

MARKET RESEARCH OF MILK AND DAIRY PRODUCTS IN ROMANIA

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Abstract

This article analyzes the evolution of the milk and dairy products market in Romania between 2015 and 2021, using data from the National Institute of Statistics and the Center for International Trade. The study highlights the importance of the dairy sector in the European Union and investigates Romania's specific challenges, including declining exports and increased dependence on imports. Using bibliometric analysis, a decrease in research interest is observed after 2016. The research methodology is descriptive and includes the analysis of key indicators such as total resources, domestic consumption, self-sufficiency rate, import dependence and trade balance. The results show an increase in total resources but greater dependence on imports, contributing to a negative trade balance and a decrease in self-sufficiency. The conclusions underline the need to increase domestic production and reduce dependence on imports to ensure the competitiveness and sustainability of Romania's dairy industry.

Keywords: milk, dairy products in Romania, bibliometric analysis, production.

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Introduction

The dairy sector is one of the important agri-food sectors for the EU economy, with Germany, the Netherlands, Poland and Italy being the main producers and exporters of milk in the EU (Borawski et al. 2020).

The dairy sector is of significant importance to the economy of the European Union and therefore it provides many jobs throughout the Union. Thus, from production to processing and distribution, the dairy industry employs thousands of people, contributing to job creation and supporting local economies (Bojnec & Fertő, 2014). At the same time, the EU dairy industry is investing in research and development to improve product quality, production efficiency and sustainability. This contributes to stimulating innovation in the agri-food sector and increasing competitiveness on the global market (Kotyza et al., 2022). In addition, EU governments provide financial and legislative support to the dairy sector (subsidies for farmers and quality rules for dairy products) to ensure its stability and sustainability.

The results of the analysis carried out by Horl and Hess (2017) showed that net investments in products and processes by European companies in the dairy sector influence competitiveness in dairy exports.

Poczta et al. (2020) argue that dairy farms differ from country to country in Europe, but it is medium- and large-sized specialised farms that play an important role in milk production across the EU.

According to Tricarico et al. (2020), milk production must consider both food security and climate change mitigation, with socio-economic sustainability being essential in low-income countries.

The dairy sector is a strategic sector in ensuring the country's food security, as milk and dairy products are socially important products and are an indispensable element in the population's food rations, including the nutrition of children and the elderly. The study conducted by Ilie et al. in 2021 highlighted the potential of local dairy products on the Romanian market, with traditional and organic ones becoming more important for consumers.

Although Romania has natural resources necessary for agri-food production to ensure food security, in recent years the deficit of the trade balance of dairy products has been increasing, which has led to a dependence on imports of such products.

Bichescu and Stanciu (2018) argue that the forecasts regarding the evolution of the Romanian agri-food sector are pessimistic, the dependence of the Romanian agri-food market on foreign capital and imports being increasingly accentuated, Romania turning into a source of raw materials and the retail market for food produced in other areas of Europe.

In conclusion, the dairy sector has a significant influence both on the economy of the EU and Romania, contributing to the creation of jobs, to exports and to meeting the domestic demand of dairy products. It's an important player in the agricultural and agri-food landscape of the EU member states and it's supported by government policies and measures to ensure its long-term stability and growth.

The purpose of this paper is to analyze the trends on the milk and dairy products market in Romania during 2015-2021, using indicators to help form an image of the studied sector, based on empirical data provided by the National Institute of Statistics (INS) and the International Trade Center.

The structure of this paper is as follows: section 1 provides an overview of the literature on the milk and dairy products sector, section 2 presents the methodology used in the research, and the third section provides an analysis of the indicators considered.

Explore academic bibliography / Literature Review

The increasingly rapid development of dairy production activities in recent years in different regions of the world has led to the need for changes leading to more equitable and sustainable food systems, as dairy production strongly affects the environment, animal health, but also human health (Clay et al. 2020).

