A COMPARATIVE ANALYSIS OF DAIRY PRICE DYNAMICS IN THE EU, GLOBAL MARKETS, AND ROMANIA (2007–2025)

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Abstract

The dynamics of dairy product prices represent a major field of interest in the analysis of agri-food markets, with implications for competitiveness, sustainability, and food security. Between 2007 and 2025, their evolution has been shaped by multiple factors, such as raw material volatility, economic and financial crises, climate change, agricultural and trade policies, as well as disruptions caused by pandemics and geopolitical conflicts. This study provides a comparative examination of dairy price fluctuations in the European Union, on international markets, and in Romania, using the Food Price Index (FPI) as an analytical benchmark. The analysis seeks to correlate global and European trends with the specificities of the Romanian dairy sector, taking into account production structure, domestic consumption levels, and integration into trade flows. Through this approach, the study outlines the main mechanisms and driving factors behind price variations, offering a framework for understanding the complexity of the current context and identifying avenues for further research.

Key words: *diaries, food price index, food security, geopolitical environment, policies*

INTRODUCTION

The dairy sector represents a cornerstone of the agri-food economy, providing essential nutrients for human diets while generating significant income and employment along the agricultural value chain [1,2]. Globally, milk production has increased by more than 60% over the past three decades, driven by rising demand in Asia and other emerging economies, population growth, and improvements in herd genetics and feed efficiency [3]. The European Union (EU) accounts for roughly 21% of global milk output and remains one of the largest exporters of dairy products, contributing substantially to global food security and rural livelihoods [4,5].

Between 2007 and 2025, the dairy sector has undergone profound structural changes and has been exposed to increased market volatility. The abolition of milk quotas in April 2015 represented a major shift in EU agricultural policy, encouraging market liberalization and productivity growth [6], but also exposing farmers to price swings linked to international supply and demand conditions [7]. Following quota removal, milk production in some EU countries expanded rapidly, leading to temporary oversupply and downward pressure on farm-gate prices [8]. These developments coincided with global price shocks, including the 2008–2009 financial crisis, fluctuations in feed and energy prices, and climate-related disruptions such as droughts that reduced forage availability [9,10].

At the global level, the FAO Food Price Index (FFPI) has shown significant variation over this period. In August 2025, the overall FFPI averaged 130.1 points, nearly unchanged from July but 6.9% above its August 2024 level. The FAO Dairy Price

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Index, which reflects price changes for butter, skim milk powder (SMP), whole milk powder (WMP) and cheese, declined slightly compared to July 2025, but remained 16.2% higher year-on-year, reflecting sustained demand and tight supplies [11]. The high sensitivity of the dairy price sub-index to both input costs and export availability underscores its role as a barometer of global food market stability.

External shocks have amplified price volatility in recent years. The COVID-19 pandemic disrupted global dairy supply chains, led to a sudden shift in consumption patterns from food-service to retail, and caused temporary oversupply and milk dumping in some regions [12]. Regression discontinuity analyses show that retail dairy prices initially dropped by approximately 8% during early lockdowns due to collapsing out-of-home demand and elevated consumer price sensitivity [12]. More recently, the Russia-Ukraine war has significantly increased input costs (notably energy, fertilizers, and feed grains), exerting upward pressure on production costs and contributing to renewed price spikes across the food sector [13]. These combined shocks have highlighted the vulnerability of dairy producers to global market disturbances and have renewed discussions on the need for policy tools to stabilize farm incomes [14].

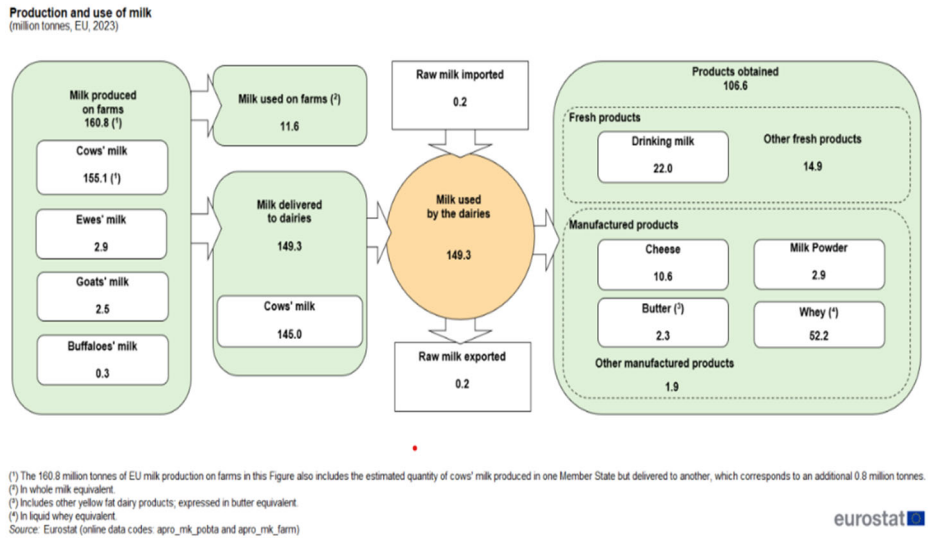

Fig. 1 Production and use of milk
(million tones, EU, 2023)

