APPROACHES ON THE GLOBAL MILK VALUE CHAIN. A PERSPECTIVE FROM THE ROMANIAN MILK MARKET

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Abstract
The global food value chain encompasses a component of particular importance: the milk market. What makes this component unique is that fact that milk represents an essential part in almost any diet, a key factor for the production of dairy products. The main objective undertook in this research paper was to quantify the pressure put on the global milk chain by Romania. The results highlight that the milk imported quantities represent, on average, 3.5% of the Romanian production of milk in the 2010-2019 period. Romania is a small player in terms of the pressure put on the global milk value chain, from the perspective of milk demand. The loss caused on the Romanian milk chain by the trade deficit can be ameliorated by increasing the national production capacities.

Keywords: *milk value chain*; *Romanian milk market*; *balance of trade*; *national production*; *dairy products*
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1. Introduction

One of the key sectors of animal production in Romania is the milk sector. In the Romanian milk market, there were 562 active enterprises in 2018, according to the National Institute for Statistics, based on the following CANE code: 105 Manufacture of dairy products. In 2017, the number of active enterprises in this sector increased with 5.64%, followed by another, even bigger increase in 2018: 7.25% (2018 reported to 2017).
Milk and dairy products are essential components in almost any diet and this is one the reasons why the milk market has its unique contribution to any economy around the world. Moreover, this sector generates links between agriculture and industry and plays an important role in the global value chain.
The production of milk is a branch with high contributions to the animal agricultural production in Romania. On average, Romania produced on average 4,836.09 million liters of milk in the 2010-2019 period, according to the data of the National Institute for Statistics (2020). In 2019, the average nominal monthly consumption of milk was 5.523 liters. At January 1st 2019, Romania had a total resident population of 19,414,458. Consequently, the national consumption of milk is 1,286.71 million liters in 2019. In the same year, the national production of milk was 4,616.10 million liters. Therefore, 27.87% of the milk production represents, mathematically, the total national consumption of milk (NIS, 2020).

The main objective undertook in this research paper is to quantify the pressure put on the global milk chain by Romania, under the hypothesis that pressure comes from the result of a balance of trade characterized by deficit. Another objective is to correlate the pressure put on the global milk chain by Romania with the national consumption and production of milk, besides the balance of trade results.
This study brings its contributions to the fields of the agricultural economics and global value chains. This research is meant to provide a broader perspective on the global milk value chain, approached from multiple angles: the Romanian milk market, referring to the national and international demand, supply and price of milk. Moreover, the national consumption and production are considered when approaching the Romanian milk market.

2. Literature Review

Popescu and Caraba-Meita (2020) highlighted that Romania has a high potential to produce milk, but the dairy farming has become an activity at the threshold of profitability for most enterprises. Their study demonstrated that the milk production is positively influenced by price growth, but its growth rate is still below the price increase rate. Putting this into the context of the global value chain, Roman (2020) demonstrated that the distance between markets can represent one of the most important factors determining price differences.
The position of the Romanian milk market in the global milk value chain depends on global milk market. The global milk value chain is complex and has the consumer as the final link. The milk supply chain comprises primary food production, feed component production, cattle feed production, livestock production and milk production, milk processing, wholesale and retail sales, and consumption (Borawski et al., 2019). The Common Agriculture Policy helped to stabilise agricultural markets in the European Union, including the milk market. The price volatility of milk can be controlled in the market with the help of the Common Agriculture Policy (Borawski et al., 2020). This is important because the dairy market is particularly sensitive to changes of the raw milk prices (Ignat and Constantin, 2020).
Romanian milk producers compete with farms, not only at national level, but also at international level. This obliges them to consider knowledge transfer, modern technical endowment & technologies and farm management, as they are the key qualitative factors for keeping production cost low, while also assuring a high-quality milk, economic efficiency and competitiveness (Popescu, 2017). Additionally, environmental and social factors influence the agricultural economic output (Zaharia and Pătărlăgeanu, 2019). Their impact can be positive, especially when harnessing sustainable business opportunities in agriculture and in rural areas in general (Istudor and Petrescu, 2016).
The milk market is characterized by seasonal fluctuations in the purchase volume in particular months (Olszańska and Dittrichová, 2016). Krivosikova et al. (2020) support the idea that the changing consumption patterns in milk market determine enterprises part of the global value chain to consider consumer preferences in order to meet the market demands efficiently and rapidly.
Enterprises active in the milk market are competitive and give thoughts to many KPIs when elaborating strategies: production, marketing, financing etc. Nica (2017) suggested they should pay close attention to comparing their products in the market, carefully setting the prices, they should analyse channels and promotional aspects in relation to their close competitors, in order to identify risk areas, competitive advantages and disadvantages. Higher competition in this market can result in an intensifying interest in finding solutions to reduce production and marketing costs by improving both the national and international distribution channels (Popescu, 2016).

