhouses in the Rest:** Large slaughterhouses slaughtering more than 22,000 tonnes cwe per year located in areas of the country where poultry production is marginal. On average, the slaughterhouses in this group process lower volumes than their counterparts in the west. Their level of labour productivity is still high, but lower than that of abattoirs in the west. Their product-mix includes a high proportion of cuts.
- **Small slaughterhouses in the Rest:** Small slaughterhouses slaughtering less than 22,000 tonnes cwe per year located in areas of the country where poultry production is marginal. Being less productive than large abattoirs, these slaughterhouses are relatively more specialised in production sold under quality labels such as Label Rouge (LR)/ECC and

[4] https://www.betterchicken.org.uk/better-chicken-commitment/?_gl=1*dt62n2*_ga*NDIxMjc2MTA3LjE3MzYzMjg1MTI.*_ga_RMC05PGGT7*MTczNjMyODUxMS4xLjEuMTczNjMyODU0MC4zNC4wLjA.*_gcl_au*MTI5NzcyNjIxOS4xNzM2MzI4NTE0

organic, and in fresh whole poultry, which requires less labour per unit of meat produced. Some of these small slaughterhouses belong to or are subsidised by municipalities and provide slaughtering services in remote areas. The number of slaughterhouses in this group has decreased in recent decades. Competition from more productive slaughterhouses, the stagnation of production sold under quality labels, and the lack of investment to modernise equipment are the main factors explaining this trend.

- **On farm slaughters:** Semi-professional slaughterhouses, often located near or on a farm, providing slaughtering services with the aim of selling poultry meat directly at farm markets. The equipment and productivity levels are not comparable to those of professional slaughterhouses, but this may be offset by a higher selling price. The product-mix consists mainly of fresh whole poultry. Despite their large number, the share of production sold by these slaughterhouses is marginal and is fixed at 0% in the model baseline. Parameters of slaughterhouses in these group are based on values sourced from RCC, 2013.
- **Secondary Processors:** Meat processors not involved in slaughtering. Firms in this group buy poultry meat from slaughterhouses and process it into more sophisticated food products (poultry products). Within these firms, poultry meat often shares space with meat from other sectors, mainly pork. Few meat processors in this group are very large, most are small or medium-sized. Their location is relatively more homogeneous in the country than that of the professional slaughterhouses.

Table 4 Main structural characteristics of French meat processors

		Small slaughterhouses in the Rest	Large slaughterhouses in the Rest	Large slaughterhouses in the West	On farm slaughters	Secondary Processors
Number of processing plants		46	8	19	-	95
Meat production per plant [t cwe]		7 148	34 983	59 569	11	917
Share of domestic conventional production (slaughters)		15%	16%	69%	marginal	-
Share of domestic LR/ECC production (slaughters)		34%	14%	52%	marginal	-
Share of domestic organic production (slaughters)		34%	14%	52%	marginal	-
Share of poultry products			43%			57%
Share of organic production in the product-mix		4%	2%	2%	-	0%
Conventional product-mix	Whole frozen poultry	0%	0%	13%	0%	-

	Whole fresh poultry	26%	13%	11%	70%	-
	Cuts	67%	80%	70%	20%	-
	Poultry products	7%	7%	6%	10%	100%
LR/ECC product-mix	Whole frozen poultry	0%	0%	0%	0%	-
	Whole fresh poultry	65%	65%	65%	70%	-
	Cuts	35%	35%	35%	20%	-
	Poultry products	0%	0%	0%	10%	100%
Organic product-mix	Whole frozen poultry	0%	0%	0%	0%	-
	Whole fresh poultry	65%	65%	65%	70%	-
	Cuts	35%	35%	35%	20%	-
	Poultry products	0%	0%	0%	10%	100%
Labour productivity [t cwe/Full Time Equivalent]	Whole poultry	144	202	212	22	-
	Cuts	48	67	78		-
	Poultry products	19	20	21		35
Depreciation per tonne cwe [€/t cwe]		92	116	106	354	219

3.1.2 Simulated scenarios

In addition to the two project scenarios, Organic in Every Table (OET) and Green Public Policy (GPP), we also simulate a business-as-usual scenario called Reference, which we use to compare the simulation results in our future horizon. Summarised description of OET and GPP narratives produced in the framework of the project in WP2 can be found in the Annex. In the next section,

we present how these narratives, and the Reference scenario are declined in the French poultry meat industry.

In all scenarios, changes in the share of organic production are taken directly from the results of Deliverable D3.2 "Socio-economic impact assessment of scenarios, at sectoral and focus country level". As a simplification, assumptions related to broilers in Deliverable D3.2 are applied to the whole poultry value chain[5].

Reference: In the Reference scenario, French poultry meat production slightly declines, dragged down by the reduced production of ducks, turkey, and other poultry species that are not chicken. Despite, the increasing consumption of chicken, which partly replaces the consumption of other meats (especially beef), French producers are unable to follow the trend, and the increase of imports continues. The share of organic production stagnates in percentage terms. *Label Rouge* production is partly replaced by the new European Chicken Commitment quality sign, which guarantees lower prices for the consumer.

The trend towards geographical specialisation in production continues. This leads to an increase in the number of poultry reared and slaughtered in the West. The product-mix for conventional production continues the ongoing trend. The share of cuts and poultry products grows at the expense of whole fresh poultry. The share of frozen poultry remains stable as the export market to Middle Eastern countries stabilises.

The share of poultry products processed by second meat processors remains at the current level. Finally, the concentration of production in large slaughterhouses continues, leading to an increase in the volume of meat processed by large abattoirs. The possibility of developing economies of scale and the introduction of new technologies allows an increase in labour productivity for all meat processors (higher increase for large slaughterhouses).

Organic in Every Table: In the Organic on Every Table scenario, as society changes and calls for a reduction in the role of animal products in a healthy and sustainable diet, French poultry production declines more than in the Reference scenario.

The share of organic production increases, favoured by large companies: large slaughterhouses and large retailers. As in the Reference scenario, the localisation of livestock remains fairly concentrated in the country, favouring networks and concentration processes and the emergence of large organic poultry farms, mostly located in the West. These farms are vertically integrated with large retailers and processors. *Label Rouge* production is partly replaced by the new European Chicken Commitment label, which guarantees lower prices for consumers, and by organic production. Large retailers and processors expand their organic product lines and become directly involved in the food chain by partnering with or acquiring smaller organic players. This wider availability makes organic food more accessible to everyone. At the same time, alternative models such as e-commerce, local box schemes, farmers' markets, and direct consumer partnerships also flourish.

The networks and concentration processes of organic production in this scenario favour the large vertically integrated slaughterhouses, especially those located in the West. At the same time, half

[5] Regarding the evolution of meat production, we consider the evolution of broiler meat production as sourced in D3.2 and the trend evolution of other poultry meat (turkey, ducks, and other poultry species) production (-35%).

of the organic poultry meat from farms specialising in direct sales is processed in on-farm slaughterhouses.

There is a degree of commoditisation of organic production. To attract new groups of consumers and increase the mainstream availability of organic products, big business and large corporations use advertising to introduce new range of products (such as a wider range of organic nitrite-free delicatessen poultry from heavier birds) and new ways of consuming organic poultry (such as fillet cuts or deboned chicken legs) that are more similar to conventional production. As a result, the share of cuts and poultry products for organic and production becomes similar as for conventional poultry. For the other aspects of the scenario, such as the evolution of the conventional product-mix, the volume processed by each meat processing plant and labour productivity, Organic in Every Table follows the same assumptions as the Reference Scenario.

Green Public Policy: In the Green Public Policy, as in the Organic in Every Table scenario, society changes and adopts a diet based on less animal products. More direct government intervention in consumer habits (e.g., through taxation or public procurement) stops the growth of poultry meat consumption and decline production more than in the Reference scenario. Encouraged by new ambitious public policies aimed at protecting the environment and biodiversity, poultry systems undergo a transition towards localised feed sourcing, leading to a reduction in production intensity. These policies encourage the reduced specialisation of production areas in the country and the reduction of synthetic fertilisers. Livestock is partly relocated within the country to reduce pressure, especially in the west. In this scenario, poultry farms with localised feed source and on-farm feed autonomy become more numerous. Some of these are organic.

These changes imply a partial relocation of slaughter. The share of production processed in large abattoirs in the West decreases in favour of the other groups of abattoirs. As in the scenario Organic in Every Table, alternative distribution models for organic production based on direct sales emerge. Half of the organic poultry meat from farms specialising in direct sales is processed in on-farm slaughterhouses. Green public policies also favour higher animal welfare standards. New ECC farms enter the market, more numerous than in the Reference scenario, while the share of *Label Rouge* declines due to competition from ECC and organic poultry. The organic product-mix remains the same as the current situation, with the exception of a slight increase in the share of poultry products, whose development contributes to the development of the organic poultry value chain, but that remains limited because of public policies (public advertising, VAT taxes, public procurement etc.) restraining the diffusion of ultra-processed food products.

The organic product-mix remains relatively unchanged with a relatively higher share of whole fresh poultry. This means that more consumers purchase organic poultry to consume it as is currently the case, as a premium dish during special occasions and family meals.Therefore, we assume that the share of cuts in the conventional product-mix increases relatively more than in the Reference scenario, as we imagine a partial substitution between whole fresh organic poultry meat and conventional. In this scenario, we assume that the introduction of these new, more ambitious public policies does not interfere with existing trends in the meat industry in terms of the evolution of the volume processed by each meat processing plant, and the labour productivity of meat processors.

Specific changes to modelling parameters based on the assumptions of the three simulated scenarios are presented in Table 5, Table 6, and Table 7.

Table 5 Changes of modelling parameters in the French Poultry Meat Industry scenarios

	Initial Situation	Reference	Organic in Every Table	Green Public Policy
Evolution of domestic poultry production from farms (expressed in tonnes cwe of meat)	-	-3%	-9%	-9%
Share of domestic meat production from farms based on the type of production	conventional (conv): 77.4% Label Rouge/ EU Chicken Commitment (LR/ECC): 20.3% organic (org): 2.3%	conv: 76.8% LR/ECC: 20.9% org: 2.4%	conv: 72% LR/ECC: 19% org: 9.0%	conv: 72% LR/ECC: 19% org: 9.0%
Evolution of the distribution of slaughters to the different meat processors		The share of domestic conv production processed in large slaughterhouses in the West increases from 69% to 75% The share of domestic conv production processed in large slaughterhouses in the Rest increases from 16% to 18% No change regarding the distribution of LR/ECC and org domestic production.	The share of domestic conv production processed in large slaughterhouses in the West increases from 69% to 75% The share of domestic conv production processed in large slaughterhouses in the Rest increases from 16% to 18% The share of domestic org production processed in large slaughterhouses in the West increases from 52% to 60% The share of domestic org production processed in large slaughterhouses in the Rest increases from 14% to 20%	The share of domestic conv production processed in large slaughterhouses in the West decreases from 69% to 64% The share of domestic LR/ECC and org production processed in large slaughterhouses in the West decreases from 52% to 40% In the Rest, for all types of production (conv, LR/ECC, org), the share of domestic meat processed increases proportionally for small and large slaughterhouses

			No change regarding the distribution of LR/ECC production. Half of organic meat from direct sales is processed on the farms (5% of total domestic organic production)	Half organic meat from direct sales is processed on farms (7.5% of total domestic organic production)
Evolution of the product-mix of the slaughterhouses		For all slaughterhouses, for conv production, the share of cuts is increased by 5%. The share of poultry products in the product-mix reaches 10% for all slaughterhouses. The share of frozen poultry in the product-mix remains stable. No change in the product-mix of LR/ECC and org production.	For all slaughterhouses, for conv production, the share of cuts is increased by 5%. The share of poultry products in the product-mix reaches 10% for all slaughterhouses. The share of frozen poultry in the product-mix remains stable. The product-mix of org production becomes that of conventional production. No change in the product-mix of LR/ECC production. No change in the product-mix of organic production processed in on farm slaughters.	For all slaughterhouses, for conv production, the share of cuts is increased by 8%. The share of poultry products in the product-mix reaches 10% for all slaughterhouses. The share of frozen poultry in the product-mix remains stable. For org production, the share of poultry products in the product-mix reaches 5%. The share of cuts remains stable. No change in the product-mix of LR/ECC production No change in the product-mix of organic production processed in on farm slaughters.
Share of poultry products	57%	No change	No change	No change

processed by second processors				
Meat processed per slaughterhouse		+10% for large slaughterhouses	+10% for large slaughterhouses On farm slaughterhouses double their size	+10% for large slaughterhouses On farm slaughterhouses double their size
Evolution of the labour productivity		+15% for large slaughterhouses, +10% for the others	+15% for large slaughterhouses, +10% for the others	+15% for large slaughterhouses, +10% for the others

Table 6 The French poultry product-mix (conventional, LR/ECC, and organic production) in the Initial situation and in the three simulated scenarios

Product-mix	Initial situation	Reference	Organic in Every Table	Green Public Policy
Frozen whole poultry	7%	7%	6%	6%
Fresh whole poultry	25%	19%	17%	21%
Cuts	63%	67%	69%	65%
Poultry products	5%	7%	8%	7%

Table 7 The French poultry product-mix for organic production in the Initial situation and in the three simulated scenarios

Product-mix	Initial situation	Reference	Organic in Every Table	Green Public Policy
Frozen whole poultry	0%	0%	0%	0%
Fresh whole poultry	65%	65%	11%	61%
Cuts	35%	35%	79%	34%
Poultry products	0%	0%	10%	5%

3.1.3 Modelling results

In the Reference scenario, despite the reduction in poultry meat production, large slaughterhouses in the West and rest of France (Rest) increase their production volumes by 5% and 6% respectively. This means that the entire reduction in production is absorbed by small slaughterhouses, which reduce their volumes by 28% (Figure 8). As a consequence of this production reduction, 15 small slaughterhouses exit the market causing €87 million of stranded assets. In contrast, as the production of poultry products increases, 23 new secondary processors are needed. Total employment in the sector falls faster than production (-5%), as a result of the relocation of production to more productive types of slaughterhouses and the general increase in labour productivity. The increased production of more labour-intensive products, such as cuts and poultry products, does not compensate for this trend. While the employment of large slaughterhouses remains relatively stable in the West (-2%) and in the Rest (+2%), the employment of small slaughterhouses strongly decreases (-41%), while that of secondary processors increases by 28%. As the share of organic production changes only marginally in this scenario, the share of employment in the organic sector also remains stable at 1% of total employment in the poultry meat industry (Figure 9). The average annual depreciation

per slaughterhouse increases by 18% as slaughterhouses become more concentrated and larger (Figure 10). Finally, value added increases by 7% as the share of cuts and poultry products with higher value added per kg increases. **See Table 1 for a complete summary of all simulation results.**

In the Organic in Every Table scenario, total production decreases by 6% compared to the Reference scenario. Since organic production is more concentrated in large slaughterhouses in this scenario, their production declines by 6% in the West and 4% in the Rest compared to the Reference scenario. In contrast, small slaughterhouses in the Rest see a sharper decline of 9%. Despite the drop in production, total employment in the sector remains stable (declining by only 1% when excluding on-farm slaughtering). This stability is due to organic poultry meat being more frequently processed into cuts and poultry products, which require higher labour intensity. As a result, employment in the organic sector accounts for 12% of total employment, even though it represents only 9% of total production volume. Total employment in the organic sector increases by 835% compared to the Reference scenario, while organic production only increases by 279%. It is distributed 15% in small slaughterhouses, 16% in large slaughterhouses in the Rest, 42% in large slaughterhouses in the West, 10% in on-farm slaughters, and 18% in secondary processors. As production is relatively more concentrated in large slaughterhouses, the annual capital depreciation per slaughterhouse is slightly higher than in the Reference Scenario. The volume of stranded assets reaches €137 million, almost twice as much as in the Reference Scenario, mainly as a result of higher production reductions that leads 20 slaughterhouses out of the market (18 of them being small slaughterhouses). Finally, value added increases by 1% compared to the Reference scenario, as the higher value added of organic production (see our assumptions in the Methods section) offsets the effect of lower production.

In the Green Public Policy scenario, total production decreases by 6% compared to the Reference scenario, similar to the Organic in Every Table scenario. However, due to efforts to reduce livestock concentration, particularly in western France, and increase farm feed autonomy, production shifts. Large slaughterhouses in the West see a significant 23% reduction in production, while those in the Rest remain relatively stable with a 1% increase. Meanwhile, small slaughterhouses in the Rest experience a sharp 69% increase in production and increase by 15% in number. Despite the decline in production, total employment in the sector increases slightly by 1% compared to the Reference scenario, driven by a higher share of production being processed in small, labour-intensive slaughterhouses. However, if on-farm slaughtering is excluded, total employment would decrease by 1%. The share of employment in the organic sector reaches 8% implying a growth of 706% of workers in the organic sector, more than linearly with respect to production increase This share is higher than in the Reference scenario but lower than in the Organic in Every Table scenario. This is because most organic meat continues to be processed in forms that require less labour, such as whole poultry meat. Total employment in the organic sector is distributed 23% in small slaughterhouses, 7% in large slaughterhouses in the Rest, 32% in large slaughterhouses in the West, 15% in on-farm slaughters, and 9% in secondary processors. As production is relatively less concentrated in large slaughterhouses, the annual capital depreciation per slaughterhouse is considerably lower than in the Reference Scenario. The volume of stranded assets reaches €149 million, almost twice as much as in the Reference scenario and slightly more than in the Organic in Every Table scenario. These stranded assets result from the exit of the market 5 large slaughterhouses in the West. Finally, value added decreases by 1% compared to the Reference scenario. The higher value added of organic production (see our assumptions in the Methods section) partially offsets the impact of lower production. However, this effect is less pronounced than in the Organic in Every Table scenario,

as the share of cuts and poultry products in organic production, which provide higher value added per kg, is lower in the Green Public Policy scenario.