Eurostat data indicate that EU milk production has generally followed a stable or slightly increasing trajectory since 2015, with regional differences reflecting structural competitiveness, climatic conditions, and the adoption of technological innovations [15]. Major producers such as Germany, France, the Netherlands, and Poland dominate EU milk output, while smaller producers face structural challenges including fragmented farm structures and lower productivity [16].

Romania holds a distinctive position within the EU dairy landscape. While milk and dairy consumption remain culturally ingrained, Romania has consistently registered a negative trade balance for dairy products, reflecting insufficient domestic production to cover demand [17]. According to national statistical data, cattle herds

decreased by 8.01% between 2016 and 2020, yet milk production increased by nearly 16% due to productivity improvements [18]. However, production faced renewed pressure in 2021-2022 from rising input costs, drought affecting feed crops, and price imbalances imposed by processors [19]. Consumer surveys show that price and store availability remain primary purchase drivers, but there is a growing preference for local origin, ecological certification, and traditional dairy products among higher income groups [20].

Importantly, dairy price dynamics are influenced not only by macroeconomic and policy shocks but also by changes in production practices that directly impact milk composition and quality**.** Recent research demonstrates that supplementing cow diets with oilseed cakes (sunflower, rapeseed, linseed) can significantly modify the fatty acid profile of milk, increasing its nutritional value and market differentiation potential [21]. Such feed interventions, particularly those that enhance Omega-3 content and improve the Omega-6/Omega-3 ratio, contribute to the production of value-added dairy products that can command premium prices on the market, aligning with consumer trends favoring functional and healthier foods [21,22].

Given this complex context, the present study aims to perform a comparative analysis of dairy price dynamics between 2007 and 2025 in three major contexts: global markets, the EU aggregate, and Romania. Using the FAO Food Price Index (FPI) as an analytical benchmark [23], together with Eurostat [25] and INS [18] data on production and trade, the study correlates global and European trends with Romania's production structure, domestic consumption, and market integration. The analysis seeks to identify the principal mechanisms driving price variability, clarify the transmission of global shocks to national price formation, and propose policy recommendations to enhance resilience and competitiveness in the Romanian dairy sector. [14]

MATERIAL AND METHOD

This study integrates data and insights from peer-reviewed scientific publications identified through comprehensive searches in databases such as ScienceDirect, Web of Science (via Enformation), and Google Scholar. In addition, statistical data were retrieved from authoritative sources, including the Food and Agriculture Organization (FAO) Food Price Index (FPI) and Dairy Price Index, Eurostat databases on milk production, prices and trade, and national statistics provided by the Romanian National Institute of Statistics (INSSE) and the National Agency for Animal Husbandry.

The analysis covers the period 2007–2025 and combines descriptive and comparative approaches. Global, EU and Romanian price trends were examined through index-based comparisons, while production, trade balance, and competitiveness indicators (RCA) were calculated to assess the integration of Romania's dairy sector into international markets. Particular attention was given to the effects of external shocks—including the abolition of milk quotas, the COVID-19 pandemic, and the Russia-Ukraine war—on price volatility and market dynamics.

RESULTS AND DISSCUSIONS

1) Evolution of Dairy Prices (2007-2025)

The evolution of dairy product prices between 2007 and 2025 reflects a sequence of economic cycles, market crises, and structural transformations within the global agri-food supply chain. According to data from the Food and Agriculture Organization, the Dairy Price Index recorded three major peaks during this period - 2008, 2014, and 2022 -each followed by corrective phases resulting from supply–demand imbalances. [23]

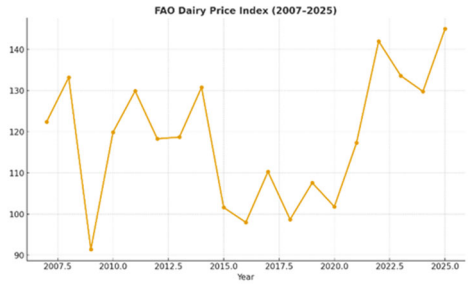

Fig. 2 FAO Dairy Price Index (2007-2025)

