Croatian pork meat market outlook and analysis of monthly remainders in pig fattening

Aleksandra Berić[2], Krunoslav Zmaić[1], Ana Crnčan[1], David Kranjac[1]

[1] Josip Juraj Strossmayer University in Osijek, Faculty of Agrobiotechnical Sciences Osijek, Vladimira Preloga 1, 31000 Osijek, Croatia
[2]Postgraduate university student of doctoral studies, majoring in "Agroeconomics", Faculty of Agrobiotechnical Sciences Osijek, J.J.Strossmayer University of Osijek, Vladimira Preloga 1, Osijek, Croatia (aberic@fazos.hr),

Abstract

Pork meat production is one of the key sectors of agricultural production in the Republic of Croatia, playing a significant role in ensuring domestic meat supply and supporting rural economic activity. However, in recent years particularly in the period from 2020 to 2023 the sector has been facing persistent negative indicators and structural challenges. These difficulties come from strong market volatility, high input costs (feed, energy), and simultaneously low purchase prices which have contributed to reduced production stability. Crises such as the COVID-19 pandemic, the war in Ukraine, and the outbreak and spread of African Swine Fever have further exacerbated the sector's vulnerabilities. This paper provides a balance sheet overview of the Croatian pig production sector since Croatia's accession to the EU and an analysis using the Monthly Remainders Methodology, with the aim of identifying the key trends and changes in the sector's performance and explaining why these have deteriorated during the 2020 to 2023 period.

INTRODUCTION

Despite favourable natural conditions, the availability of resources, and a long-standing tradition of pig farming, the pig production sector in the Republic of Croatia has been facing numerous structural and market related challenges, particularly since the country's accession to the European Union in 2013. Although deeply rooted in rural areas especially in Eastern Croatia this sector has been experiencing a continuous decline in production capacity and competitiveness compared to other EU member states (Kranjac et al., 2018; Grgić et al., 2019).
A comparison of sectoral indicators from 2013 and 2023 reveals clear negative trends, most notably a decline in the number of sows and pigs across all categories, indicating a long-term downward trajectory in production (Table 1).

Table 1. Number of different categories of pigs in the Republic of Croatia (2013 – 2023)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023 vs 2013
Piglets and pigs from 20 to 50 kg (000 head)	518	595	526	557	511	502	444	464	434	383	375	-27.5%
Pigs for fattening (000 head)	465	442	519	483	482	423	451	456	431	474	391	-16.1%
Pigs for breeding (000 head)	128	119	122	122	128	124	128	113	107	87	87	-32.0%
Pigs total (000 head)	1111	1156	1167	1163	1121	1049	1022	1033	971	944	853	-23.2%

Source: Croatian Bureau of Statistics 2013-2023

Changes in demand, increased competition within the EU single market, and growing pressure on the economic sustainability of production have further worsened conditions on the domestic pork market. Between 2013 and 2023, pork meat production in Croatia increased modestly by 5.5%, while domestic consumption rose by over 40%, highlighting a growing dependence on imports. Imports surged by 68.5% over the same period. Consequently, the trade deficit in pork deepened, with net exports deteriorating by 57.4%, reflecting the sector's declining self-sufficiency and competitiveness (Table 2).

Table 2. Pork meat market outlook in the Republic of Croatia (2013 – 2023)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023 vs. 2013
Pork meat production (1000 t)	106,8	95,8	94,0	104,9	118,3	129,7	134,8	125,3	122,5	129,5	112,6	5.5%
Domestic consumption (1000 t)	148,2	155,9	160,5	166,3	173,7	193,6	197,3	188,6	209,4	226,2	210,2	41.8%

Imports (1000 t)	60,64	75,96	86,13	81,34	86,16	87,53	83,54	84,86	94,31	102,9	102,2	68.5%
Exports (1000 t)	1,55	3,35	7,03	9,41	7,04	7,44	7,08	6,65	7,40	12,62	9,23	495,5%
Net Exports (1000 t)	-59	-72,6	-79,1	-71,9	-79,1	-80,1	-76,5	-78,2	-86,9	-90,4	-93	-57,4%

Source: Croatian Bureau of Statistics 2013-2023

Figure 1 illustrates the self-sufficiency rate in pig meat production in Croatia compared to the European Union average from 2013 to 2023. While the EU has maintained a consistently high level of self-sufficiency exceeding 100% throughout the observed period, Croatia's self-sufficiency has shown a continuous downward trend. This divergence highlights the increasing structural vulnerability and declining domestic capacity of the Croatian pig sector.