3. Materials and methods

In order to meet the undertook research objective, a statistical analysis was carried out, with the purpose of measuring the pressure put on the global milk chain by Romania, under the hypothesis that pressure comes from the result of a balance of trade characterized by deficit. The statistical analysis will also include a correlation between the previously described pressure and the national production and consumption of milk.

Data were downloaded from two sources in September 2020. Data related to the values and quantities of milk import and export were downloaded from the Trade Map database (2020). Trade Map was developed by the International Trade Centre UNCTAD/WTO (ITC) with the purpose of facilitating strategic market research, monitoring both national, international and product-specific trade performance. Data related to population (indicator code: POP105A), milk consumption (indicator code: BUF110J) and production (indicator code: AGR202A) were downloaded from the Romanian National Institute for Statistics database, Tempo.

Data related to the milk imported and exported by Romania represents the sum of two subcategories: *0401 Milk and cream, not concentrated nor containing added sugar or other sweetening matter* and *0402 Milk and cream, concentrated or containing added sugar or other sweetening matter*. Data related to the balance of trade with milk was calculated based on the import and export data. The balance of trade was calculated by subtracting the export from the import and, consequently, a positive value of the balance of trade represents the milk deficit.

Regarding the data related to population (POP105A), it represents the resident population at January 1st; all persons of Romanian nationality, foreign or stateless, who have their usual residence in Romania. The average nominal annual consumption of milk was calculated based on the BUF110J indicator, which represents the monthly average nominal consumption – this value was multiplied by twelve in order to obtain annual data. According to the Romanian National Institute for Statistics, the average consumption represents the average quantities included in a person's food, irrespective of the products' sources and consumption places. The annual production of milk is based on the AGR202A indicator and represents the total milk production, calves consumption included. There source of the milk includes cows, buffalo cows, sheep and goats.

4. Research findings and discussions

The statistical analysis was firstly focused on the international milk market, approached from the perspective of the Romania's contribution on generating demand and supply of milk in the market. Tables 1 and 2 refer to the values and quantities of the imported and exported milk by Romania.

Table 1. Imported and exported milk by Romania (expressed in EUR, thousands) per year and per milk subcategories (0401 and 0402), 2010-2019

Year	Imported milk by Romania			Exported milk by Romania		
	Total	0401	0402	Total	0401	0402
2010	66,754 €	74.10%	25.90%	17,698 €	8.70%	91.30%
2011	75,996 €	71.96%	28.04%	25,616 €	13.84%	86.16%
2012	74,838 €	71.24%	28.76%	22,993 €	24.32%	75.68%
2013	85,646 €	73.75%	26.25%	23,667 €	61.19%	38.81%
2014	73,994 €	74.22%	25.78%	44,435 €	44.69%	55.31%

2015	78,141 €	77.14%	22.86%	36,732 €	49.76%	50.24%
2016	96,872 €	77.08%	22.92%	33,285 €	67.96%	32.04%
2017	123,288 €	79.05%	20.95%	37,152 €	77.53%	22.47%
2018	108,508 €	79.80%	20.20%	44,916 €	79.02%	20.98%
2019	129,086 €	67.08%	32.92%	43,086 €	81.58%	18.42%

Source: Own conceptualization based on the International Trade Centre data, (2020)

On average, the value the imported milk by Romania increased annually in the 2010-2019 period by 8.55%, while the value of the exported milk by Romania increased annually, on average, by 14.10%. Even though the rhythm of exported milk is faster than that of the imported, the absolute value of exports and imports play a much more significant role in this analysis. On average, the value of the imported milk by Romania was 91,312 € (thousands), which is 2.77 greater than the value of the exported milk.

