REPRESENTING COMPETITIVENESS OF BULGARIAN DAIRY PRODUCTION

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Abstract

Bulgarian dairy production makes up a significant portion of the overall agricultural sector's production (12% in 2021). The study reveals its development and quantifies sectoral competitive performance. The period under review began after Bulgaria acceded to the EU in 2007. Canada's Task Force for Competitiveness in the Agri-Food Sector developed a theoretical framework, defined as "the sustained ability to profitably gain and maintain market share" (Martin et al. 1991), which forms the basis of the method's concept.

The study aims to investigate the development of the Bulgarian milk sector's competitiveness (including dairy, sheep, goat, and buffalo milk and products). An index of competitiveness was developed and applied, comprising of two components: market performance and value generated. The results synthesize competitive performance on internal and external markets, showing a sustainable competitiveness decline through the examined period.

Keywords: milk, dairy products, competitiveness index.

Introduction

Maintaining and improving a competitive market position promotes sustainable economic development, as well as opportunities for national agriculture development. Agriculture companies serve a variety of functions in the economy, ranging from providing raw materials for processing and creating jobs in rural areas to better utilizing limited agricultural resources. Therefore, determining the state of competitiveness of a given agrarian sector is of significant importance for agrarian policy.

Examining Bulgarian milk production from this perspective aims to quantify the change in the level of competitiveness since the country's accession to the EU in 2007. The study covers all major types of milk production, including cows, buffalo, sheep, and goats. The sector's importance is also due to its volume of production, which accounted for 12% of all Bulgarian agriculture's total production in 2021.

Materials and methods

Few topics in modern economic theory elicit as much heated discussion as the concept of the competitiveness of the national economy's production. Studies have been conducted to

systematize approaches to measuring competitive performance for all sectors of the economy. Hatzichronoglu (1996) focused on the competitiveness of the agricultural sector. Latruffe (2010) presents a highly fragmented theoretical framework regarding applicable methods. Frohberg & Hartmann (1997) divide approaches to measuring competitiveness into two categories: ex-ante assessment of competitive potential and ex-post measurement of competitive performance. They assert that the majority of research on revealed competitive performance either aggregates the entire output of a given sector or considers the performance of the products with the highest volume and value. Analysis of commodity exports can estimate relative advantages in the absence of precise data on the factors of production (labor and capital) for a given country. In an attempt to systematize the different definitions of competitiveness, Bris and Caballero (2015) present thirteen conceptually different ones, adding their own definition. The level of research, whether it focuses on the performance of a specific product on the market, business units/clusters, or the national level, partially determines this divergence in economic theory.

We can link established theoretical frameworks like Michael Porter's "diamond" of competitiveness (Porter 1990), which focuses on the performance of individual companies and specialized clusters of companies, or the Heckscher-Ohlin model (Leamer 1995), which estimates the availability and costs of national factors of production, to reveal competitiveness at these different levels. Latruffe (2010), when investigating the applicable approaches for assessing competitiveness, divides them into three groups: commercial measures, strategic management measures, and determinants of competitiveness. As a result, the inconsistency in theory that leads to different conceptions of competitiveness leaves the agricultural science researcher free to choose and apply the one that best suits the particular research goals and objectives, insofar as some theoretical frameworks and concepts are more suitable than others for assessing the revealed competitiveness of agricultural productions.

Kovacheva (2011) investigated the competitiveness of Bulgarian dairy products on foreign markets. Bulgaria's net foreign trade balance for dairy products was used as a measure of the sector's relative competitiveness. After 2007, the decline in the foreign trade balance led to the determination that domestically produced dairy products exported to international markets were insufficiently competitive.

To examine the macro-level competitiveness of the Bulgarian dairy sector, Stoychev and Ivanov (Stoychev & Ivanov 2021) applied the modified index for quantifying national competitiveness, following Ivanov's (2016) approach. This study demonstrated the shift in the competitive performance of Bulgarian dairy farming markets. Based on the Canadian Working Group's definition of the competitiveness of agricultural production, "The ability to sustainably gain and maintain market share," serves as the basis for this development. This definition lays down two concepts: profit formation (sustainability) and market share (Martin et. al., 1991).

