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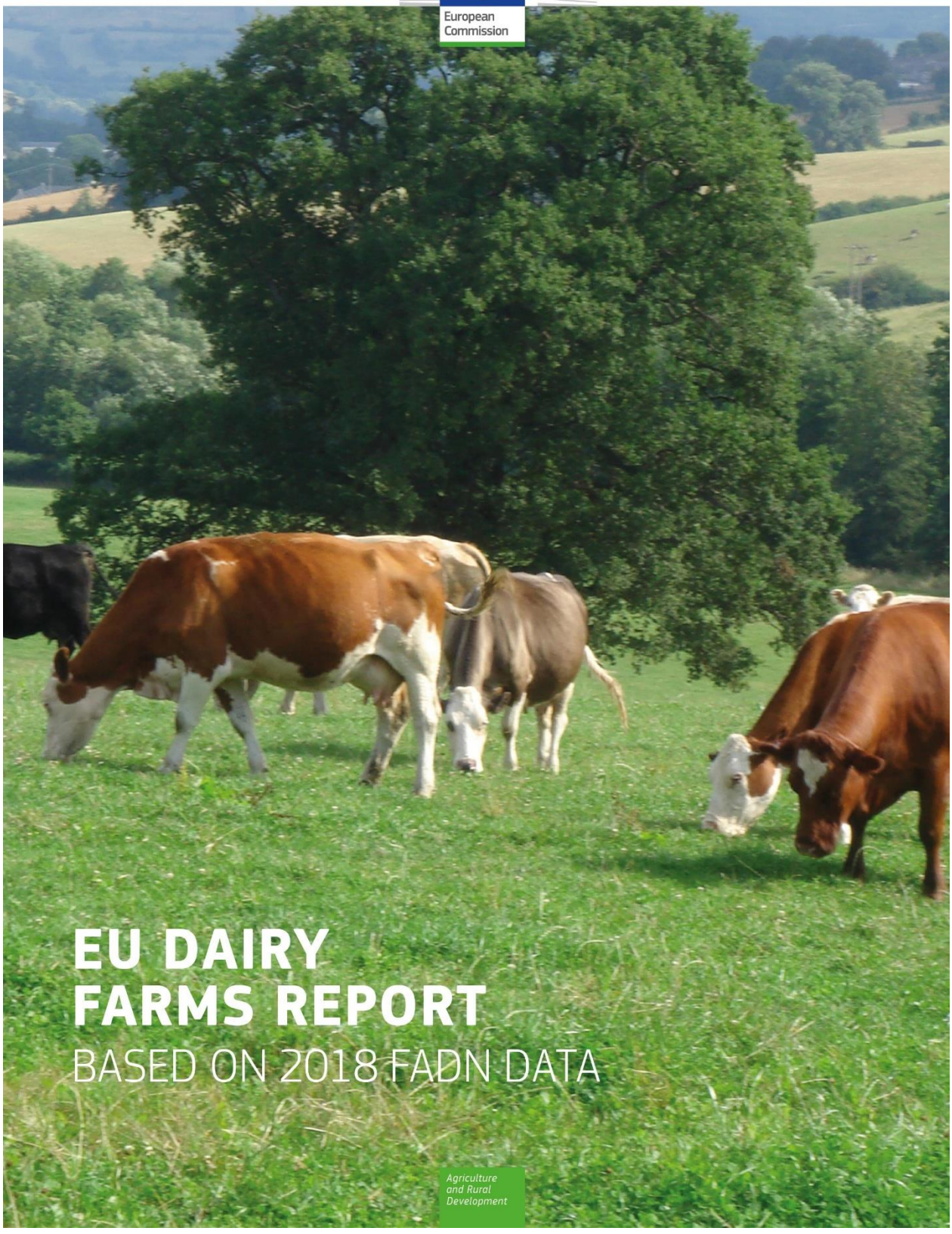


EU DAIRY FARMS REPORT

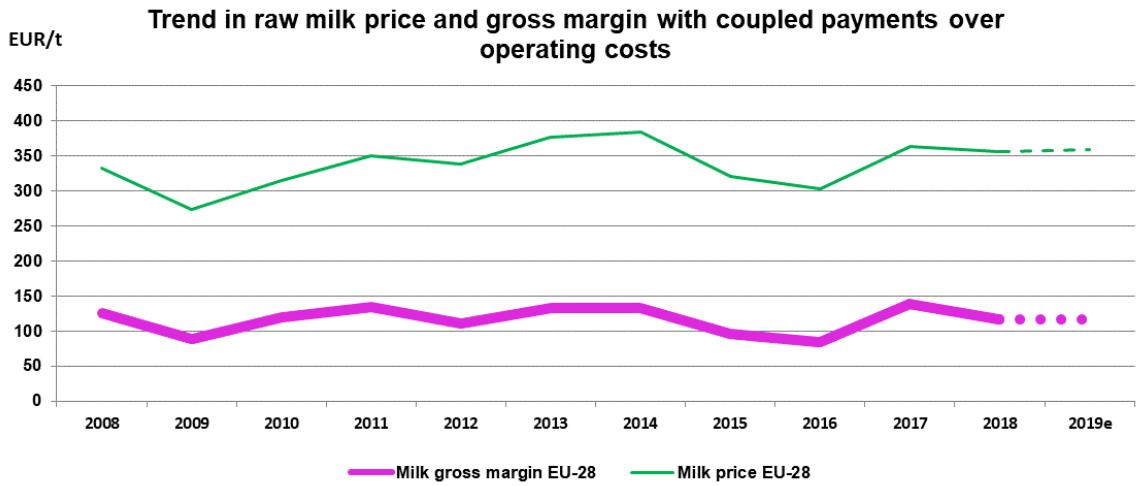
BASED ON 2018 FADN DATA

Agriculture and Rural Development

Executive summary

This annual report provides an economic **overview of EU milk specialised farms**[1] based on the latest available data from the farm accountancy data network (FADN) for **2018.** It provides trends in milk margin per tonne and in income per annual work unit from 2008[2] to 2018, together with estimates of gross milk margins[3] for 2019. The sample of milk specialised farms in 2018 represented 89% of dairy cows and 90% of EU-28 milk production.

Profitability of milk production in the EU was rather good in 2018, though not exceptional.



Source: EU FADN — DG AGRI, Model of the allocation of milk costs

In 2008-2018, dairy farms experienced three crises related to **milk margins**. The first one occurred in 2009 when the milk price dropped by 17% year-on-year and margins declined from EUR 125/t of milk in 2008 to barely EUR 88/t a year later. This was followed by an improvement in 2010 and 2011 with margins reaching a peak of EUR 134/t. The second crisis, which occurred in 2012, involved a price decrease coupled with a cost increase. Margins fell as a consequence, although not to the 2009 level. By contrast, 2013 and 2014 were beneficial years with raw milk prices rising to EUR 383/t and a margin of around EUR 133/t in both years. Following this rise, the third crisis began in 2015 and lasted until the third quarter of 2016.

During this third crisis, raw milk prices went down and, as a result, margins did too. In 2016 **milk margins** stood at EUR 84/t for the first time since 2009. After the 2014 milk price rise, dairy cows herd and milk production rose in the following 2 years. This coincided with a decline in global import demand (in particular from Russia and China) and had an adverse impact on the EU margin. The proportion of specialised milk farms in EU-28 with a positive

[1] The report concerns not only farms classified as 'milk' by typology i.e. TF 45 *Specialist dairying*, but also some farms belonging to TF 47 *Cattle dairying, rearing and fattening combined*, TF 73 *Mixed livestock, mainly dairying* and TF 83 *Field crops — grazing livestock combined*, where milk production is significant. For details on farms sel*ection* for this report please see Annex 1, Methodology 1.

[2] 2013 for Croatia.

[3] Gross margin = (milk price + coupled payments) — (feed, veterinary, energy costs and other operating costs). Decoupled payments, progressively introduced from 2005, are not included in margins, but they are part of income.

milk margin fell from 95% to 91% between 2014 and 2016.

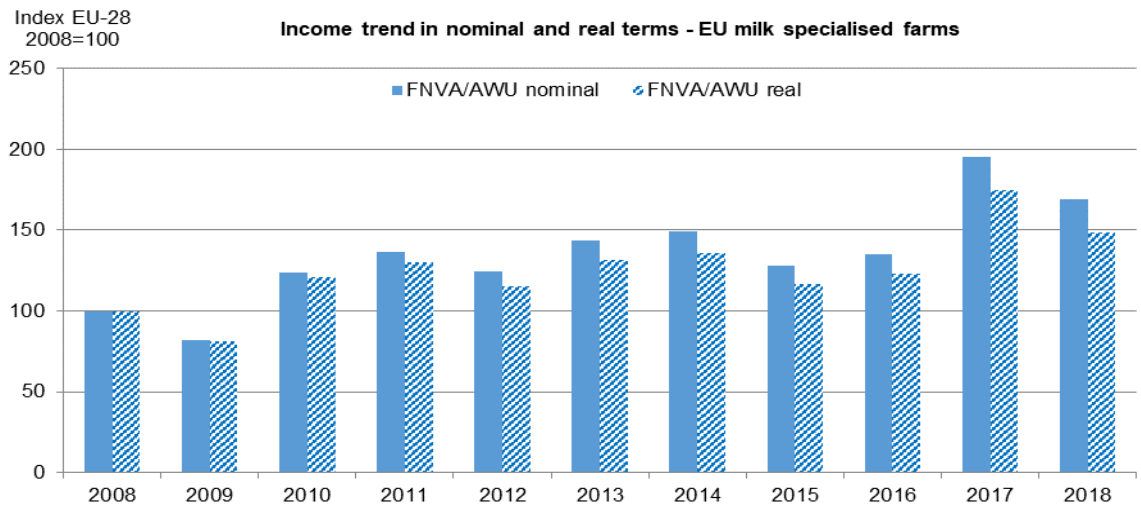
The situation on the global market changed again in 2017 due to a decline in milk collection and a growing demand for dairy fats (notably butter) and cheese. As a consequence, milk producers saw an increase in raw milk prices (to EUR 363/t). This led to a significant improvement in margins, which at EUR 39/t, reached their highest level of the decade. The global demand for dairy products was more stable in 2018, compared to the large growth in 2017. Production of raw milk in 2018 was almost 1% higher than in the previous year. A shortage of own-produced feed stuffs led to a 6% increase in overall operating costs (EUR 146/t), which with price decrease (EUR 356/t), narrowed the margin (EUR 116/t).

The trend was similar in all Member States even though gross margin levels differed significantly: in 2018, gross margin with coupled payments ranged from EUR 65/t in Czechia to EUR 194/t in Italy (see Annex II).

The estimate for 2019 is very similar to 2018. A further increase in operating costs (EUR 249/t) is expected, mainly due to an increase in compound feedstuff and a slight increase in the milk price (EUR 359/t), which taken together slightly increase the milk margin by EUR 1/t (to EUR 357/t)

After a steady increase in **input costs** between 2009 and 2014, a downward trend was observed in 2015-2016. In 2015, the **total operating costs** for milk production decreased by 8% year-on-year, and in 2016 they went down by another 2%. In 2017, input costs started rising again reaching the 2015 level. In 2018, the operating costs increased by another 6% and the estimate for 2019 shows a further 1% increase. This change is mostly driven by fluctuations in feed costs.

The changes in milk margins from one year to another also had an impact on dairy **income**, which followed a similar pattern. In terms of **farm net value added by annual work unit** (FNVA/AWU), 2013 and 2014 were positive years with EU-28 dairy farms obtaining a higher average FNVA/AWU than in 2008 (base year) in both, nominal and real terms. In the following 2 years – 2015-2016 - when the milk market was disturbed, incomes deteriorated compared to previous years. However, they were still higher than in the base year. They recovered the following year, reaching the highest level in the analysed period - 95% higher than in 2008 in nominal terms and 75% higher in real terms. In 2018 the FNVA/AWU declined slightly compared to 2017, but still remained high (69% and 49% higher than in 2008 in nominal and real terms, respectively).

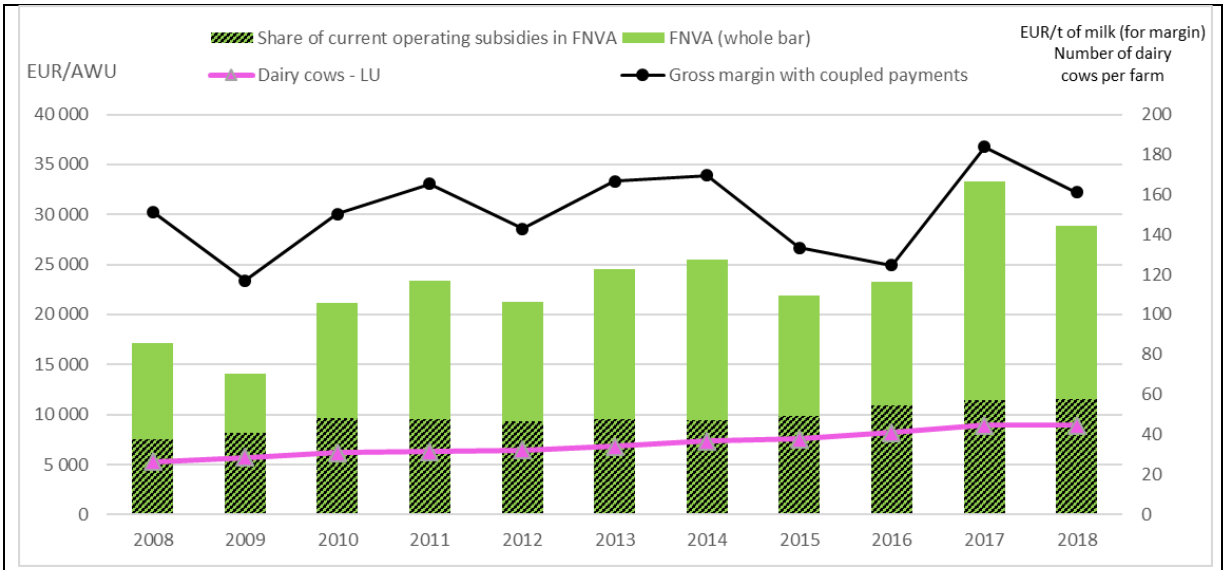


Source: EU FADN — DG AGRI, ESTAT (HICP index).

Overall, dairy specialised farms provided **higher incomes per annual work unit than the average EU-28 farm**, though they were not among the top three best performing types of farm in 2018. The FNVA/AWU in 2018 in the average farm was EUR 23 332/AWU, whereas in specialised milk farms it was EUR 28 842/AWU, only below farms specialising in granivores (EUR 36 637/AWU), wine (EUR 36 004/AWU) and horticulture (EUR 31 496/AWU).

Income levels varied between **Member States** due to differences in productivity, farm size, herd size and milk production. In terms of FNVA per labour unit, the gap is still large. The milk margin does not always correlate with income: some Member States with a large margin did not have a high income. For example, in Romania even though the margin per tonne of milk was among the highest in EU-28 (after Italy), the income per AWU was the smallest (EUR 5 176/AWU) due to very small herd (only 6 LU of dairy cows on average), and the milk yield was only 3 645 kg/cow. Similarly, in Bulgaria, in spite of decent margin of EUR 150/t (around 30% higher than EU average), income was barely EUR 9 930/AWU, due to a small milk yield (3 437 kg/cow) and moderate herd size (26 LU of dairy cows). In contrast, the highest income (at 85 419 EUR/AWU) was in Denmark, even though the margin (at EUR 107/t) was 8% less than the EU-28 average. Denmark had the highest milk yield (at 9 805 kg/cow) with a very big dairy herd (186 LU of dairy cows) which allowed it to profit from economy of scale.

In 2019, due to a positive trend in prices - and thus gross margin - and a further expansion in milk production per farm, it is expected that income in milk specialised farms will have increased compared to 2018.