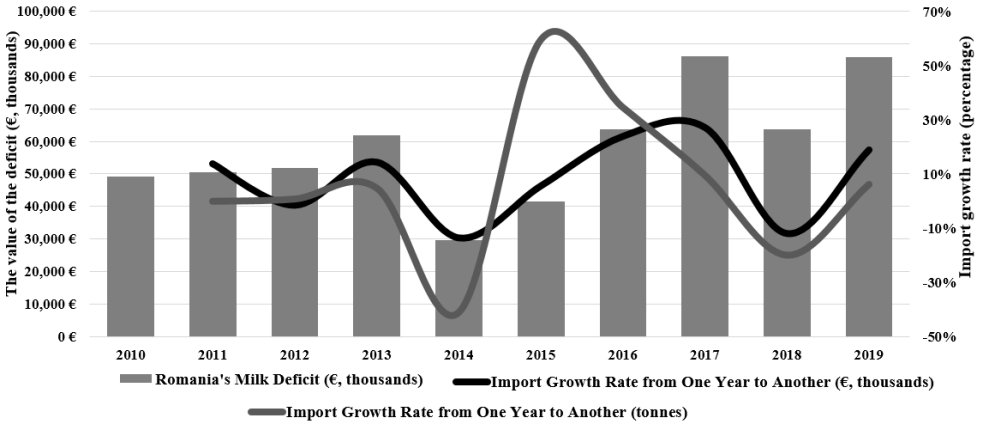
Table 2. Imported and exported milk by Romania (expressed in tonnes) per year and per milk subcategories (0401 and 0402), 2010-2019

Year	Imported milk by Romania			Exported milk by Romania		
	Total	0401	0402	Total	0401	0402
2010	131,384	93.25%	6.75%	17,996	10.80%	89.20%
2011	137,495	92.70%	7.30%	24,272	24.73%	75.27%
2012	137,129	89.81%	10.19%	23,146	34.59%	65.41%
2013	151,295	92.12%	7.88%	31,891	74.48%	25.52%
2014	127,466	93.42%	6.58%	57,223	65.53%	34.47%
2015	162,144	93.09%	6.91%	50,166	67.45%	32.55%
2016	205,613	92.75%	7.25%	55,032	85.68%	14.32%
2017	230,396	90.27%	9.73%	65,586	91.42%	8.58%
2018	208,284	91.95%	8.05%	76,491	92.78%	7.22%
2019	202,028	90.38%	9.62%	62,196	93.77%	6.23%

Source: Own conceptualization based on the International Trade Centre data, (2020)

Regarding the imported and exported quantities of milk, Romania imports and exports mostly milk and cream, not concentrated nor containing added sugar or other sweetening matter (indicator code 0401 in Tables 1 and 2). On average, the quantities of the imported milk by Romania increased annually in the 2010-2019 period by 5.8%, while the quantity of the exported milk by increased more rapidly, by 17.99%. This happened because the quantities of the imported milk were on average 3.64 times greater than the quantities at export. The relative change discrepancies between the imported and exported milk quantities occur because of the import-export ratio, which is in the favour of imports.

Figure 1. Romania's milk balance of trade deficit and the import growth rate, 2010-2019



Source: Author's conceptualization, based on the International Trade Centre data, (2020)

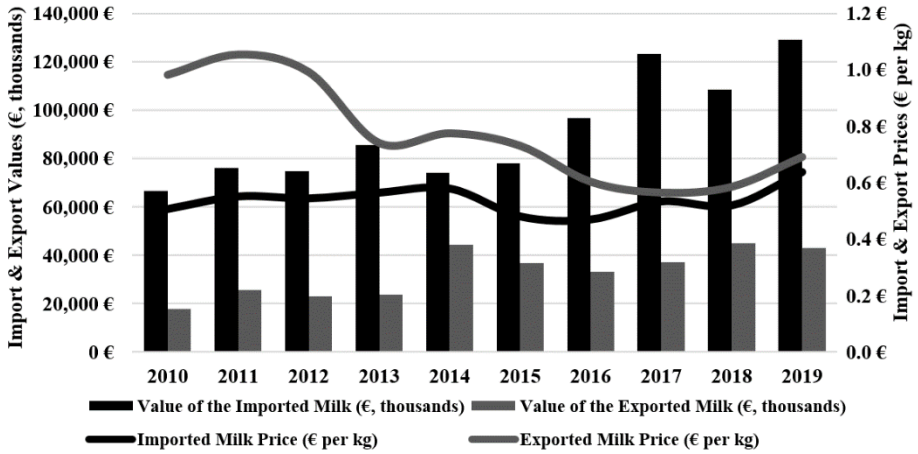
Romania was the most affected by the deficit of the balance of trade with milk in 2017 and 2019. In the analyzed period, the total value of the deficit with milk is 583,543 thousands EUR, with an average annual increase of 12.34%. This percentage is 1.44 greater than the average annual increase of the value of the imported milk by Romania.
Besides data related to the imported & exported values and quantities of milk by Romania, the prices at import & export were calculated in Table 3 by reporting the value of imported & exported milk to the corresponding quantities.