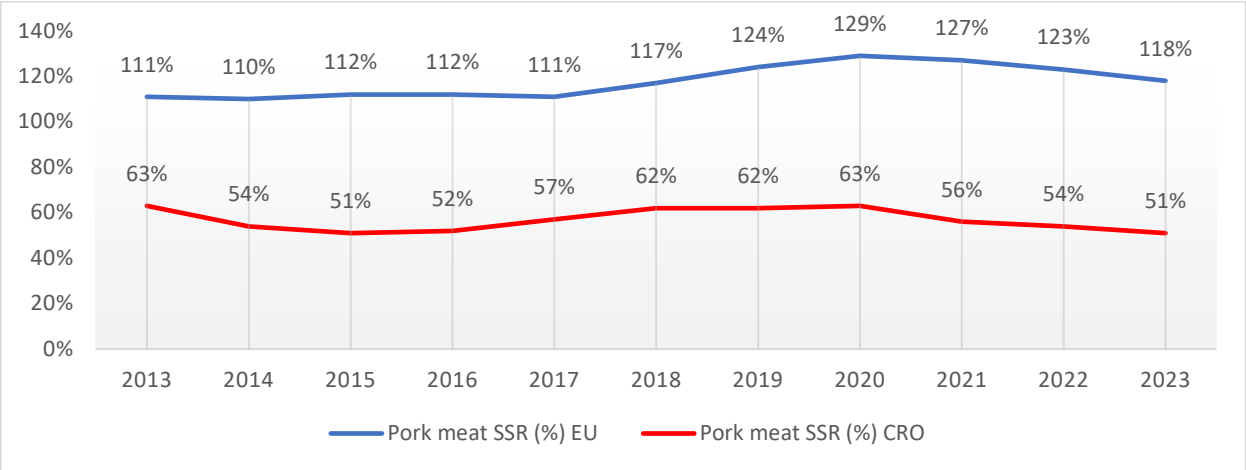

Figure 1. Comparison of pork meat self-sufficiency in the EU and Croatia (2013 – 2023)

Source: Croatian Bureau of Statistics, EUROSTAT 2013-2023

Since 2020, the sector has been additionally destabilised by a series of external shocks. The outbreak of the COVID-19 pandemic caused significant disruptions in supply chains and led to pork surpluses, which dramatically reduced purchase prices. Although pork prices began recovering in early 2022, producers did not experience financial relief due to the surge in input costs, driven by inflation and the rise in energy prices caused by the war in Ukraine (Sohag et al., 2023). Prices of cereals and animal feed increased significantly, while elevated piglet prices throughout 2023 placed further pressure on producers' profitability.

During the same period, the sector was also affected by the outbreak of African Swine Fever (ASF), which further disrupted production, restricted the movement of live animals, and undermined investment security. The combination of market volatility, cost increases, and animal disease outbreaks has deepened already existing negative trends and threatens the long-term sustainability of pig production in the Republic of Croatia (Kranjac et al., 2020; Grgić et al., 2016).

METHODOLOGICAL APPROACH

The monthly remainders methodology is an established analytical tool developed and applied by the European Commission's Meat Market Observatory under DG AGRI. Its primary purpose is to monitor and analyse key production input factors in the pig sector across the European Union (EU). The methodology allows for the calculation of the remaining margin (remainder) left to producers after deducting the cost of basic production inputs from the average monthly carcass price of pigs.

The basic production inputs considered in the calculation include the cost of compound feed ingredients and piglet prices, which are analysed alongside monthly pig carcass prices. The average monthly price of feed ingredients is derived from the weighted average of monthly prices of cereals (feed barley, wheat, and maize) and soybean meal, with cereals accounting for 85% and soybean meal for 15% of the feed composition. All price data including piglet, feed, and carcass prices were obtained from the DG AGRI commodity price monitoring platform (Monthly Commodity Dashboard).