Source: EU FADN — DG AGRI, Model of the allocation of milk costs

Whereas margins and income fluctuated over the period analysed, **direct payments and subsidies** played a crucial role in income, as they remained a stable component, especially from 2010 onwards. In EU-N13 Member States, direct payments were gradually phased-in (they are still being phased-in in Croatia), which also positively affected incomes. In 2009, subsidies accounted for more than half of income (58%) but this fell to below 40% in recovery years 2013-2014 (to 39% and 37% respectively) and in 2017 (to 34%). Subsidies as a share of income rose again in crisis years 2015-2016 (to 45% and 47% respectively). However, in nominal terms, the value of subsidies grew steadily from EUR 7 751/AWU in 2008 to EUR 11 514/AWU in 2018, emphasising the growing importance of **voluntary coupled support (VCS).**

The introduction of VCS in 2015 positively affected revenues from milk[4]. In 2007-2009 coupled support was on average EUR 2/t of milk. This then rose to EUR 4/t until 2014, and from 2015 it remained unchanged at EUR 7/t. However, the level of support differs significantly between Member States. The highest coupled milk payments were received in Finland (EUR 84/t of milk), followed by Croatia (EUR 72/t) and Romania and Bulgaria (both EUR 39/t). Several Member States (Denmark, Germany, Ireland, Luxembourg, the Netherlands and the United Kingdom) did not use VCS to support the milk sector at all

The EU average conceals a wide range of national and regional variations, as illustrated further in the report.

[4] In the model for cost of milk production coupled payments i.e. those linked to actual year's production, both, national and EU financed are considered part of milk revenues.

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Box 1: The Farm Accountancy Data Network (FADN)

The **FADN**[5] is a European system that collects structural and accountancy data on farms using annual sample surveys. The aim is to monitor agricultural holdings' incomes and business activities and to evaluate the impacts of the common agricultural policy (CAP).

The FADN survey covers only those farms exceeding a minimum economic size (threshold) so that only the most relevant part of the agricultural activity in each EU Member State is covered, i.e. at least 90% of the standard output and 90 % of utilised agricultural area (UAA) covered in Eurostat's farm structure survey (FSS). For 2018, the FADN sample consists of over 80 000 holdings in the EU-28, which represent almost 5 million commercial farms out of the approximately 10 million farms included in the FSS.

The survey provides representative data by region, economic size and type of farming activity.

The FADN is the only harmonised source of microeconomic data, which means that the accounting principles are the same in all EU Member States.

At the time of writing, the most recent FADN data available were for the 2018 accounting year[6]. The two-year lag in data is due to the time needed to collect, check and correct accountancy data from all EU Member States after closing the accounting year in question.

A significant change in FADN methodology became applicable in 2010. From that year onwards, the revised EU-typology of farms (replacing standard gross margin by the standard output[7]) was integrated into the FADN database. This report is the third edition of the dairy farms report based on the 'standard output' database.

As a result of adapting to changing farm structures, Member States may increase the minimum threshold for farms entering the FADN survey provided that they still cover a substantial part of agricultural production and UAA. The most recent changes took place in Bulgaria in 2016 and in Romania in 2018 when they increased the thresholds from EUR 2 000 to 4 000 of standard output (SO), causing a break in the time series. Many farms that had previously reported their data to FADN were left out of the survey. To avoid a break in the time series in this version of the milk report for both Bulgaria and Romania, the minimum threshold of farms was set at EUR 4 000 SO for all presented years[8].

5 For more information on FADN: https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/farms-farming-and-innovation/structures-and-economics/economics/fadn_en

6 In principle, 2018 FADN data cover all Member States' accounting data from 1 January 2018 to 31 December 2018. For Germany it covers 1 July 2018 to 30 June 2019, however for the purpose of this report, the majority of costs and production data for Germany have been adjusted to the year 2018 using a coefficient (EUROSTAT indices).

7 See the FADN website for more information.

8 Results for milk farms in Bulgaria and Romania below EUR 4 000 SO are available in the previous edition of the milk report https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/fadn-dairy-report-2016_en.pdf

1. INTRODUCTION

This report provides an economic overview of EU dairy farms, based on the latest available FADN data (for 2018), and estimates the cost of production and gross margins for 2019. The 2008-2018 period was marked by a high level of volatility in agricultural production - particularly in the dairy sector, with both milk prices and input prices being affected. Following the 2009 crisis, producer prices recovered in 2010-2011, dropped again in 2012 and then rose in 2013-2014 to above the 2011 level. Raw milk prices fell again in 2015-2016 and recovered again from 2017. There was an insignificant drop in prices in 2018 and a slight improvement in 2019.

This report also provides an analysis of the economic situation of EU dairy farms. Chapter 2 describes the **sample of dairy farms** on which the results presented in this report are based. Chapter 3 provides an **analysis of the milk margin** at EU and Member State level. Chapter 4 is dedicated to **income analysis** at EU and national level. The methodology is explained in Annex I. Detailed data for the EU, provided by Member States and regions that were set out in Annex II in previous versions of the report have been transferred to the interactive dashboards available on the **AGRI - food data portal** (https://agridata.ec.europa.eu/extensions/DataPortal/home.html).

2. DAIRY FARMS IN THE EU

This study is based on farms that are mainly oriented towards milk production[9]. Following changes in the farm typology from accounting year 2010 onwards, this sample of dairy farms increased substantially, particularly in Member States that joined the EU in 2004, 2007 and 2013[10]. The minimum threshold of analysed milk farms was set at the economic size of EUR 4 000 of SO. In the 2018 FADN survey, the sample is made up of 14 397 farms, representing 455 581 farms in EU-28[11].

The share of the milk production covered by dairy farms in the FADN is 93% in EU-28, with notable differences between Member States. There is a significant diversity in dairy farms across the EU (Table 1). In some Member States dairy cows achieve higher average yields than the EU average (7 390 kg/cow).

In 2018, the average yield exceeded 9 000 kg per dairy cow in four Member States: Denmark (9 805 kg/cow), Estonia (9 474 kg/cow), Sweden (9 292 kg/cow) and Finland (9 225 kg/cow).

These data reflect the diversity of dairy farm structures in the EU-28, which are linked to the differences in natural potential and also to the social, economic and regulatory context. In some Member States, farms are much bigger on average. In terms of hectares of forage area, farms in Slovakia, Czechia and Estonia are the biggest (with 683 and 301 and 192 ha on average respectively). In terms of livestock units (LU), Slovakia (238 LU) and Denmark (186 LU) followed by Czechia (177 LU) and the United Kingdom (147 LU) have the highest number of dairy cows, well above the EU average of 45 LU per farm.

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9 See Annex I.

10 Cyprus, Czechia, Estonia, Hungary, Lithuania, Latvia, Malta, Poland, Slovakia and Slovenia joined the EU in 2004; Bulgaria and Romania in 2007 and Croatia in 2013.

11 This descriptive part of the report presents data for EU-28 mostly. However, in the dashboards on the AGRI-food portal, the user can select EU-28 and EU-27 (without the UK).

By contrast, some other Member States have much smaller farms, with yields that are well below the EU average. Lower yields are found in Bulgaria (with 3 437 kg/cow) and in Romania (with 3 645 kg/cow) and these Member States also have smaller structures (e.g. an average of six livestock units in Romania and an average of 26 in Bulgaria, with average forage areas of 5 hectares in Romania and 15 hectares in Bulgaria). Lithuania, Croatia and Poland also have smaller than average herds (12, 15 and 18 LU respectively). The smallest forage area was in Malta, at barely 4 ha.

Table 1: Structural information on dairy farms by Member State

Specialised milk farms								
Country	Dairy cows - LU	Forage area - ha	Total labour - AWU	Share of family labour - %	Milk yield - kg/cow	Milk production /farm - tons	Milk price - €/ton	Share of milk production - %
Belgium	77	54	1.99	96%	7 946	610	336	92%
Bulgaria	26	15	2.43	63%	3 437	91	309	87%
Cyprus	.	.	.	.	.	.	.	.
Czechia	177	301	17.99	7%	8 239	1 457	336	66%
Denmark	186	127	3.46	35%	9 805	1 824	386	98%
Germany	74	62	2.30	64%	7 986	588	359	95%
Greece	.	.	.	.	.	.	.	.
Spain	63	31	2.05	72%	8 874	560	303	94%
Estonia	107	192	5.69	17%	9 474	1 014	304	94%
France	64	80	2.01	86%	7 059	453	356	96%
Croatia	15	13	2.13	86%	5 195	77	324	81%
Hungary	57	42	4.18	21%	7 982	453	302	80%
Ireland	82	66	1.69	83%	5 851	478	335	99%
Italy	52	26	1.90	84%	6 681	350	450	91%
Lithuania	12	24	1.74	81%	5 863	70	273	86%
Luxembourg	77	86	1.87	88%	7 888	608	331	97%
Latvia	21	46	2.22	59%	6 695	137	282	94%
Malta	69	4	2.36	77%	6 787	470	479	100%
The Netherlands	102	58	1.86	87%	8 907	912	383	97%
Austria	21	25	1.62	98%	7 350	157	375	94%
Poland	18	14	1.82	95%	6 077	111	305	86%
Portugal	33	17	1.76	75%	8 012	266	308	95%
Romania	6	5	1.19	94%	3 645	22	297	69%
Finland	42	56	2.16	79%	9 225	391	376	96%
Sweden	87	132	2.79	63%	9 292	807	364	98%
Slovakia	238	683	28.44	1%	7 375	1 754	338	68%
Slovenia	20	17	1.77	100%	5 782	115	312	91%
The United Kingdor	147	117	2.89	58%	7 490	1 101	349	98%
EU-28	**45**	**40**	**1.95**	**78%**	**7 390**	**329**	**356**	**93%**

Source: EU FADN, data are not displayed for Cyprus and Greece because there were fewer than 15 milk farms in the sample.

3. ANALYSIS OF MILK MARGINS

This chapter presents the main findings on the revenue, costs and margins of dairy activity. The results relate exclusively to the production of milk and milk products, without taking into account the by-products (calves and cull dairy cows). They are expressed in terms of current euro per tonne (EUR/t) of milk produced. The tables in Annex II show the detailed results for the EU, by Member State and region.

Three different margin indicators are studied[12]. The **gross margin** (over operating costs) is generally used when making comparisons with alternative types of production (labour, land and capital costs still have to be paid whichever type of production is chosen). The **net margin** (before own factors) is calculated as the gross margin minus depreciation and external factors (wages, rent and interest paid). The **net economic margin** assesses the residual revenue (profit or loss) obtained from production, after remuneration of all production factors including imputed family factors (opportunity costs for family factors).

The method is summarised in Box 2 and detailed in Annex I.

Box 2: Summary of the method

The FADN database contains information about output and subsidies per product, but on costs it only provides information related to the farm as a whole. Therefore, the direct contribution of each activity to the farm's income is not available, which means that the costs of production per product have to be estimated. The EU FADN unit has built several models to estimate costs and margins for the different products: arable crops, milk and beef, and permanent crops. These models allocate farm costs to a particular product using different ratios. Annex I gives details on the model for estimating the cost of production and margins for milk, which is used in this analysis (see Methodology 1).

Since 2008, imputed costs for unpaid family factors have been estimated (family labour costs and own capital costs). The aim is to make comparisons possible between Member States with different structures in terms of labour (share of family and paid labour), land (rented/owned) and capital. The methodology for estimating the opportunity costs of family labour, land and capital is explained in Annex I (see Methodology 2).

The output, operating costs and gross margin (over operating costs) for 2019 are estimated on the basis of milk prices, milk yield indices and input price indices. It is assumed that farm structures remain unchanged (e.g. the number of cows remains the same), but a change in milk production resulting from a change in average yield per cow is taken into consideration. The sources of the indices used are the following:

- for the milk price: the Commission's Directorate-General for Agriculture (DG AGRI)

- for milk yield and input prices: Eurostat databases (agricultural production, agricultural prices and price indices).

[12] For a detailed definition of the margins and costs presented, see the milk model description in Annex I.

3.1. Introduction

Following the milk crisis of 2009, 2010-2013 was a recovery period in most Member States. At EU level, in 2014 even raw milk prices reached a peak (EUR 383/t on average) for the period 2008-2019. However, operating costs per tonne did increase in parallel. All in all, margins recovered compared to 2009. By contrast, dairy margins declined in 2015 and 2016 following the steady decrease in milk prices. However, this trend did not last long, and the situation started to improve in 2017 due to the decline in milk collection and the growing demand for dairy fats and cheese. That year (2017) saw the decade's highest gross margin (139 EUR/t), which then dropped by 17% in 2018 and 2019.

In EU-28, the operating costs for milk production mainly consist of:

- feed costs (around 50% of operating costs, 70% of which are for purchased feed and 30% for home-grown feed); and
- energy, machinery and building upkeep, and contract work, each representing about 10% of operating costs.

Since the decoupling of direct support, revenues from milk[13] have depended mostly on the price and the quantity produced[14]. In the short term, gross margin is therefore mainly influenced by the raw milk price and feed costs.

Between 2008 and 2009, the average price for milk fell by 21% while operating costs per tonne dropped by only 11%. As a result, the average milk **gross margin** with coupled payments fell to EUR 88/t (see Figure 3). Raw milk prices subsequently recovered, reaching their highest level in the analysed period in 2014. This more than compensated for the continuous increase in operating costs, which also hit their highest point in 2014. As a result, there was a recovery in the gross margin, which reached EUR 133/t with coupled payments in 2014. However, in 2015 and particularly in 2016, margins went down, following the trend of dairy prices and reached a record low level of EUR 84/t - even lower than in 2009. Margins recovered again in 2017 rising even higher than the 2013-2014 level (EUR 139/t). The strong recovery did not last long, and in 2018-2019, margins fell to a moderate EUR 116-117/t.

The average **net margin** (gross margin minus depreciation and external factors, both of which did not vary much across the years) followed the same trend. After a sharp decrease between 2008 and 2009, the net margin recovered by 2011, and in 2014 it reached EUR 41/t with coupled payments. It went down again in 2015-2016 reaching the lowest level of EUR -1/t. The following year brought a remarkable recovery and the net margin went from the lowest to the highest level in the analysed period (EUR 52/t). It then dropped by half in 2018 (to EUR 26/t).

The **net economic margin** is another relevant income category. It is calculated by deducting the estimated opportunity costs for family labour and capital from the net margin. It can be perceived as a margin for farmers, to compensate them for the risks they take while running their farm if they cannot benefit from other opportunities.

The net economic margin also recovered between 2010 and 2014, reaching EUR 46/t in 2014 together with coupled payments (the highest figure was -35 EUR/t in 2011). Not only did it

[13] The decoupling also means that the link between milk margins and income of dairy producers is somewhat less obvious than in the past.

[14] Since the margins are presented per tonne of milk, the impact of the quantity produced is mostly visible in the income indicators.

benefit from the positive trend in other margins, but the opportunity costs for own capital were lower than in 2009 because of a decrease in the real interest rate[15], with the imputed family labour costs remaining more or less stable.

A negative net economic margin means that, on average, farmers do not obtain what could be considered a sufficient wage for their own labour and capital for the activity in question[16]. Following relatively good results in 2014, the net economic margin deteriorated in 2015-2016 and recovered again after 2017. In 2018 barely 23% of dairy farms in EU-28 (accounting for 36% of the milk production of EU dairy farms) had a positive net economic margin. However, this was an improvement on previous years: in 2008-2018 the positive net economic margin stood at between 9% and 23%, accounting for 16-44% of EU milk.

In 2017-2018, the level of imputed costs for family factors (family labour and own capital) decreased slightly, mainly because of declining opportunity costs for own capital resulting from low interests rates. The opportunity costs for family labour per tonne of milk rose compared to the previous year as a result of wage increases. The apparent labour productivity (milk production per AWU) has increased continuously since 2008 (Figure 1), which offsets the gain in imputed wage for family labour (Figure 2)[17]. As a result, **net economic margin** with coupled payments, although negative (EUR 44/t in 2018), was still higher than in 2009 (EUR -86/t).