Table 3. Imported and exported milk by Romania, values and prices, 2010-2019

Year	Imported Milk	Exported Milk	Imported Milk	Exported Milk
	Value (EUR, thousands)		Price (Euro per kg)	
2010	66,754 €	17,698 €	0.508 €	0.983 €
2011	75,996 €	25,616 €	0.553 €	1.055 €
2012	74,838 €	22,993 €	0.546 €	0.993 €
2013	85,646 €	23,667 €	0.566 €	0.742 €
2014	73,994 €	44,435 €	0.580 €	0.777 €
2015	78,141 €	36,732 €	0.482 €	0.732 €
2016	96,872 €	33,285 €	0.471 €	0.605 €
2017	123,288 €	37,152 €	0.535 €	0.566 €
2018	108,508 €	44,916 €	0.521 €	0.587 €
2019	129,086 €	43,086 €	0.639 €	0.693 €

Source: Author's calculations, based on the International Trade Centre data, (2020)

Figure 2. Imported and exported milk prices. Import and export values, 2010-2019



Source: Author's conceptualization, based on the International Trade Centre data, (2020)

In the analyzed timeframe (2010-2019), the imported milk price was always smaller than the price at export, which is a favorable situation for Romania. However, even though discrepancies between the import and export prices are noticeable in the 2010-2016 period, they no longer occur in the last three years included in the analysis (2017-2019). The difference between the imported milk price and the exported milk price reached a maximum in 2011, when the difference was 0.503 € per kg. This is 9.31 times greater than the difference between the imported milk price and the exported milk price recorded in 2019. Even though there were serious differences between the imported milk prices and the exported milk prices in the analyzed timeframe, all in the favor of Romania, this was not enough to ameliorate the huge deficit registered by the balance of trade in the case of milk.

Table 4. Imported and exported milk by Romania, values and prices, 2010-2019

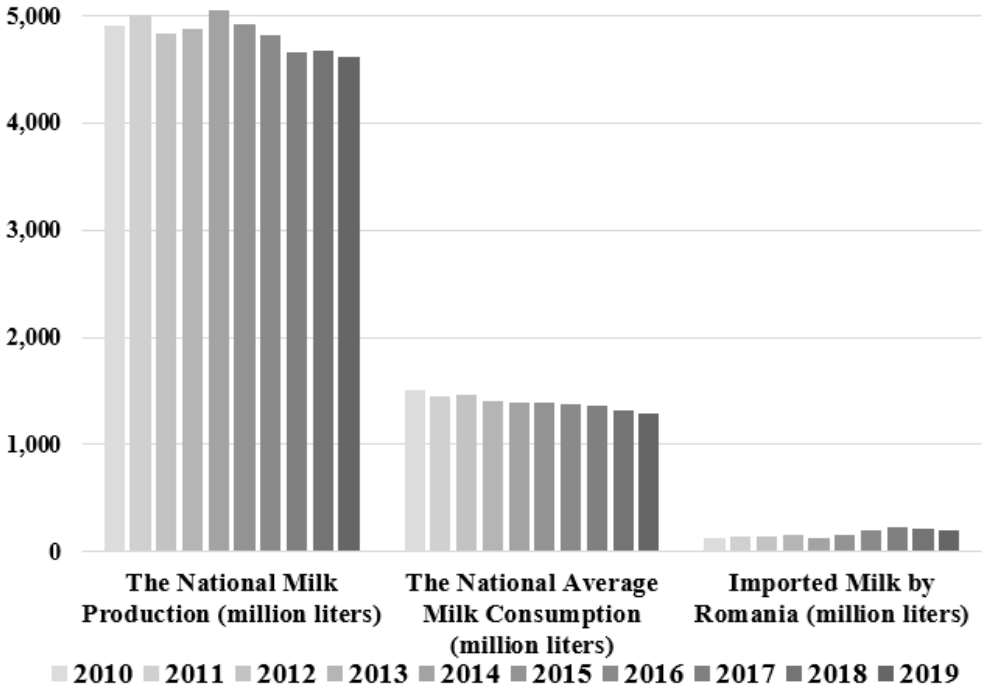
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Annual nominal average milk consumption	74.23	71.54	72.74	70.44	69.53	70.02	69.76	69.22	67.58	66.28
Resident population	20.29	20.20	20.10	20.02	19.95	19.88	19.76	19.64	19.53	19.41
Annual national milk consumption	1,507	1,445	1,462	1,410	1,387	1,392	1,378	1,360	1,320	1,287
Annual national milk production	4,913	5,007	4,834	4,873	5,054	4,916	4,813	4,662	4,674	4,616
Consumption reported to production	30.7%	28.9%	30.2%	28.9%	27.5%	28.3%	28.6%	29.2%	28.2%	27.9%