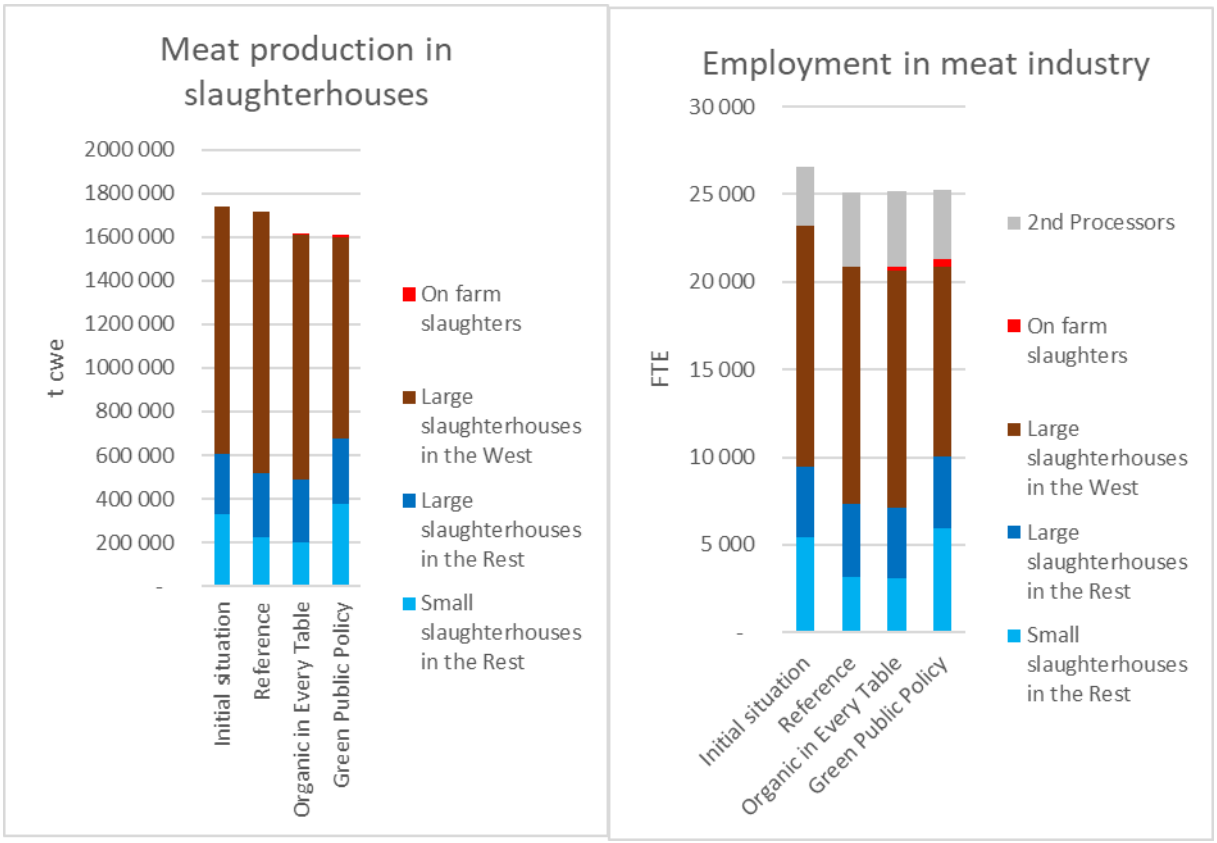

Figure 8 Meat production in French poultry slaughterhouses and employment in Full Time Equivalent in the French poultry meat industry

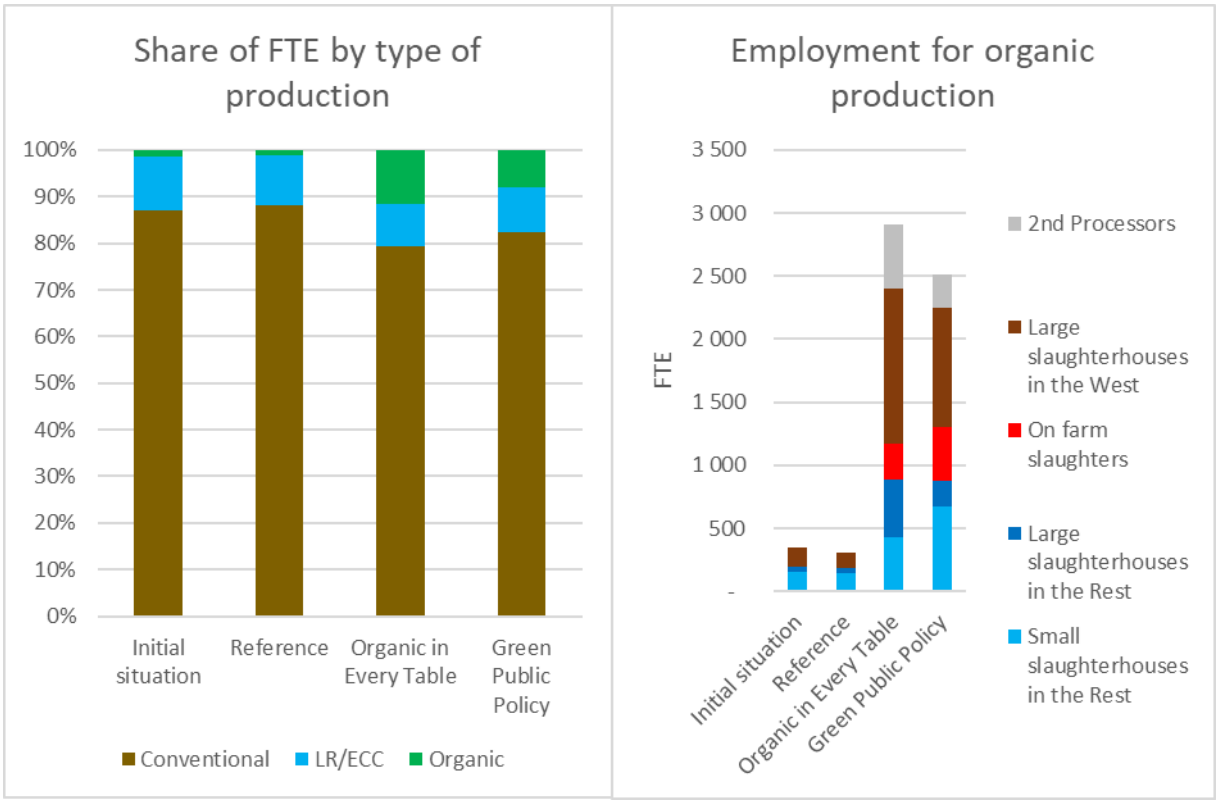

Figure 9 Share of employment by type of production and total employment in Full Time Equivalent in the organic sector in the French poultry meat industry

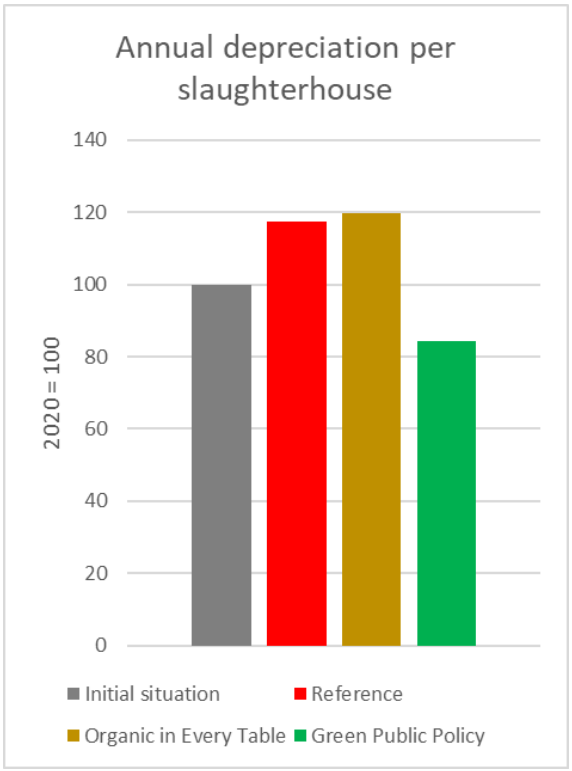

Figure 10 Annual capital depreciation per slaughterhouse in the French poultry meat industry

3.2 The Danish Poultry Meat Industry

3.2.1 Description of the sector

This section has been written with an important contribution from ICOEL in the context of Task 3.2 of the project Typology of 2020 and 2030 organic farms.

3.2.1.1 Geography of production

In 2020, the Danish poultry meat production was 166,500 tonnes in carcass weight equivalent (Eurostat). Poultry production is concentrated on the Jutland peninsula (Figure 11), especially in its northernmost and southernmost parts due to favourable conditions such as climate, infrastructure, and proximity to processing plants and markets. In contrast, the central areas, and the Zealand Islands are less dedicated to poultry production.

Unlike egg production, which has increased by around a third over the last decade, poultry meat production has increased less rapidly (+4% between 2020 and 2010), after peaking at 212,600 tonnes in the early 2000s (Eurostat).

In terms of species reared, almost all birds reared in Denmark are broilers (99%, Eurostat, 2020), with a very small proportion of other species.

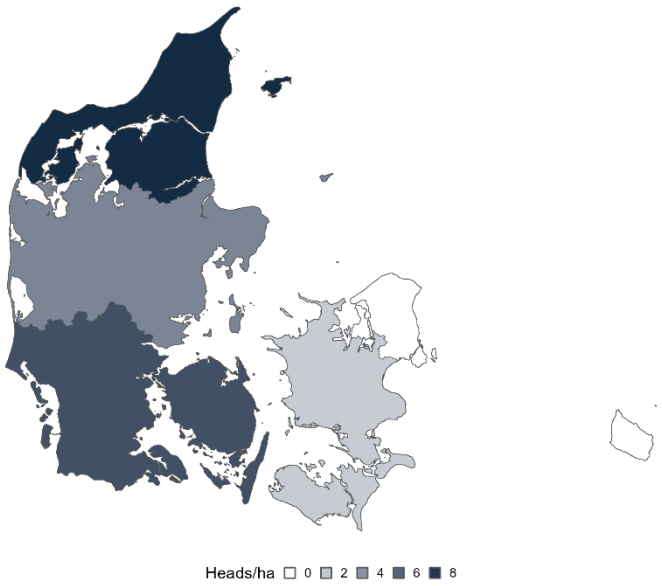

Figure 11 On farm poultry heads per hectare of agricultural land in Denmark (source: Farm Structure Survey, 2020)

Consumer demand for organic products is evident in the sales of organic eggs and chicken meat. In 2022, organic eggs accounted for roughly 33% of all eggs sold in Denmark (Danmarks Statistik). However, organic chicken meat represented only about 1-2% of the total chicken production in Denmark, with 1.7 million organic broilers produced. Organic broiler production has grown primarily in the northern and southern regions of Jutland. Producers in the north are skilled at capturing a significant market share and may have expanded due to the rising popularity of convenience products in Denmark. In contrast, producers in southern Jutland, categorised, focus mainly on exports to Germany and have been recently positively impacted by the outbreak of avian influenza in German poultry farms.

Organic chicken farmers in Denmark can be classified into three categories:

- Part of a large corporation with other production types (mainly in the North of Jutland)
- Large, specialised broiler producers (mainly in the South of Jutland)
- Extensive producers with their own distribution network.

Regarding conventional production, two conventional production systems exist: closed systems and free-range. There is no distinction made between slow-growing and fast-growing producers because conventional barns can support both types. As a result, producers of closed systems have the flexibility to switch between fast-growing and slow-growing breeds based on consumer demand. Free-range systems have a lower number of batches yearly a higher age at slaughter, but similar distribution network as closed systems.

Geographically, Denmark's location as a Scandinavian country with an extensive coastline provides the poultry industry with significant advantages for exports. The country's well-developed port infrastructure, including major shipping hubs such as the Port of Aarhus and the Port of Copenhagen, facilitates the export of poultry products to Europe's global markets. Despite its size, Denmark exports around 150,000 tonnes of poultry meat to Europe, which is similar to the export volume of larger countries such as Ireland or Italy (Figure 12). The main export destinations are Sweden (27%), the Netherlands (17%), South Africa (14%) and Germany (13%) (Comext, average 2018-2021). Exports to non-EU countries are significant and reach 36%. Besides South Africa, Denmark also exports poultry meat to other non-EU countries such as South Korea (5%), the United Kingdom (3%) and Singapore (2%).

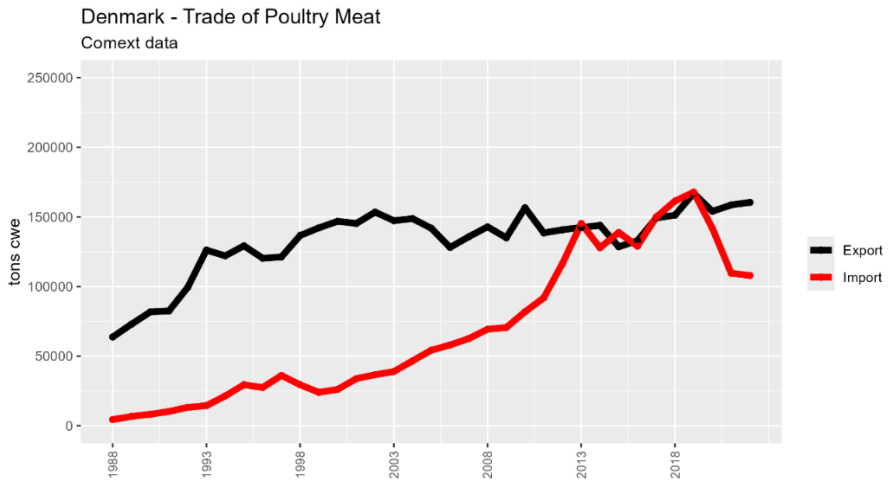

Figure 12 Danish poultry trade in tonnes of carcass weight equivalent (source: Comext)

Looking at the structure of the Danish poultry export-mix (Figure 13), the main exported products are poultry preparations (poultry products) in the form of delicatessen or ready meals. These are followed by the other cuts (wings and legs), suggesting an export strategy based on the disposal of poultry by-products and the Danish consumer's preference for chicken fillet. Finally, as in France, the export share of frozen poultry fell significantly at the end of the 1990s.

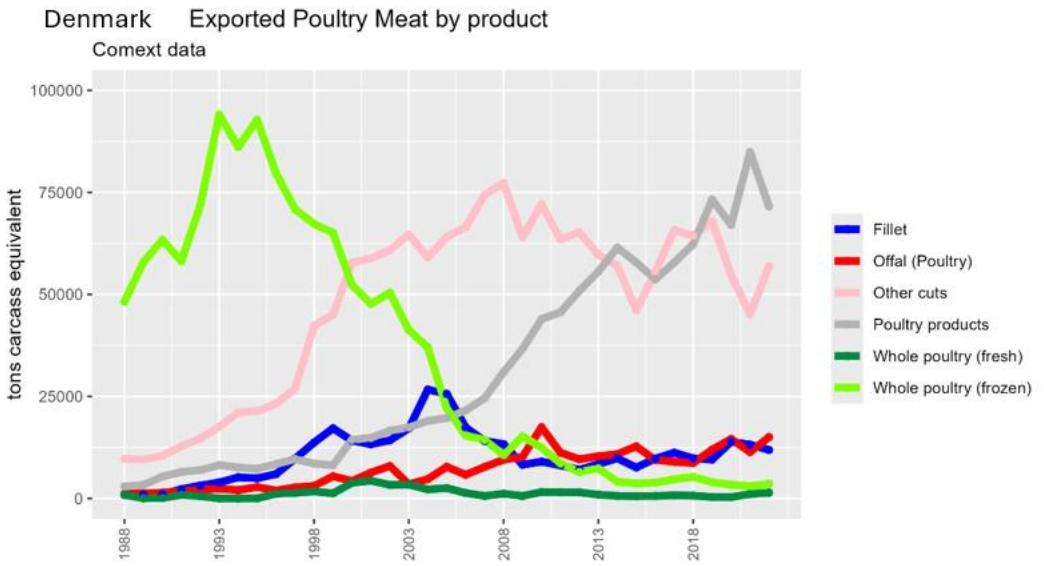

Figure 13 Danish exported poultry meat products (source: Comext)

3.2.1.2 Main actors

The geography of poultry production in Denmark is closely linked to the location of poultry processing plants. Denmark has a highly efficient poultry processing sector, which is concentrated in the regions with the highest poultry production. These plants are typically located close to major poultry farming regions, such as North Jutland, where large numbers of birds are reared for meat production. The strategic location of these plants helps to reduce transport times and costs, ensuring that poultry is processed as soon as it is reared.

These processing centres are often integrated with feed mills, hatcheries, and other key components of the poultry production chain. This integration creates a vertically coordinated supply chain that increases efficiency and reduces logistical complexity. By locating processing plants close to major poultry production areas, the Danish poultry industry benefits from a smooth, cost-effective supply chain that supports both domestic and export demand.

Figure 14 shows the geographical location of Danish meat processing plants and cold stores. According to the Danish Ministry of Food, Agriculture and Fisheries, there are 4 professional slaughterhouses in the country[6]. Half of them is only specialised in slaughtering and cutting, while the other half is also involved in the production of more processed meat products, either directly or through the purchase of specific production facilities. Danpo and ROSE Poultry are the two market leaders, slaughtering approximately 50 million broilers per year.

Among these slaughterhouses, Rokkedahl is a smaller slaughterhouse (with an annual slaughtering capacity of approximately 2 million broilers) that specialises in chickens reared with a focus on animal welfare (Scandi Standard, 2018; Rokkedahl, 2025). This abattoir integrates a farm and an energy production plant. There are also two specialised secondary meat processors (not involved in animal slaughters, only in poultry meat products preparations). The first is Robert Damkjær, which specialises in poultry sausages and delicatessen products that are sold under Halal certification and often exported to Middle Eastern countries. The second is a Danish Crown production plant in Vejle, in the central part of Jutland which specialises in canned meat.

[6] https://foedevarestyrelsen.dk/Media/638735666873507944/Poultry%20meat%20and%20poultry%20meat%20products%20270125%20-%20Japan.pdf.