Figure 1: Apparent labour productivity

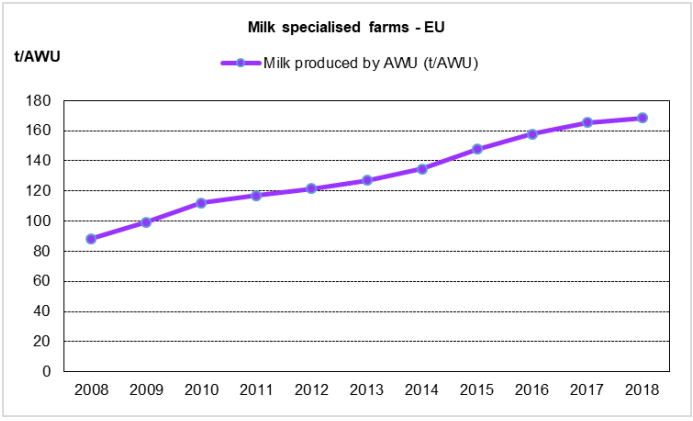
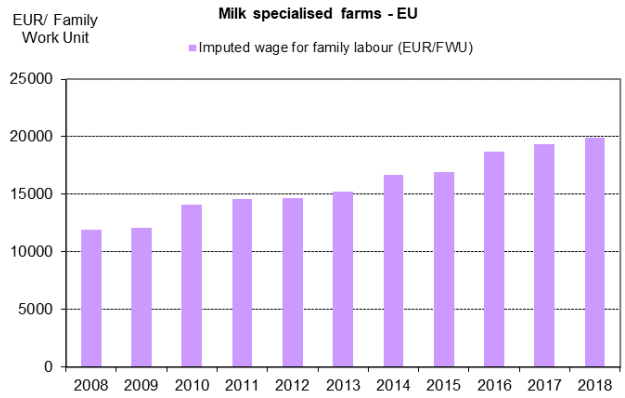


Figure 2: Imputed wage for family labour



Source: EU FADN - DG AGRI, Model of the allocation of costs for milk.

15 See Methodology 2 for further explanation. The 'real interest rate' used to calculate own capital unpaid costs corresponds roughly to the difference between the long-term interest rate and inflation. Note that opportunity costs for family labour and own capital are only estimates and should be interpreted with caution.

16 The margins presented in this section relate exclusively to the production of milk. The 'by-products' (calves and cull dairy cows) are not taken into consideration although they are accounted for in the income part.

17 The increase in labour productivity decreases the cost of labour per tonne of milk, but increases the income of family workers.

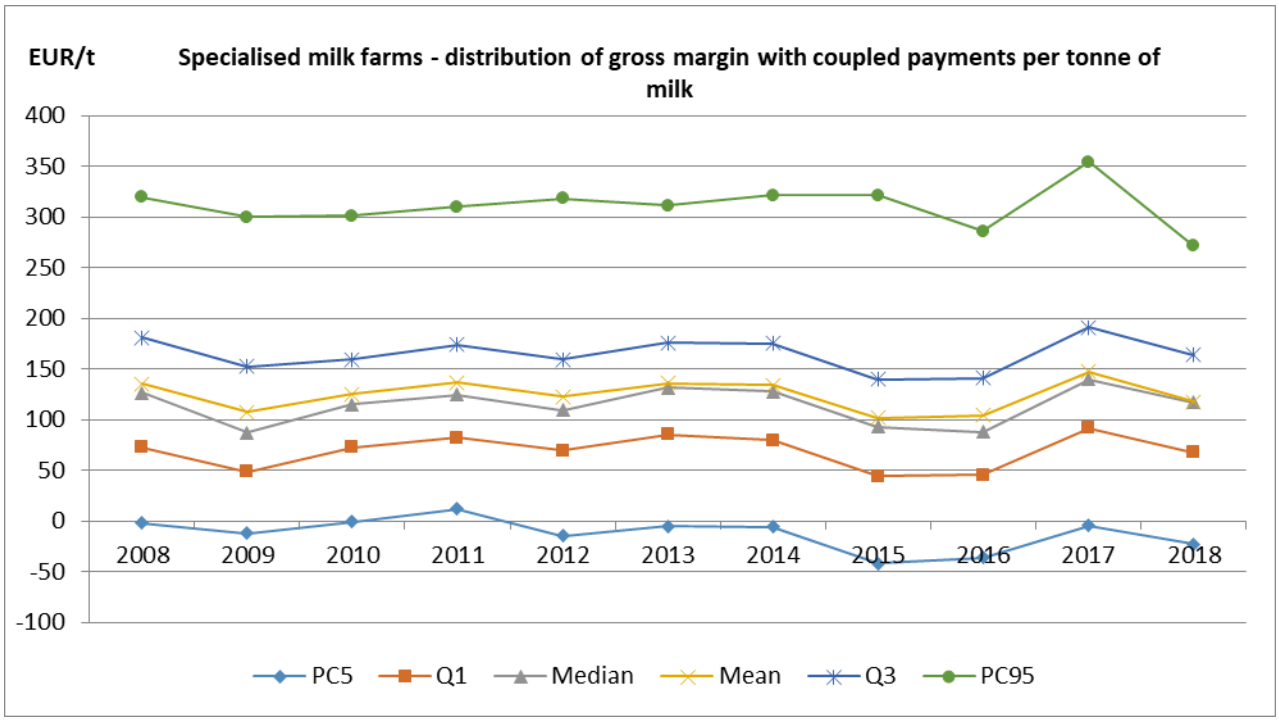
Figure 3: Trend in cost of milk production and margins, EU-28

Source: EU FADN - DG AGRI, Model of the allocation of costs for milk

3.2. Distribution of gross margin

The results displayed so far are based on averages. To provide a better understanding, the figure below shows the trend in the distribution of gross margin with coupled payments in the EU-28. The average (mean) and the median are quite close, and the distribution is close to a normal distribution. The inter-quartile range (Q3-Q1) for 2007-2018 is between approximately EUR 44/t and EUR 64/t. This gap has fluctuated in the analysed period, with notable drops in years when milk margins recovered and increases in the years when milk margins went down. The gap between the 5% top-performing farms (PC95) and the 5% least-performing ones (PC5) shows similar trends, probably as a result of the price volatility in recent years and its impact on the performance of farms.

Figure 4: Trend in the weighted distribution of gross margin - EU-28



Source: EU FADN - DG AGRI

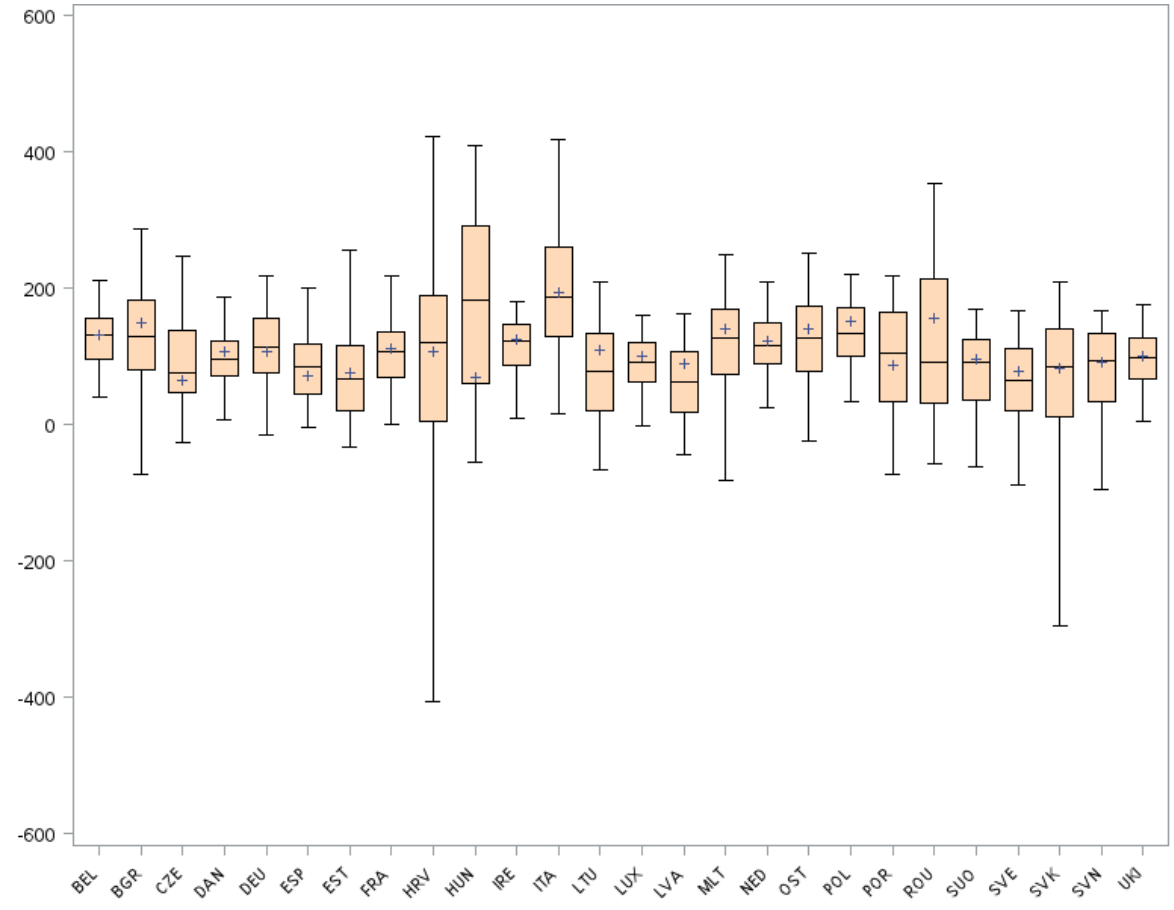
3.3. National level

This section focuses on individual Member State performances between 2008 and 2018 based on trends in costs and margins provided in the dashboards. As noted in the previous section, EU averages conceal large differences between farms. Some are national (country-specific), while others are regional (within individual Member States). The dashboards provide better insights into regional data within EU Member States.

Note that some countries (e.g. Romania) with high average gross margins (displayed with the +), have lower median gross margins. This means that well over half of the farms fall below the average gross margin. By contrast, in other Member States - such as Croatia - the average is lower than the median, in which case over half the farms reach the average gross margin. Croatia also has the widest range of gross margins from around EUR -400/t to over EUR 400/t of milk.

On **competitiveness**, the graph below shows that EU-15 Member States are the most competitive in the dairy sector[18]: for example Belgium, Denmark, Luxembourg, Ireland the Netherlands and the United Kingdom. Not only do these Member States have a gross margin with coupled payments per tonne of milk close to or exceeding the EU average, they also have the smallest inter-quartile ranges, close to or less than EUR 60/tonne of milk. The graph shows that differences between the agricultural holdings are not as big as in other, less competitive Member States.

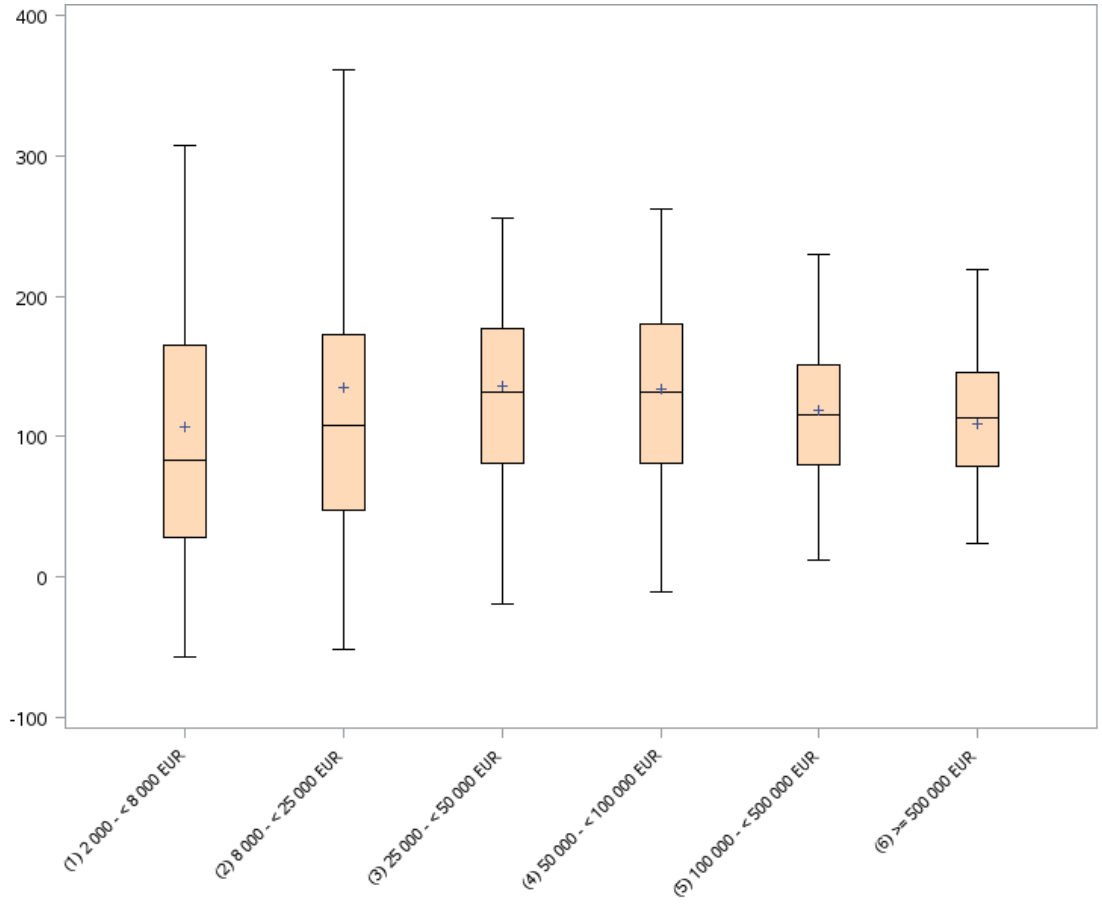
Figure 5: Weighted boxplot of gross margin with coupled payments per Member State - 2018



Source: EU FADN - DG AGRI. Extreme values are not displayed. The whiskers represent the 5th and 95th percentiles. The mean is a global ratio. Data for Cyprus and Greece are not displayed for confidentiality reasons (minimum number of farms should be 15).

[18] In this report, 'EU-15' are those Member States that joined the EU before 2004.

Figure 6: Weighted boxplot of gross margin with coupled payments per economic size class (ESC) for EU-28 - 2018



Source: EU FADN - DG AGRI. Extreme values are not displayed. The whiskers represent the 5th and 95th percentiles. The mean is a global ratio.

Looking at the **competitiveness of the different economic size classes (ESC)** in EU-28, we can see that in 2018 the results for the ESC 3 (EUR 25 000-50 000 SO) and ESC 4 (EUR 50 000-100 000 SO) were very close and these groups had the highest medians and means of gross margin with coupled payments. The first classes (small farms) had greater differences between holdings than the last classes (larger farms), because the inter-quartile range showing the differences between the highest and the lowest average gross margins was much larger. These difference for ESC classes 5 and 6 were EUR 72 and 66 respectively.

The margins for **Italy** (EUR 194/t) were by far the highest in the EU in 2018. This was due to its high value added products generating high prices, combined with limited costs per tonne of milk. Italy was followed by **Romania** (EUR 154/t), which in spite of its low milk price benefited greatly from VCS. In Romania VCS reached a significant EUR 341 per animal in 2018. However, as the subsidy was not evenly distributed among the dairy farms, coupled support stood at an average of EUR 39/tonne of milk. Operating costs in Romania were also among the lowest in EU. **Poland** and **Bulgaria** had similar levels to Romania of both, revenues from milk and operating costs and their gross margins were just behind Romania at EUR 151 and 150/t.

In 2018, the price of milk in **Malta** continued to increase and reached EUR 479/t (+3% compared to 2017). Owing to this price increase, the revenues from milk which were reinforced by substantial amount of VCS were also the highest in the EU. So were the

operating costs, resulting in a gross margin with coupled payments of EUR 140/t. The same level of gross margin was observed in **Austria** (EUR 140/t) where the price of milk, the costs level and thus the gross margin were at very similar levels in 2017-2018. In **Belgium**, which followed right behind these two Member States, not only did the price go down from 2017 to 2018, but costs also increased slightly causing the gross margin drop by 21% (to EUR 134/t).

In **Ireland**, the **Netherlands** and **France** gross margins also decreased year-on-year (by 10-21%), but they still performed well compared to the other Member States.

In **Lithuania** (EUR 109/t) the average gross margin with coupled payments decreased in 2018 compared to 2017 due to a drop in the milk price and an increase in operating costs. The drop was somewhat mitigated by an increase in coupled payments, however. In **Latvia** (EUR 89/t) the situation was similar, with the significant difference in the level of costs, resulting in a margin EUR 20/t smaller than in a neighbouring Member State. **Estonia** recorded a similar level of revenues as Lithuania and Latvia (the coupled support was marginal, only EUR 7/t), however its costs were the highest among the three and thus its gross margin stood at just EUR 76/t.