Popescu et al. (2019) confirmed on the basis of their research the following trends at the level of EU member countries during 2009-2019: decrease in the number of dairy cows and the number of dairy farms, an increase in the average number of dairy cows per farm, an increase in milk yield and an improvement in milk quality. According to the same study, in the EU, the largest and most specialised farms perform best in terms of milk production and delivery to factories. Also, Koutouzidou et al. (2022) showed in their study that modern farms achieve

better yields in milk production, and larger farms are more viable, milk production levels are maintained more easily, and costs can be controlled more efficiently.

Romania, although it has the status of a member state of the European Union, faces difficulties in organizing milk production farms, but also with problems with processing (Chiurciu and Soare, 2019).

Popescu (2015) argued that Romania has a low position among dairy exporting countries in the EU and the rest of the world, and the results of his study conducted during 2007-2012 showed that although exports and imports registered a significant increase during the analyzed period, Romania remained an importing country of dairy products.

Romania has a large share of imports due to the fact that agricultural production cannot fully cover consumption needs for product categories such as fish, meat, cereals (Popescu, 2022). One of the conclusions of another study that the same author conducted in 2017 was that the weak link between producers-processors-traders and consumers along the milk food chain allowed the milk crisis to deepen further.

Strateanu et al. (2023) argue that European agriculture is undergoing a modernization process and that digitization in the milk production chain is not impossible, but at Romanian level one of the main obstacles to achieving this is the reduced financial strength of farmers. The authors argue that the use of innovative technological systems increases milk production by introducing robots for milking, processing and conserving milk and monitoring animal-related activities.

Malos (2022) stated that Romania cannot currently apply an efficient resilience program in the dairy sector through its authorized production capacities, and solving this situation would only be possible through new investments in processing capacities correlated with investments in milk production in areas of the country where development is low.

The results of a study conducted by Bichescu and Stanciu (2018) highlighted the dependence of the national food market on imports and the lack of viable measures of the authorities for the recovery of the agri-food sector, the agri-food production sectors being uncompetitive.

The purpose of developing a bibliometric analysis in our study was to provide us information regarding the evolution of the scientific interest for the milk and dairy products market in Romania and information that would prove us that a study for a recent period would be a contribution for the literature in this area. Thus, a bibliometric analysis of the published works in the mentioned field was carried out by querying the Web Of Science database. For the purpose of developing this quantitative analysis, VOSviewer software was used, which allowed to analyze the keywords in the database and thus highlight the link between these words.

Web of Science searches using the keyword dairy products yielded 58,536 articles nationwide. These searches were carried out in order to establish a bibliometric analysis for the field of interest of the milk and milk products market.

Subsequently, with the help of VOSviewer software, following selections made with a minimum number of occurrences of the keyword (5), out of the 4668 keywords, only 376 meet the threshold. Thus, for each of the 376 keywords, the total strength of the co- or co-occurrence links with other keywords will be calculated. The keywords with the highest total link power will be selected.