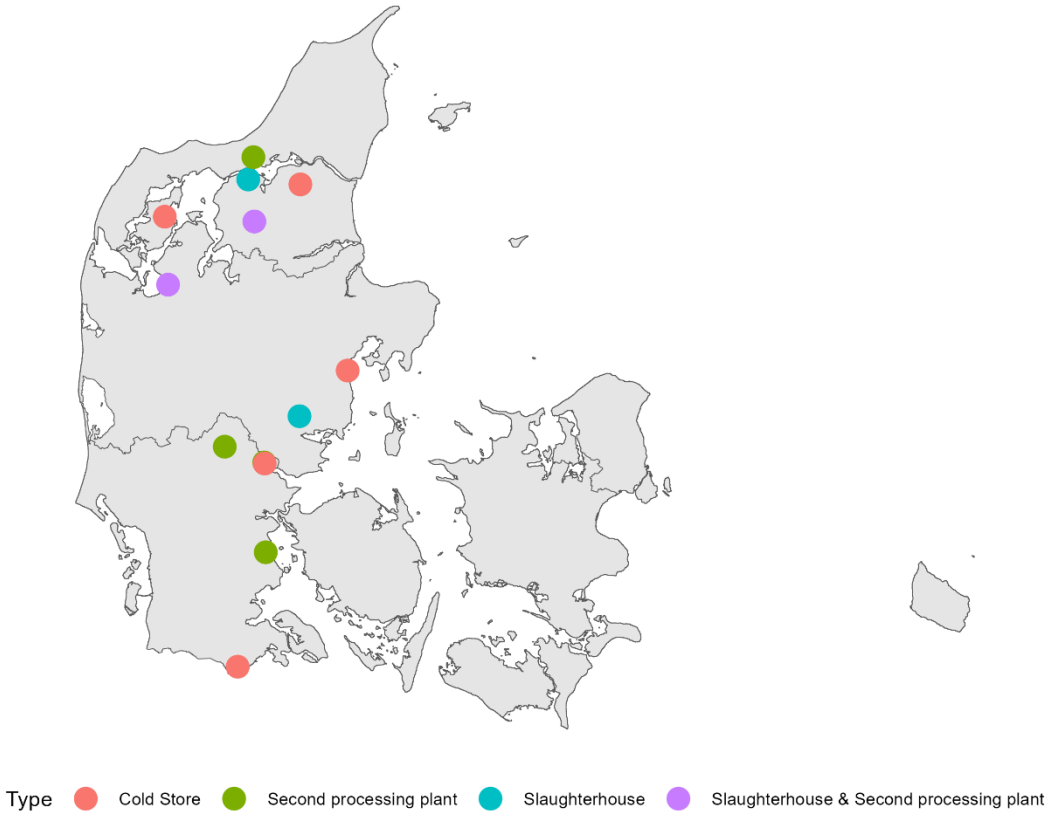

Figure 14 Geographic location of Danish meat processors and cold stores (source: Treatment from Ministry of Food, Agriculture and Fisheries of Denmark)

3.2.1.3 Product-mix

As in France, we divide Danish poultry meat products into four main product categories: frozen whole poultry, fresh whole poultry, cuts and poultry products. Due to the very limited data and information available on the poultry meat industry, we are not able to distinguish a specific product-mix for organic production. However, the high degree of specialisation in cuts and poultry products suggests that it may be the same as in conventional production. Similarly, we were not able to differentiate the product-mix of conventional closed and free-range systems, as data on these specific aspects are not publicly available in Denmark and belong to the industries.

Frozen whole poultry: Frozen whole poultry currently plays a marginal role in the Danish poultry meat industry, accounting for about 1-2% of the product-mix (PRODCOM, 2020). The traditional market for this type of product has been export. However, after the liberalisation of the agricultural market at the end of the 1990s, this has decreased significantly and currently represents a negligible share of Danish exported poultry meat products.

Fresh whole poultry: Fresh whole poultry plays a marginal role in the Danish poultry product-mix, accounting for less than 10% of total poultry meat products. In contrast to France, where this type of product is currently the main outlet for products sold with quality signs (e.g., organic), PRODCOM data interpretation suggests that consumers in Denmark spend less time cooking poultry and prefer the convenience of cuts, ready meals, and delicatessen products.

Cuts: Cuts are the main product in the Danish poultry product-mix. Small portions, quick cooking, and a lower price than more elaborate poultry products are the main reasons for the success of this type of product. As in France, the chicken fillet is by far the first piece of meat valued by the

meat industry for domestic consumption. For this reason, broilers are reared in order to maximise their weight (live weight at slaughter averages 2.2 kg, but can reach 3 kg), but especially their fillet yield. Most of the other cuts, such as legs and wings, which are less valued by consumers, are exported or processed into ready meals (e.g., hot chicken wings) directly by meat processors or by food service and restaurants to increase their added value.

Poultry products: Within the category of poultry products, we look at a wide range of products. In Denmark, this category has a specific focus on ready meals (cooked wings and legs, burgers, nuggets, breaded products, etc.) and a secondary focus on delicatessen products. This outlet represents about one third of the total poultry products produced by slaughterhouses (DANPO, 2025; Rosepoultry, 2025). In last decades, Danish (and European) consumers have come to appreciate the convenience of these products, which has forced the meat industry to adapt to consumer tastes. Imports of poultry products rose sharply between 2013 and 2018 (Comext). Despite a decline in 2019, poultry products are currently the first type of poultry meat imported by Denmark.

3.2.1.4 Recent trends

In the last decades, poultry slaughters in Denmark have stagnated after a production peak in the early 2000s (Figure 15). However, despite the decline in production since 2002, poultry slaughters have started to grow again since 2015. The growth is mainly in the production of cuts, whose share in the product-mix has been continuously increasing over the last 30 years, at the expense of fresh whole poultry and especially frozen whole poultry (Figure 16).

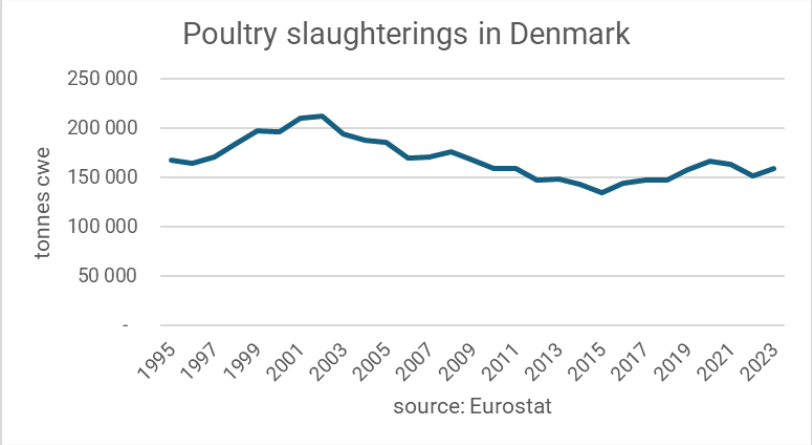

Figure 15 Poultry slaughters in Denmark (source: Eurostat)

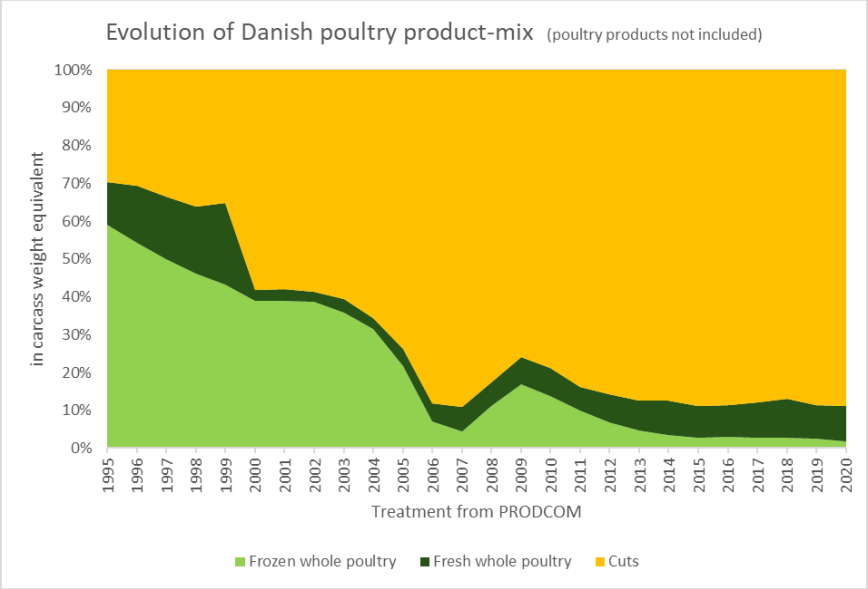

Figure 16 Evolution of Danish poultry product-mix (poultry products not included)

Organic production also stagnated with a share between 2% and 3% of total production. However, between 2023 and 2024, organic chicken production has dropped significantly due to rising production costs and a decline in consumer demand. Interviews with experts in the organic broiler sector suggest that, given the current negative situation for organic producers in Denmark, it is likely that organic farms that are part of a large corporation will switch to conventional production in order to reduce costs and remain viable in broiler production. Meanwhile, specialised organic producers in South Jutland have increasingly focused on the German market, where consumer demand is higher. On the other hand, extensive producers with their own distribution network of farms seem to be less affected by market changes due to their direct-to-consumer sales strategy with lower product volumes and strong branding that ensures a stable customer base.

In Denmark, chicken remains a widely consumed meat, with per capita consumption levels similar to those of beef and pork (FAOSTAT). However, consumer demand for organic chicken remains low. One of the main reasons is the high price of organic chicken, which is more than twice as expensive as conventional fast-growing chicken. There are several reasons for this difference. Organic chickens require more land and energy-intensive housing, especially because of the special ventilation systems. They are also raised on organic feed and roughage, which increases costs. Organic chickens also live longer, but their weight gain slows significantly towards the end of their lives, meaning that more of the feed is used to maintain the bird's body rather than to promote growth. In addition, large slaughterhouses take a fixed percentage of the revenue from processing and distribution, and because organic chicken is more expensive, the same mark-up applied to conventional chicken drives up costs at the slaughter line.

Additionally, expert interviews in the sector suggest that in Denmark the branding for organic chicken is not as strong as that for other organic products, such as milk. Consumers who are deeply committed to buying organic products are increasingly shifting towards plant-based diets, while those with more moderate ethical concerns tend to choose slow-growing conventional chicken with a free-range quality sign. Looking ahead, the European Chicken Commitment (ECC) certification is rapidly gaining market share. Denmark has the highest number of food companies that have committed to this agreement. For example, Rokkedahl, one of the largest broiler producers, began slaughtering according to these standards this year. Lastly, the most dedicated

consumers of high-welfare products might tend to choose organic chicken coming from extensive producers, which is seen as having the highest standards, over the other types of organic chicken.

Finally, over the past decade, several small-scale poultry slaughterhouses have closed due to poor economic performance, leaving only large slaughterhouses and one small-sized facility in northern Jutland. Experts in the sector suggest that the large slaughter lines are not suited for processing smaller batches, non-homogeneous groups, or broilers with higher live weights. While mobile slaughtering units are available in Denmark, experience has shown that the process can be highly stressful for the birds, as animal catching is spread over several days. As a result, extensive producers are forced to either build their own slaughterhouses or outsource slaughtering to other countries, particularly Germany. However, this limits their ability to obtain the Danish welfare certification if they intend to sell locally, as it is typically required for certification to use Danish facilities.

3.2.1.5 The typology of meat processors

Danish meat processors were divided into three different groups based on three main criteria: size, presence of on-farm slaughtering and specialisation in secondary processing products. Due to very limited data availability, we made the following simplifications. We assumed that all secondary processing poultry products (ready meals, delicatessen, etc.) are processed in production plants controlled by slaughterhouses. This means that we excluded specialised secondary meat processors from the analysis. We were also not able to differentiate the share of organic production in the product-mix for the different groups of meat processors. The main structural characteristics of the tree groups of meat processors are summarised in Table 8.

- **Small/specialised slaughterhouses:** The slaughterhouses in this group have three main characteristics in common. The first is that the production volumes are relatively small (less than 9 million broilers slaughtered per year). The second is that they are family-owned. The third is that these abattoirs specialise in slaughtering and meat cutting operations. This means that the small scale of their structure does not allow them to process more sophisticated poultry products, and they prefer to concentrate on primary processing. The geographic location of these abattoirs may vary. One is located in the high-volume poultry production area in North Jutland, while the other is in the central areas of the peninsula, where the volume of poultry raised is lower. Unlike the small French slaughterhouses, the abattoirs in this group are highly efficient, although they do not benefit from economies of scale due to the small volumes processed. They compensate for their small size with highly automated production lines, some of which are brand new. In addition, one slaughterhouse in this group has developed a market strategy consisting in slaughtering heavier broilers (3 kg compared to an average of 2.2 kg) to reduce fixed costs per broiler and increase productivity.
- **Multi-product slaughterhouses:** Multi-product slaughterhouses are large slaughterhouses that slaughter around 50 million broilers per year and are owned by a holding group. These slaughterhouses are located in North Jutland, where poultry production is highly concentrated. Their large structure allows them to have diversified production lines and to produce more sophisticated poultry products. This can be done close to the abattoir or in specific production facilities owned by the firm. Offering a wide range of products limits specialisation and increases transaction costs. For this reason, despite their economies of scale, their labour productivity is high but lower than that of small/specialised slaughterhouses.

- **On-farm slaughters:** Semi-professional slaughterhouses are often located near or on farms and provide slaughtering services with the aim of selling poultry meat directly at farm markets. The equipment and productivity levels are not comparable to those of professional slaughterhouses, but this may be offset by a higher selling price. The product-mix consists mainly of fresh whole poultry. The share of production sold by these slaughterhouses is currently marginal and for simplicity is fixed at 0% in the baseline model. Parameters of slaughterhouses in these group are based on values sourced from RCC, 2013.

Table 8 Main structural characteristics of French meat processors

		Small/specialised slaughterhouses	Multi-product slaughterhouses	On farm slaughters
Number of processing plants		2	2	-
Meat production per plant [t cwe]		12507	70743	11
Share of domestic conventional production (slaughters)		15%	85%	marginal
Share of domestic ECC production (slaughters)		15%	85%	marginal
Share of domestic organic production (slaughters)		15%	85%	marginal
Share of poultry products		100%		
Share of organic production in the product-mix		1.1%	1.1%	-
Conventional product-mix	Whole frozen poultry	2%	1%	0%
	Whole fresh poultry	9%	6%	70%
	Cuts	89%	56%	20%
	Poultry products	0%	37%	10%
ECC product-mix	Whole frozen poultry	2%	1%	0%
	Whole fresh poultry	9%	6%	70%
	Cuts	89%	56%	20%

	Poultry products	0%	37%	10%
Organic product-mix	Whole frozen poultry	2%	1%	0%
	Whole fresh poultry	9%	6%	70%
	Cuts	89%	56%	20%
	Poultry products	0%	37%	10%
Labour productivity [t cwe/Full Time Equivalent]	Whole poultry	1030	429	22
	Cuts	343	143	
	Poultry products	-	48	

3.2.2 Simulated scenarios

As for the French poultry meat industry, in addition to the Reference scenario, we simulate for Denmark the Organic in Every Table and Green Public Policy scenarios whose narratives can be found in the Annex. In the next paragraphs, we present how these narratives and the Reference scenario are implemented in the Danish poultry meat industry. In all scenarios, changes in the volumes of livestock production and the share of organic production are taken directly from the results of Deliverable D3.2 Socio-economic impact assessment of scenarios, at sectoral and focus country level.

Reference: In the Reference scenario, Danish poultry production continues the very recent increase in production, fuelled by rising exports and benefiting from the increase in global poultry meat consumption. The new European Chicken Commitment standards applied for a share of current conventional production. The share of organic production declines as the organic value chain fails to attract consumers with moderate ethical concerns who prefer to buy ECC chickens. In this scenario, we assume no change in the evolution of the distribution of slaughters to the different meat processors, nor in the product-mix of the slaughterhouses. Finally, future technological progress and increased automation allow all processing plants to slightly increase their already high labour productivity.

Organic in Every Table: In Organic in Every Table the consumer demand of poultry meat declines as it is partly substituted by plant-meat products. This negatively impacts the overall production increase of the sector and stagnates production. A more concerned average consumer contributes to increase the share of organic production, favoured also by an organic market boom driven by big business that prefer invest in organic rather than in ECC. The holding groups that control multi-product slaughterhouses adopt a strategy intended to increase investments on organic production in partnership with large retailers. In this context, we assume that all organic production is processed in multi-product slaughterhouses. These firms invest on product-

innovation and in more sophisticated products, such as healthy poultry-based ready meals and nitrate-free poultry delicatessen, which are becoming a driving force in attracting new groups of consumers to the organic market. For the other aspects of the scenario, such as the evolution of the conventional product-mix, the volume processed by each meat processing plant and labour productivity, Organic in Every Table follows the same assumptions as the Reference Scenario.

Green Public Policy: In the Green Public Policy scenario, as in the Organic in Every Table scenario, society changes and adopts a diet based on fewer animal products. More direct government intervention in consumer habits (e.g., through taxation or public procurement) stops the growth of poultry meat consumption and stagnates production. In contrast to the Organic in Every Table scenario, in the Green Public Policy scenario the switch is not directly promoted by large companies, but is driven by government policy. The introduction of more ambitious environmental and animal welfare public policies in favour of organic production persuades conventional farmers to convert to organic and ECC production methods. Increased subsidies are given to farmers to encourage conversion, but also to slaughterhouses to make them more willing to accept the smaller, more heterogeneous batches that are typical of organic production, especially if they come from extensive producers. With more flexibility and fewer logistical constraints than large multi-product abattoirs, small/specialised slaughterhouses seize the opportunity and double their share of the total national organic production processed. On-farm slaughterhouses (and mobile abattoirs) also receive public support, increase their size through subsidised investment and become more involved in organic meat processing. Following these changes, the poultry meat product-mix, especially the organic product-mix, becomes less intensive in poultry products such as ready meals and delicatessen, as public policies are also introduced to limit the diffusion of ultra-processed foods, especially for healthier food products as organic products. As in the Reference scenario, all processing plants increase their labour productivity slightly. In Green Public Policy, this also applies to on-farm slaughterhouses, which can benefit from subsidised public investment.