In addition to input prices, the methodology incorporates key parameters of the pig fattening cycle. Some of these parameters are fixed, such as the initial piglet weight, average daily gain, fattening duration, feed conversion ratio, and carcass yield. Others are calculated values, including the final weight of the fattened pig, carcass weight, and required feed quantity per 100 kg of carcass weight.

Based on this methodology, a comprehensive overview was created for the average monthly prices of feed, piglets, carcasses, and the calculated monthly remainder (in EUR) left to producers in the Republic of Croatia for the period from 2020 to 2023.

The following parameters are used in the calculation of monthly remainders in pig fattening:

- Initial piglet weight (IPW, kg) = fixed = 25.00
- Average daily gain (ADG, kg) = fixed = 0.80
- Fattening duration (days) = fixed = 121.7
- Feed conversion ratio (kg gain/kg feed) = fixed = 3.00
- Carcass yield (CY, index) = fixed = 0.78
- Final weight (FW, kg) = calculated = IPW + (ADG × fattening duration)
- Carcass weight (CW, kg) = calculated = FW × CY
- Feed requirement (FR, kg per 100 kg carcass) = (ADG × fattening duration × conversion ratio) × 100 / CW
- Feed composition = fixed
- Average feed price (AFP, EUR/kg) = monthly feed price × share of component in the feed
- Feed cost (FC, EUR/100 kg carcass) = AFP × FR
- Piglet price (PP, EUR/head) = fixed
- Piglet cost per 100 kg carcass (PC, EUR) = PP × 100 / CW
- Carcass price (CP, EUR/100 kg) = average of S, E, and R classes
- Monthly remainder (EUR/100 kg carcass) = CP – (FC + PC)

RESULTS

The analysis of monthly producer remainder in pig fattening in the Republic of Croatia from 2020 to 2023 reveals pronounced market disruptions and cost pressures, particularly in the wake of pandemic and war-induced shocks. Figure 2 shows monthly average carcass prices (S+E classes), feed costs, piglet prices, and the calculated producer remainder (margin) per 100 kg of carcass. The beginning of the year 2020 was still relatively stable, despite the onset of the COVID-19 pandemic in early spring. The full effects of pandemic-related market disruptions did not materialize until the last quarter of the year, when carcass prices began to decline sharply indicating the emergence of surplus volumes on the EU single market.

In 2021, the sector entered a pronounced crisis phase. Average annual feed costs increased by 34.5% compared to 2020, while carcass prices declined by 17%. These dynamics significantly eroded profitability, with the producer remainder dropping by more than 60%. Monthly data show that throughout much of 2021, margins were critically low or negative, especially in the second half of the year.

Although carcass prices began recovering in early 2022, this did not result in a recovery of producer remainders. The main limiting factor was the surge in feed costs triggered by the outbreak of war in Ukraine. Compared to 2020, feed costs in 2022 were nearly twice as high, while the average annual producer remainder was just 20.51 EUR per fattened pig, lower than in 2021. This suggests that the increase in output prices was insufficient to compensate for extreme input cost inflation.

The year 2023 was also characterized by elevated production costs. Feed prices remained high (64.5% above 2020 levels), and piglet prices surged dramatically by 120.4% compared to 2020. However, a strong increase in carcass prices throughout much of the year (up 34.6% compared to 2020) provided partial relief. The average annual producer remainder rose to 37.34 EUR per pig, marking a modest recovery but still far from sustainable margins.