Finland and **Croatia** were the Member States with the highest non-market support to milk production in 2018: EUR 84/t and EUR 69/t respectively. Croatia managed to sustain the levels of revenues and operating costs similar to the preceding year, and margins were therefore only slightly smaller at EUR 109/t. Finland, despite having one of the highest milk revenues in the EU, also had very high operating costs - especially overheads - which accounted for more than half of the total costs.

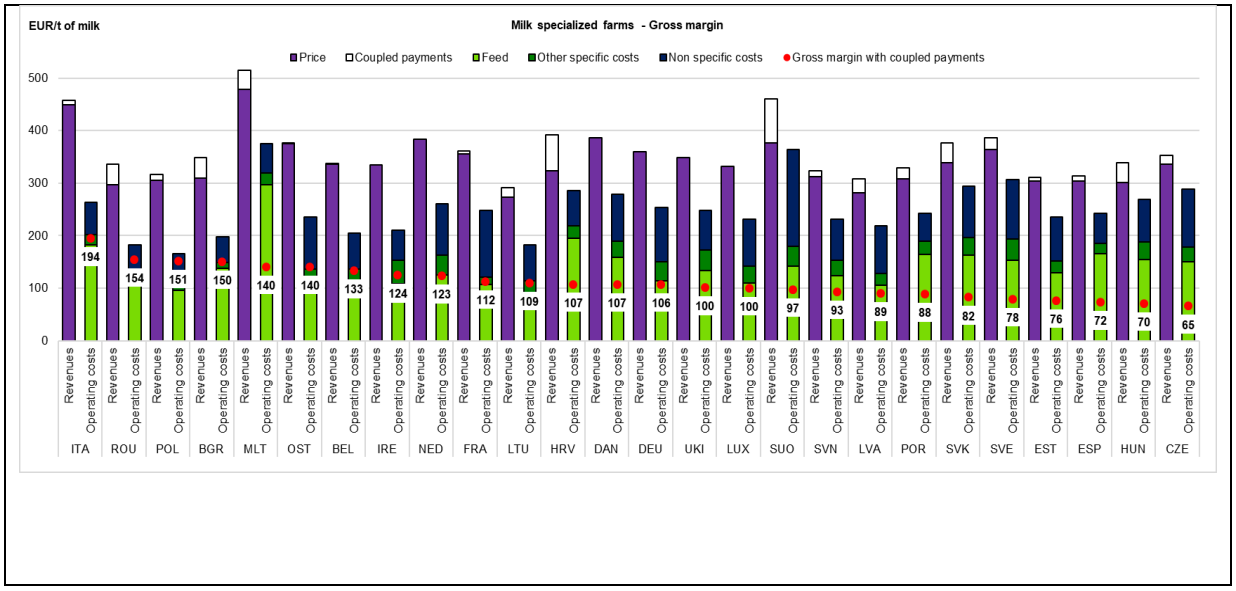
A similar level of gross margin with coupled payment, between EUR 107-100/t, was recorded in **Denmark**, **Germany**, **Luxembourg** and the **United Kingdom**. The common factor was that the revenues for all of them depended solely on the milk price, as they did not benefit from non-market support in the form of VCS.

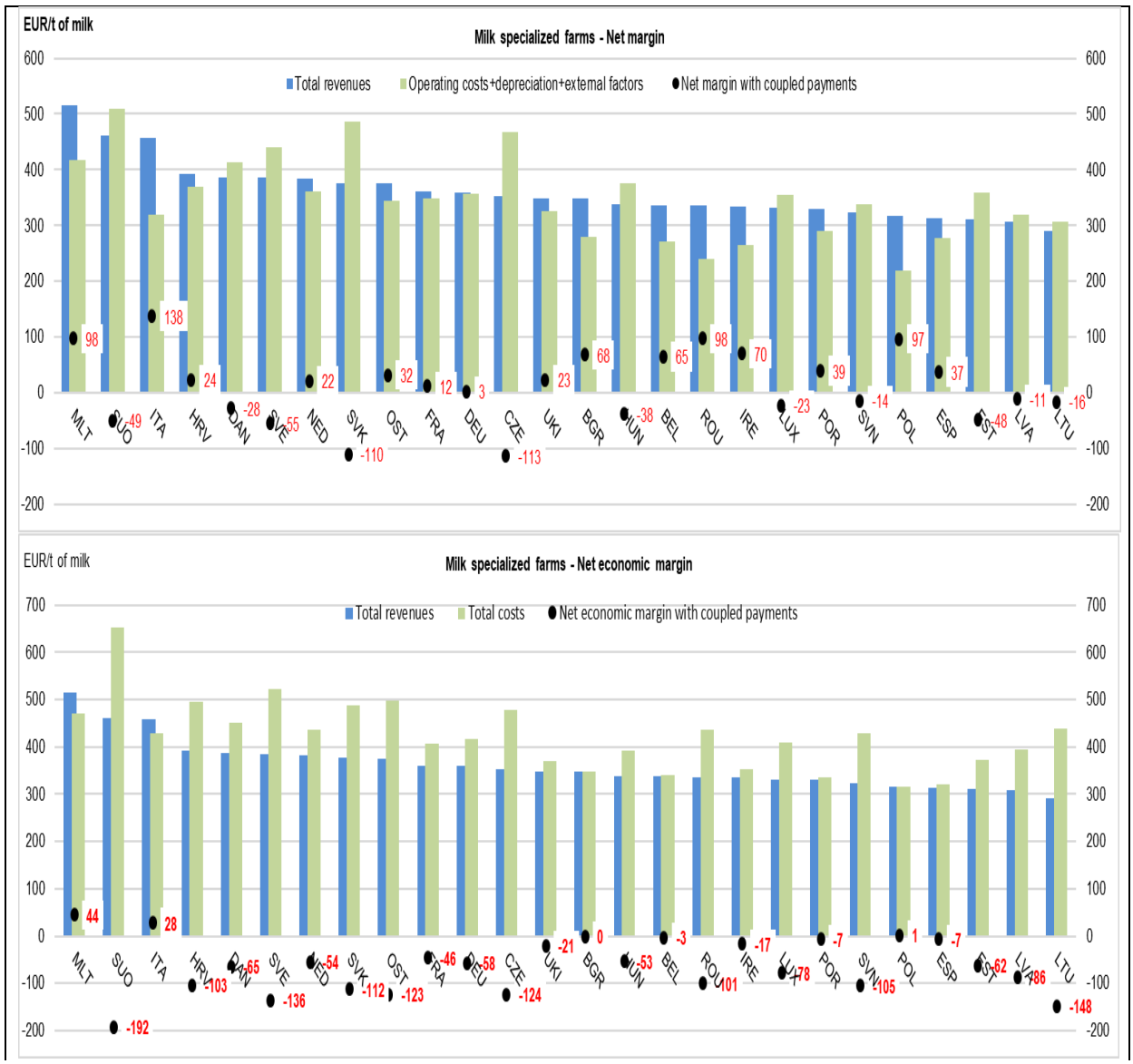
Slovenia and **Portugal** were among the few Member States that recorded an increase in margin from 2017 to 2018, as their milk price increased. Despite the moderate increase, their margins were below EUR 100/t (EUR 93 and 88/t, respectively) which was lower than in other Member States and below the EU average (EUR 116/t). The milk price also went up in **Slovakia** in 2018, but the cost of feedstuff rose in parallel so the milk margin did not change from 2017 to 2018. In Slovakian dairy farms, like in Finland, the overheads were a substantial part of operating costs.

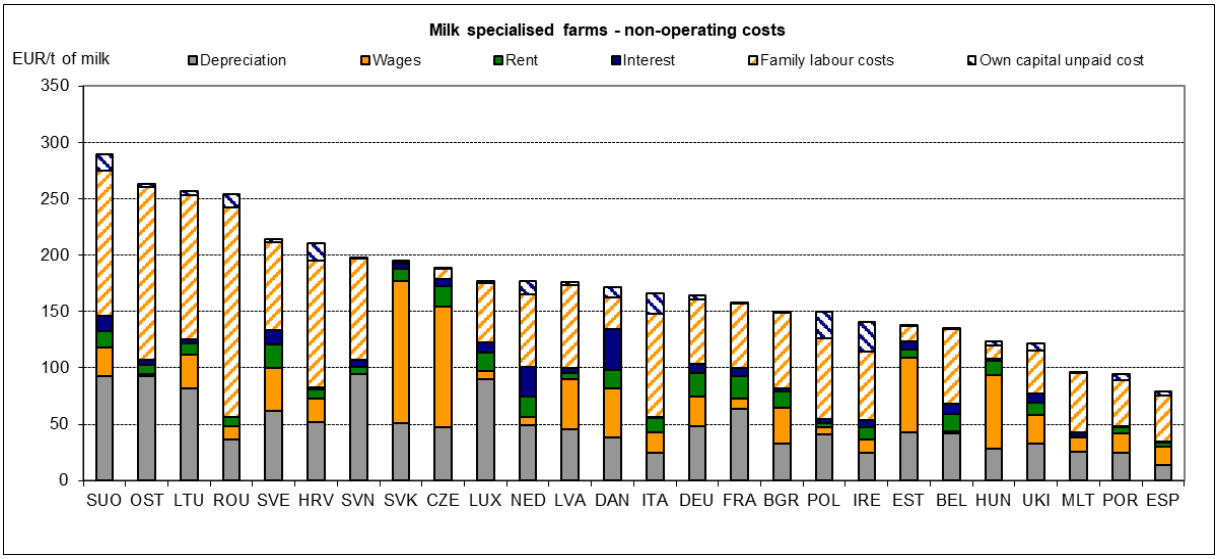
In **Sweden** the margin decreased by 35% between 2017 and 2018. Despite the revenues from milk once being relatively high - supported by substantial coupled payments - the operating costs were also high, bringing the margin down to barely EUR 78/t. A major decrease in the margin (-25%) was also recorded in **Spain**, making in the lowest in the EU-15. Spain was among the few Member States whose milk margin did not recover as much as in other Member States in 2017-2018.

For years, the lowest margins have been recorded in **Hungary** and **Czechia**. This did not change in 2018. Interestingly, both Member States have relatively low levels of specialisation (64% in Czechia and 80% in Hungary vs an EU-28 average of 93%) so their operating costs in relation to milk revenues are high. Their revenues are not low compared to other Member States and they do benefit significantly from VCS, but the costs offset the gains, bringing the margins down to barely EUR 72/t in Hungary and EUR 65/t in Czechia.

Figure 7: Cost of milk production and margins in the EU Member States, 2018







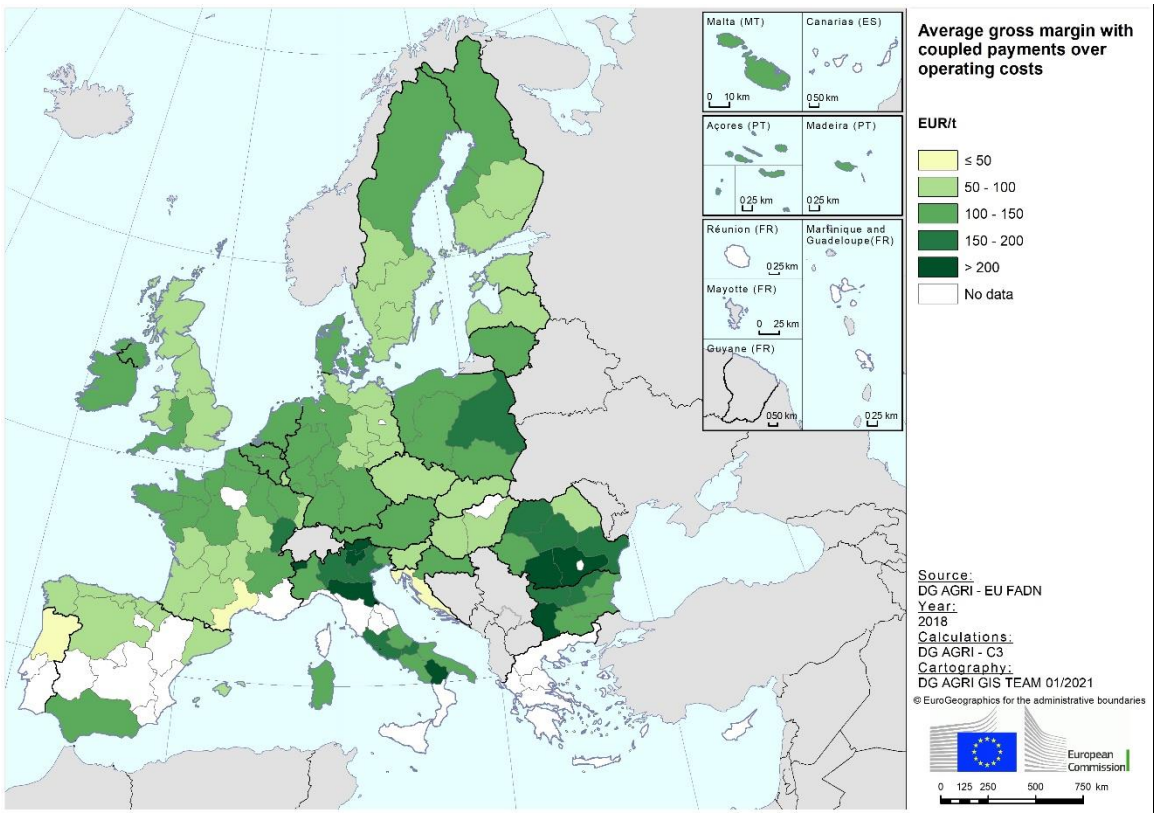
Source: EU FADN - DG AGRI, Model of the allocation of costs for milk.

3.4. Regional level

As already mentioned, there are also differences within Member States. The map below shows the average gross margin per tonne with coupled payments by FADN regions.

The best performing regions are those with high average raw milk prices (e.g. in Italy), low operating costs (e.g. Romania and Bulgaria), coupled support (e.g. in Finland) or higher competitiveness (e.g. Ireland, France, Belgium, Germany and Poland). More detailed results are provided in the dashboards on AGRI's food data portal.

Map 1: Average gross margin per tonne with coupled payments by FADN regions, 2018



Source: EU FADN - DG AGRI, Model of the allocation of costs for milk

4. INCOME ANALYSIS

This chapter focuses on trends in dairy farm income. As it looks at the farm as a whole, it incorporates the results of other farm activities. It studies the following **income indicators**:

– Farm net value added (FNVA) equals total output (total production value), plus balance of current subsidies and taxes, including direct payments, minus intermediate consumption and depreciation. It represents the amount available to pay for all fixed production factors (land, labour and capital), that are either owned by the farm or are external.

– Farm net income (FNI) (or family farm income (FFI) if farms use unpaid labour force[19]) equals FNVA minus external factors, plus the balance on subsidies and taxes on investments. It is the amount available to pay for own production factors (labour, land and capital).

– Remuneration of family labour (RFL) is calculated in only for family farms. It equals FNI minus the opportunity cost for own capital. It represents the amount available to pay family labour.

These indicators are expressed **per annual work unit** (AWU), for FNVA and FNI, or per **family work unit** (FWU) for FFI or RFL, in order to take into account of the differences in the labour force salary on the holding. All income indicators are calculated before deduction of income or any personal taxes and expressed in current euro. Detailed tables are presented in the dashboards on AGRI's food data portal.

Box 3: What are the components of income on dairy farms?

Holdings have two sources of agricultural[20] income: market and subsidies.
Income from the market:
- dairy enterprise: the margins associated with the production of milk are presented in the first part of this report. However, since public support is no longer incorporated in the milk price, it is not always easy to predict the income of dairy farms by looking solely at the margins.
- coproducts of the dairy activity: to ensure comparability, the results presented in the first part of this report relate specifically to the production of milk. Because they could blur the picture and make it difficult to interpret the results[21], the costs and revenues of products directly linked to milk production (calves and cull dairy cows) are not taken into consideration when calculating the margins. They are, however, part of the income calculation. For example, cattle sales (be they dairy cattle or other cattle, including fattened animals) account for around 5% of the total output[22] of dairy farms at EU-28 level, with differences between the Member States.
- other enterprises: the sample of dairy farms has been selected in such a way that the dairy represents at least 40% of the holdings' potential production. Although farms are quite specialised, especially in EU-15, they may have other activities that contribute to the total output of the farm and generate costs. These not only include crop production, but also other related activities such as forestry, tourism (e.g. in Austria), etc.
Subsidies: these include decoupled payments and also contribute significantly to the income of dairy farms.