– 2007-2009 - Global Financial Crisis: After a rapid increase in international demand in 2007, prices for skimmed milk powder and butter reached record highs, followed by a decline of almost 40% in 2008-2009 due to the global recession [23].
– 2010-2014 - Recovery Phase: Between 2010 and 2014, expanding demand from Asia and the Middle East drove a new upward cycle in global dairy trade, bringing the FAO Dairy Index to around 250 points by mid-2014 [24].
– 2015-2016 - Abolition of EU Milk Quotas: The removal of milk production quotas across the European Union (Regulation 1308/2013) led to a temporary oversupply and a 15% drop in farm-gate milk prices, with the EU average falling to 29.8 EUR/100 kg [25]. This period placed considerable pressure on farmers, particularly in Central and Eastern Europe, including Romania.
– 2017-2019 - Moderate Stabilization: From 2017 onward, prices stabilized, fluctuating around 34-36 EUR/100 kg in the EU, supported by improved market balance and increased exports to Asia and North Africa [25].
– 2020-2021 - COVID-19 Pandemic Impact: The global health crisis caused a drop in demand from the food service sector and significant logistic disruptions, followed by a rapid rebound in household consumption. FAO reported that the global Dairy Price Index recovered to about 130 points in 2021 [23]

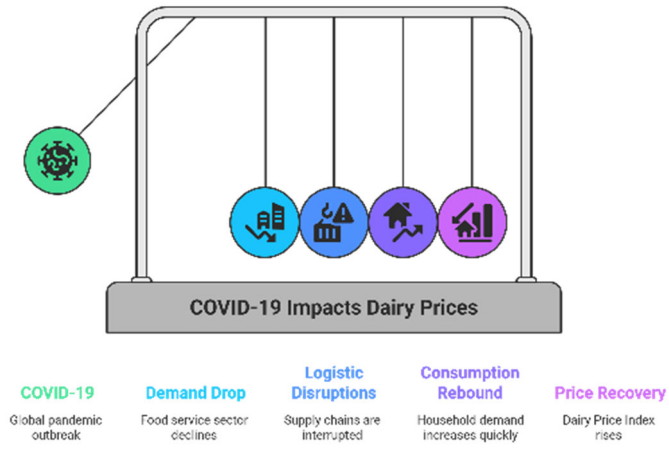

Fig. 3 COVID-19 Impacts Dairy Prices

– 2022-2023 - Energy Crisis and War in Ukraine: Prices reached their highest level in two decades, increasing by nearly 20% compared to 2021, driven by escalating costs of energy, feed, and transportation [26]. In 2023, the FAO reported a 16.6% decline, with the index averaging 118.8 points, reflecting weaker global import demand and the accumulation of stocks [23, 26].
– 2024-2025 - Rebalancing Phase: In 2024, the average FAO index reached 129.6 points, while in September 2025 it stood at 148.3

points (-2.6% month-to-month; +9% year-to-year), signaling the transition toward a new market equilibrium [23, 27, 28].

At the European Union level, farm-gate milk prices followed a similar pattern, rising steadily from 26 EUR/100 kg in 2007 to 55 EUR/100 kg in 2023, with shorter recovery phases compared to global markets [25].

In Romania, the trend mirrored that of the EU but exhibited greater volatility. The study by Vâtcă et al. [29] showed that, between 2013 and 2018, Romanian average raw-milk prices were at least 20% below the EU mean, with marked seasonality - higher in autumn and winter, lower in spring and summer. In 2007, the farm-gate price averaged 0.23 EUR/L, reaching 0.57 EUR/L in 2023, reflecting rising production costs and inflationary pressures [25, 29].

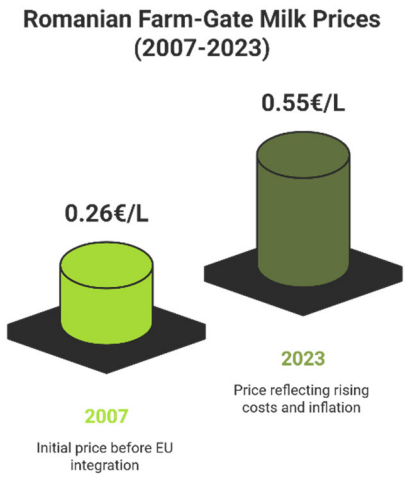

Fig. 4 Romanian Farm-Gate Milk Prices (2007-2023)

Overall, the 2007-2025 period confirms that global and EU dairy markets are strongly interconnected, while lower-productivity member states, such as Romania, remain more exposed to input-cost shocks and production imbalances.

2) Comparative Analysis: Global, EU, and Romania

Global dairy markets between 2007 and 2025 exhibited high volatility but also strong synchronization with European price trends [23, 25, 30]. FAO and Eurostat data indicate that while global prices fell sharply during crises (2008–2009 and 2015–2016), the European Union recovered faster due to improved export capacity and policy adjustments [23, 25].