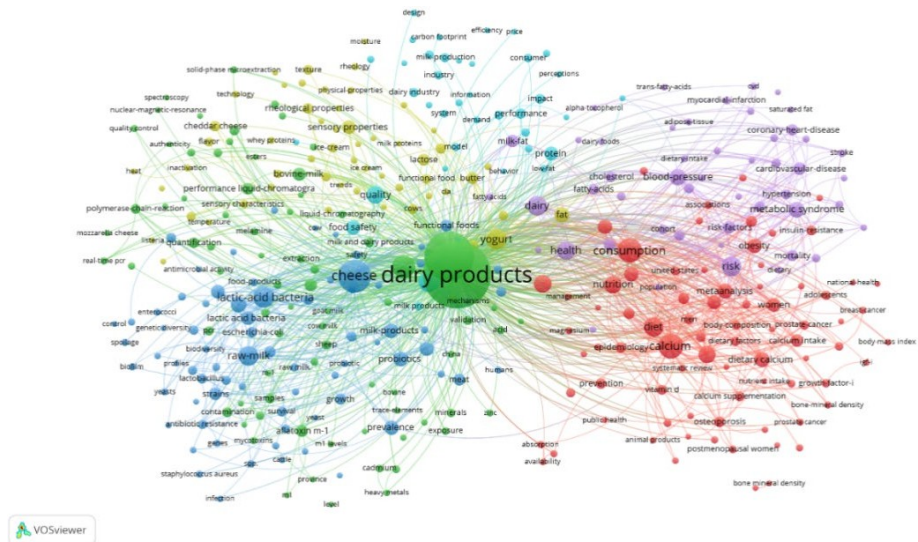


Figure 1. Cluster map of dairy-related words

Source: Web of Science results processed by authors using VOSviewer software

In figure 1, 6 clusters were identified, for each of which resulted a number of articles as follows: cluster 1 (79 items), cluster 2 (77 items), cluster 3 (74 items), cluster 4 (56 items), cluster 5 (50 items), cluster 6 (40 items).

In terms of the analyzed time frame, 2012-2022, figure 2 shows an uneven variation in their development over time of the 376 articles, 6 clusters, 8809 links. For articles that used as a keyword: *dairy products*, 2 other clusters resulted, 365 links, 603 appearances, and the year in which most publications were made was 2013; *cheese* resulted in 3 more clusters, 276 links, 142 appearances, the year in which there were most publications being 2013; *yogurt* resulted in another 4 clusters, 161 links, 55 appearances, the year in which there were most publications being 2016; *health* resulted in another 5 clusters, 127 links, 45 appearances, the year in which there were most publications being 2016; *lactate* resulted in 5 more clusters, 155 links, 51 appearances, the year in which there were most publications being 2013; *Consumption* resulted in another cluster, 182 links, 77 appearances, the year in which there were most publications being 2014. As we could see through figure 2, the years in which most occurrences were made being the interval 2013-2016, remaining that for the next period of years analyzed, the number of occurrences in this field to register: a decrease.

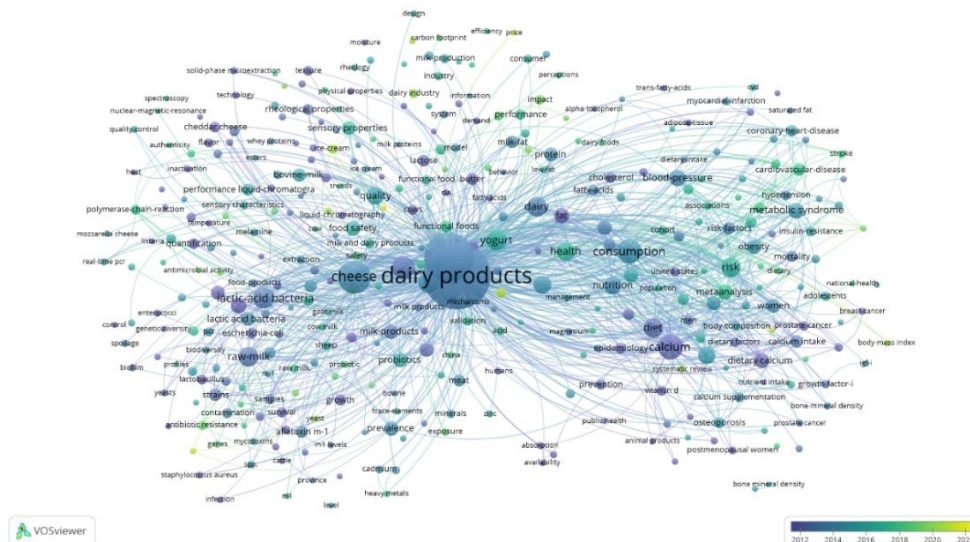


Figure 2. Dynamics of basic research topics over time
Source: Web of Science results processed by authors using VOSviewer software