19 For t this report, 'family farms' are defined as farms employing an unpaid labour force - usually family labour force.

20 Farmers may have other sources of external income. These are not taken into account.

21 Besides, they are not always well reported in the farm return.

22 SE131, i.e. total output without compensating for differences in forage valuation.

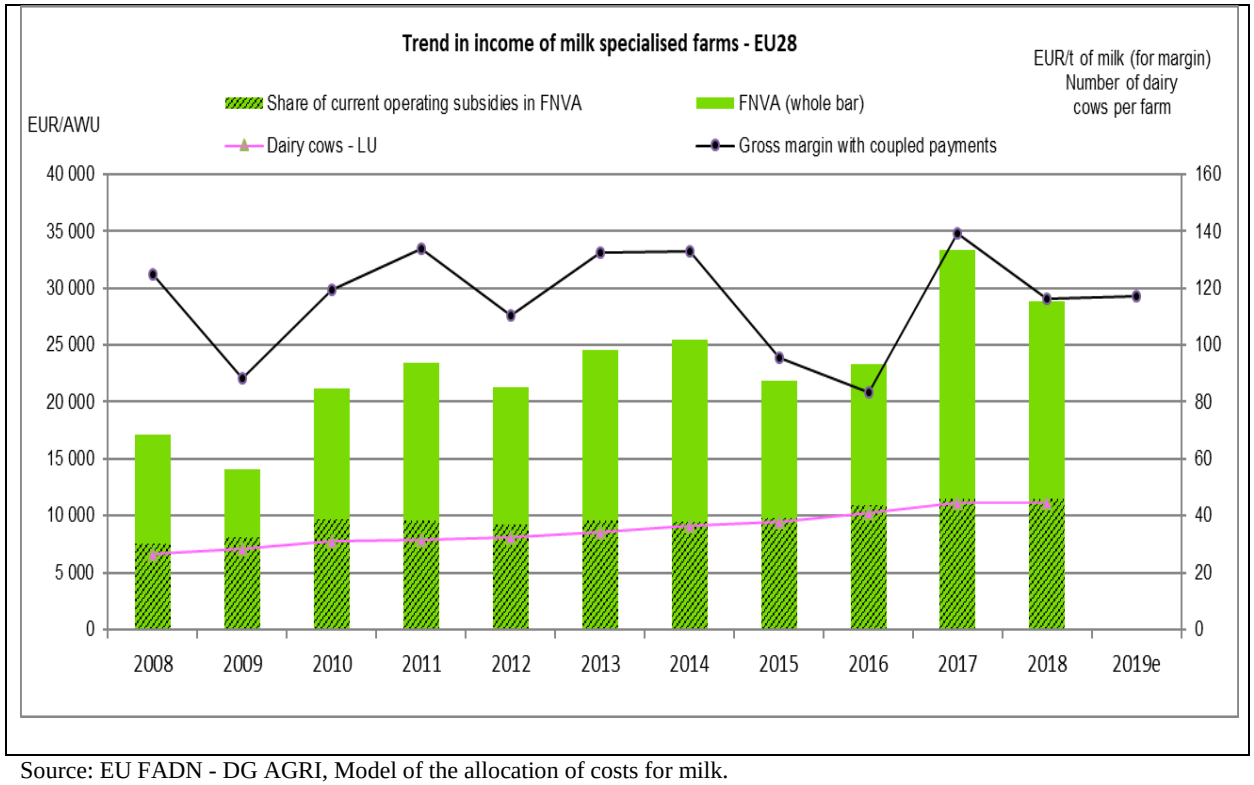
4.1. Introduction

The income of the EU dairy farms fell in 2018 after a remarkable increase in 2017, but was still higher than in 2008-2016

The income (FNVA/AWU) of EU dairy farms peaked in 2013-2014 only to fall again in 2015 and 2016, with the downward cycle ending towards the beginning of 2017. In the end, 2017 turned out to be the decade's most prosperous year for milk farms, mainly because of an increase in milk price. In 2018, the milk price dropped, as did the income of dairy farms (by 16%). The milk price remained higher than in 2008-2016 (on average 35% higher), however. Direct payments and subsidies increased moderately, due in particular to the introduction of voluntary coupled support (VCS) in the new CAP reform, which most Member States made use of. Next to beef, milk farms receive the second highest amount of VCS support.

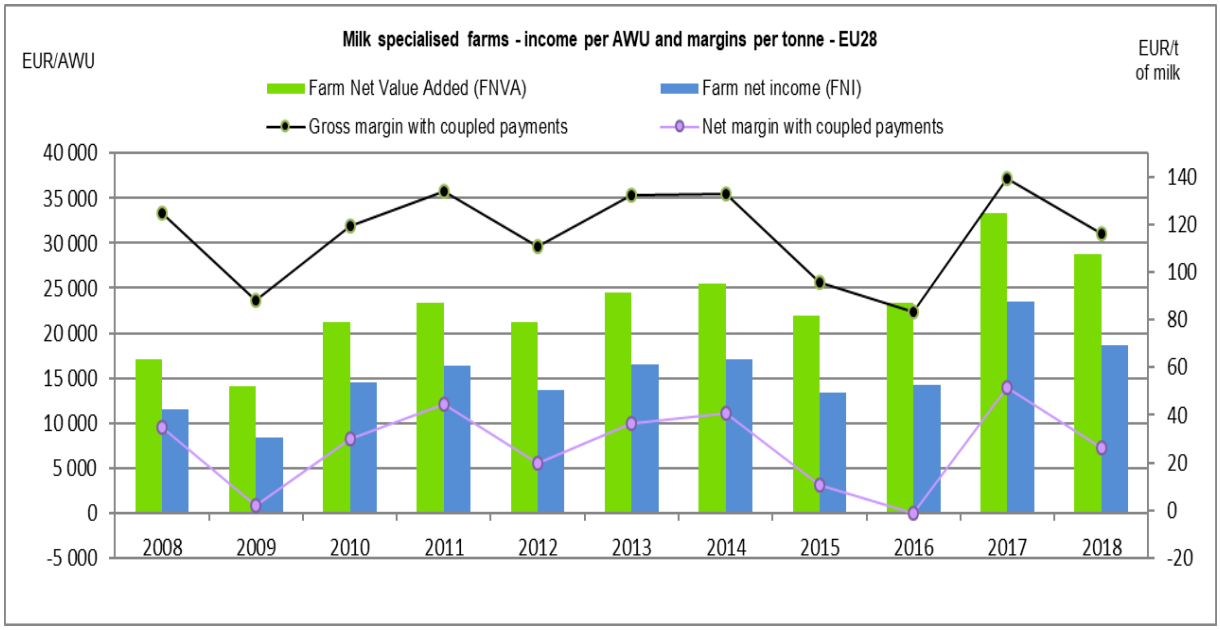
Milk farms are continuing the **process of concentration** (i.e. a gradual increase in the dairy cow herd size). In 2008-2018 the average herd in an EU specialised milk farm increased by 69%, i.e. from 26 to 46 cows on average. The average milk yield over the same period increased by 14% and the average milk production per farm increased by 92%. In 2018 the decrease in the raw milk price (-2% from 2017) was compensated by an increase in the volume of milk production (+1% on average per farm). As a result, market revenue decreased at a lower rate than the price (-1.2%).

Figure 9: Trend in income of dairy farms, EU



Source: EU FADN - DG AGRI, Model of the allocation of costs for milk.

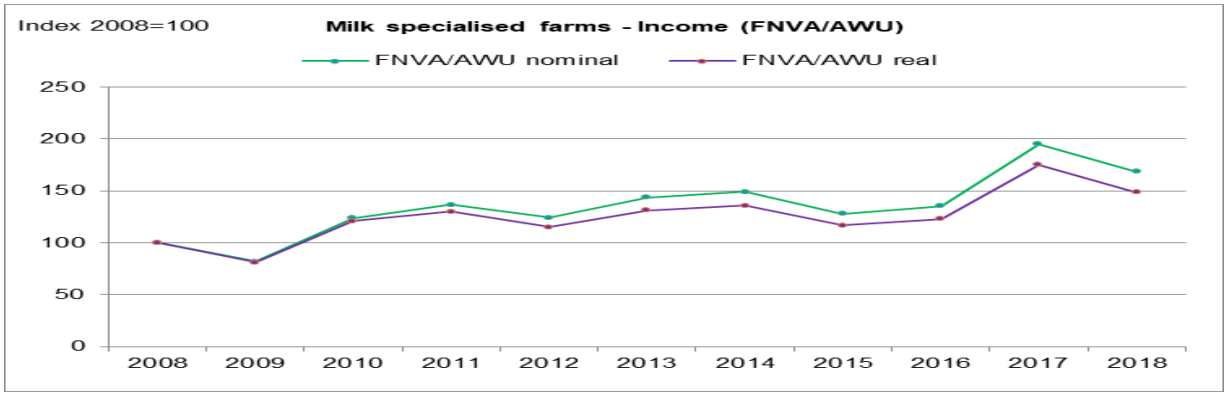
Figure 10: Trends in the income of dairy farms, EU-28



Source: EU FADN - DG AGRI, Model of the allocation of costs for milk.

The income (FNVA/AWU) trends in nominal and real terms over the period 2008-2018 were as follows: The income of dairy farms increased significantly between 2009 and 2011, followed by a slight decline in 2012, with a further increase in 2012-2014 and another decrease in 2015-2016. Incomes then peaked in 2017, only to decline in 2018. Nominal income remained higher than real income, but the gap between the two continued to rise during the period examined.

Figure 11: Income trends in nominal and real terms, EU-28



Source: EU FADN - DG AGRI, ESTAT (HICP index EUR 2008=100).

The results for EU-28 shown in the above graph conceal substantial differences in income between Member States, as we will see in the following sections.

All in all, incomes in dairy farms in EU-28 remained positive, and performed above the average for all types of farming in 2017-2018. However, since 2009 they have no longer been in the top three of types of farming for income.

Figure 12: Comparison of the income of milk farms with other farms, EU-28, 2018

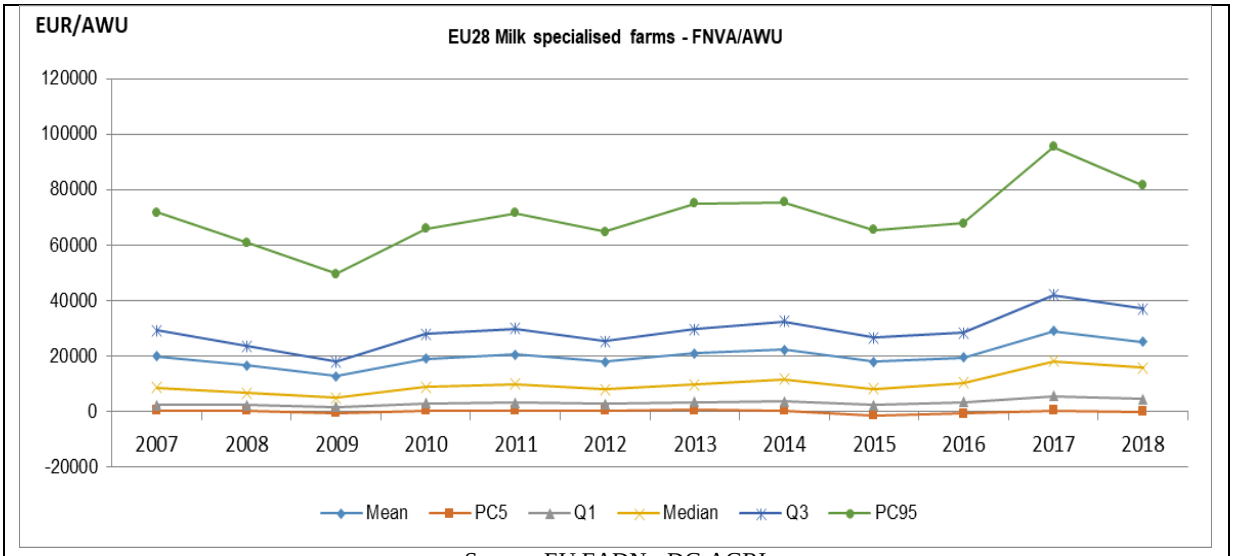
* Source: EU FADN - DG AGRI, FADN public database http://ec.europa.eu/agriculture/rica/database/database_en.cfm

4.2. Distribution of FNVA/AWU

Similar to the distribution of margins, the average EU income conceals major differences between Member States. The figure below shows the trend in the distribution of weighted FNVA/AWU for milk specialised farms. The results show that the distribution is not normal (but skewed to the right side), having quite a wide gap between the 5% top-performing farms (PC95) - with much higher income levels - and the 5% least-performing farms (PC5) - with income levels closer to the median.

As shown in the graph below, the mean FNVA/AWU is somewhere between the third quartile (Q3) and the median. The median on the other hand is close to the first quartile (Q1). This means that a majority of dairy farms (more than 50%) have an income lower than the average.

Figure 13: Trend in the weighted distribution of FNVA/AWU



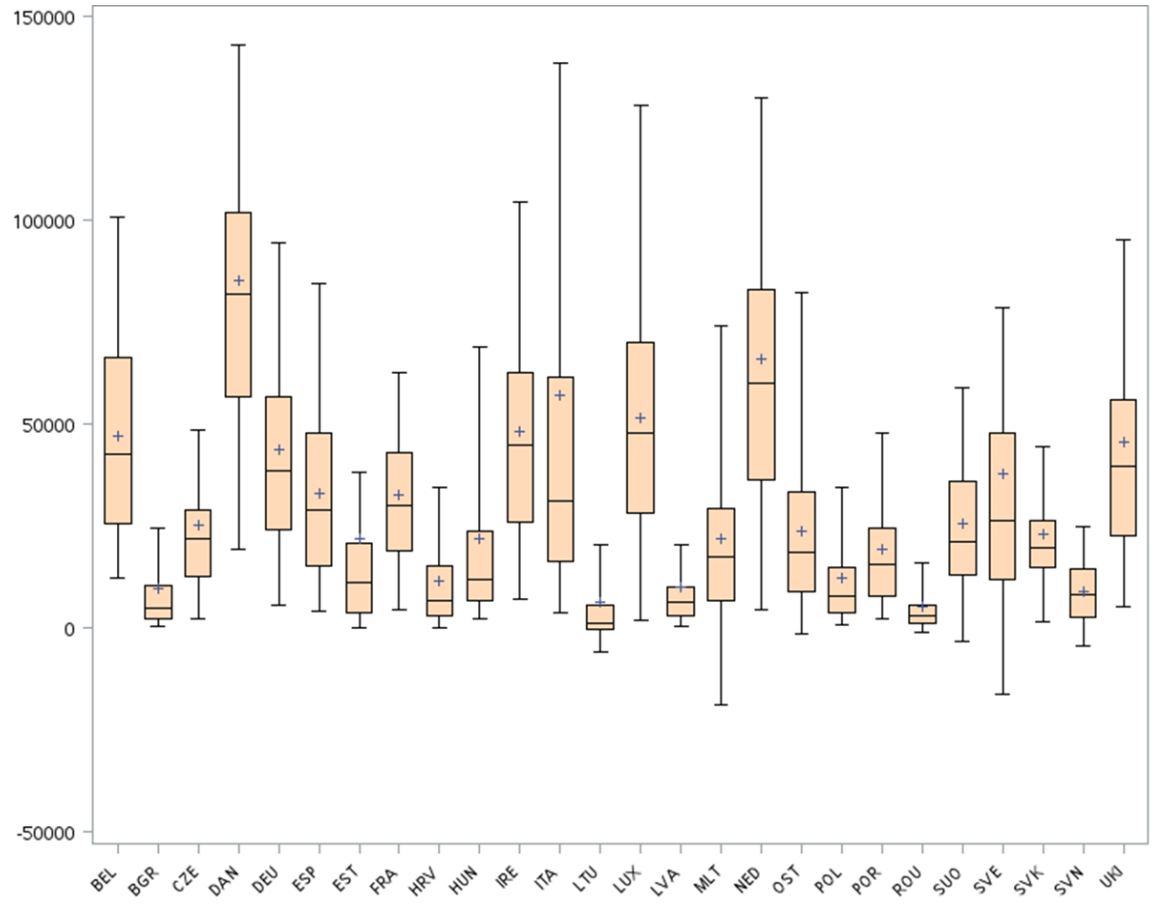
Source: EU FADN - DG AGRI

Results are not only affected by differences between Member States but also by differences within Member States, as illustrated in the Figure 14 below.