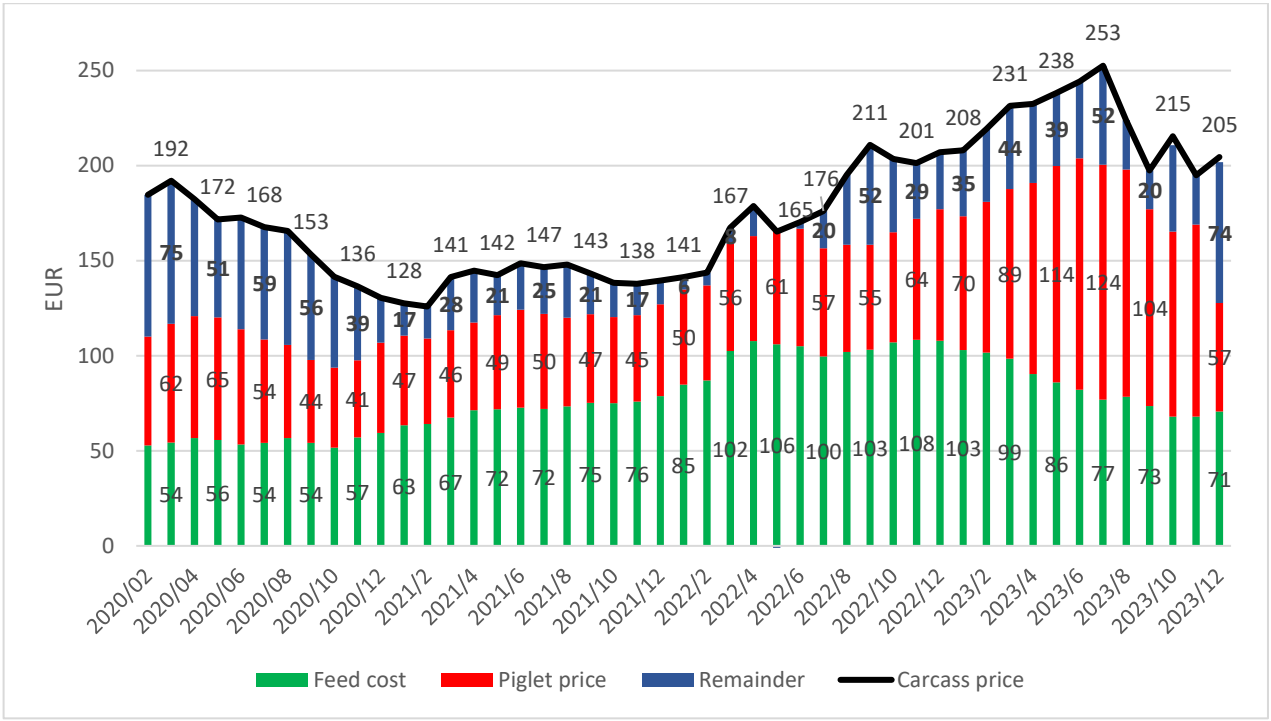

Figure 2. Monthly producer remainder in pig fattening in the Republic of Croatia from 2020 to 2023.

Source: Author's calculation according to DG AGRI - Monthly commodity dashboard

Between 2020 and 2023, there was a marked increase in average carcass prices and piglet prices, particularly in 2023, when the piglet price nearly doubled compared to 2020. Feed costs peaked in 2022, followed by a slight decrease in 2023 (Table 3). The "Remainder" value, which reflects a form of margin or profitability indicator, showed a significant drop in 2021 and 2022, but partially recovered in 2023. This suggests that despite high input costs, better market prices for carcasses helped improve returns in the 2023.

Table 3. Comparative display of average values by year (2020–2023)

Year	Feed cost	Piglet price	Remainder	Carcass price
2020	54.75	53.42	57.33	165.58
2021	71.67	47.17	21.25	140.33
2022	101.75	57.75	20.50	180.00
2023	83.08	98.08	40.17	221.83

Source: Author's calculation

Discussion

The results confirm that the Croatian pig production sector has undergone a period of significant deterioration between 2013 and 2023, both in terms of structural capacity and economic viability. The decline in the number of breeding animals, persistent reduction in total pig stock, and increasing import dependency clearly point to a long-term erosion of production potential. This structural weakening is mirrored in the decline of Croatia's self-sufficiency rate, which has fallen sharply even as the EU average remains stable.

The producer margin analysis based on the monthly remainders methodology further reveals that this deterioration is not only structural but also strongly influenced by external cost and price shocks. The most critical period, as shown, was 2021–2022, when producers faced the dual burden of sharply increased feed prices and only modest carcass price recovery, leading to unsustainably low margins. Although 2023 brought a moderate recovery in sector, it was driven largely by favourable market prices rather than underlying cost reductions or productivity improvements suggesting a fragile and uncertain recovery.