The proposed approach to measuring competitiveness is different because it combines and quantifies the dairy products presented by the sector at different levels—national and international markets at the same time. We believe that the applicable level of abstraction is acceptable given our aim to depict competitiveness at the sectoral level and quantify its performance.

The approach also provides an opportunity to compare competitive performance across economies of different sizes. We are simplifying competitive performance modeling to better delineate trends over time, but it also overlooks determinants specific to each country that affect production at a lower level, such as natural and climatic conditions, the average scale of production, dominant dairy cattle breeds, and milk chain integration.

Following this framework, the competitiveness index consists of two components: the market performance component and the value component. We assume that they are equally important; therefore, they have equal weight when calculating the competitiveness index.

$$IC_{BG} = \frac{PIC_{Mpc} + PIC_{DC}}{2} \quad (1), \text{ where}$$

PICMpc - share of the gross value of milk production per capita;

PIC_{DC} – represents the gross value of Bulgarian milk production.

The index takes values between 0 and 1, with a zero when there is no domestic production. A national production close to the global average can reach a value of 1, indicating that the country is the primary producer of the product. The index assumes a value of 0.5 when the performance of local and world production equalizes.

The market performance component (PICMpc) takes the following form:

$$PIC_{Mpc} = \frac{MP_{ctr}}{MC_{ctr} + MC_{WR} + MNE_{ctr}} \quad (2)$$

MPctr – milk production in the country per capita;

MCctr – per capita milk consumption in the country;

MCwd – world milk consumption per capita;

MNEctr – net dairy exports per capita.

For comparability, we apply a weight per capita. In order to avoid double counting in the denominator of expression (2) there is a distinction between local consumption per capita (MC_{ctr}) and world consumption per capita (MCwd).

Subtracting imports from the country's total dairy exports yields the country's net dairy exports (MNEctr).

$$MNE_{BG} = ME_{BG} - MI_{BG} \quad (3)$$

ME_{BG} – exports of dairy products per capita;

MI_{BG} – import of dairy products per capita.

Bulgaria is a net importer of dairy products (calculated by milk protein in goods), therefore the MNEctr indicator is not considered when calculating the index component.

The following equation expresses the value component (PICVC), which represents the change in the value of dairy products:

$$PIC_{VC} = \frac{MV_{BG}}{MV_{BG}+MV_{WR}} \quad (4)$$

MV_{BG} - share of gross production value of Bulgarian milk production per capita;

MV_{WR} - share of gross value of milk production in the world, per capita (for dairy cows, buffaloes, dairy sheep and mother goats).

The calculation of the MVwR value excludes the value of domestic milk production (MVctr). The smaller the difference between the gross value of domestic production and the world value of cow's milk, the more importance PICvc has. The calculation is based on the export prices of dairy products from the country and the world.