Unlike the distribution of gross margin with coupled payments, the biggest spreads in terms of inter-quartile range for FNVA/AWU are in EU-15, particularly in Belgium, Denmark, Ireland, Italy, the Netherlands, Sweden and the UK. In these Member States, the median is also significantly lower than the average, meaning that a large number of holdings have income levels lower than the average.

By contrast, in the Member States that joined the EU in and after 2004, the inter-quartile range figures, which show differences between the top 25% performing farms and the 25% least-performing farms, are smaller. Only Malta showed a high (similar to EU-15) pattern for inter-quartile range, but with significantly lower average values.

Figure 14: Distribution of FNVA/AWU (weighted boxplot) in milk specialised farms within Member States - 2018

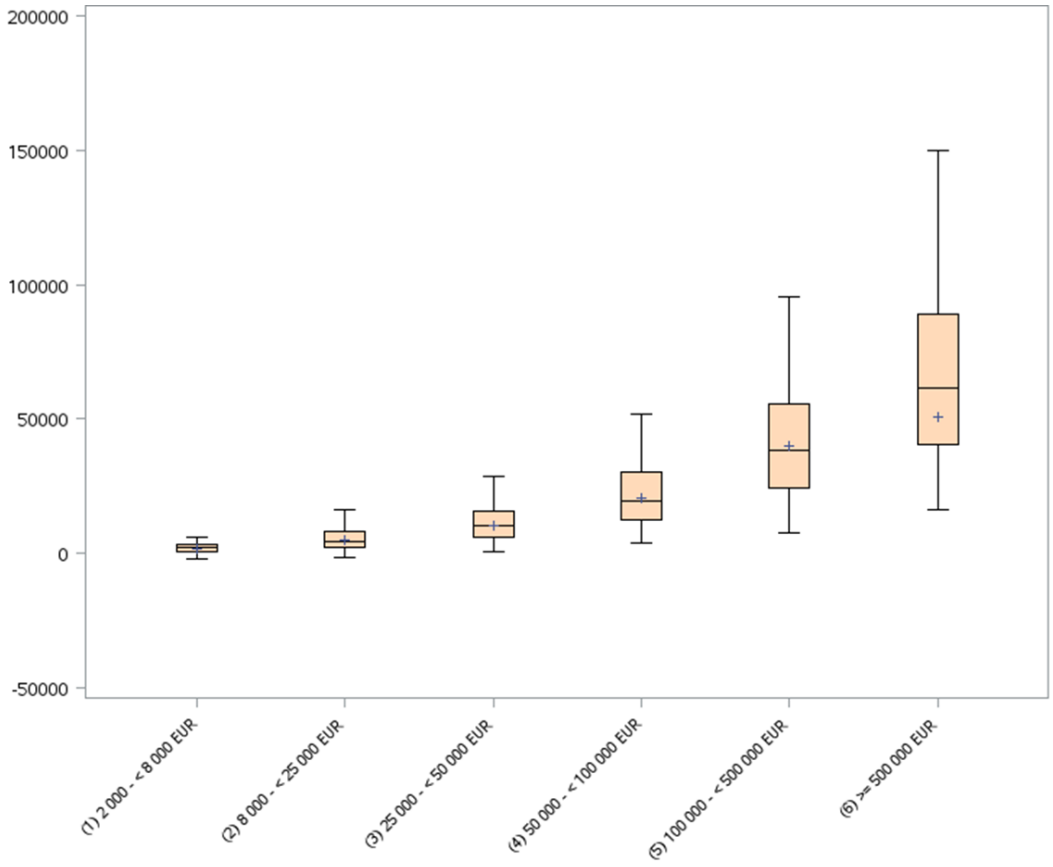


Source: EU FADN - DG AGRI. Extreme values are not displayed. The whiskers represent the 5th and 95th percentiles. The mean is a global ratio. Data for Cyprus and Greece are not displayed for confidentiality reasons (minimum number of farms should be 15).

On the **competitiveness of the different economic size classes (ESC)** in EU-28, in 2018 the last classes (bigger holdings) had the highest average income compared to the small farms where incomes were much lower. This can be explained by several factors, such as the existence of economies of scale, especially in most of the 'dairy belt' countries (Germany, France, Ireland, United Kingdom, the Netherlands and Denmark).

In terms of dispersion, the group of the biggest agricultural holdings also had the largest spreads in terms of inter-quartile range for FNVA/AWU. And, the median FNVA/AWU in the biggest farms from ESC (6) is significantly higher than the average. This means that the incomes of well over half of the farms were higher than the mean, calculated as a global ratio.

Figure 15: Distribution of FNVA/AWU (weighted boxplot) in milk specialised farms within economic size classes (ESC) for EU-28 - 2018



Source: EU FADN - DG AGRI. Extreme values are not displayed. The whiskers represent the 5th and 95th percentiles. The mean is a global ratio.

4.3. National level

In principle, the income disparity between dairy farms in Member States that joined the EU before 2004 and those that joined after are clear in the charts below. The 12 Member States with the highest income/AWU are in EU-15. In addition, none of the Member States that joined the EU in or after 2004 reached the EU average income for dairy farms (EUR 28 842/AWU).

Figures 16-18 show the average income indicators of dairy farms by Member State in 2018. The **FNVA/AWU** varied significantly between Member States, ranging from above EUR 85 000/AWU in **Denmark** to barely EUR 5 100/AWU in **Romania** and EUR 6 300/AWU in **Lithuania**. The high average income in Denmark was mainly due to large dairy herds and very high average yields per cow (above 9 500 kg/cow), which far exceeded the EU average (around 7 000 kg/cow) in 2018. By contrast, Romania had very small farms on average and small milk yields, and despite high margins incomes were low.

The EU average (EUR 28 842/AWU) was noticeably influenced by the exceptional performance of the **Netherlands**, **Italy** and **Luxembourg**, all with incomes over EUR 50 000/AWU. In Luxembourg, over 70% of the income was generated by subsidies. Six more Member States had incomes per AWU above the EU average.

In **Finland** 154% of average income (EUR 25 508/AWU, just below the EU average) was created by non-market support. That means that market revenue was not enough to cover costs, and without direct payments, incomes in Finnish dairy farms would have been negative.

Among the 'new'[23] Member States, the highest incomes per AWU were reported in **Czechia**, **Slovakia, Malta** and **Hungary** (between EUR 25-20 thousand/AWU). There was a significant gap between these four countries and the other 'new' Member States. In addition to Romania and Lithuania who had the lowest incomes in the EU, **Poland**, **Croatia**, **Latvia**, **Bulgaria** and **Slovenia** had incomes between EUR 12-9 thousand/AWU, which barely reached 30-43% of the average EU income.

[23] Member States that joined the EU in or after 2004.

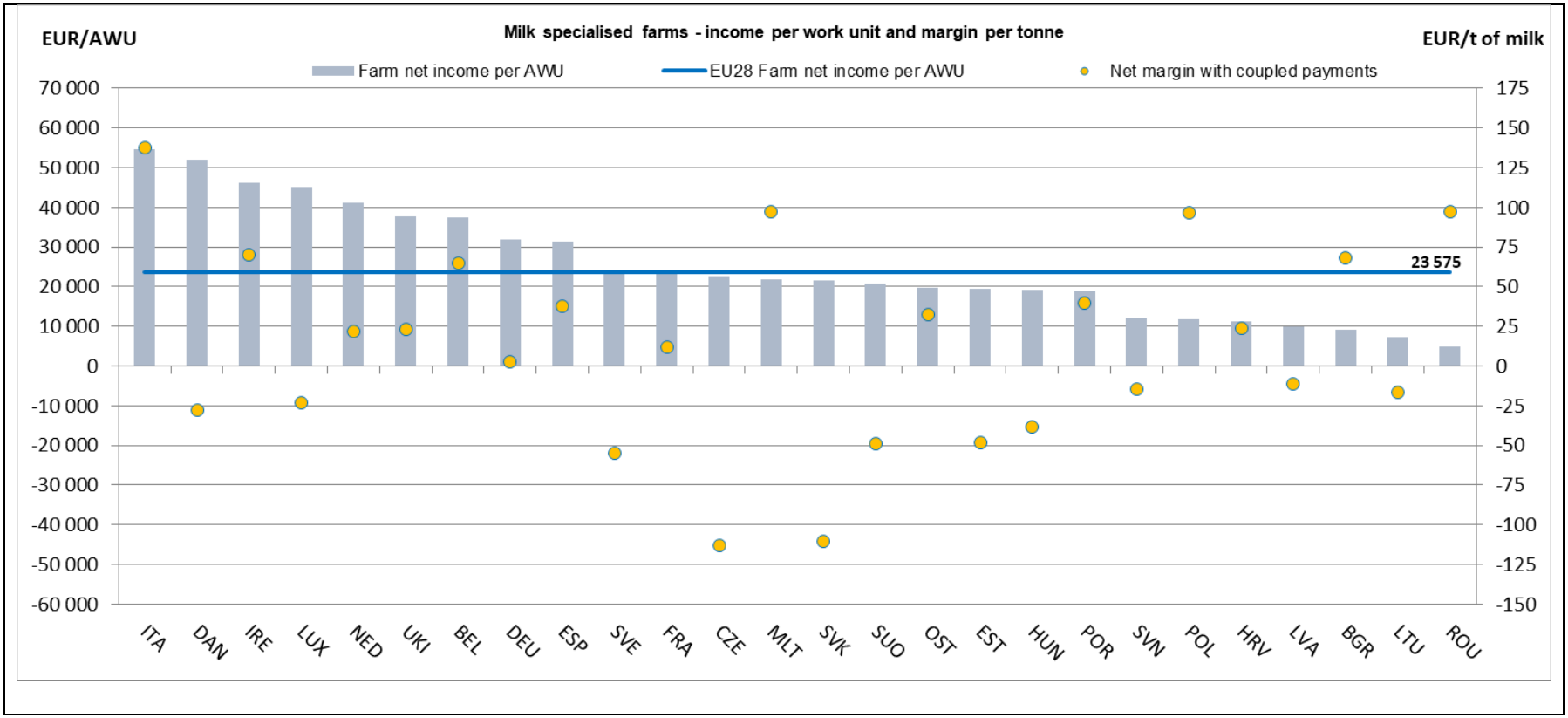
Income indicators for dairy farms in EU-28, 2018[24]

Figure 16: Income per work unit and margins per tonne (farm net value added and gross margin with coupled payments), 2018

Source: EU FADN - DG AGRI, Model of the allocation of costs for milk.

[24] For Finland, Luxembourg, Lithuania and Slovenia average income without CAP support was negative in 2016. In the graph, amounts below zero are part of the negative income compensated by CAP support.

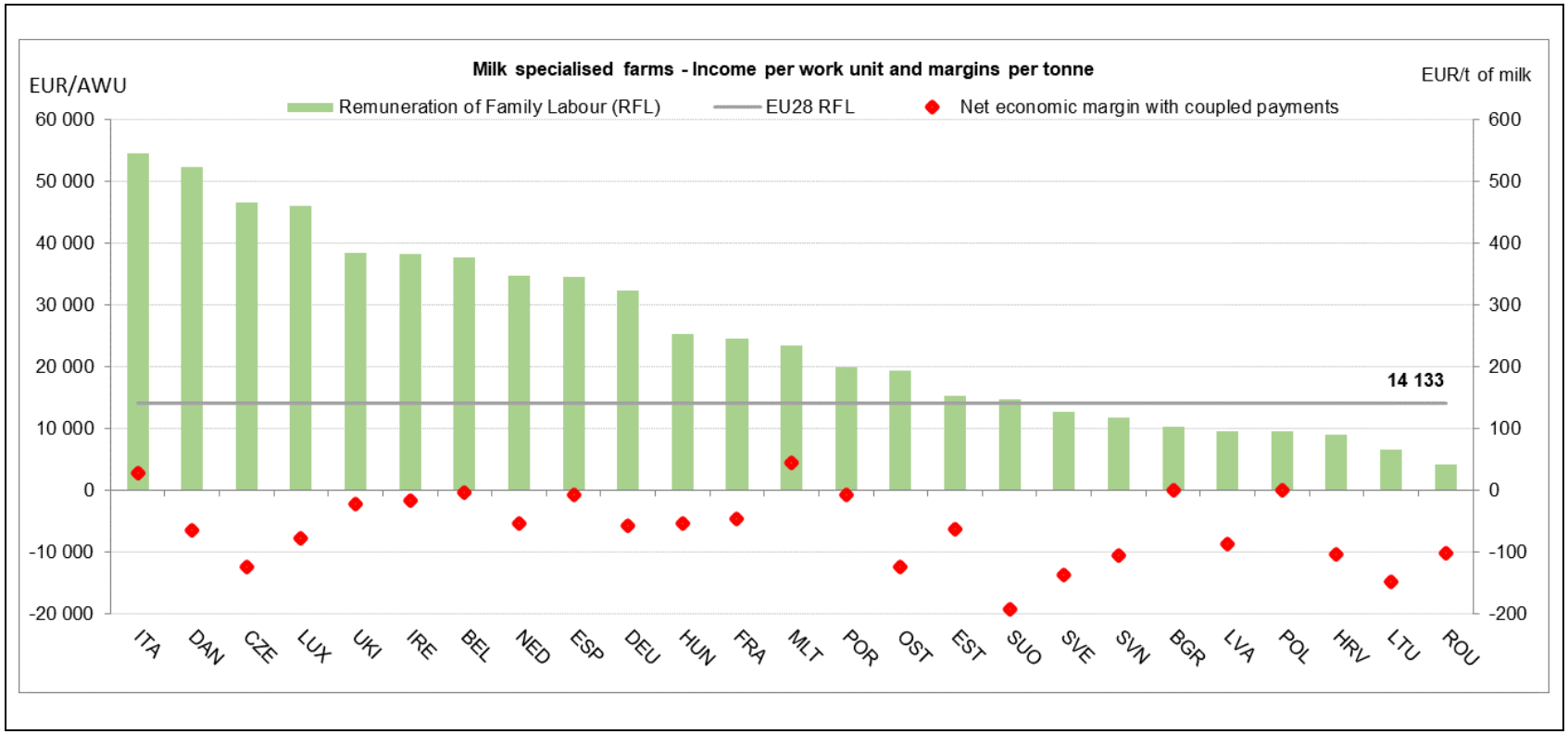
Figure 17: Income[25] per work unit and margins per tonne (farm net income and net margin with coupled payments), 2018



Source: EU FADN - DG AGRI, Model of the allocation of costs for milk.

[25] To express income per annual work unit, wages paid which were previously deducted have now been added (in FADN standard results [SE420+SE370]/SE010).