In this context, it becomes evident that the Croatian pig sector lacks resilience and is heavily exposed to input price volatility, particularly in feed and piglet markets. Compared to more integrated or vertically coordinated systems in other EU countries, Croatian production is still fragmented, undercapitalized, and under-technologized. Moreover, the impact of external crises (e.g., COVID-19, the war in Ukraine, and ASF outbreaks) has been magnified in Croatia by the absence of adaptive support mechanisms, structural investment, and long-term policy orientation.

Importantly, the growing trade deficit and rising domestic consumption underline a serious food security issue. The inability to meet domestic demand despite favourable agro-climatic conditions raises questions about policy effectiveness and the alignment of CAP support instruments with national priorities. Current trends suggest that without

targeted intervention particularly in breeding herd recovery, technology adoption, and risk management the sector may continue to decline, further undermining rural development and national meat supply chains.

Future policy directions must therefore focus not only on short-term crisis relief but also on long-term restructuring. This includes incentivizing genetic improvement, fostering producer cooperatives, modernizing farm infrastructure, and improving market access. At the same time, national authorities should work more closely with EU institutions to ensure that rural development measures, environmental schemes, and animal welfare standards do not unintentionally disadvantage small and middle-sized producers who already operate under tight margins.

CONCLUSION

The Croatian pig production sector has experienced a sustained decline from 2013 to 2023, marked by significant reductions in pig population, breeding stock, and self-sufficiency. Despite favourable natural and agricultural conditions, the sector's competitiveness has eroded due to structural inefficiencies, limited modernization, and vulnerability to market and external shocks such as the COVID-19 pandemic, the war in Ukraine, and African Swine Fever (ASF).

Economic analysis based on the "monthly remainders" methodology shows that producers faced especially critical conditions in 2021 and 2022, when skyrocketing feed and piglet costs were not matched by carcass prices, resulting in unsustainably low or even negative margins. A partial recovery in 2023 was largely price-driven and remains fragile.

The growing gap between domestic pork production and consumption, alongside a widening trade deficit, highlights an urgent need for strategic policy intervention. Without targeted investments in breeding programs, infrastructure, and risk management, as well as support for producer collaboration and technological adoption, the sector risks further decline.

To ensure long-term sustainability, future policy must balance economic competitiveness with social and environmental goals, aligning EU and national support frameworks to strengthen the resilience, productivity, and food security role of Croatia’s pig sector.

REFERENCES

Croatian Bureau of Statistics (2025). Livestock production data. https://web.dzs.hr/PXWeb/Menu.aspx?px_language=hr&px_type=PX&px_db=Poljoprivreda%2c+lov%2c+%u0161umarstvo+i+ribarstvo (Accessed April 17, 2025)

European Commission, DG AGRI (2025). Monthly commodity price dashboard. https://agridata.ec.europa.eu/extensions/DashboardPrice/DashboardMarketPrices.html (Accessed April 18, 2025)

EUROSTAT (2025). Agricultural production - livestock and meat data. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agricultural production-livestock and meat (Accessed April 17, 2025)

Grgić, I., Hadelan, L., Prišenk, J., Zrakić, M. (2016). Stočarstvo Republike Hrvatske: stanje i očekivanja. Meso, 3(8), 256-262.

Grgić, I., Krznar, S., Bratić, V. (2019). Poljoprivredna proizvodnja Republike Hrvatske prije i nakon pristupanja EU. U: Bilandžija, N., Kovačev, I., ur. Aktualni zadaci mehanizacije poljoprivrede. Zagreb: Sveučilište u Zagrebu, Agronomski fakultet, Zavod za mehanizaciju poljoprivrede, 487-496.

Kranjac, D., Zmaić, K., Erjavec, E. (2018). Pregled i perspektiva tržišta svinjskog mesa u Republici Hrvatskoj-simulacija modelom parcijalne ravnoteže. Agroeconomia Croatica, 8(1): 75-83.

Kranjac, D., Zmaić, K., Grgić, I., Salamon, P., Erjavec, E. (2020). Accession impact and outlook for Croatian and EU crop and livestock markets. Spanish journal of agricultural research, 18(1), 103.

Sohag, K., Islam, M., Tomas Žiković, I., Mansour, H. (2023). Food inflation and geopolitical risks: analyzing European regions amid the Russia-Ukraine war. British Food Journal, 125(7): 2368-2391.