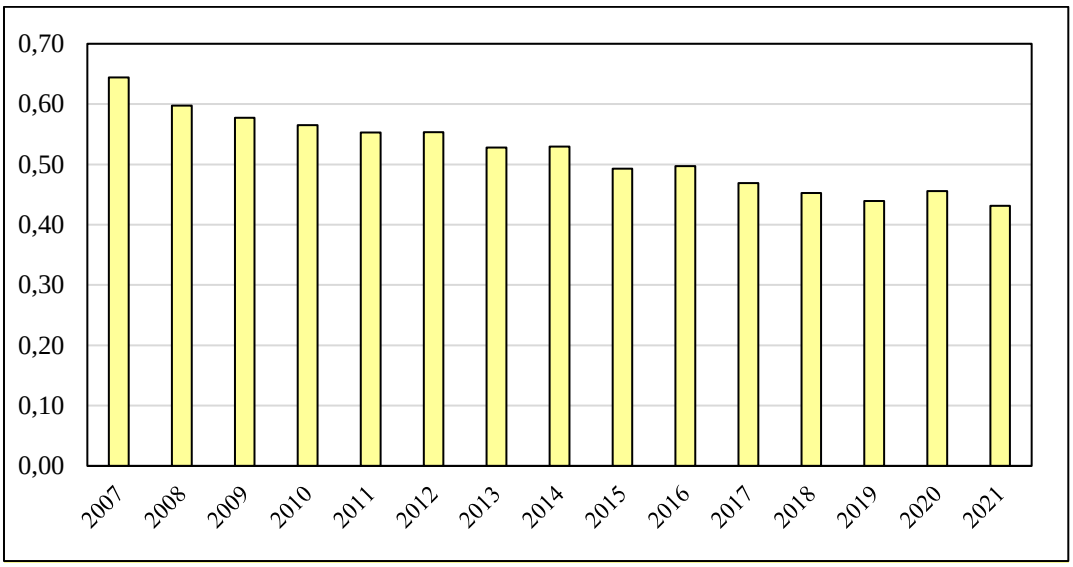
Results and discussion

For Bulgaria, a steady decline in the volume of milk produced is observed for the period considered. Figure 1 reveals the negative dynamics of PICMpc component development.

Smaller farms' lower productivity per animal results in lower production efficiency compared to larger farms, which leads to lower incomes and financial liquidity issues during sudden changes in the country's economic or climatic conditions. van Berkum (2009) in a study of dairy farms in the new member and candidate states of the EU, prognosticated that the dairy farms in Bulgaria will experience a drastic structural transformation in the future, with many small farmers exiting the sector due to small volumes and outdated technology of production, a high level of investment necessary to satisfy the EU standards for milk quality, an underdeveloped milk collection system, a weak link between farmers and processors in the food chain, resulting in a significant percentage of milk left on the farms and the unreliability of payments of some of the processors. The availability of alternative work, opportunities for education and the social services for farmers (pensions) will control the pace of this process.

For the period 2007-2019, the number of farms with up to 20 dairy cows decreased by 90%, up to 20 buffaloes by 81%, up to 50 sheep by 92%, and up to 50 goats by 94%. But not all the farms have ceased their activities, some have increased the number of dairy animals and have moved into a higher category or changed their specialization. The competition with other agricultural producers for arable land, which stimulates an increase in rent payments, severely limits the opportunities for dairy farming development, because access to pastures and land for forage production is crucial. Another reason is the insufficient mechanization of the production process (especially in sheep and goat breeding) and worse working conditions and wages compared to other sectors of the economy, which leads to the loss of qualified personnel and difficulties in attracting new experienced workers.

Figure 1. Dynamics of the production component

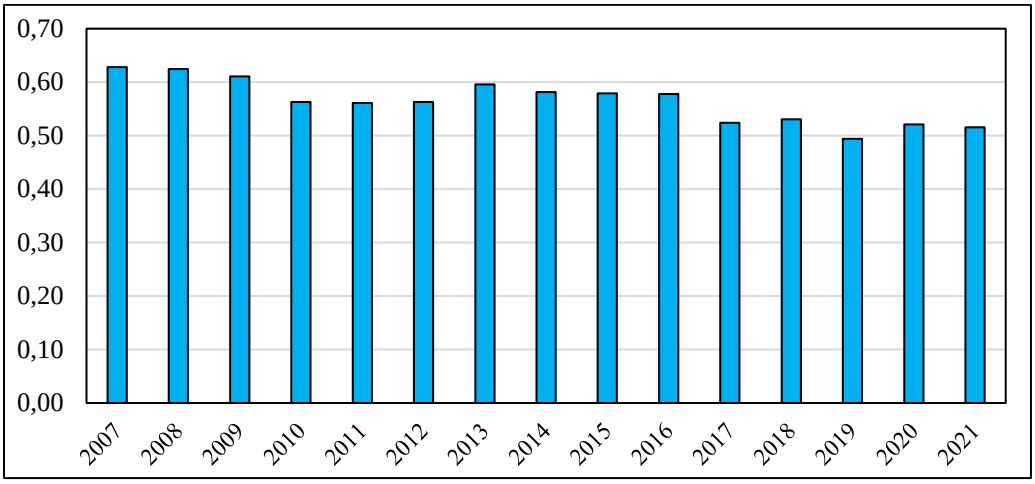


Source: International Trade Centre, FAO, UN, own calculations.