Figure 18: Income per work unit and margins per tonne (remuneration of family labour and net economic margin with coupled payments), 2018



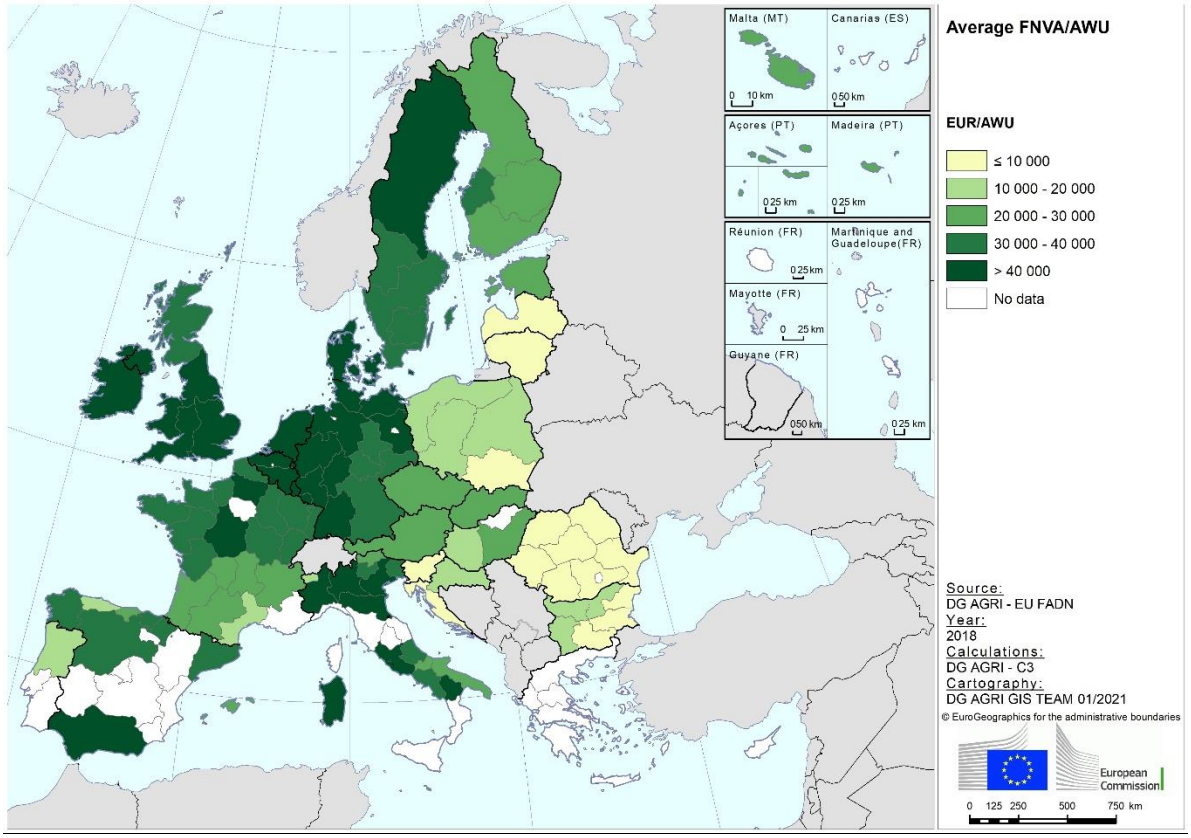
Source: EU FADN - DG AGRI, Model of the allocation of costs for milk.

4.4. Regional level

The map below shows the average FNVA/AWU in milk specialised farms by region in 2018.

The picture is quite different from that of the gross margin mentioned earlier. The best performing regions are mostly located in northern Europe: Ireland, the United Kingdom, the Benelux countries, Denmark, Sweden, north-west Germany and northern part of Italy. Most of them belong to the 'dairy belt' which can easily be seen in the map (regions with darker green colours). By contrast, Europe's southern and eastern regions had the lowest income levels except from Andalusia in Spain. More detailed results are provided in the dashboards on AGRI's food data portal.

Map 2: FNVA/AWU in milk specialised farms by FADN regions, 2018



Source: EU FADN - DG AGRI, Model of the allocation of costs for milk

5. ANNEXES

ANNEX I

Methodology 1

The model for estimating milk production costs and margins on the basis of FADN data

The FADN (farm accountancy data network) database contains information on output and subsidies per enterprise. However, as regards costs, it only provides information for the farm as a whole[26]. In this context, the contribution of each enterprise to the farm income is not directly available. Production costs by-product therefore have to be estimated. The EU FADN unit has built several models to estimate costs and margins for a range of different products: arable crops, milk and beef, and permanent crops. This Annex describes the methodology used to estimate milk production costs and margins.

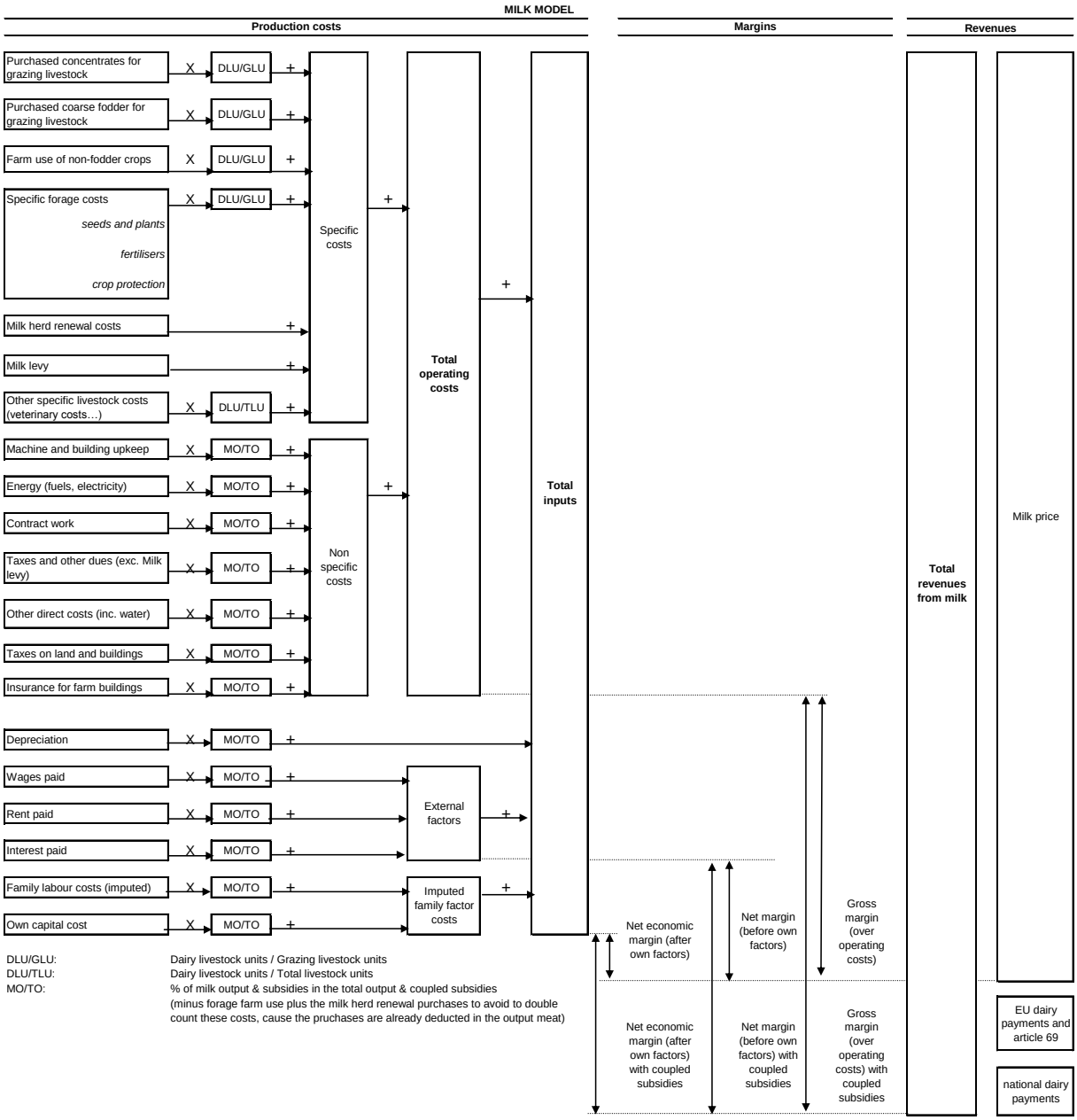
The allocation of costs

The following terminology is used with regard to costs:

- **Operating costs**, which include the following:
  - **Specific costs**: for milk production, they cover purchased concentrates, purchased coarse fodder, farm use of non-fodder crops, specific forage costs, milk herd renewal costs, the milk levy and other specific livestock costs (veterinary, etc.).
  - **Non-specific costs**: upkeep of machinery and buildings, power (fuel and electricity), contract work, taxes and other dues (excluding the milk levy), taxes on land and buildings, insurance for farm buildings and other direct costs (including water for the milk model).
- **Depreciation**
- **External factors**: i.e. wages, rent and interest
- **Imputed family factors**, which cover: family labour cost and own capital cost (own land cost + estimated cost for own capital except land - interest paid).

The costs are illustrated in the following breakdown.

[26] It is difficult for the accountant or the farmer to assess the proportion of water or electricity or fertilisers to allocate to each activity, especially for mixed farms.


MILK MODEL
Production costs
Margins
Revenues
Purchased concentrates for grazing livestock
Purchased coarse fodder for grazing livestock
Farm use of non-fodder crops
Specific forage costs
seeds and plants
fertilisers
crop protection
Milk herd renewal costs
Milk levy
Other specific livestock costs (veterinary costs…)
Machine and building upkeep
Energy (fuels, electricity)
Contract work
Taxes and other dues (exc. Milk levy)
Other direct costs (inc. water)
Taxes on land and buildings
Insurance for farm buildings
Depreciation
Wages paid
Rent paid
Interest paid
Family labour costs (imputed)
Own capital cost
DLU/GLU
DLU/TLU
MO/TO
Specific costs
Non specific costs
Total operating costs
External factors
Imputed family factor costs
Total inputs
Net economic margin (after own factors)
Net margin (before own factors)
Gross margin (over operating costs)
Net economic margin (after own factors) with coupled subsidies
Net margin (before own factors) with coupled subsidies
Gross margin (over operating costs) with coupled subsidies
Total revenues from milk
Milk price
EU dairy payments and article 69
national dairy payments
DLU/GLU: Dairy livestock units / Grazing livestock units
DLU/TLU: Dairy livestock units / Total livestock units
MO/TO: % of milk output & subsidies in the total output & coupled subsidies
(minus forage farm use plus the milk herd renewal purchases to avoid to double count these costs, cause the pruchases are already deducted in the output meat)

The basis of the methodology is to allocate a share of the farm costs to milk production. Different **ratios** are used:

– Dairy livestock units[27] as a proportion of grazing livestock units (DLU/GLU on the flow chart) is used to allocate grazing livestock feed costs;

– Dairy livestock units as a proportion of total livestock units (DLU/TLU) is used to allocate other livestock specific costs;

– Milk output and subsidies as a proportion of total output[28] plus linked subsidies (MO/TO) is used to allocate non-specific inputs and fixed costs. Subsidies are taken into account to make it possible to compare results over time. Since 2004 part of the milk support that was previously included in the price has been allocated via a direct payment. Moreover, this makes it possible to distinguish and to take better account of the co-existence of beef production on farms where costs of milk production are estimated (increasing the importance of direct aid support compared with market price support in beef production). The total output (TO denominator) is also adjusted by deducting the value of home-grown fodder recorded in the FADN and adding the purchase costs for milk herd renewal (see below).

The **milk levy**[29] covers the costs of milk production only. In the previous model the levy was deducted from subsidies on the revenues side. But with the current model, there is a disparity in how Member States record the levy. This is because - since the change of the farm return in 2014 - milk levy figures are registered in different places depending on the Member State.

Some disparities in FADN recording between Member States should also be taken into account to be able to make comparisons. Some Member States (generally from the north of the EU) do not put a value on **fodder** in the FADN, mainly because of the difficulty of estimating production and the value of forage. Based on the principle that forage production is simply an input for animal production, and that failure to record it - either on the crop output side, or on the animal costs side - does not affect income, no effort is made to estimate it. In other Member States - generally those where fodder production is more expensive - a value is assigned to the production of fodder. Even if this difference is unlikely to affect margins, it can lead to biases when comparing costs between Member States. To take account of the differences in records, fodder production used on the farm is treated as follows for the purpose of the model:

– The value of the **farm use of non-fodder plants** (e.g. barley, rye, etc.) is maintained in the item *'Crops used for feed'*, but the farm use value of all crops used as forage (fodder roots, other fodder plants - e.g. silage of cereals, temporary grass, meadows and pastures and rough grazing) is excluded.

– The value of **fodder plants produced on the farm** is estimated on the basis of the specific costs of the crops (e.g. seeds, fertilisers, crop protection). Specific costs are allocated to fodder production according to a ratio (fodder on total area). However, some forage crops do not benefit from all inputs (e.g. there is no crop protection for temporary grass). Therefore, the area taken into account in the ratio varies according

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27 Dairy livestock units are defined as dairy cows and a share of total breeding heifers and young females. This share is equal to dairy cows as a proportion of the total number of cows (dairy cows, cull dairy cows and other cows).

28 Output after deduction of forage crops farm use.

29 The milk levy was linked to the milk quota, so this cost item completely disappeared (equals 0) as of 2015.

to the input. The following table details the calculation. This item is called *'specific forage costs'*.

Estimation of *'specific forage costs'*

Cost item	Allocation key[30]
Seed costs	% area of fodder crops, other forage crops and temporary grass in the total utilised agricultural area (UAA) - after exclusion of fallow lands, areas leased to others, meadows and rough grazing
Fertiliser costs	% area of fodder crops, other forage crops, temporary grass and meadows in the total UAA - after exclusion of fallow lands, areas leased to others and rough grazing
Crop protection costs	% area of fodder crops and other forage crops in the total UAA - after exclusion of fallow lands, temporary grass, areas leased to others, meadows and rough grazing

– The **home-grown fodder value is deducted from total output** (the denominator in the allocation ratio MO/TO) because it is included in the farm total output and it has to be deducted to obtain a comparable ratio between the Member States that value fodder and those that do not.

The **milk herd renewal purchases cost** was introduced when the model was revised in 2008. Although the cost of rearing the farm's own milk heifers was already included in the model, the cost of the purchase of new heifers (for example, to renew the genetic potential of the herd) was not included. It was indirectly partly taken into account by the MO/TO ratio, because the total output of the farm includes the meat output, which is calculated by deducting the purchases. Therefore, for farms that rely heavily on purchases rather than on rearing their own animals, total output (the denominator) was lower and therefore the ratio used for allocating costs to milk was higher, with the result that all of their costs calculated using this ratio were higher. However, it was done regardless of whether these purchases were linked to the milk enterprise or to the meat enterprise. With the new method, an attempt has been made to take direct account of the share of purchases that can be related to milk.

The aim is therefore to take direct account of the cost of purchases of young female bovines to be used for milk production[31]. This cost is calculated by multiplying the farm purchases of female cattle from 12 to 24 months and of breeding heifers by the ratio of dairy cows over the total dairy cows plus suckler cows. This makes it possible to allocate a share of young female cattle purchases to milk production.

However, a correction should be made for total output (the denominator in the allocation ratio MO/TO) to avoid the double counting of these costs. The total output already deducts all purchases of animals, so the calculated milk herd renewal costs should be added back into the total output used in the allocation ratio MO/TO.

30 Codes refer to product or cost codes in the farm return (Commission Regulations 2237/77 and 868/2008).

31 The value of sales of cull dairy cows cannot be deducted because of the scarcity of information about this item in the FADN database. Moreover, it can be considered as a meat by-product, which anyway has not been included in the model design until now. The value of calves is not taken into account in revenues, despite the fact that it is an obligatory by-product of milk production.

The following FADN cost items have been included in the 2008 revision of the model:

– **taxes and other dues** (excluding the milk levy) (part of farming overheads, non-specific costs);

– **insurance on farm buildings** (part of farming overheads, non-specific costs); and

– **taxes on land and buildings** (part of farming overheads, non-specific costs).

The estimation of imputed unpaid family factors has also been included in the margin and income calculation. The methodology used is explained in another annex.

Revenues from milk

Revenues from milk take into account:

– the value of **sales of milk and milk products**;

– **EU coupled dairy payments such as voluntary coupled support (VCS) as of 2015 or Article 68 between 2009 and 2014**; and

– any coupled **national dairy payments**.

This means that the value of calves and of sales of cull dairy cows is not taken into account, because no satisfactory method has been found to estimate this value on the basis of the current data.

The margins

The following terminology is used in relation to margins:

– **Gross margin (over operating costs)**: sales of milk and milk products minus operating costs;

– **Net margin (before own factors)**: sales of milk and milk products minus operating costs, depreciation and external factors; and

– **Net economic margin (after own factors)**: sales of milk and milk products minus operating costs, depreciation, external factors, and imputed unpaid family factors.

All the margins are displayed **with and without coupled payments for milk** (EU and national). This makes it possible to simulate the removal of coupled payments.