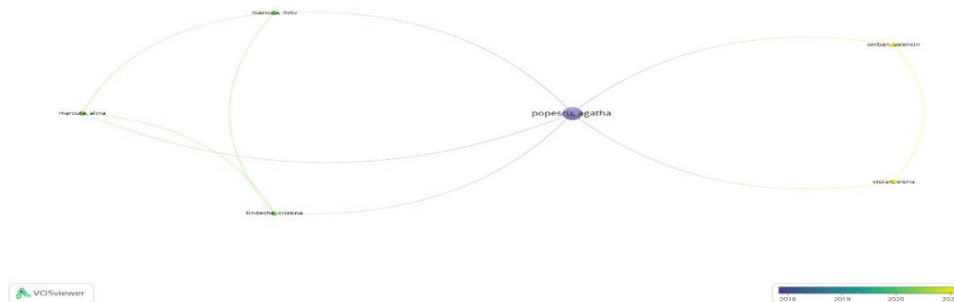


Figure 3. The relationship of author and co-author for Romanian authors
Source: Web of Science results processed by authors using VOSviewer software

In figure 3 we are shown the image for the 150 results obtained with the help of the filter made on the Web of Science database using as keyword the *milk market in Romania* having as predetermined criterion a minimum number of documents of an author (4), out of the 430 identified authors, only 8 meet the thresholds. Thus, for each of the 8 authors, the total strength of the co-author's links with other authors will be calculated. The authors with the highest total link strength will be selected (number of authors to be selected – 8). Following another established criterion, some of the 8 elements in the already established network are not connected to each other, the largest set of connected items consists of 6 items. Thus, 2 clusters resulted with 6 articles, 9 links, 36 total linking power: in cluster 1 there were 3 articles, and for cluster 2 resulted in 3 articles; the period in which the publications appeared being 2018-2021.

Material and methods

The bibliometric analysis was developed in order to identify the evolution of the scientific interest for the topic of the market of milk and dairy products in Romania, by querying the Web of Science database using VOSviewer software. The investigation was made for the period 2012-2022, consequently there were some exclusions because the articles published before 2012 were rejected. We chose the VOSviewer software because it focuses on the graphical representation of the bibliometric map which is more easily accessible for public. To create the figures and data from the articles resulting from the query, we conducted an analysis of keywords related to dairy products, an analysis of dynamics over the time of research topics relevant to our interest and also a co-authorship analysis to identify influential Romanian authors.

In order to achieve the objective of the study, empirical data collected from the National Institute of Tempo-Online Statistics, respectively the International Trade Center database, were analyzed.

The main indicators taken into account were total resources, domestic consumption of milk and milk products (in milk equivalent of 3.5% fat), self-sufficiency rate, import dependency rate, trade balance for milk and dairy products. The data were processed using common methods used to identify the main trends and the comparison method was also used. The reference period for the studied indicators was 2015-2021.

Results and discussion

Regarding the next section of the study, the results obtained will be presented. as a result of descriptive analysis carried out on the basis of data taken from food balances published on the website of the National Institute of Statistics. The purpose of this data analysis is to provide an overview of the researched topic, respectively of the trends that characterized the milk and dairy products national market during 2015-2021. This overview will be an added value to the literature because according to the bibliometric analysis carried out in the previous section there are no studies of trends in the Romanian dairy market for the mentioned period.

The indicators included in the analysis are closely related to the most frequent and interesting keywords associated with the dairy products market according to the developed bibliometric analysis. In this respect, the studied indicators were: total resources of milk and milk products, domestic availability for consumption, self-sufficiency rate and import dependency rate. Also, the evolution of the trade balance for the milk and dairy products category during 2015-2022 was studied.

The total resources of milk and milk products (in milk equivalent of 3.5% fat) increased by 2993 thousand hl in 2021, compared to 2015. In creating total resources, milk production had the largest contribution (79.94%), its share being 10.19 percentage points lower than that of 2015.