Specific changes to modelling parameters based on the assumptions of the three simulated scenarios are presented in Table 9, Table 10, and

	Initial situation	Reference	Organic in Every Table	Green Public Policy
Frozen whole poultry	1%	1%	0%	1%
Fresh whole poultry	6%	6%	6%	12%
Cuts	61%	61%	44%	63%
Poultry products	32%	32%	50%	24%

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Table 9 Changes of modelling parameters in the Danish Poultry Meat Industry scenarios

	Initial Situation	Reference	Organic in Every Table	Green Public Policy
Evolution of domestic poultry production from farms (expressed in tonnes cwe of meat)	-	+6%	0%	0%

Share of domestic meat production from farms based on the type of production	conv: 97.2% ECC: 0% org: 2.8%	conv: 89.5% ECC: 10% org: 0.5%	conv: 95% ECC: 0% org: 5%	conv: 84% ECC: 9% org: 7%
Evolution of the distribution of slaughters to the different meat processors		No change	All organic production is processed in multi-product slaughterhouses No change for conv production	The share of organic production processed in small/specialised slaughterhouses doubles. 7.5% of organic production is processed in on farm slaughters (same value as in France) No change for conv and ECC production
Evolution of the product-mix of slaughterhouses		No change	The share of organic poultry products in the product-mix of multi-product slaughterhouses increases from 37% to 50% No change for the other slaughterhouses No change for the other types of production	No change
Meat processed per slaughterhouse				On farm slaughterhouses double their size
Evolution of the labour productivity		+5% increase for small/specialised and multi-product slaughterhouse	+5% increase for small/specialised and multi-product slaughterhouse	+5% increase for small/specialised and multi-product slaughterhouse +10% for on farm slaughterhouses

Table 10 The Danish poultry product-mix (conventional, ECC, and organic production) in the Initial situation and in the three simulated scenarios

	Initial situation	**Reference**	**Organic in Every Table**	**Green Public Policy**

Frozen whole poultry	1%	1%	1%	1%
Fresh whole poultry	6%	6%	6%	7%
Cuts	61%	61%	60%	61%
Poultry products	32%	32%	33%	31%

Table 11 The Danish poultry product-mix for organic production in the Initial situation and in the three simulated scenarios

	Initial situation	**Reference**	**Organic in Every Table**	**Green Public Policy**
Frozen whole poultry	1%	1%	0%	1%
Fresh whole poultry	6%	6%	6%	12%
Cuts	61%	61%	44%	63%
Poultry products	32%	32%	50%	24%

3.2.3 Modelling results

In the Reference scenario, both multiproduct and small/specialised slaughterhouses increase their production volume by 6%. While average labour productivity improves for all firms, the growth in total production offsets the decrease in employment. As a result, the workforce needed in this scenario grows by 1%. Employment in the organic sector declines by 54% linearly with respect to production decrease. Workers in the organic sector represent only 0.5% of the total workforce in the poultry meat industry. Finally, value added increases by 11%, driven by both higher production and greater value added per kg from ECC production. In this report, we assume that, similar to organic production, ECC production also generates higher value added per kg (see the Methods section for our assumptions). In doing the modelling calculations, we assume the gap of value added per kg between ECC and conventional production is one-third of the gap observed between organic and conventional production. See Table 1 for a complete summary of all simulation results.

In the Organic in Every Table scenario, total poultry meat production decreases by 6% compared to the Reference scenario. This decline is unevenly distributed, with multiproduct slaughterhouses reducing production by 5% and small/specialised slaughterhouses by 10%, as they cease processing organic meat. In contrast, organic production increases by 843%.Total employment in the sector drops by 4%. However, this decline is less pronounced than the drop in production, since organic poultry meat is more frequently processed into poultry products and in multiproduct slaughterhouses, which require higher labour intensity per tonne of meat processed. For the same reason, employment in the organic sector surges more than linearly with respect to the increase of production (1,130%) compared to the Reference scenario, reaching 6% of total sector employment, equivalent to approximately 100 full-time equivalent (FTE) workers. Finally, value added decreases only by 1% compared to the Reference scenario as the higher value added of organic production (see our assumptions in the Methods section) and of organic poultry products partially offsets the impact of lower production.

In the Green Public Policy scenario total poultry meat decreases at the same rate as in the Organic in Every Table scenario (6%). As small/specialised slaughterhouses manage to increase their

production by 1% as they process relative more organic production, the decline in production is only absorbed by multiproduct slaughterhouses that reduce their volumes by 7%. Since a portion of organic production involves labour-intensive on-farm slaughter, total employment in the sector decreases less than production decline (-5% compared to the Reference scenario). However, without considering on-farm slaughtering, total employment would decline by 7%. Employment in the organic sector increases by 1,341%, which is relatively less than the organic production increase (+1,221%) as more organic meat is processed in less labour-intensive slaughterhouses, and it reaches 8% of total sector employment. It is distributed 7% in small/specialised slaughterhouses, 65% in multiproduct slaughterhouses, and 28% in on-farm slaughters. Finally, value added increases by 13% compared to the Reference scenario, as the lower production volumes are offset by the higher value added per kilogram generated by organic (and ECC) products, particularly when slaughtering occurs on the farm.

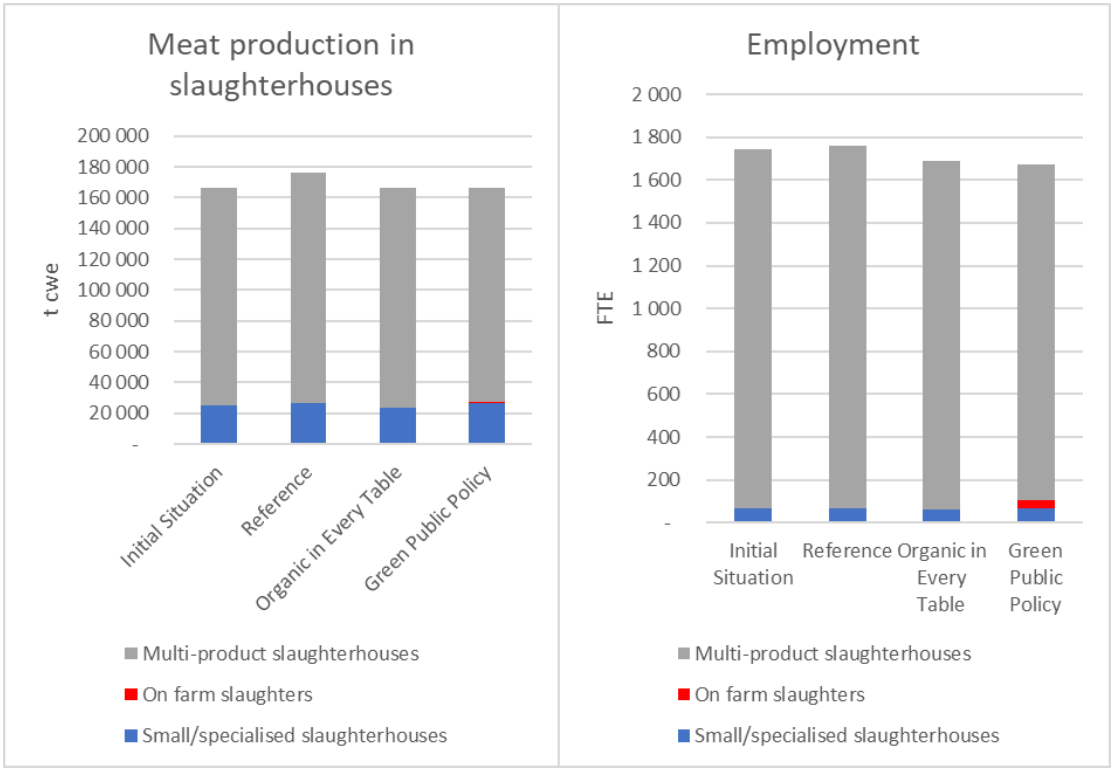


Figure 17 Meat production in Danish poultry slaughterhouses and employment in Full Time Equivalent in the Danish poultry meat industry

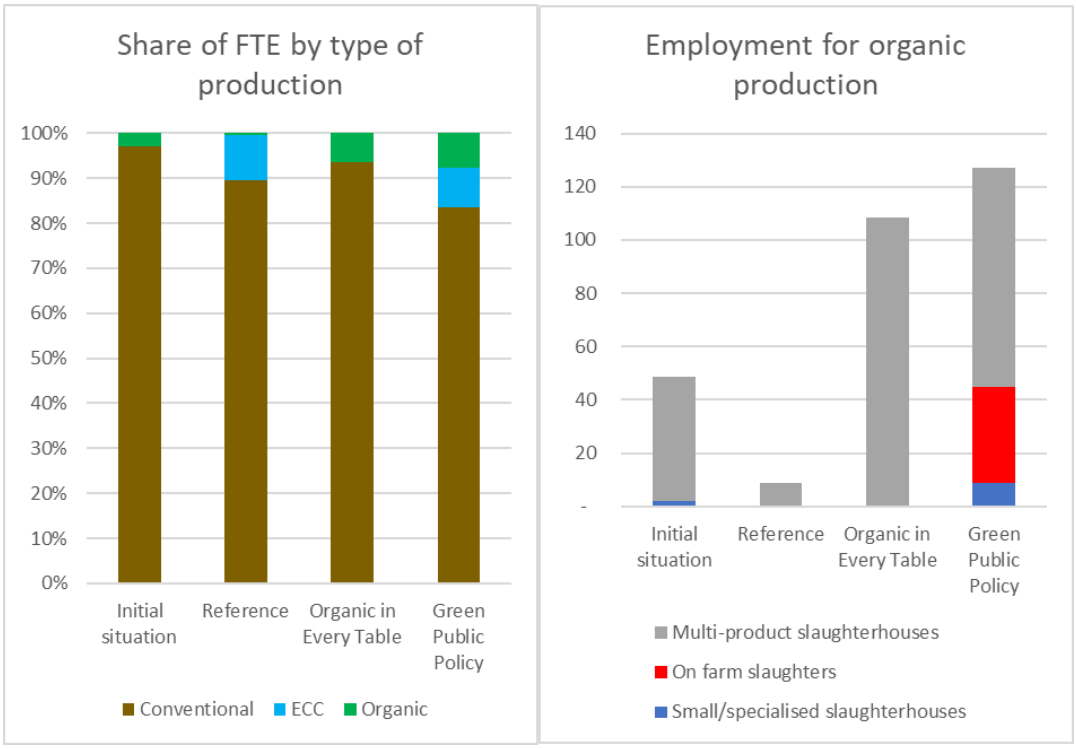


Figure 18 Share of employment by type of production and total employment in Full Time Equivalent in the organic sector in the Danish poultry meat industry

3.3 The French Dairy Industry

In the following chapter, an analysis of the French dairy industry is presented. For simplicity, the analysis is limited to cow's milk; the milk derived from goats and sheep, which accounts for 3.5% of total production, is not included.

3.3.1 Description of the sector

3.3.1.1 Geography of production

In 2020, French milk collection was around 24 million tonnes (FranceAgriMer). Of this total, 5% was organic. The dairy herd is concentrated in the region known as the dairy crescent, stretching from the Pays de la Loire to the Massif Central, and passing through Brittany, Normandy, Hauts-de-France, Grand Est, and Jura (Figure 19). The majority of dairy cows are raised in the northwestern part of France, with Normandy, Pays de la Loire, and Brittany accounting for half of the nation's cattle population. Around 14% of the cow's milk collected in France is used to produce products with protected designations of origin (PDO) or protected geographical indications (PGI), primarily for cheese production. This proportion has remained relatively stable over the past two decades. Most milk collected in the Jura and Alps is processed into PDO cheese, whereas in the Massif Central only a quarter of the milk is used for PDO cheese production.

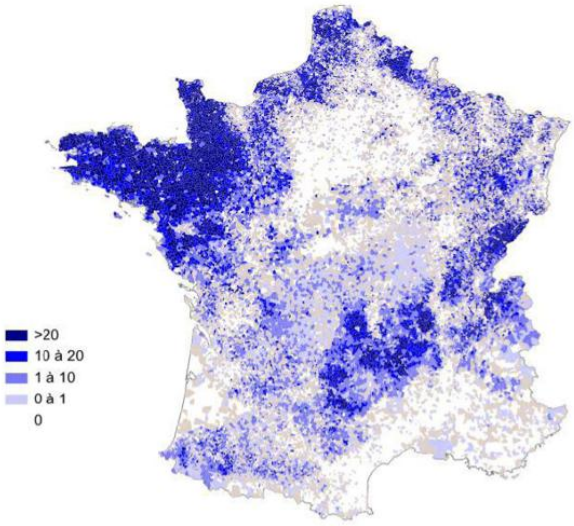


Figure 19 Dairy cows per km^2 in France (source: IDELE from SPIE/Normabev)

The geographical distribution of organic dairy cows mirrors that of conventional dairy cows (

Figure 20 Geographic distribution of organic dairy cows (source: Agence Bio, 2020)

). Western regions, notably Brittany and Normandy, account for the highest concentrations of organic dairy cows. However, when the proportion of organic dairy cows in each region is examined (Figure 21), a more homogeneous situation emerges. In particular, regions in the south of France, where the volumes of milk collected are relatively low, have a higher share of organic dairy cows compared to conventional dairy cows.

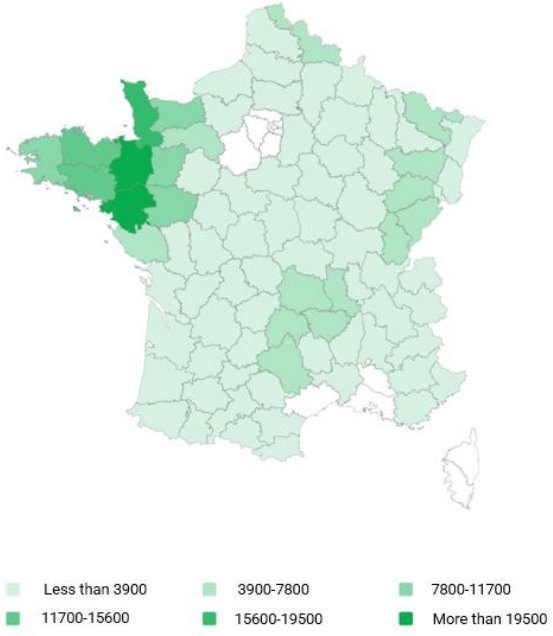


Figure 20 Geographic distribution of organic dairy cows (source: Agence Bio, 2020)

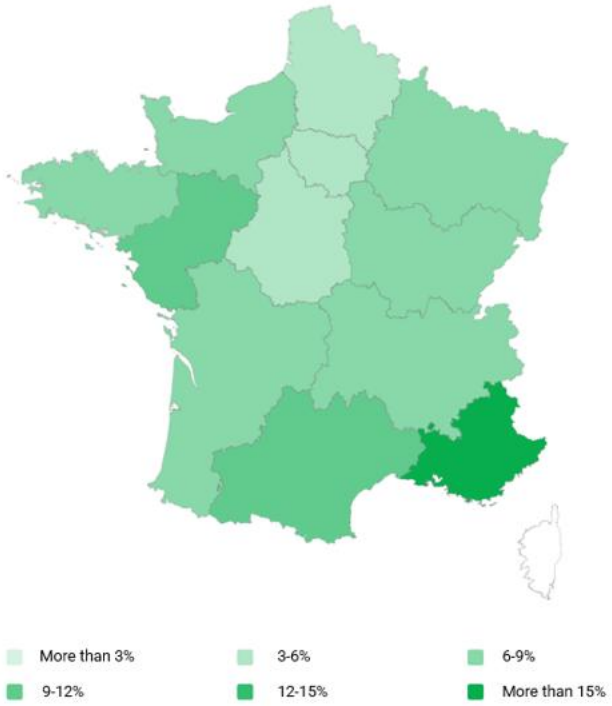


Figure 21 Share of organic dairy cows in France (source: Agence Bio, 2020)

3.3.1.2 Main actors

The dairy sector is highly concentrated, with the ten largest dairy groups accounting for more than three quarters of milk production (BASIC, 2023). Among them, there are multinational corporations with a significant international footprint. This group includes cooperatives such as Sodiaal, Laïta, and Agrial and private companies such as Lactalis, Danone, Savencia, and Bel (Table 12). The remaining dairy industry consists of organisations with varying sizes and market roles. These include regional to inter-regional cooperatives, cooperatives and smaller enterprises targeting high-value markets, delivery cooperatives, private specialised companies, and smaller processors focused on PDO-PGI products.

Table 12 Main companies involved in dairy processing in France (source: BASIC, 2023)

Company	Status	Turnover in France (billion € 2021)
Lactalis	Private company	4.4
Sodiaal	Cooperative	4.2
Savencia	Private company	2
Danone	Private company	1.8
Laïta	Cooperative	1
Agrial	Cooperative	1
Bel	Private company	0.8

Around 600 processing establishments are involved in processing French milk production, employing around 60,000 people. About 32% of these establishments are dedicated to the processing of organic milk (EAL, 2020). A significant proportion of these processors are situated within the cheese-specialised regions of Bourgogne Franche-Comté and Auvergne Rhône Alpes. These two regions are followed by the regions belonging to the western milk basin, namely Brittany, Pays de la Loire, and Normandy (Figure 22). All dairies processing organic milk are

mixed, meaning that they also process conventional milk. The processing of organic milk is even more geographically specialised than conventional production. Cheese is mainly processed in the east, butter in the west (Brittany and Pays de la Loire), and drinking milk in the west and the northern region of Haut de France. Only yoghurts and dairy desserts are more homogeneously processed throughout the country.

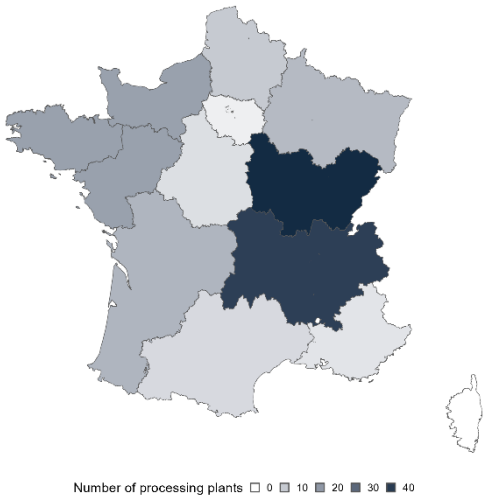


Figure 22 Number of plants processing organic milk by region (source: EAL, 2020)

The main collectors of organic milk are Biolait, Sodiaal, and Lactalis. In 2018, they represented around 57% of total organic milk collected (FranceAgriMer, 2019). Faced with two big groups such as Lactalis and Sodiaal, Biolait is currently the first organic milk collector in France collecting 25% of total organic milk (Ouest France, 2024). Biolait, is a private collector specialising in organic milk. The organisation focuses solely on milk collection, without engaging in processing of dairy products. To avoid over-reliance on a single processor, Biolait limits its contracts with any one dairy processor to no more than 20% of its total volume, collaborating with over 100 different processors (Loveluck and Aubert, 2019). As a pioneering player in the organic milk sector, having entered the market before larger dairies, Biolait has built strong credibility in this rapidly growing industry along with a wide and rural collecting network. However, the growth of the organic market has intensified competition among various actors. To safeguard and diversify its operations, Biolait is exploring different segmentation strategies. Moving beyond contracts focused solely on liquid milk, the company is expanding its product offerings, with organic cheese emerging as a significant growth opportunity (Loveluck and Aubert, 2019).