The sample of farms

Given the estimation methodology, i.e. the need to allocate costs, to obtain reliable estimations of production costs and margins it is necessary to focus on **milk specialised farms**. Depending on the specific objectives of the analysis, different specialisation criteria might be chosen. In general, the following criteria have been used:

– Farms covered by the following types of farming (TF): 45 *Specialist dairying*, 47 *Cattle dairying, rearing and fattening combined*, 73 *Mixed livestock, mainly dairying*, 83 *Field crops — grazing livestock combined.* The decision was made to include farming types 47, 73 and 83 (and not only 45) in the sample so as to cover a larger proportion of dairy cows, particularly in the new Member States.

– In the report version based on 2018 data introduced **minimum economic size** of the farm was set **at EUR 4 000** SO mainly in order to avoid break down in the time series for Bulgaria and Romania which changed their thresholds in 2017 and 2018 respectively. Moreover, this was necessary in order to eliminate very small farms of a semi-subsistence character, even though they provide data to FADN. In the previous versions of the milk report, the data including the farms with economic size between EUR 2 000-4 000 SO for Bulgaria and Romania are available.

– A structural specialisation rate[32] greater than **40%**. This criterion has been introduced to make the sample of specialised farms more stable over time and therefore ensure better comparability of results over time[33].

– An actual specialisation rate[34] greater than **35%**. This criterion has been kept to make sure that in reality, milk production remains the holding's main activity in reality.

– A share of sales of milk and milk products in the milk output higher than 50%.

– An average milk price at farm level of less than EUR 900/t of milk, in order to exclude farms producing **buffalo milk**. These farms are mainly located in the two Italian regions *Lazio* and *Campania*, essentially for the production of '*Mozzarella di buffala*'. It was decided to exclude them because of their major differences in terms of milk yield, price, costs and margins.

Moreover, given the use of different ratios for the allocation keys[35], some precautions are necessary in order to prevent problems with estimates:

– total output and total output plus subsidies should be strictly positive;

– total output plus subsidies should be greater than milk output plus subsidies; and

– total output should be greater than milk output[36].

Farms that do not meet these conditions are excluded from the sample used to estimate costs and margins.

The results are presented in **EUR/t of milk**. They are known as the 'global ratio', i.e. they are obtained by dividing the average revenues, costs or margin in the Member State (or region) by the average quantity of milk produced in that Member State (or region) (and not by the weighted average of the individual ratio by farm).

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32 Structural specialisation rate: the potential contribution of the 'cattle, dairying pole' (as defined by Commission Regulation (EC) No 1242/2008 establishing a Community typology for agricultural holdings) to the total production of the farm i.e. the share of the milk sector in the total standard output.

33 The comparability of results over time is however also affected by the extrapolating factors: as FADN is a sample survey, the collected data need to be extrapolated against the population of farms reported under the Farm Structure Survey (FSS). A new FSS is carried out every 3 years and takes the form of a census every 10 years. Due to this update in the population used for extrapolation, the weight of a given farm remaining in the sample may change quite significantly, which affects the average results. However, extrapolating with the newest FSS population is deemed to provide more precise, actual results for the most recent years, which is what matters for the purpose of this report.

34 Actual specialisation rate: the share of milk output and subsidies in total output and coupled subsidies (forage farm use deducted) as reported in the farm accounts.

35 Allocation keys: dairy livestock units as a proportion of grazing livestock units, dairy livestock units as a proportion of total livestock units, milk output and subsidies as a proportion of total output and coupled subsidies, milk output as a proportion of total output.

36 The number of dairy cows and of grazing livestock units must also be greater than 0.

Methodology 2

The method for estimating imputed unpaid family factor costs - Method

- **Family labour cost**: this is estimated on the basis of the wages which the owner of the farm would have to pay to hire employees to do the work carried out by family members.

It is estimated as the average regional wage per hour obtained in the FADN database[37] multiplied by the number of hours worked by family workers on the farm.

It is commonly acknowledged that the number of hours worked by family workers is sometimes overestimated. Thus the method uses a maximum of 3 000 hours per annual work unit (this is the equivalent of 8.2 hours a day, 365 days a year, and corresponds more or less to the time that can be spent on a farm by dairy farmers)[38].

Using hours makes it possible to remunerate a manager more than an employee for working more hours.

It is challenging to calculate a reliable estimate because records of hours worked on the farm might be overestimated and it is not easy to determine what an appropriate wage for family labour is. Farmers may indeed agree to be paid less than they would be based on the average agricultural wage. They may consider farming a way of life or benefit from other sources of income for their household (other gainful activities directly related to the holding, spouse working outside the farm, etc.).

- **Own capital cost**

  - **Own land cost**: this is estimated on the basis of the rent that the owner of the farm would have to pay if the land were rented instead of owned.

    It is estimated as the owned area multiplied by the rent paid per ha on the same farm or, if there is no rented land on the farm, by the average rent paid per ha in the same region and for the same type of farming[39].

  - **Cost of own capital (other than land)**: the cost of own capital (permanent crops, buildings, machinery and equipment, forest land, livestock and crop stocks) is estimated at its opportunity cost. That is how much money the farmer could gain from investing the equivalent of its capital value in a bank.

The interest paid on the capital is not known, as this information is optional in the FADN farm return. Nevertheless, to take into account the actual interest rate paid on the farm, a 'weighted' interest rate is calculated as the weighted average of this interest rate for debts and the long-term interest rate taken from the Global Insight database for the net worth. It should be noted that if the 'weighted' interest rate is lower than the long-term interest rate (which means that the calculated rate of interest paid is lower than the long-term interest rate), the LT interest rate is used instead of the 'weighted' interest rate.

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37 If there are not enough farms (fewer than 15) with paid labour at regional level, the national average is taken into account.

38 A constraining factor of the estimation method is that if a farmer receiving a salary would probably work less.

39 If there are not enough farms (fewer than 15) in a given region for a type of farming, the national rent per hectare for the given type of farming is used (the TF8 classification is used).

In the end, the own capital value (excluding land and land improvement) is estimated as the average value of the assets (closing plus opening valuation divided by 2) multiplied by the real interest rate[40]. The correction is made by subtracting the inflation rate[41] from the nominal interest rate. A condition is applied to avoid negative real interest rates.

The total circulating capital is not valued because of the unreliability of this variable in some Member States. Nevertheless, the crop stock value is taken into account.

To calculate the **unpaid capital costs,** in order to avoid double counting, we have to deduct the **interest paid** should be deducted from the sum of the own land cost and the cost of own capital except land:

Imputed unpaid capital costs = own land cost + estimated cost for own capital except land — interest paid (when interest paid is lower than the sum of own land and own capital costs).

The total cost of imputed unpaid family factors is then the sum of family labour costs and unpaid capital costs:

Imputed unpaid family factors = family labour cost + unpaid capital costs

Or

Imputed unpaid family factors = family labour cost + (own land cost + estimated cost for own capital other than land – interest paid)

40 The increase in the value of assets is excluded from income calculations. For example, land appreciates in value over time, which is one of the reasons why investors invest in land. This gain is not included in income; therefore it would not be consistent to include it in the cost of capital. In addition, in the FADN, assets are valued at replacement value. Depreciation is based on this replacement value and therefore already takes into account the increase in prices (inflation). Consequently, it would be double counting to include the inflation part of interest in the cost of capital.

41 The inflation rate is based on the Eurostat annual average rate of change in harmonised indices of consumer prices (HICPs). Inflation rates based on price indexes of GDP and gross fixed capital consumption were tested, but they were very high and led to substantial negative costs for capital, mainly in the Member States that joined the EU in or after 2004. An inflation rate calculated on the basis of price indices for gross fixed capital consumption was also tested, as it seemed to be more closely related to assets. However, this rate has fluctuated widely over the years for certain Member States. In addition, land is an asset that does not depreciate. Therefore the inflation rate of gross fixed capital consumption must not have a closer relationship with the change in the price of agricultural assets than with the consumer price indices.

Table 2: Share of dairy cows covered by the FADN by Member State

Number of dairy cows in 1000 heads	FADN 2018			Eurostat 2018	Coverage FADN/ESTAT		
	Non-specialised milk farms	Specialised milk farms	Total	Number of dairy cows	Non-specialised milk farms	Specialised milk farms	Total
Belgium	88	463	550	529	17%	87%	104%
Bulgaria	65	212	276	244	26%	87%	113%
Cyprus	.	.	.	32	.	.	.
Czechia	140	225	365	359	39%	63%	102%
Denmark	12	556	568	570	2%	98%	100%
Germany	366	3 962	4 328	4 101	9%	97%	106%
Greece	.	.	.	95	.	.	.
Spain	109	842	951	817	13%	103%	116%
Estonia	7	87	94	85	9%	102%	111%
France	355	3 382	3 737	3 554	10%	95%	105%
Croatia	34	76	110	136	25%	56%	81%
Hungary	71	178	248	239	30%	74%	104%
Ireland	29	1 385	1 414	1 369	2%	101%	103%
Italy	517	1 467	1 984	1 939	27%	76%	102%
Lithuania	45	227	273	256	18%	89%	107%
Luxembourg	2	50	52	53	4%	94%	99%
Latvia	17	144	161	144	12%	100%	112%
Malta	0	7	7	6	2%	106%	109%
Netherlands	106	1 674	1 780	1 552	7%	108%	115%
Austria	50	514	564	533	9%	96%	106%
Poland	405	1 663	2 068	2 214	18%	75%	93%
Portugal	15	186	202	235	6%	79%	86%
Romania	414	437	851	1 158	36%	38%	73%
Finland	11	284	294	264	4%	108%	112%
Sweden	10	350	360	313	3%	112%	115%
Slovakia	58	73	131	128	46%	57%	103%
Slovenia	18	94	112	103	18%	91%	109%
United Kingdom	65	1 754	1 819	1 879	3%	93%	97%
EU 28	**3 008**	**20 292**	**23 300**	**22 908**	**13%**	**89%**	**102%**

Source: EU FADN 2018, Eurostat livestock statistics 2018, treatment DG AGRI.

Table 3: Share of milk production covered by the FADN by Member State in 2018

Milk production (in 1000 tonnes)	FADN 2018			Eurostat 2018	Coverage FADN/ESTAT		
	Non-specialised milk farms	Specialised milk farms	Total		Non-specialised milk farms	Specialised milk farms	Total
Belgium	651	3 675	4 327	4 244	15%	87%	102%
Bulgaria	229	728	956	899	25%	81%	106%
Cyprus	.	.	.	228	.	.	.
Czechia	1 195	1 857	3 052	3 162	38%	59%	97%
Denmark	111	5 455	5 566	5 615	2%	97%	99%
Germany	2 803	31 638	34 441	33 087	8%	96%	104%
Greece	.	.	.	655	.	.	.
Spain	594	7 473	8 067	7 336	8%	102%	110%
Estonia	57	825	881	797	7%	103%	111%
France	2 386	23 872	26 258	25 055	10%	95%	105%
Croatia	105	396	501	618	17%	64%	81%
Hungary	484	1 418	1 902	1 949	25%	73%	98%
Ireland	139	8 104	8 243	7 831	2%	103%	105%
Italy	1 556	9 796	11 353	12 340	13%	79%	92%
Lithuania	268	1 334	1 602	1 568	17%	85%	102%
Luxembourg	14	394	408	408	4%	97%	100%
Latvia	91	967	1 058	980	9%	99%	108%
Malta	1	45	46	40	2%	111%	113%
Netherlands	918	14 910	15 828	14 090	7%	106%	112%
Austria	286	3 778	4 065	3 821	7%	99%	106%
Poland	1 958	10 109	12 067	14 171	14%	71%	85%
Portugal	88	1 493	1 581	1 940	5%	77%	82%
Romania	1 488	1 591	3 079	3 798	39%	42%	81%
Finland	97	2 617	2 714	2 398	4%	109%	113%
Sweden	71	3 252	3 323	2 760	3%	118%	120%
Slovakia	419	535	954	905	46%	59%	105%
Slovenia	66	541	608	629	11%	86%	97%
United Kingdom	437	13 137	13 574	15 488	3%	85%	88%
EU 28	**16 513**	**149 940**	**166 453**	**166 810**	**10%**	**90%**	**100%**

Source: EU FADN 2018, Eurostat production statistics 2018, treatment DG AGRI.

Table 4: Share of milk production by Member State in the FADN 2018

Member State	Share of milk production 2018
Belgium	2%
Bulgaria	1%
Cyprus	0%
Czechia	2%
Denmark	3%
Germany	21%
Greece	0%
Spain	4%
Estonia	1%
France	16%
Croatia	0%
Hungary	1%
Ireland	5%
Italy	7%
Lithuania	1%
Luxembourg	0%
Latvia	1%
Malta	0%
Netherlands	10%
Austria	2%
Poland	7%
Portugal	1%
Romania	2%
Finland	2%
Sweden	2%
Slovakia	0%
Slovenia	0%
United Kingdom	8%
EU 28	**100%**

Source: EU FADN - DG AGRI.

Table 5: Share of milk production by Member State and farm type in FADN 2018

Member State	Share of milk production by farm type				Share of farms by farm type			
	Specialised milk farms				Specialised milk farms			
	Specialist dairying	Cattle - dairying, rearing and fattening combined	Mixed livestock, mainly grazing	Mixed fieldcrops and grazing livestock combined	Specialist dairying	Cattle - dairying, rearing and fattening combined	Mixed livestock, mainly grazing	Mixed fieldcrops and grazing livestock combined
Belgium	72%	15%	8%	4%	67%	23%	5%	5%
Bulgaria	92%	3%	0%	6%	93%	2%	1%	4%
Cyprus	100%	0%	0%	0%	100%	0%	0%	0%
Czechia	44%	2%	4%	50%	65%	8%	3%	25%
Denmark	99%	0%	1%	0%	98%	0%	1%	1%
Germany	90%	3%	2%	6%	92%	5%	1%	3%
Greece	21%	79%	0%	0%	74%	26%	0%	0%
Spain	97%	2%	1%	0%	91%	7%	1%	0%
Estonia	92%	1%	0%	7%	83%	10%	0%	7%
France	73%	8%	5%	13%	74%	11%	4%	11%
Croatia	84%	11%	0%	5%	75%	20%	0%	5%
Hungary	90%	0%	0%	10%	81%	0%	0%	19%
Ireland	96%	3%	1%	0%	93%	6%	1%	0%
Italy	93%	4%	1%	1%	89%	9%	0%	1%
Lithuania	81%	2%	0%	17%	89%	3%	0%	9%
Luxembourg	88%	11%	1%	1%	83%	15%	1%	1%
Latvia	81%	2%	1%	16%	83%	3%	3%	11%
Malta	93%	1%	5%	0%	96%	2%	2%	0%
Netherlands	98%	0%	2%	0%	97%	0%	2%	0%
Austria	96%	3%	0%	1%	94%	5%	0%	1%
Poland	89%	1%	1%	9%	91%	2%	1%	7%
Portugal	99%	1%	0%	0%	98%	2%	0%	0%
Romania	74%	14%	5%	7%	65%	17%	10%	8%
Finland	98%	1%	0%	1%	98%	1%	0%	2%
Sweden	94%	6%	0%	1%	88%	11%	0%	1%
Slovakia	63%	5%	4%	29%	63%	12%	1%	24%
Slovenia	97%	1%	0%	1%	94%	4%	1%	1%
United Kingdom	97%	1%	1%	1%	96%	3%	1%	1%
EU 28	**89%**	**4%**	**2%**	**5%**	**85%**	**7%**	**3%**	**5%**

Source: EU FADN - DG AGRI.

ANNEX II

Results in 2008-2019 for EU-28 and EU-27 (without the UK), by Member State and region are available on AGRI's food data portal:

https://agridata.ec.europa.eu/extensions/FarmEconomyFocus/FarmEconomyFocus.html

Data as of January 2021.

European Commission

EU dairy farms report
based on 2018 FADN data

Contact:
European Commission
DG Agriculture & Rural Development,
Farm economics
E-mail: agri-rica-helpdesk@ec.europa.eu
Internet: https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/farms-farming-and-innovation/structures-and-economics/economics/fadn_en

This report provides an overview of costs of production, margins and income of specialised milk farms in the EU. The analysis is based on 2018 FADN data.

European Commission
Directorate-General for Agriculture and Rural Development
https://ec.europa.eu/info/departments/agriculture-and-rural-development_en