The share of imports of milk and milk products in 2021 was 20.06% of total resources, imports increasing by 6891 thousand hl compared to 2015. Imports in 2021 were 4.12 times higher than exports of and milk products.

As for exports of milk and milk products (in milk equivalent of 3.5% fat), they increased by 1202 thousand hl in 2021 compared to 2015.

Table 1. Total resources of milk and milk products

	2015 Thousand hl	2016 Thousand hl	2017 Thousand hl	2018 Thousand hl	2019 Thousand hl	2020 Thousand hl	2021 Thousand hl	Structure (%)	
								2015	2021
RESOURCE	61745	62175	61914	63263	62946	64063	64738	100.00	100.00
Usable production	55648	54245	52666	52835	52568	52812	51750	90.13	79.94
Import	6097	7930	9248	10428	10378	11251	12988	9.87	20.06
Export	1950	2048	2644	2791	2464	2487	3152		

Source: Authors' processing of food balance data available on

<https://insse.ro/cms/ro/tags/bilanturi-alimentare>

The domestic consumption of milk and milk products (in milk equivalent of 3.5% fat) was 847 thousand hl higher in 2021 than in 2015. The largest share of domestic milk consumption was held by those available for human consumption and varied slightly compared to 2015.

Table 2. Domestic consumption of milk and milk products

	2015 Thousand hl	2021 Thousand hl	Structure (%)	
			2015	2021
Domestic consumption availabilities	59791	60638	100.00	100.00
Feed consumption	4337	4219	7.25	6.96
Industrial transformation	2235	2329	3.74	3.84
Available for human consumption	48244	48881	80.69	80.61

Source: Authors' processing of food balance data available on

<https://insse.ro/cms/ro/tags/bilanturi-alimentare>

Self-sufficiency considers one of the pillars of food security, namely food availability, and focuses on the country's internal capacity to produce enough food. The rate of self-sufficiency

shows whether the country's production of a particular product is sufficient to meet domestic needs. Regarding the analysis of the self-sufficiency rate for the period 2015-2021 for the group of milk and dairy products, according to Table 3 there is a high level of self-sufficiency, over 80%, over the entire studied period. The SSR (Self-Sufficient Ratio) decreases by 9.03 percentage points in 2021 compared to 2015, registering a decreasing trend over the analyzed period that provides clues for a not exactly favorable outlook for food security for this category of products.

Table 3. SSR - Milk and dairy products

Product	Year	Self-Sufficient Ratio
Milk and dairy products	2015	93.06%
	2016	90.22%
	2017	88.86%
	2018	87.37%
	2019	86.92%
	2020	85.77%
	2021	84.03%

Source: Authors' processing of food balance data available on <https://insse.ro/cms/ro/tags/bilanturi-alimentare>

The rate of dependence on imports shows as a percentage the dependence of a country on imports to satisfy its domestic needs. From the analysis of the import dependency rate for the milk and dairy products category for the period 2015-2021, there is an unfavorable evolution of the indicator, from 10.20% in 2015 to 21.09% in 2021, which means that Romania's dependence on imports of milk and dairy products necessary to cover domestic demand has increased significantly.

Table 4. IDR - Milk and dairy products

Product	Year	Import Dependency Ratio
Milk and dairy products	2015	10.20%
	2016	13.19%
	2017	15.60%
	2018	17.24%
	2019	17.16%
	2020	18.27%
	2021	21.09%

Source: Self-processing according to food balance data available on the <https://insse.ro/cms/ro/tags/bilanturi-alimentare>

According to Figure 4, Romania's trade balance for milk and dairy products in 2015-2022 is negative, especially for the cheese and raw milk category, but also for all other products. The deficit has deepened from year to year, so if in 2015 it was -101340 thousand euros for the

cheese and raw milk category, in 2022 the deficit was almost 4 times higher -400453 thousand euros, one of the causes being the decreasing production from year to year.