In the dairy industry, the relationship between dairies and farmers can be tense. Farmers are often heavily dependent on their milk collectors, who may be their only customer, due to the specific nature of the product. Milk is a perishable product with a short shelf life, it is bulky and contains a large amount of water, making it difficult to store. Unlike cereal farmers, dairy farmers cannot easily adjust production because there is a long cycle before a cow begins to produce milk. This is exacerbated in organic production because organic milk is more seasonal than conventional milk, with lower milk production in the summer and higher in the spring when grass growth is strong.

Farmers therefore currently have little individual market power, and in some regions, they have no choice of collector due to the presence of a monopsony. Farmers' dependence on their

collector is reinforced by transport costs and the limited number of collection rounds, especially in remote and mountainous areas.

3.3.1.3 Product-mix

Creating product-mix categories for a product like cow's milk can be quite a challenge. Milk can be consumed in many different forms, just think of the many types of cheese produced in France, the different types of milk, or the different types of dairy desserts. For this reason, we have taken a simplified approach in this report, following the categories proposed in FranceAgriMer, 2019. The product categories that we identify are butter, cheese, cream, milk, yoghurts, and other products.

The product-mix in the organic cow's milk sector focuses on mass-market products that are relatively basic, meaning they undergo minimal processing. These characteristics align with the image of organic products being healthy, minimally processed, and natural (FranceAgriMer, 2022). If we take a deeper look at the product-mix composition of dairy products (Figure 23), we see three main differences between organic and conventional production. Organic milk is relatively less processed in cheese and other products and relatively more in drinking milk. In the following section we will look at each of these categories.

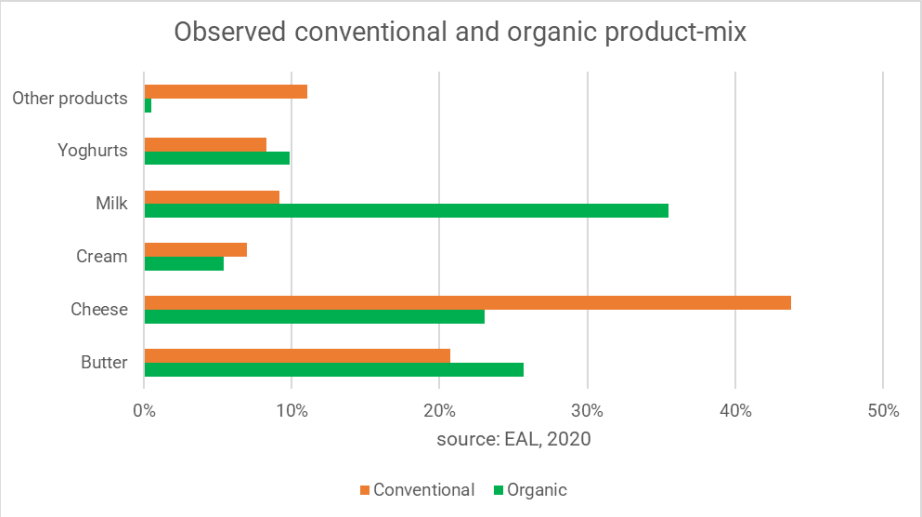


Figure 23 Observed conventional and organic product-mix (source: Enquête Annuelle Laitière, 2020)

Butter: In France, butter is a key ingredient in the daily recipes of most households and in a wide range of processed products. For this reason, it is the second most important destination in the product-mix of the French milk collected. French butter production is currently unable to keep pace with consumption and the French trade balance for butter is negative. In recent years, the volume of imported butter has increased from 160,000 tonnes in 2010 to 225,000 tonnes in 2023 (FAOSTAT).

Cheese: The production of cow's milk cheeses in France is an important part of the country's agricultural economy and cultural identity. France is home to more than 1,200 varieties of milk cheeses, many of which are strongly linked to specific regions. Some of the most famous, such as Camembert, Brie, and Comté, are made from the milk of local breeds of cow, reflecting the characteristics of the region's climate, soil and farming practices. In regions such as Normandy, cow's milk cheese is a staple, with Camembert being one of the most internationally recognised cheeses. The Alps and the Jura are known for their hard cheese production, with Comté being a

standout. The Loire Valley and Île-de-France are known for softer, creamier cheeses such as Brie and Coulommiers. The diversity of French cow's milk cheeses not only offers a wide range of flavours and textures but also supports regional economies and traditions. Much of France's cow's milk cheese production is regulated by PDO and PGI quality labels, which ensure that cheeses are made to strict standards, often using traditional methods and local ingredients. Overall cheese consumption has increased in recent decades. In recent years, this has been accompanied by a growing preference for Italian cheese, which has contributed to an increase in cheese imports. However, the French trade balance in cheese remains largely in surplus, thanks to its well-known cheeses exported to European and world markets. In the last decade, the production of organic cheese has increased relatively more than the other processed organic milk products (Eurostat data), demonstrating consumer interest in this type of product. Organic cheese is currently the third main outlet for organic milk production. It is mainly processed in Brittany and Bourgogne-Franche-Comté. Almost half of the production of non-fresh cheese is processed in the latter (FranceAgriMer, 2019).

Cream: Cream is made from cow's milk through a careful separation process that concentrates the fat content. This is usually done using centrifuges or separators to achieve the desired consistency and richness. The resulting cream is used in a wide range of products, from desserts such as crème brûlée and pastries to dishes such as sauces and soups. Packaged cream remains a rather marginal outlet for French dairy production. However, in the organic dairy industry, it is the product that has seen the largest percentage increase in volume between 2012 and 2022, tripling its production (Eurostat data). Today, the share of cream in the organic product-mix is very similar to that of conventional production.

Milk: Packaged milk includes a wide range of drinking milk: whole milk, skimmed milk, semi-skimmed milk, baby milk, and flavoured milk. Although it is the most traditional outlet for milk production, it is not currently the main product processed by the French dairy industry, lagging behind other products such as cheese and butter. The situation is different for organic production. Organic drinking milk is an important outlet for French organic milk production, often chosen by committed organic consumers as a fresh product in contrast to the other more processed products of the industry. The production of packaged organic milk is relatively concentrated. The three main operators account for almost all production, leaving little volume for the remaining groups, which account for about half of the organic packaged milk plants (FranceAgriMer, 2019).

Yoghurts: The yoghurt category includes classic packaged yoghurts, but also quark, dairy desserts, and other fermented milk products. Like drinkable milk, yoghurt consumption has declined in the last decade, partly replaced by more processed dairy products, often containing cheese and cream. The location of organic yoghurt production is quite homogeneous in the country and often realised in small production units. With the highest conversion efficiency between dairy products (1 kg of yoghurt ≈ 1 kg of milk) and a positive image for the consumer (healthy diet, weight loss, good digestion of food, etc.), yoghurt adapts well to short value chains such as on-farm production and direct sales (IDELE, 2013).

Other products: The other products category includes all the so-called dairy ingredients used in the dairy and non-dairy industries. These products are rich in proteins and can come from butter and cheese production (buttermilk and lactoserum) or from collected milk. These products include milk powder, whey, lactose, casein, and other milk proteins. Traditionally considered a by-product of the food industry, the situation has changed radically in recent decades. These

products are often used in the manufacture of other dairy products (yoghurts, dairy desserts, ice creams, etc.), chocolate, bakery products, confectionery, and other food industry products. They can also be used as the main product in special diets (sports diets, infant diets, clinical diets, or diets for the elderly). France is a major producer of dairy ingredients and has a large positive trade balance with other countries. In recent years, the organic production of dairy ingredients has increased dramatically, indicating a wide range of future market opportunities for this type of product. However, its share in the product-mix remains far below that of conventional production. Organic milk is often downgraded before being sold for processing into dairy ingredients.

3.3.1.4 Recent trends

In recent years, there has been a marked decline in French milk production. Indeed, since 2014, the decline has accounted for 7% of total production (Figure 24). The main factors contributing to this phenomenon are the significant reduction in the number of dairy farmers over the last two decades, the lower growth in the size of the herd per farm and the lower demand for dairy products from domestic consumers. It has been difficult to replace older dairy farmers with younger ones, especially in cases where the dairy herd on the farm is small or where the farm is mixed (producing milk and crops for sale). As a result of this trend, Lactalis, one of the main players in the milk market, recently announced a plan to reduce milk collection by around 9% by 2030 (Le Monde, 2024). After the end of the milk quotas, the decline in production has particularly affected the regions in the south-west of the country, which have experienced an extremely high decline in production, reaching 25% between 2015 and 2021 (Le Sillon Info, 2022). In this area, traditional dairy production has been partly substituted by plant-based alternatives following a market strategy initiated by Danone. This situation has contributed to the progressive concentration and specialisation of milk production, which is now almost exclusively located in the west and the eastern and central areas of the so-called dairy crescent (refer to Figure 19).

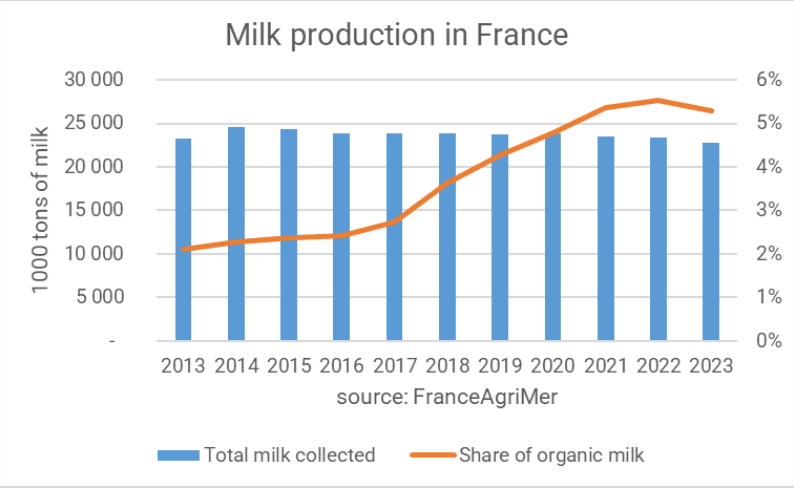


Figure 24 Milk production in France (source: FranceAgriMer)

Over the last decade, organic milk production has increased sharply, accounting for 5.5% of the national milk collection in 2022, up from 2.1% in 2013. In parallel, cow's milk used for PDO and PGI products has remained stable at around 13% of the total national collection. In the last two years, however, the growth of organic milk has been challenged by a slowdown in consumption. Demand for organic dairy products has fallen, particularly in the face of inflation, which has made these products less attractive due to their higher prices. As a result, interviews with experts in the dairy sector suggest that major processors stopped supporting new conversions to organic production as much organic milk was downgraded as conventional. Rising costs of living and

inflationary pressures have also led consumers to seek cheaper alternatives, including private labels and locally produced items. This shift in purchasing habits has created difficulties for organic milk producers, who have faced reduced demand and stagnating prices (Figure 25), while costs continued to rise. The overall outlook for organic milk remains uncertain at present, with both inflation and changing consumer preferences weighing heavily on the sector.

Faced with the organic crisis, generalist companies such as Lactalis fared better than others. They implemented a form of solidarity among all their producers (conventional and organic) to adjust milk prices in favour of organic. Despite halting conversions to organic production, they maintained a pool of producers for the post-crisis period, ensuring the possibility of developing an organic segment. This approach was also feasible due to the relatively modest premium for organic milk, especially in comparison with other livestock sectors. Biolait, on the other hand, found itself in a difficult position, with unfulfilled contracts and facing significant challenges at a time when the company was relying on growth.

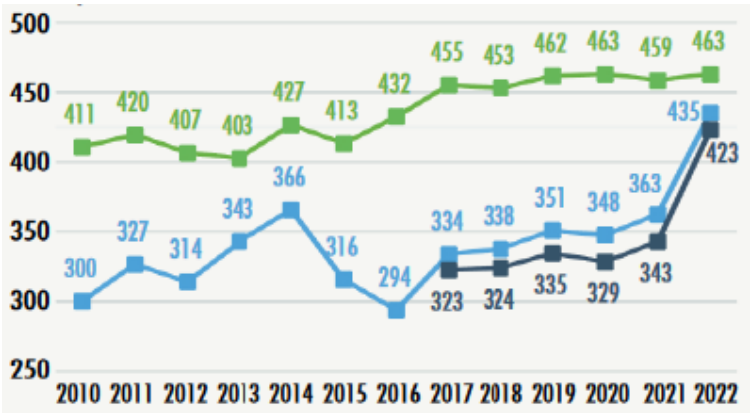


Figure 25 Price (€/1,000 litres) for organic (green), conventional (dark blue) and all kind of milk (light blue). Source (IDELE, from FranceAgriMer)

If we look at the evolution of the product-mix of dairy products (conventional and organic) (Figure 26), we see that, unlike the poultry meat industry, it has changed only marginally over the last twenty years. Cheese, cream and yoghurt are the products that have increased their share in the product-mix. Conversely, butter, drinking milk and other products have decreased their share. This last category, despite its rather stagnant share in the product-mix, has increased its value considerably in recent years and is currently one of the emerging outlets in the industry (Lortal and Boudier, 2011; Web-Agri, 2023). Regarding the organic product-mix, the development of processed dairy products suggests a conventionalisation of organic production, which has become more and more processed like the conventional product-mix. Cream, cheese, and butter have increased their production relatively more than drinking milk and yoghurt (Figure 27).

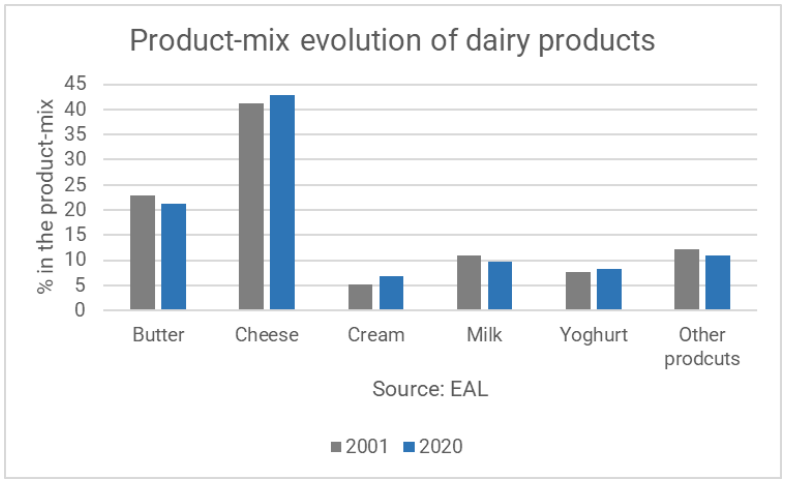


Figure 26 Product-mix of dairy products in France in 2001 and 2020 (source, EAL)

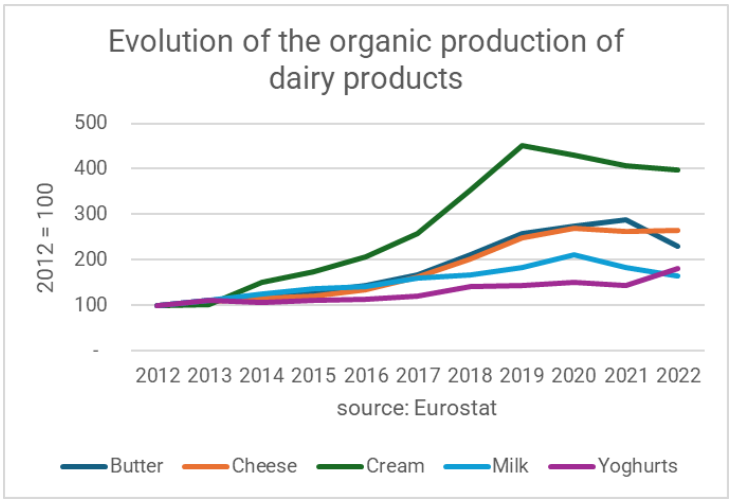


Figure 27 Evolution of the organic production of dairy products in France, year 2012 = 100 (source: Eurostat)

French dairy exports have grown significantly over the last two decades, both in terms of total value and the share of exports to non-EU countries (Figure 28). The main export markets are Germany, Belgium and China, with China's share growing rapidly. The United States have also become an important destination. However, exports to Italy and Spain have decreased, partly due to higher milk production in these countries following the end of EU quotas. Between 2001 and 2023, exports in milk equivalent increase by 30%, although they decline slightly after 2015 due to lower milk deliveries and a smaller share of milk exported.

French dairy exports continue to be dominated by protein-rich products such as milk powder and cheese, which maintain their competitive edge. Conversely, butter exports have suffered from price competition. On the import side, France's dairy imports have also increased, mainly from EU countries, with a particular increase in cheese and butter imports. Despite these trends, France maintains a positive trade balance for dairy products.

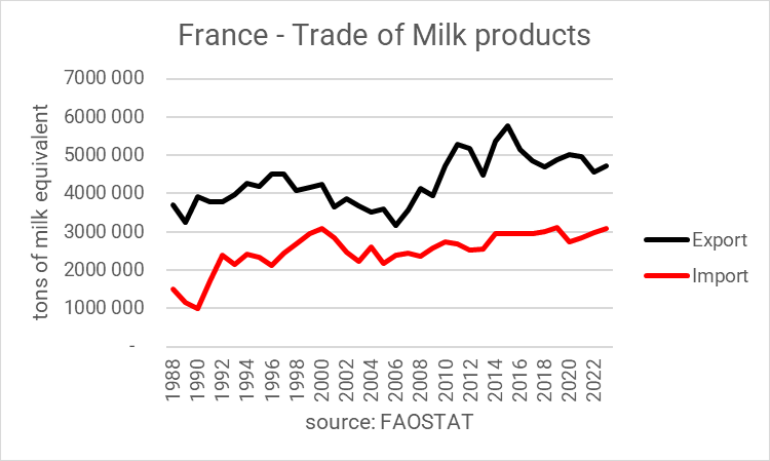


Figure 28 French dairy trade of milk products in milk equivalent (source: FAOSTAT)

Finally, regarding the development of processing plants in the dairy industry, most of the new investments have targeted the modernisation of processing plants. Dairy plants have followed the process of concentration of livestock production in the country. Currently, many processing plants in the south-west of the country are under-utilised following the decline of dairy farming in the region and are at risk of closure. Nevertheless, the concentration of production does not constitute a homogeneous trend. Indeed, a significant number of small traditional cheese factories continue to operate throughout the country. In recent years, the butter sector has even experienced a certain degree of de-concentration of processing plants, with an increasing number of small units opening in various areas of the country, thus offering a segmented butter production.