From 2015 on, the transparency of farm gate milk prices has increased due to the public registration of purchasing contracts and the introduction of the EU quality standards (therefore imposed regular farm inspections by the Bulgarian authorities), which are prerequisites for accessing the raw milk market. However, due to the significant investments required, some specialized farms shifted their focus from dairy to meat production.

Figure 2 shows the development dynamics of the value component PICDc. There is a significant decline after the Global Financial Crisis in 2009. In the following years, it began to recover for the period 2013-2016, but then again began to decrease in value due to external for Bulgarian market factors (for example the Russian Federation announced in August 2016 a ban on the import of dairy products from the EU, resulting in the retention of dairy products in the EU common market and pressure on milk purchase prices in the union). Another factor is the weak integration in the dairy food chain, in contrast to other EU countries, where farmers are not only raw material producers but also through associations own a share in processing enterprises. In Bulgaria, food industry developed according to a different model, which led to dominance of processors in determining the purchase price due to the fragmentation and weakness of milk producers and their organizations. But it is important to note that due to accumulated negative impressions in collective memory regarding cooperation during the planned economy/agriculture, farmers avoid association, which undermines their economic sustainability, to the extent that cooperation can also contribute to reducing production costs through group purchases of materials and jointly use of the equipment.

Figure 2. Dynamics of the value component

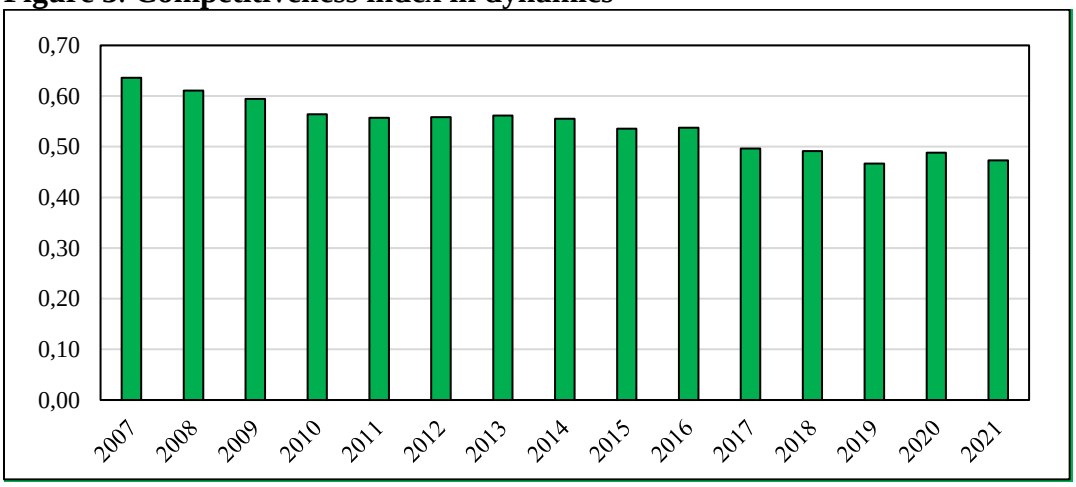


Source: International Trade Centre, FAO, UN, own calculations.

But if we focus only on the Bulgarian milk market, it would not give us the full picture. Since the abolition of milk quotas for cow's milk producers in April 2015, there has been increased price volatility in the EU caused by overproduction of milk (the increase is mainly due to the countries of the so-called "Milk belt": the Baltic states, Ireland, Belgium, the Netherlands, Denmark, the western parts of Germany and France (Jansik et. al. 2014) where the climate is characterized by higher air humidity and warmer winters, which favor pasture animal husbandry) and relatively constant consumption in the Union's internal market. To the extent that Bulgarian production is less than 1% of all milk production in the EU, the influence is from the general to the Bulgarian market. But the EU is also a large exporter, so the competitive performance of the European dairy sector on the international market and the increase or decrease in imports of key importers such as China, African countries, and South-East Asian countries lead to fluctuations in the prices of the final products, and from there to the purchase prices of milk.

Composite indices of competitiveness are presented in figure 3. The composite index shows a constant decrease, which follows from the decrease of its constituent components.