Romania generally followed the EU trajectory but with higher amplitude in both price increases and decreases. The average Romanian farm-gate price remained 15–25% below the EU mean throughout most of the period, mainly because of lower productivity, smaller farm size, and dependence on imported feed and energy inputs [29, 31].

3) Structural Factors Affecting Romanian Prices

The evolution of dairy product prices in Romania between 2007 and 2025 was influenced by a series of structural, economic, and institutional factors closely connected to the general dynamics of Romanian agriculture and the gradual integration into the European single market. Following the country's accession to the European Union in 2007, the dairy sector underwent a complex transformation process characterized by the progressive modernization of processing units, changes in farm structure, and alignment with the standards of the Common Agricultural Policy (CAP) [30]. However, the slow pace of adaptation, high fragmentation, and unequal access to resources maintained strong price volatility, with Romania consistently ranking below the EU average in terms of farm-gate milk prices [29,30,31].

Farm Structure and Production Fragmentation

The extremely fragmented production structure was one of the main factors influencing the formation of dairy product prices. More than 90% of dairy farms in Romania owned fewer than five cows, and

a significant share of production was intended for self-consumption [18,32]. This structure limited economies of scale and producers competitiveness, generating high collection costs and difficulties in standardizing raw milk quality [33]. The differences between commercial and subsistence farms deepened, which led to a polarization of the market and the consolidation of the industrial segment around major processors [34].

Milk Collection System and Rural Infrastructure

The milk collection network underwent major transformations after 2010, yet regional disparities persisted. Areas with a higher density of cooperatives-particularly Transylvania and Banat-recorded more stable prices, while southern and eastern regions, dominated by individual producers, faced stronger decreases in farm-gate prices [35]. High logistics costs, poor rural infrastructure, and insufficient cooling and storage facilities caused significant efficiency losses, estimated at 15-20% of the final product price [36].

Investments, Subsidies, and Access to Finance

APC (Agricole Production Cooperatives) policies supported sector modernization through the 2014–2020 and 2021–2027 Rural Development Programs; however, their impact was uneven [38]. Large processors benefited from funds for equipment modernization, livestock genetics improvement, and capacity expansion, while small farmers encountered difficulties in obtaining financing and co-financing [37,38].

The absorption rate of EU investment funds in the dairy sector remained below 40%, further amplifying competitiveness gaps between farms [17]. Consequently, between 2015 and 2020, the market structure became significantly more concentrated, with the top ten processors controlling over 60% of the total processed milk volume at the national level [39].

Abolition of Milk Quotas and Market Liberalization

The abolition of the milk quota system in 2015 had direct effects on the Romanian market, which had never reached its national quota before liberalization [7]. After 2015, the domestic market became more vulnerable to external price fluctuations, being influenced by milk surpluses from Western Europe. Between 2016 and 2018, the average price of raw milk in Romania decreased by almost 10%, due to declining international demand and rising imports of finished dairy products [8]. Macroeconomic factors such as GDP, disposable income, and food consumption significantly influenced production and price dynamics in the post-quota period [40].

External Crises and Inflationary Impact (2020–2025)

Between 2020 and 2025, external crises exacerbated structural imbalances, as the COVID-19 pandemic disrupted supply chains, increased input prices, and reduced HoReCa demand, generating temporary surpluses and raw milk price declines [12,13,30].

The war in Ukraine led to sharp increases in energy, feed, and transport costs, which were subsequently transmitted to final dairy prices. Despite partial government support measures, inflationary pressures remained high, with dairy prices rising by more than 45% between 2021 and 2023 [12,13,30,14].

Sustainability Transition and Structural Costs

The transition toward sustainability and the enforcement of EU standards on environmental protection and animal welfare have significantly altered the cost structure of Romanian dairy production [30]. Similar to other Eastern European states, Romania

faces difficulties in balancing economic competitiveness with sustainability requirements under the European Green Deal and the Farm to Fork Strategy [41]. Rising energy costs, dependence on imported feed, and compliance expenses have reduced profitability, keeping farm-gate prices below production costs for many smallholders.

CONCLUSIONS

The comparative analysis of dairy price dynamics between 2007 and 2025 highlights the interdependence between global, European, and Romanian markets in a context shaped by successive crises, market liberalization, and structural transformations. While the EU dairy sector has shown greater capacity to adapt to external shocks, Romania remains vulnerable to international fluctuations due to production fragmentation, limited investment, and low competitiveness.

This study provides an integrated scientific perspective on the mechanisms through which agricultural policies, economic drivers, and global events influence price formation, contributing to a better understanding of dairy market resilience. From a practical standpoint, the findings emphasize the need to strengthen rural infrastructure, support small producers, and promote sustainable investments as essential measures for enhancing competitiveness and price stability in Romania.

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