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Imported milk by Romania	131.38	137.50	137.13	151.30	127.47	162.14	205.61	230.40	208.28	202.03
Imported milk reported to the national production	2.7%	2.7%	2.8%	3.1%	2.5%	3.3%	4.3%	4.9%	4.5%	4.4%

Source: Author's calculations, based on the International Trade Centre data (2020) and Tempo – NIS, (2020)

In Table 4, the annual nominal average milk consumption is expressed in litres, the resident population is expressed in millions, the annual national milk consumption is expressed in million litres (calculated: the annual nominal average milk consumption × resident population), the annual national milk production is expressed in million litres and the imported milk by Romania is expressed in million kilograms (we considered one kilogram to be the equal of a litre).

Figure 3. The evolution of Romania's milk production, consumption and imports, 2010-2019



Source: Author's calculations, based on the International Trade Centre data (2020) and Tempo – NIS, (2020)

Based on the calculations from Table 4 and illustrated in Figure 3, one important finding of this research is that, from the perspective of milk quantities, the percentage of the imported milk keeps obtaining bigger shares each year out of the national milk percentage, even though it is still situated between 5% each year in the analyzed period. In 2019, the percentage of the imported milk reported to the national milk percentage is 1.63 times greater than in 2010 and 1.24 greater than the average (2010-2019).
Regarding the average national milk consumption, there is no significant indication of an increasing trend, but on the opposite. On average, 28.8% of the national milk production could cover the national consumption of milk. This is expected, considering that most of the milk production is used to manufacture cheeses and fermented beverages (Rokicki et al., 2019). In 2019, Romania registered a 370,246 € (thousands) trade deficit regarding dairy products (code 04) and 23.22% of this deficit is caused by milk. Moreover, in 2019, Romania has a 228,189 € (thousands) trade deficit regarding cheese and curd (code 0406), representing 61.63% out of the total dairy products deficit (code 04).
Considering these characteristics of the Romanian milk market, its impact on the global milk value chain and Romania's milk production and consumption, one can notice that the imported milk quantities represent only a small part when reported to the needs of the country. China puts most of the pressure on the global milk chain value in terms of milk demand, due to its milk deficit of 3,794,889 € (thousands) registered in 2019. Romania's milk trade deficit represents only 2.26% of the world's biggest milk deficit registered by a country, China. In this ranking, China is followed by Algeria, Italy and Mexico.

Conclusions

Milk is one of the most valuable raw animal production sources. Strict transportation regulations must be respected when operating with milk in the global chain.
The objective undertook in this research paper was met. Romania's pressure on the global milk chain is small when compared to other countries, considering that the pressure was quantified from the perspective of the international milk demand. The hypothesis has been accepted. In the global milk chain, Romania's pressure comes from the result of a balance of trade characterized by deficit.
During 2010-2019, Romania's milk trade deficit increased almost annually. In these ten years, the milk deficit sums up to 583,543 € (thousands) and export represent only 36.09% of the import. On average, Romania imported 169,323 tonnes of milk annually and exported 463,999 tonnes. For the imported milk, Romania paid 91,313 € (thousands) and received 32,958 € (thousands) for the export, annually, on average.
Regarding the national production and consumption of milk, one of the main highlights of this research is that the imported tonnes of milk represent, on average 3.5% of the national production. This percentage can be considered a loss of the Romanian milk chain or can be interpreted as the premises for new business opportunities. Romania's milk trade deficit can be ameliorated by increasing the national production capacities.

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