3.3.1.5 The typology of dairy processors

French dairy processors were divided into 8 different groups according to different criteria: their main product specialisation, their size, and the presence of on-farm processing. Their main structural characteristics are summarised in Table 13.

During the process of establishing the typology, in order to determine the specialisation of each dairy processing plant, we preferred to use an alternative method rather than the NACE code classification, which we believe has various distortions and inconsistencies. We considered a processing plant j to be specialised in product p if product p is the most processed product in terms of volume in processing plant j.

- **Large milk and fresh products processing plants:** Processors in this category process more than 100,000 tonnes of milk per year and specialise in packaged milk and fresh products such as packaged cream and yoghurt. They account for more than two-thirds of the milk production processed in dairy and fresh product processing plants and are mainly located in the north-west area of the country. In the milk and fresh products sector, the level of concentration is particularly high for organic production, which is relatively more processed by these types of processing plants than by small units. Economies of scale allow these establishments to have high labour productivity and a relatively low level of capital depreciation per unit of milk processed.
- **Small milk and fresh products processing plants:** Processors in this category process less than 100,000 tonnes of milk per year and specialise in packaged milk and fresh products. Compared to large milk and fresh product processors, small units are more largely distributed in the country, have a lower proportion of organic milk processed and

a higher degree of specialisation in yoghurts and dairy desserts. Smaller volumes of milk processed limit economies of scale. For this reason, the labour productivity of establishments in this group is relatively low.

- **Butter processing plants:** Butter processing plants are highly specialised processing plants, mainly focused on the production of butter. However, processors in this category also sell other high fat products such as cream and cheese and some by-products of butter production in the form of dairy ingredients. There is some heterogeneity in this group between very few but very large butter processing plants for the commodity market and small butter processors mostly involved in traditional high-quality butter production. In recent years, this polarisation has been reinforced by the exit of many medium-sized processors from the market. Due to the large processors concentrating most of the butter production and the relatively low demand for labour in butter processing compared to capital investment, this is the type of dairy industry where labour productivity in volume is the highest in our typology.
- **Large cheese processing plants:** Large cheese dairies are highly specialised plants that process more than 50,000 tonnes of milk per year. Their product-mix is mostly just cheese production, with some by-products sold as cream, yoghurt, and dairy ingredients. As they mostly produce commodity cheeses, the share of organic production in their product-mix is rather low. As for large milk and fresh products processing plants, the high volumes processed allow them to reduce fixed costs per unit of milk processed. This ensures high labour productivity.
- **Small cheese processing plants:** Small cheese dairies are highly specialised plants that process less than 50,000 tonnes of milk per year. Their product-mix consists mainly of cheese production, with other dairy products sold being very marginal. These units often produce high quality products, which are often sold at a higher price in supermarkets and specialised cheese shops. The number of plants in this group is very high, but with a very low level of production per unit. Their high number reflect the importance of traditional cheese-making in France especially in Bourgogne France-Comté and Auvergne Rhône Alpes, regions that include most of small cheese processing plants. Around a quarter of total French cheese production is processed by production plants in this group. The share of organic production in their product-mix is high. About half of the total organic cheese production is realised in these units. The high degree of craftsmanship, combined with high fixed labour costs, means that labour productivity per unit of output of plants in this group is very low.
- **Milk powder and ingredients processing plants:** Processors in this category are processing plants specialising in milk powder and high-protein milk products. The number of processing plants in this group is rather low compared to cheese or milk and fresh products processing plants, reflecting the relatively new sector represented by the production of milk ingredients. The average volume of production is also rather low compared to dairies specialised in butter or large traditional dairies producing milk, fresh products or cheese. A relatively large part of the volumes processed are industrial by-products from other milk processors, mainly cheese and butter factories. The share of organic production in the product-mix of processors in this group is close to zero. Organic by-products are almost always downgraded before entering these processing plants. Finally, because of the high level of R&D required in this type of firms, labour requirements per ton of milk produced are quite high.
- **Non-dairy processing plants:** Non-dairy processors are plants whose main output is a non-dairy product. Processors in this group can be producers of confectionery, beverages, ice cream, etc., but also non-food producers such as cosmetics and skin care

products, pharmaceuticals, and packaging. As they incorporate the milk into other processed products, the share of pure milk products sold by these processors is very small. The share of organic milk production processed by these establishments is also marginal. For these reasons, the place of this group of processing plants in our analysis is limited.

- **On-farm processing plants:** On-farm processors are small dairies located on a farm. These facilities allow farmers to shorten the value chain and develop a direct relationship with the final consumer, selling dairy products directly at farmers' markets or through internet sales. As on-farm processing units can be quite heterogeneous, in this report we consider an on-farm processing unit specialised in ultra-fresh dairy products with a high share of yoghurt, fresh milk and cheese in its product-mix. This is in line with the logic of many agricultural producers who want to attract consumers by promoting the freshness and healthiness of their products. Another option would have been to set up an on-farm processing plant specialising in cheese production. However, this would have been redundant with the existing category of small cheese processing units, as they share most of their structural characteristics. On-farm processing plants process very small quantities of milk coming from the farm, have a low level of automation and high fixed labour costs. For this reason, their physical labour productivity is low, but this is compensated by higher selling prices. As it is difficult to estimate the exact share of production processed on the farm due to its low value, the share of production sold by these processing plants is assumed to be 0% in the model baseline. The parameters of the on-farm processing plants are based on values obtained from IDELE, 2013.

Table 13 Main structural characteristics of French dairy processing plants

		Large Milk and fresh products processing plants	Small Milk and ultra-fresh processing plants	Butter processing plants	Large Cheese processing plants	Small Cheese processing plants	Milk powder and ingredients processing plants	Non-dairy processing plants	On-farm processing plants
Number of processing plants		21	69	30	51	393	25	24	-
Milk processed per plant [1000 t milk eq.]		199	22	193	154	7	58	46	0.130
Share of conventional milk delivered		16%	7%	21%	36%	12%	3%	5%	0%
Share of organic milk delivered		38%	11%	26%	11%	13%	0.5%	1%	0%
Share of organic milk delivered in the total deliveries of the plant		14%	10%	7%	2%	6%	1%	1%	-
Product-mix	Butter	0%	3%	83%	1%	1%	0%	14%	5%

	Cheese	10%	4%	3%	93%	98%	0%	9%	19%
	Cream	22%	7%	8%	2%	1%	0%	0%	5%
	Milk	43%	31%	2%	0%	0%	2%	1%	23%
	Yoghurts	25%	55%	1%	2%	0%	0%	0%	49%
	Other products	0%	0%	3%	2%	0%	98%	77%	0%
Labour productivity [t milk eq./Full Time Equivalent]		496	221	762	385	214	342	not considered	30
Depreciation per tonne cwe [€/1000 t of milk eq.]		12.30	32.67	14.53	25.80	33.85	14.52	not considered	196

3.3.2 Simulated scenarios

As for the other two case studies analysed, in addition to the two project scenarios, Organic in Every Table (OET) and Green Public Policy (GPP), we also simulate a business-as-usual scenario called Reference, which we use to compare the simulation results in our future horizon. Summarised description of OET and GPP narratives produced in the framework of the project in WP2 can be found in the Annex. In the next paragraph, we present how these narratives, and the Reference scenario are declined in the French dairy industry. In all scenarios, changes in the share of organic production are taken directly from the results of Deliverable D3.2 Socio-economic impact assessment of scenarios, at sectoral and focus country level.

Reference: The Reference scenario makes rather optimistic assumptions about the evolution of milk production. Despite a trend reduction in the number of dairy cows, the increase in milk yield per cow allows milk collection to remain stable. The share of organic milk collected also stagnates at 2020 levels, implying that the current organic crisis will come to an end, but that consumers will not increase their purchases of organic dairy products any further. Farms continue the observed trends of specialisation and concentration of dairy production. They increase in size, increase their milk yield, and become more and more specialised. Some conventional mixed systems move towards more intensive systems in order to increase milk yields and develop economies of scale. The situation is similar for organic dairy farms. Pasture-based and mountains dairy farms decrease the share in production, while some organic large dairy farms appear in the market. This trend towards concentrating milk production in smaller production areas has implications for the dairy industry. Large milk, fresh products, and cheese processing plants located in the main production areas increase their share in the volume of milk processed. Following the small changes in the product-mix over the last twenty years, in this scenario there are no changes in the product-mix of each processing plant. The share of milk collected and processed in non-dairy industries is also kept stable. Finally, future technological progress and increased automation allow all processing plants to slightly increase their labour productivity.

Organic in Every Table: In Organic in Every Table, as society changes and calls for a reduction in the role of animal products in a healthy and sustainable diet, the dairy cow herd decreases more

than in the Reference scenario, leading to a reduction in total milk production. Conventional farms continue the ongoing trend towards specialisation and concentration as in the Reference scenario. Some of them convert to organic farming, driven by growing consumer demand. The localisation of livestock remains concentrated in the country, favouring economies of scale and agglomeration and the emergence of larger organic (and conventional) farms, mostly located in the west. These farms are directly linked to large retailers and processors and produce rather commodified products with a relatively low price, intended for mass consumption. At the same time, alternative models such as e-commerce, farmers' markets, and direct sales also flourish, as do new organic farms specialising in direct sales with small on-farm processing units.

In this scenario, large processors and retailers play a leading role in facilitating the mainstream availability of organic products, also by increasing the range of products available to consumers. Milk powder and ingredient processors seize the opportunity of a growing and stable organic demand to invest even more in R&D to increase their sales volumes. They begin to offer high-protein organic products suitable for athletes and consumers shifting to low-calorie diets.

Apart from the increase in sales of milk protein ingredients, and unlike other food sectors, in the dairy sector the leading role of large processors in the development of organic production does not lead to an increase in the volume of processed products in the product-mix. In the dairy sector, more processed products tend to include a higher proportion of butter and cheese, which are often used as ingredients in other preparations. These two products have a low nutritional value and score poorly on Nutri-Score, NOVA, and other rating systems. The healthier diets of all consumers in this scenario force dairy processors to adapt. As a result, the conventional product-mix becomes more similar to the organic one, with a higher proportion of milk and fresh products. For the other aspects of the scenario, such as the evolution of labour productivity and the volumes of milk processed per dairy plant (except for on-farm processing plants that increase in size), Organic in Every Table follows the same assumptions as the Reference Scenario.

Green Public Policy: In Green Public Policy, public support plays a crucial role in the environmental transition. New green public policies foster a higher decrease in livestock numbers and of the dairy herd than the Reference scenario. This decrease is also encouraged by a reduced consumer demand for meat and dairy products. The new Common Agricultural Policy emphasises stronger support for organic farming and agri-environmental measures, making organic production more appealing. For dairy farming new policies measures favour grassland conservation and extensive dairy production with localised feed sources and on-farm feed autonomy. As a result, conventional extensive dairy systems maintain their share of production, while some conventional intensive systems are converted to organic. Livestock is partly relocated in the country to reduce environmental pressure, particularly in the west. Livestock is reintroduced in areas that were traditional dairy basins, but that are currently marginal such as the south-west, the northern plains, and the more remote mountain areas. In these areas, some new organic dairy farms emerge, mixing livestock and crop activities. Some are former conventional cereal farms in arable areas reintroducing livestock. In this scenario, organic dairy farms highly specialised in pasture-based systems increase their share of production, as are organic farms in mountainous areas. New types of organic farms specialising in direct sales emerge, as well as some large-scale organic dairy farms, although their number remains lower than in the Organic in Every Table scenario.

In the dairy industry, the partial relocation of milk production affects milk processors. In this scenario, large processors find it more difficult to increase their production volumes and to

develop economies of scale, as their transport costs for milk collection increase as farms are less concentrated in the dairy basins. Despite the increased production of organic products, the organic product-mix remains virtually unchanged. While some consumers increase their purchases of organic products spontaneously, others are encouraged by public procurement policies. Public institutions increasingly buy healthy organic products and distribute them in school canteens, hospitals and other public places. Finally, as in Organic in Every Table, Green Public Policy follows the same assumptions as the Reference Scenario for the other aspects of the scenario, such as the evolution of labour productivity and the volumes of milk processed per dairy plant (except for on-farm processing plants which increase in size as they are supported by public investment aid).

Specific changes to modelling parameters based on the assumptions of the three simulated scenarios are presented in Table 14, Table 15, Table 16, Table 17, and Table 18.

Table 14 Changes of modelling parameters in the French Dairy Industry scenarios

	Initial Situation	**Reference**	**Organic in Every Table**	**Green Public Policy**
Evolution of domestic milk production		0%	-9%	-12%
Share of domestic milk production based on the type of production	conv: 94.5% org: 5.5%	conv: 94.4% org: 5.6%	conv: 85.8% org: 14.2%	conv: 86.8% org: 13.2%
Share of milk processed in non-dairy processors		No change for conv (5%) and org (1%)	No change for conv (5%) and org (1%)	No change for conv (5%) and org (1%)
Share of milk processed to on-farm processing plants		No change (0%)	4% of total org production	4% of total org production
Evolution of the distribution of milk processed to the different dairy processors[7]		No change for conv and org	For conv: The share of Milk and fresh products processing plants is increased from 24% to 35%. The share of Milk powder and ingredients processing plants remains stable (3%). The share of Cheese and Butter processing	No change for conv and org

[7] In this line, we mention the evolution of the relative share of production processed in professional dairies (Milk and fresh products processing plants, Butter processing plants, Cheese processing plants, and Milk powder and ingredients processing plants). This means that if the share of production processed by, for example, on-farm processors increases and all other professional dairies decrease their production proportionally, we will show "no change".

			plants is decreased proportionally For org: The share of Milk and fresh products processing plants is increased from 50% to 80%. The share of Milk powder and ingredients processing plants is increased from 1% to 5%. The share of Cheese and butter processing plants is decreased proportionally	
Evolution of the distribution of milk processed in Milk and fresh products processing plants		For conv: the share of large processing plants is increased from 71% to 80% For org: the share of large processing plants is increased from 77% to 80%	For conv: the share of large processing plants is increased from 71% to 80% For org: the share of large processing plants is increased from 77% to 80%	For conv: the share of large processing plants is decreased from 71% to 65% For org: the share of large processing plants is decreased from 77% to 40%
Evolution of the distribution of milk processed in Cheese processing plants		For conv: the share of large processing plants is increased from 76% to 80% For org: the share of large processing plants is increased from 46% to 60%	For conv: the share of large processing plants is increased from 76% to 80% For org: the share of large processing plants is increased from 46% to 60%	For conv: the share of large processing plants is decreased from 76% to 65% For org: the share of large processing plants is decreased from 46% to 30%
Evolution of the product-mix of the milk processors		No change	No change	No change
Share of organic "other products" downgraded to conventional production	100%	100%	50%	50%

Milk processed per dairy processor		No change for dairies	No change for dairies +30% for on-farm processing plants	No change for dairies +30% for on-farm processing plants
Evolution of the labour productivity		+5%	+5%	+5%

Table 15 The French dairy product-mix (conventional and organic production) in the Initial situation and in the three simulated scenarios

	Initial Situation	Reference	Organic in Every Table	Green Public Policy
Butter	21%	21%	17%	21%
Cheese	43%	43%	35%	41%
Milk and fresh dairy products (cream & yoghurts)	25%	25%	38%	27%
Other products	11%	11%	10%	11%

Table 16 The French dairy product-mix for organic production in the Initial situation and in the three simulated scenarios

	Initial Situation	Reference	Organic in Every Table	Green Public Policy
Butter	24%	24%	9%	25%
Cheese	26%	26%	13%	24%
Milk and fresh dairy products (cream & yoghurts)	48%	48%	71%	48%
Other products	2%	2%	6%	3%

Table 17 Observed (EAL, 2020) and modelled organic product-mix in the dairy industry

	Observed	Modelled
Butter	26%	24%
Cheese	23%	26%
Milk and fresh dairy products (cream & yoghurts)	51%	48%
Other products	1%	2%

Table 18 Change in the production of French organic dairy products in the Organic in Every Table and Green Public Policy scenarios compared to the Reference scenario

	Organic in Every Table	Green Public Policy
Butter	-10%	112%
Cheese	21%	96%
Milk and fresh dairy products (cream & yoghurts)	250%	108%
Other products	543%	234%

3.3.3 Modelling results

In the Reference scenario, total milk production remains stable, but production shifts between different types of dairies. Large milk and fresh product processors, as well as large cheese processing plants, increase their processed volumes by 11% and 6%, respectively, while other dairies see a decline in production (Figure 29). Total employment in the sector decreases by 8%, driven by the concentration of production in larger, more efficient dairies and overall improvements in labour productivity across all firms. For the same reason, total employment in the organic sector also decreases by 6%, representing approximately 5.5% of total employment in the dairy industry (Figure 30). As a result of the concentration of production, 5 new large dairies are required in this scenario, 2 in the milk and fresh products sector, and 3 in the cheese sector. In contrast, 93 small dairies exit the market, including 73 from the cheese sector. Due to this concentration of production in large firms, the annual capital depreciation per dairy processor increases by 14% (Figure 31). Finally, despite stable production levels, value added decreases by 2%, as products sold by large dairies generate less value added per kg of milk. See Table 1 for a complete summary of all simulation results.

In the Organic in Every Table scenario, total dairy production declines by 9% compared to the Reference scenario. However, the impact on total employment, which decreases by only 2%, is mitigated by the growth of labour-intensive on-farm processing plants. Excluding this type of employment, the decline in total workforce employed in dairies would have closely matched the drop in production (-9%), indicating that replacing butter and cheese with more fresh products, all else being equal, has almost no effect on overall employment. In the organic sector, production increases by 134%, while employment rises by 265% compared to the Reference scenario (+133% when excluding on-farm processing plants). The organic sector accounts for approximately 20% of total employment in the dairy industry, equivalent to around 11,000 full-time equivalent (FTE) workers. It is distributed 33% in Large Milk and fresh products processing plants, 17% in Small Milk and fresh products processing plants, 4% in butter processing plants, 3% in large cheese processing plants, 3% in small cheese processing plants, 4% in milk powder and ingredients processing plants, and 36% in on-farm processing plants. As this scenario involves a change in consumers' food diets, this implies a great reconfiguration in the number and composition of dairy firms in the market. 17 new processing plants are needed in the milk and fresh products processing sector, while 197 processing plants exit the market, 92% of them being cheese factories. The average annual capital depreciation of dairy processing plants increases slightly with respect to the Reference scenario since milk and fresh products processing plants are on average larger despite being less capital intensive per tonne of milk than cheese processing plants. Finally, despite the reduction of production, value added increases by +3% as the higher value added per kg of organic production (see our assumptions in the Methods section) offsets the effect of lower production.