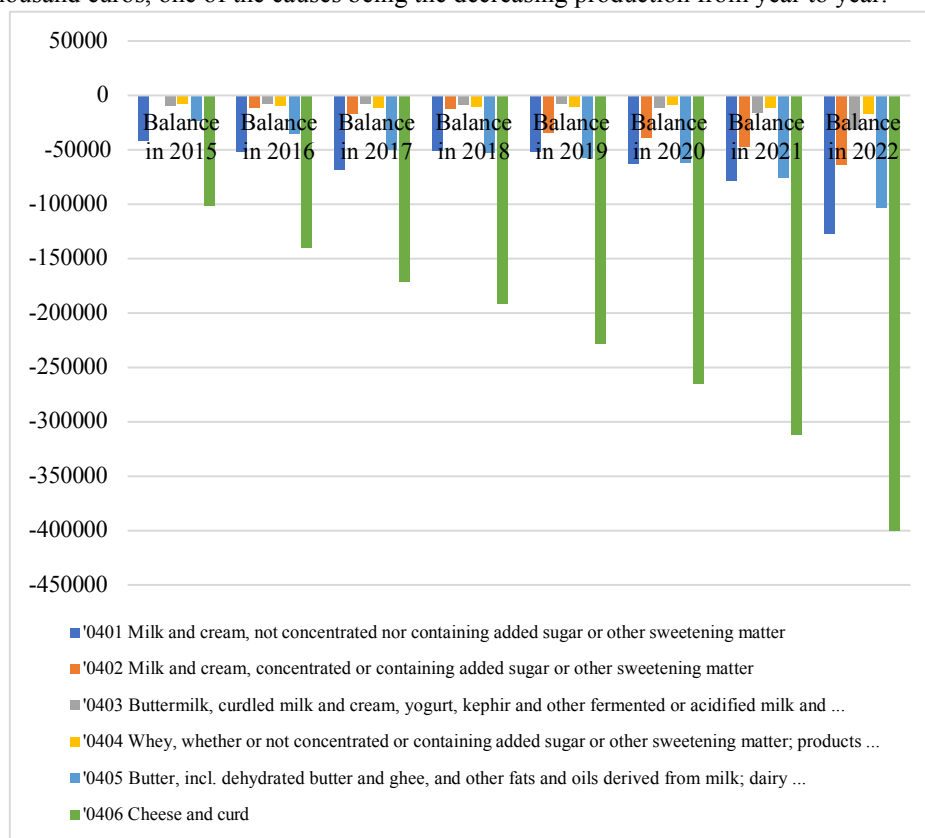


Figure 4. Romanian trade balance for milk and dairy products between 2015-2022 (euro thousand).

Source: International Trade Center

Conclusions

Following the elaboration of the bibliometric analysis based on the information obtained by querying the Web of Science database and their processing in VOSviewer it was found that the interest in the research area of the milk and dairy products market at national level was more pronounced in 2013-2016, when most publications were registered, After that, between 2017 and 2022, the number of researches in the mentioned field decreased.

The words or word structures that were most commonly identified in publications in association with "dairy products" were cheese, yogurt, health, consumption, calcium.

The limitations of the research carried out are closely related to the limitations of the elaborated analysis, so that additional analyzes can be developed through which to evaluate a series of specific indicators, such as the impact of publications in the field.

Regarding the analysis of indicators obtained with the help of data from food balances published by INSSE, we noted the increase in total milk and dairy products resources for

2015-2021, but an unfavorable signal is given by the value of imports, which have a share of 20% of total milk and dairy products resources in 2021.

Worrying is also the decreasing trend of the indicator self-sufficiency rate during 2015-2021, so that Romania does not produce enough to fully cover its domestic consumption needs for all categories of dairy products.

The study highlighted the dependence of the milk and dairy products market on imports and the increasing deficit of Romania's trade balance for these products during the period under consideration.

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