Figure 3. Competitiveness index in dynamics

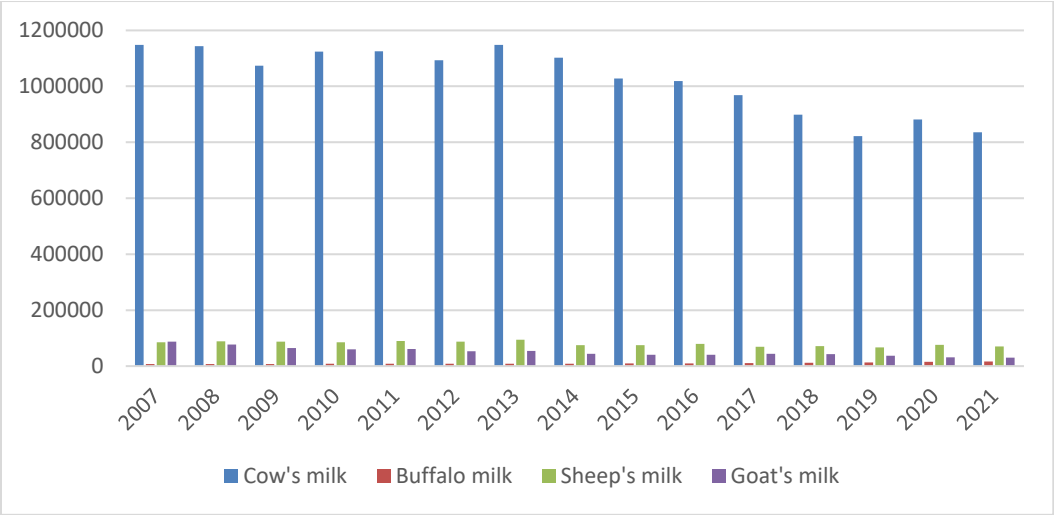


Source: International Trade Centre, FAO, UN, own calculation.

Competitive potential

Could we expect an improvement in the coming years? Dairy production is a function of the number of dairy animals and productivity. Productivity is largely a function of nutrition and husbandry technology. In 2021, cow milk accounted for 87.7% of the total Bulgarian milk production. Sheep's milk ranks second with a share of 7.4%, goat's at 3.2%, and buffalo at 1.7%. Therefore, an increase in the average productivity of dairy cows—from 3.6 t per head in 2021 (for comparison, the productivity is in neighboring Greece 7.9 t per head and 7.5 t per head on average for the EU (EC, 2023)—could reverse the trend in Figure 4 without the need to increase the number of dairy cows, thereby compensating for the decrease in production volume of other types of milk.

Figure 4. Change in production by types of milk in Bulgaria, tons



Source: MAF, Department "Agrostatitics".

Conclusions

Agricultural economic research commonly views competitiveness through the lens of market performance or as a factor driving performance. The analysis's purpose was to reveal the comperative competitive performance of milk production in Bulgaria for the period following the EU entry. The methodology used to assess the competitiveness index tracks the dynamics of change in terms of milk production and value creation in the country and reports a sustainable decrease.

The components of the index show that while the decline in the production component is relatively smooth, the value component has experienced variations caused by changes in the economic environment. Reasons for this can be found in the decrease in milk production due to the decrease in the number of dairy animals in the country and the difficulties of adapting farms to the changing market environment, but also in small amount of production in Bulgaria compared to the EU therefore market trends on the common market translates to local market and farms and food processors have to adapt.

Reversing the downward trend requires support through investments in specialized farms that aim to improve farming technology and increase productivity, thereby enhancing the competitiveness of the dairy sector and economic sustainability of the farmers.

The components of the index show that while the decline in the production component is relatively smooth and related to a decrease in the number of milk-producing animals, the value component has experienced variations caused by changes in the economic environment. The reasons for this include inefficient milk production, challenges in adapting farms to the changing market environment, and the relatively small amount of production in Bulgaria compared to the EU. Consequently, the transfer of market trends from the common market to the local market necessitates adjustments from specialized farms and food processors.

Reversing the downward trend necessitates support from investments in specialized farms that aim to improve farming technology and increase productivity, thereby enhancing the dairy sector's competitiveness and farmers' economic sustainability.

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