In the Green Public Policy scenario, total dairy production declines by 12% compared to the Reference scenario. However, due to the higher presence of small, more labour-intensive dairy processors and on-farm processing plants, the impact of reduced production on total employment is fully offset. As a result, the sector's workforce demand increases by 4% (it would have decreased by 3% if on-farm processing plants were excluded). In this scenario, large dairy processors in the milk and fresh products and cheese sectors decline their production by around a third, while small milk and fresh products processing plants and small cheese processing plants increase their production by 93% and 53% respectively. Butter and milk powder and ingredients processing plants also reduce their production by around 10%. In the organic sector, production increases by 109% and employment by 269% compared to the Reference scenario (+151% when excluding on-farm processing plants). The organic sector accounts for approximately 19% of total employment in the dairy industry, equivalent to around 11,000 full-time equivalent (FTE)

workers. It is distributed 9% in large milk and fresh products processing plants, 28% in small milk and fresh products processing plants, 9% in butter processing plants, 4% in large cheese processing plants, 16% in small cheese processing plants, 1% in milk powder and ingredients processing plants, and 32% in on-farm processing plants. Because of production relocation towards smaller and less geographically concentrated processing plants, 30 processing plants exit the market, half of them being large cheese processing plants. In contrast, 27 new small milk and fresh products processing plants and 97 new small cheese processing plants are needed. As the average size of processing plants is lower, the average capital depreciation per dairy processor decline reaching around 80% of initial levels. Finally, as in the Organic in Every Table scenario, despite the reduction of production, value added increases by 1% as the higher value added per kg of organic production offsets the effect of lower production.

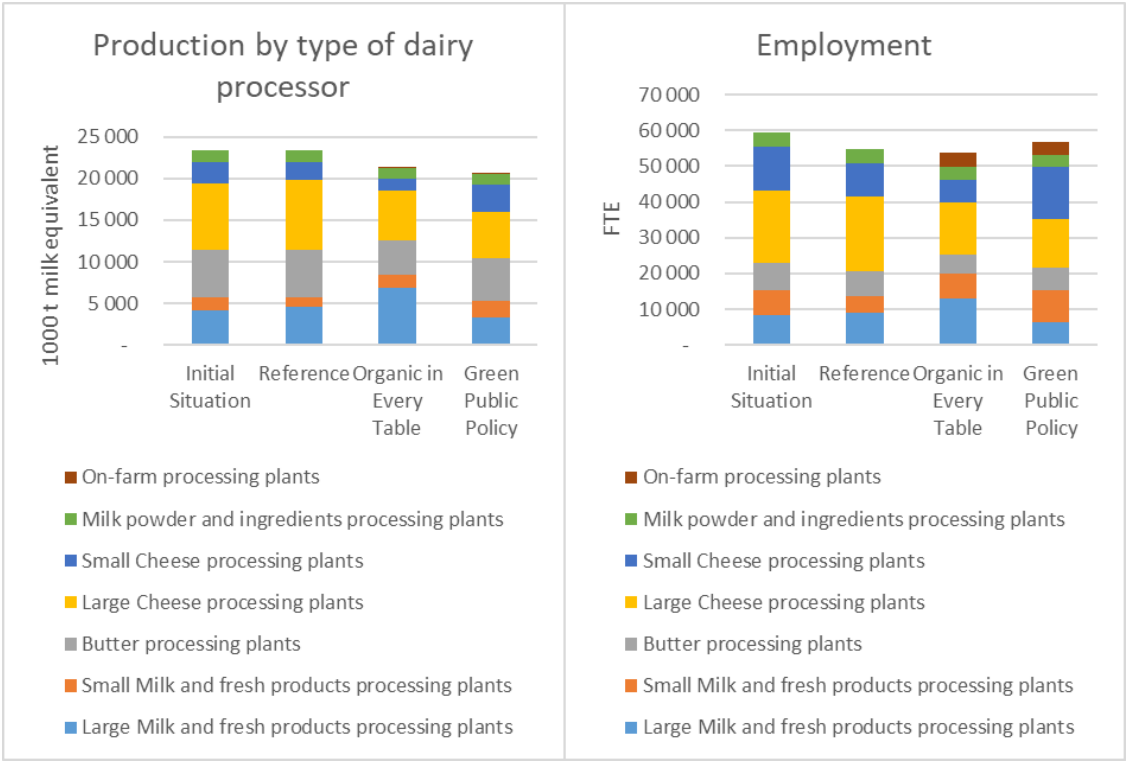


Figure 29 Production in French dairy industries and employment in Full Time Equivalent in the French dairy industry

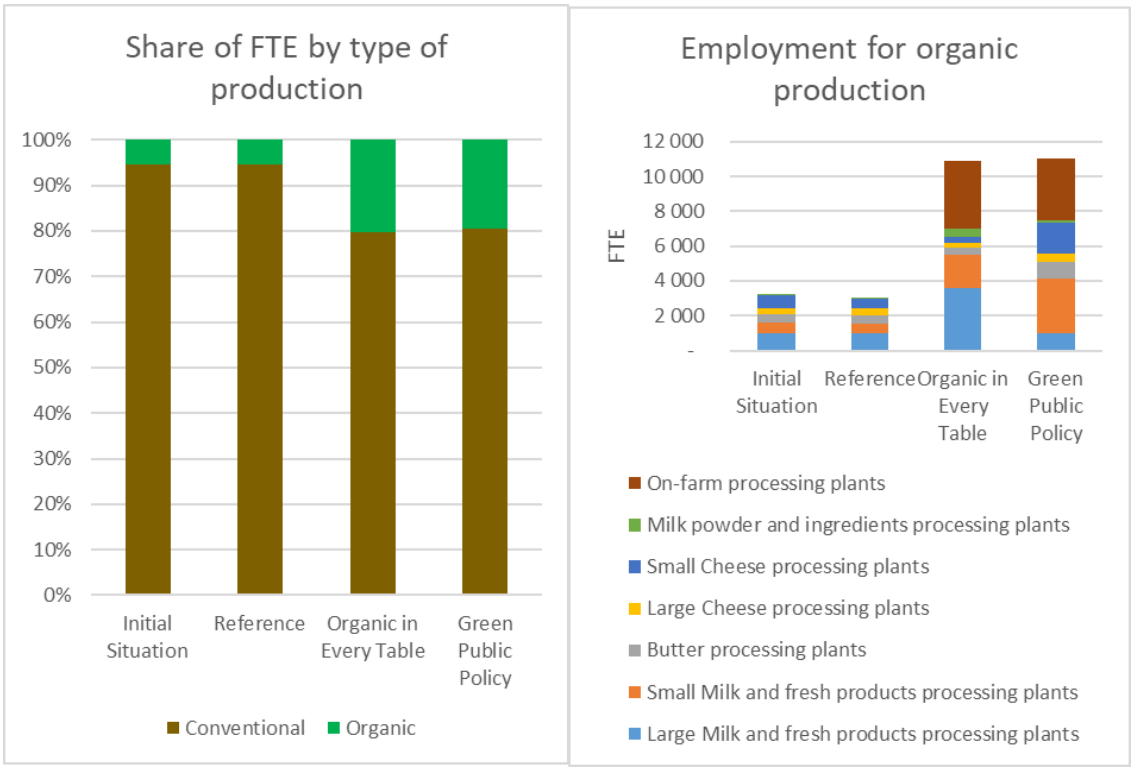


Figure 30 Share of employment by type of production and total employment in Full Time Equivalent in the organic sector in the French dairy industry

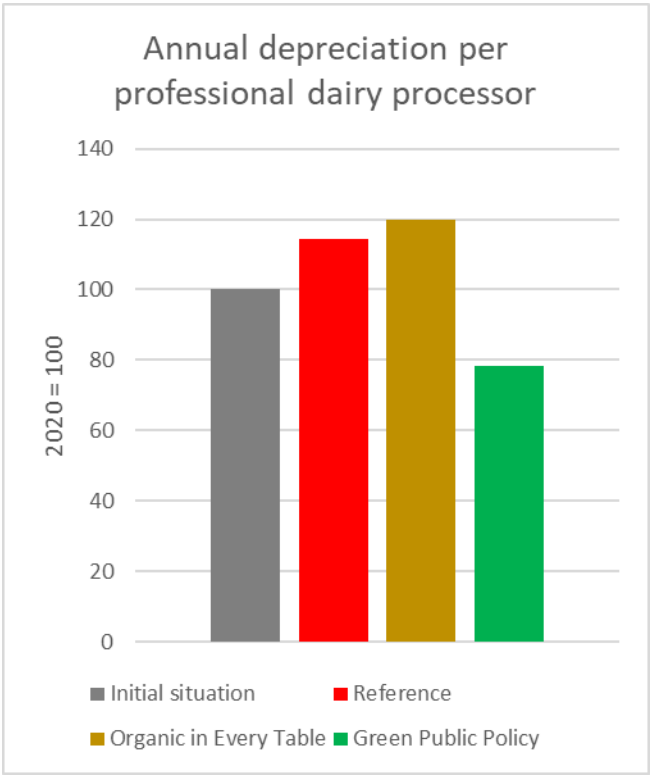


Figure 31 Annual capital depreciation per professional dairy in the French dairy industry

4.Discussion

In this section, we summarise the key findings of the report and provide policy recommendations. It is divided into two parts: the first presents general considerations on the analysis of the food industry within the organic sector across the three case studies, while the second focuses on the simulation results.

The organic food industry

- In the case studies analysed in this study, organic poultry meat and dairy products are rarely exported to other countries and remain produced for domestic production. *Policies aimed at helping food processors to coordinate and improve logistics to increase exports of organic processed poultry and dairy products can be a solution to promote organic value chains in these two sectors.*

- In the poultry meat industry, genetic improvements of organic strains are needed to increase the proportion of fillet in the carcass. Product innovation for organic production is also needed. Examples of new outlets for organic production are the deboned chicken leg and the introduction of more delicatessen products (hams, sausages, etc.) from heavier organic birds.

- Reducing the share of organic production downgraded to conventional is important to restart the growth of the organic sector after the current crisis. *As the downgrading of production is particularly concentrated in some products (e.g., wings and legs in the poultry meat industry and milk ingredients in the dairy industry), more targeted public procurement strategies targeting these products should be put in place to support organic development (for example, by serving relatively more (organic) chicken wings in schools rather than (conventional) chicken fillets).*

- The existence of higher margins for food processors and retailers on organic products compared to conventional production has the effect of raising prices for consumers and/or lowering prices for farmers, thus discouraging the development of organic value chains. *Investigating the reasons for these higher margins for food processors seems necessary to remove one of the lock-ins limiting the development of organic production.*

- Ensuring differentiation between organic and other quality or animal welfare scheme is very important for the development of organic production. Particularly in the poultry industry, the potential presence of conventional production reared to higher welfare standards, such as the European Chicken Commitment, could lead to consumer confusion and threaten the development of organic production. *Public policy should aim to clearly communicate the benefits of the organic label and avoid misleading equivalence with other labels and preserve the integrity of the organic label.*

- In the poultry case studies (and in many other sectors), there is a widespread lack of high-quality data on the organic food industry. *To improve the understanding of organic production flows beyond the farm gate and to better analyse the behaviour of the food industry regarding organic products, more comprehensive surveys are required. The French Annual Dairy Survey, which explicitly includes volumes of organic products per each processing plant, serves as a valuable example.*

Simulation results

- The implementation of the Organic in Every Table and "Green Public Policy" scenarios leads to different outcomes on job employment in the food industry depending on the case study analysed.
    - In the French poultry meat industry both scenarios can help reduce the effect of the decline in meat production on job losses. In Organic in Every Table, this is attributed to the higher level of processing in organic production, while in Green Public Policy, this is due to the greater share of production processed by small firms.
    - In the Danish poultry meat industry, only the Organic in Every Table scenario can mitigate the job losses derived by stagnant meat production and increased productivity through a higher processing of organic poultry meat. As the Green Public Policy scenario implies a higher share of production processed in smaller but highly productive firms, this mitigation effect does not happen.
    - In the French dairy industry, only the Green Public Policy scenario can mitigate job losses resulting from reduced milk production by promoting smaller, more labour-intensive firms. In contrast, the Organic in Every Table scenario does not lead to increased processing of raw milk, as doing so could undermine the goal of promoting healthier food diets in this sector and for this reason does not mitigate the reduction of job losses.
- The on-farm processing of dairy products and poultry meat is a high labour-intensive activity with the potential to generate high value-added output and employment opportunities at the farm level, thereby mitigating the decline in the number of farmers. However, an increase in on-farm processing capacity results in a reduction in job requirements at the processing level in professional slaughterhouses and dairies. *As the groups benefiting from this increased on-farm production are not identical (farmers vs. food industry workers), public welfare measures such as financial support, professional retraining, and psychological support should be implemented to protect food industry workers from the risks of unemployment during the transition.*
- In the French dairy industry, policies designed to promote organic production in areas with marginal livestock farming may not have a positive impact on diets. These policies could benefit small dairy processors that specialise in cheese and butter production—foods that should be consumed in moderation due to their low nutritional value. *Policies aimed at de-specialising production areas should also be complemented by policies aimed at changing consumer habits towards healthier and more sustainable diets.*
- The relocation of production in the Green Public Policy scenario in the French case studies could generate a higher volume of stranded assets and lead to the exit of various food processors from the market. *Policies are needed to mitigate the negative effects of this scenario by encouraging the transfer of jobs between regions and protecting the most exposed investors and credit institutions that could suffer from the possible bankruptcy of food processors.*

- In the French poultry meat industry, the ongoing low productivity of small food processors and their decreasing numbers in the market highlight the need for action. *Despite being the primary beneficiaries of a relocation scenario such as in Green Public Policy, it is crucial to encourage these small processors to reinvest their additional profits into a robust investment plan aimed at enhancing their economic productivity and competitiveness against foreign rivals. Additionally, they should focus on adopting technologies that improve animal welfare and promote energy efficiency.*

5.Conclusion

This report examined the processing of organic production through three case studies of livestock value chains in France and Denmark. To our knowledge, it represents one of the first detailed analyses of a frequently overlooked segment of the organic value chain, the food industry, examined at the sectoral level. Furthermore, the report enhances the understanding of the organic food industry by presenting an original qualitative and quantitative typology of processing firms, along with a modelling simulation designed to assess the impacts of various future scenarios on organic agriculture on the structure of the food industry.

This report is not without limitations. In studying the organic food industry, many simplifications had to be made in the analysis and modelling approach due to the limited amount and poor quality of data on the food industry, and in particular regarding the processing of organic food products. This is particularly true for the Danish case study, where the number of food processors is also very small. Secondly, our modelling simulator does not directly explore how a firm's behaviour might be influenced by its association with a holding company. These holding companies have the ability to dictate strategies for their firms and provide support through marketing efforts and investment. Finally, our modelling simulator is based on many exogenous parameters and considers the modeller as a central planner with the power to decide where and how to allocate organic (and conventional) production. While this approach is adapted to foresight analysis and allows great flexibility in scenario design, it is not intended to endogenously optimise the behaviour of economic agents nor to assess the impact of such scenarios on product prices, wages and social welfare.

Despite these limitations, this study presents opportunities for future research on organic value chains and provides valuable insights for policymakers and stakeholders on the potential development of the organic processing industry through various alternative pathways.

References

AND. "Analyse des flux d'importation de volaille en France." (2021) https://www.franceagrimer.fr/Actualite/Filieres/Viandes-blanches/2021/Vient-de-paraitre-Analyse-des-flux-d-importation-de-volaille-en-France

Aubert, Pierre-Marie, et al. "Designing just transition pathways: A methodological framework to estimate the impact of future scenarios on employment in the French dairy sector." Agriculture 11.11 (2021). https://doi.org/10.3390/agriculture11111119

Bâ, Maïmouna, Mathilde Gresset-Bourgeois, and Philippe Quirion. "L'effet sur l'emploi d'une transition écologique de l'agriculture en France: le cas du scénario Afterres." Le Courrier de l'environnement de l'Inra 66 (2016): 93-102. https://abiodoc.docressources.fr/index.php?lvl=notice_display&id=36080

Biofil. Les souches à double fin marquent des essais (2024) https://hal.inrae.fr/hal-04465783v1

Bolwig, Simon, et al. "Integrating poverty and environmental concerns into value-chain analysis: a conceptual framework." Development policy review 28.2 (2010): 173-194. https://doi.org/10.1111/j.1467-7679.2010.00480.x

COMEXT database https://ec.europa.eu/eurostat/comext/newxtweb/

DANPO. "Best-in-class chicken production" https://www.danpo.dk/en/consumer/about-us/best-in-class-chicken-production?_gl=1*1ucivy6*_up*MQ..*_ga*MTI5NDQxMzQ2Mi4xNzI4MDM2MTEw*_ga_3L66X74JY3*MTcyODAzNjEwOC4xLjAuMTcyODAzNjEwOC4wLjAuMA. (2025)

Fan, Xiao-Mei, and Hong-Guang Liu. "Global supply chain shifting: A macro sense of production relocation based on multi-regional input-output table." Economic Modelling 94 (2021): 672-680. https://doi.org/10.1016/j.econmod.2020.02.009

FAOSTAT database https://www.fao.org/faostat/en/#data

Fernandez-Stark, Karina, Penny Bamber, and Gary Gereffi. "The Fruit and Vegetables Global Value Chain." Economic Upgrading and Workforce Development. Durham, NC: Duke CGGC (2011). https://scholars.duke.edu/publication/1609371

FranceAgriMer. « Observatoire de la formation des prix et des marges des produits alimentaires ». Rapport au Parlement 2022 (2022) https://observatoire-prixmarges.franceagrimer.fr/rapports-au-parlement-et-lettres

FranceAgriMer. « Quels impacts de l'essor de la production de lait biologique sur l'aval de la filière ? » (2019) https://www.franceagrimer.fr/Actualite/Filieres/Lait/2019/Publication-Quels-impacts-de-l-essor-de-la-production-de-lait-biologique-sur-l-aval-de-la-filiere

Gereffi, Gary, John Humphrey, and Timothy Sturgeon. "The governance of global value chains." Review of international political economy 12.1 (2005): 78-104. https://doi.org/10.1080/09692290500049805

Hernández, Virginia, and Torben Pedersen. "Global value chain configuration: A review and research agenda." BRQ Business Research Quarterly 20.2 (2017). https://doi.org/10.1016/j.brq.2016.11.001

IDELE. « Produire et vendre des produits bovins laitiers fermiers en circuits courts » (2013) https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://monlabofermier.fr/wp-content/uploads/2015/08/Produire-et-vendre-des-produits-bovins-laitiers-en-circuits-courts.pdf

LE BASIC. « La filière bovin lait française » (2023) https://lebasic.com/actualites/etude/analyse-de-la-creation-et-de-la-repartition-de-la-valeur-dans-la-filiere-bovin-lait-francaise/

Le Monde. « Le géant du lait Lactalis annonce un plan social touchant ses éleveurs français » (2024). https://www.lemonde.fr/economie/article/2024/09/26/le-geant-du-lait-lactalis-annonce-un-plan-social-touchant-ses-eleveurs-francais_6335612_3234.html

Le Sillon Info. « La filière laitière du Sud-Ouest «à la croisée des chemins» (2022) https://www.lesillon.info/la-filiere-laitiere-du-sud-ouest-la-croisee-des-chemins

Lortal, Sylvie, and J. F. Boudier. "La valorisation de la matière première lait, évolution passée et perspectives." Innovations Agronomiques 13 (2011). https://hal.inrae.fr/hal-01454218v1

Loveluck W. and Aubert PM. "Structure / Governance of French Dairy to Liquid Milk Value Chain", (2019) https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://valumics.eu/wp-content/uploads/2021/09/Dairy_Research_Findings_Brief_Final.pdf&ved=2ahUKEwj_kcvTkOyNAxVwLPsDHc4LCnkQFnoECB0QAQ&usg=AOvVaw3u4N3zsKRdz4IRtSbTGAuf

Martínez, Sara Herreras, et al. "Analysis of socio-economic impacts of sustainable sugarcane–ethanol production by means of inter-regional Input–Output analysis: Demonstrated for Northeast Brazil." Renewable and Sustainable Energy Reviews 28 (2013): 290-316. https://doi.org/10.1016/j.rser.2013.07.050

Orsini, Stefano, Padel, Susanne, Gambelli, Danilo, et al. Beyond "mainstream" and "alternative" in organic food supply chains: Empirical examples of added value distribution from eight European countries. British Food Journal, 2020, vol. 122, no 3, p. 798-812. https://doi.org/10.1108/BFJ-07-2019-0508

Ouest France. "Un nouveau président pour Biolait, premier collecteur de lait bio en France » (2024) https://www.ouest-france.fr/economie/agriculture/un-nouveau-president-pour-biolait-premier-collecteur-de-lait-bio-en-france-ba78d048-32ea-11ef-8462-4d5d263c07bc

Ponte, Stefano, and Timothy Sturgeon. "Explaining governance in global value chains: A modular theory-building effort." Global Value Chains and Global Production Networks. Routledge, 2017. 195-223. https://doi.org/10.1080/09692290.2013.809596

PRODCOM database https://ec.europa.eu/eurostat/en/web/prodcom/database

RCC. « Produire des volailles destinées aux circuits courts de commercialisation » (2013) https://www.centre-diversification.fr/document/81/produire-des-volailles-destinees-aux-circuits-courts-de-commercialisation.html

ROKKEDAHL. " Vi er stolte af vores nordjyske arv". https://rokkedahl.dk/om-rokkedahl/#voreshistorie

Rosepoultry. "Our locations". https://www.rosepoultry.com/about-rose/our-locations/

Sanders, J., Gambelli, D., Lernoud, J., Orsini, S., Padel, S., Stolze, M., Willer, H. and Zanoli, R. (2016) Distribution of the added value of the organic food chain. Braunschweig: Thünen Institute of Farm Economics https://orgprints.org/id/eprint/31990/3/sanders-etal-2016-Distribution-of-the-added-value-EUCommission-FinalReport.pdf

Saget, Catherine, Adrien Vogt-Schilb, and Trang Luu. Jobs in a net-zero emissions future in Latin America and the Caribbean. Washington DC and Geneva: Inter-American Development Bank and International Labour Organization, 2020. https://publications.iadb.org/en/jobs-in-a-net-zero-emissions-future-in-latin-america-and-the-caribbean

Scandi Standard. "Scandi Standard (SCST SS) invests in a 51% stake in Rokkedahl Foods ApS facilitating an accelerated roll-out of premium birds in Denmark" https://investors.scandistandard.com/en/press/scandi-standard-scst-ss-invests-51-stake-rokkedahl-foods-aps-facilitating-accelerated-roll

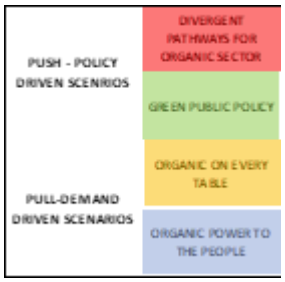
UFC Que Choisir. « FRUITS ET LEGUMES BIO EN GRANDES SURFACES. Une consommation freinée par une offre indigente et des marges indigestes » (2017) https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://orthez.ufcquechoisir.fr/wp-content/uploads/sites/118/2017/12/enqu%25C3%25AAte-produits-bio-dans-les-grandes-surfaces.pdf&ved=2ahUKEwi4lJOLkeyNAxVhQqQEHb42KKIQFnoECBUQAQ&usg=AOvVaw1cWio0WxHuZdk5E6fCHGp5

Wang, Zhen, et al. "Industry relocation or emission relocation? Visualizing and decomposing the dislocation between China's economy and carbon emissions." Journal of cleaner production 208 (2019): 1109-1119. https://doi.org/10.1016/j.jclepro.2018.10.166

Web-Agri. « Développer le cracking du lait pour gagner en valeur ajoutée » (2023) https://www.web-agri.fr/archives/article/842326/developper-le-cracking-du-lait-pour-gagner-en-valeur-ajoutee

Annex

Summarised description of Organic on Every Table (OET) and Green Public Policies (GPP) narratives



		PUSH - POLICY DRIVEN			PULL - DEMAND DRIVEN		
	DRIVER	STATE 1	STATE 2	STATE 3	STATE 1	STATE 2	STATE 3
MEGA TRENDS	Political climate towards OF	Green Deal cancelled	Green Deal stalled	Green Deal +	Green Deal cancelled	Green Deal stalled	Green Deal +
	Water availability for farming	Water conflicts	Mixed corporate-public governance of water	Circularity and regulated water	Water conflicts	Mixed corporate-public governance of water	Circularity and regulated water
CONSUMERS PERSPECTIVE SUPPLY CHAIN	Competition from alternative standards	Mainstream agriculture revival	Entropy of standards	Organic primacy	Mainstream agriculture revival	Entropy of standards	Organic primacy
	Food scares	Organic scandals	No pain, no gain	Conventional food scandals	Organic scandals	No pain, no gain	Conventional food scandals
	Sustainable and healthy diets	Going junky	Healthy but Grey	Healthy & Green	Going junky	Healthy but Grey	Healthy & Green
	Large retail chains involvement	Fragmented supply	Networking	Big is better	Fragmented supply	Networking	Big is better
	Organic public procurement	Organic demand stays private	Fragmented public procurement	Public procurement boost	Organic demand stays private	Fragmented public procurement	Public procurement boost
POLICY	Eco-schemes, national/ regional policies OF	Unfavourable CAP	Neutral CAP	Favourable CAP	Unfavourable CAP	Neutral CAP	Favourable CAP
	NGT in OF	NGT liberalisation	NGT only in conventional	NGT-free EU	NGT liberalisation	NGT only in conventional	NGT-free EU
	Subsidised credit for OF/processor	Credit crunch for organic farmers	Credit lines for organic farmers	Organic finance	Credit crunch for organic farmers	Credit lines for organic farmers	Organic finance
FARMERS PERSPECTIVE AKIS	Conversion of arable farming systems	Concentrated growth	Lagger countries catching-up	Widespread uniform conversion	Concentrated growth	Lagger countries catching-up	Widespread uniform conversion
	Conversion of livestock systems	Concentrated growth	Lagger countries catching-up	Widespread uniform conversion	Concentrated growth	Lagger countries catching-up	Widespread uniform conversion
	Farm-gate relative prices of OP vs CP	No more premium	Uneven premiums	Premium prices are there to stay	No more premium	Uneven premiums	Premium prices are there to stay
	Capacity building in organic NGOs	Fragmented NGOs	Few EU/National strong lobbying	Development of Organic NGOs	Fragmented NGOs	Few EU/National strong lobbying	Development of Organic NGOs
	Training and education for OF	Organic AKIS stay marginal	Common AKIS for farming	Knowledge boost in OF	Organic AKIS stay marginal	Common AKIS for farming	Knowledge boost in OF

Organic on Every Table scenario narrative

Organic farming's benefits for the environment and society are well understood by citizens and policymakers alike, and this is broadly reflected in their actions towards organic.

The Green Deal is challenged by the polarity between long-term green targets and emergency needs triggered by global crises and trade. However, evidence of the climate emergency and water issues keep environmental considerations prominent, triggering the agri-food industry push for NGTs. However, thanks to the lobbying of organic and like-minded NGOs and national authorities, the Green Deal remains, and NGTs are kept out of organic.

The push for protecting biodiversity and groundwater resources and reducing oxygen loss in rivers, lakes and local watercourses is connected to organic farming. It helps reinforce the positive political climate for organic. Organic primacy is propelled and stands out from attempts from alternative standards and schemes to gain room and legal recognition in the sustainability and market domain.

Nearly all people recognise the organic label as a guarantee for the food values they care about. Organic food has reached all European families – in their houses when preparing dinner, but also at work and in restaurants, and is increasingly coupled with health-related attributes and claims. Organic food is widely included in schools and public canteens, through targeted green public procurement policies.

The organic premium still exists, but the price differential is smaller (except for animal products), partly because supply chain actors are empowered, and farmers have more direct involvement in the distribution chains and can broker better agreements with processors and distributors, which is reflected in the prices offered by large retail chains to their customers.

Large-scale retailers play a leading role in facilitating the mainstream availability of organic products by increasing the range of products and getting more involved in the organic food chain. They have also incorporated and consolidated some small-scale alternative and specialised retailers. However, alternative models are expanding and innovating, e.g., e-commerce, digital box schemes and CSAs, farmers' markets, new distribution models, and general farmer-consumer partnerships.

Organic farmers receive preferential credit due to their ecosystem services (e.g., carbon and biodiversity credits). Private investment funds and public support both play an important role in financing the sector. While the generally positive policy and market conditions encourage a widespread conversion to organic for arable and permanent crops, livestock production is carried out in the context of wider societal shifts in relation to the diminishing role of animal products in healthy and sustainable diets. Issues such as appropriate production methods, animal welfare etc. are important, and grazing animal farming doesn't expand overall. Still, it is concentrated in specific areas, such as mountain regions and less favoured areas.

Organic Agricultural Knowledge and Information Services (AKIS) widely exists in all schools, agricultural training and advisory services, universities and research institutions and are becoming mainstream. The current trends on AKIS sustainable farming are mainstreaming organic agriculture, placing it side by side with agroecology and regenerative methods.

Shorter version

Public policy has long championed organic farming, but now consumer demand is reshaping the entire organic food chain, creating an organic market boom driven by big business. Consumers' desire for healthy, sustainable food at home, work, and restaurants is transforming the landscape. The organic label is a trusted symbol of the values they care about – environmental responsibility, animal welfare, and potential health benefits. This recognition is pushing supermarkets, restaurants, and even schools to offer more organic options.

Big business is strategically aligning itself with this consumer demand. Major retailers and processors are expanding organic product lines and getting directly involved in the food chain by partnering with or acquiring smaller organic players. This wider availability makes organic food more accessible to everyone. As competition rises, the price gap between organic and conventional shrinks. At the same time, alternative models like e-commerce, local box schemes, farmers' markets, and direct consumer partnerships are flourishing. These options empower farmers, giving them more control over the supply chain and allowing them to negotiate better deals with processors and retailers, ultimately capturing a larger share of the final consumer price. This shrinking price gap further fuels consumer demand, creating a virtuous cycle.

Investment is another key player. Private funds are pouring into the organic sector, driven by strong consumer demand. This financial backing helps farmers convert to organic practices and expand production to meet growing needs. This market-driven approach is making organic food more accessible and affordable, creating a win-win for everyone: consumers get the food they desire, farmers benefit from increased market opportunities, and taxpayers welcome more sustainable farming practices without the need for increased public support. Organic farmers, empowered by a strong market and greater control in the supply chain, are seamlessly integrating organic principles with agroecology and regenerative methods. A surge in organic conversion for arable and permanent crops is driven by favourable market conditions reinforced by favourable policies and regulations. Livestock production faces challenges due to shifting dietary preferences: grazing animal farming remains localised, primarily in mountain and less favoured regions, while pig and poultry production is increasingly challenged by plant-based meat substitutes.

This scenario is likely to create more regional differences than the Green Public Policy. In countries where – for various reasons (lower incomes and lower appeal/presence of big players) – organic demand will be lower, the effect would be mostly on exports, with lower farm-gate prices. In richer countries with stronger supply chains, imports will increase alongside with lower price gap between farmer and consumer prices, with a better share of value added going to organic farmers. Commoditisation may occur but only to a certain extent, or organic products will become indistinguishable from conventional ones. Given the market is led by big players, and there is a significant pouring of private funds also in the form of investments, increases in productivity, efficiency, and size are more likely to occur than in the first scenario. Networks and concentration processes are also more likely to occur.

- Consumer desire for healthy, sustainable food is driving a market boom for organic products, led by big business.
- The trusted organic label pushes supermarkets, restaurants, and schools to offer more organic options.
- Major retailers and processors are expanding organic offerings and directly entering the supply chain. Increased competition shrinks the price gap between organic and

conventional products, further fueling consumer demand, but can also put pressure on farmers' share of the final price.
- Investment in the organic sector helps farmers convert and expand production, but the impact on their share of the final price depends on negotiation power within the market. Farmers' cooperatives/networks and stronger bargaining power can help ensure a fairer share of the final price for producers.

Green Public Policy scenario narrative

Growing concerns among the public and policymakers regarding significant environmental challenges such as climate change, biodiversity loss, and issues related to water and soils have intensified. In response, there is a heightened focus on bolstering and improving European policy frameworks, including initiatives like the Green Deal, Farm 2 Fork, and Biodiversity Strategies, along with subsequent policies. The escalating severity of extreme weather events, like droughts and floods, coupled with rising costs for energy, fertiliser, and imported feed, is prompting farmers to increasingly embrace and cooperate with green policies to mitigate risks.

The evolving political landscape, marked by the forming of new farmer networks, signals a proactive engagement with environmental concerns and a shift in production systems. There is an increasing collaboration between organic and agroecology organisations, as well as environmental NGOs. This collaborative effort extends to establishing diverse production standards, focusing on ensuring long-term resilience.

Building upon the commitments outlined in the CAP 2023-27, the future CAP reform strongly emphasises organic farming and agri-environmental support. Given the added environmental benefits, this strategic shift makes organic production more appealing, especially for arable producers. The pig and poultry systems witness a transition toward localised feed sourcing, leading to reduced intensity. Overall, livestock numbers decrease alongside reduced consumer demand for meat and dairy products.

The push for conversion to organic practices is primarily driven by policy initiatives and public support rather than market forces. While premium prices are not guaranteed and may experience fluctuations, policy measures actively support the organic Agricultural Knowledge and Innovation Systems (AKIS), supply chain, and market initiatives to encourage and facilitate conversion.
There is growing acceptance of organic practices at the national and local levels, with organic food becoming the standard in public institutions such as hospitals, canteens, and schools. The widespread adoption of organic practices is particularly encouraged in regions facing significant environmental challenges. Regions grappling with issues like abandonment find new opportunities to re-engage with farming.

While current organic regulations gain prominence, there is increasing pressure from other farming groups to develop alternative standards, such as integrated and regenerative approaches, including the introduction of EU sustainability labelling. Efforts to standardise and reduce greenwashing are essential to avoid the proliferation of competing standards. Adaptations to organic regulations are necessary to address emerging challenges related to climate, biodiversity, and consumer expectations, ensuring the continued predominance of organic practices.

Shorter version

The public's environmental concerns, including climate change and biodiversity loss, are shaping EU policies. European farmers are on the frontline of a public push for sustainable agriculture, driven by the urgency of climate change and extreme weather events. Public support is playing a crucial role in this transition. The new Common Agricultural Policy (CAP) emphasises stronger support for organic farming and agri-environmental measures, making organic production more appealing, especially for arable producers. The pig and poultry systems witness a transition toward localised feed sourcing, leading to reduced intensity. Grazing cattle and herds are maintained and supported by public policies aimed at biodiversity conservation. Overall, livestock numbers decrease alongside reduced consumer demand for meat and dairy products. The CAP's significant support for organic farming makes it the most attractive option for farmers. However, alternative standards lead to consumer confusion and unreliable private demand. Therefore, organic premium prices aren't guaranteed and can fluctuate. This is where robust public support from the European Union steps in. This support extends to research, education, and market development for organic products. Additionally, public institutions across Europe are increasingly buying organic, creating a stable and reliable market demand. National differences in public support and market development are reducing in importance. With the many emerging alternative standards (e.g., regenerative, outcome-based approaches) backed by large corporate players, the EU organic regulation remains the essential tool to ensure the continued growth of organic farming and maintain consumer confidence.

In this scenario, there isn’t a specific incentive for farmers to grow in size, diversify their production, or increase their productivity, though EU, national, or regional policy may impact these variables by AKIS (e.g. funding research and extension), or by public schemes favouring networking (e.g., cooperatives), acquisitions and the like. Diversification may be however imagined if CAP measures ask for increased rotations, biodiversity, and the like.

- Public concern for the environment shapes EU policies, making organic farming the most attractive option for farmers, especially for crops.
- Public support through the CAP incentivises organic practices and reduces livestock intensity. It also helps maintain grazing herds for biodiversity.
- A strong, public-backed organic label ensures consumer confidence despite competition from alternative standards. However, fluctuating private demand due to alternative standards can impact the farmers' share of the final price.
- Public institutions buying organic creates a stable market, even if consumer demand fluctuates and price premia may reduce.

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