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***Original Paper***

# Self-sufficiency rate in the pork sector in Slovakia

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**ABSTRACT**

The paper deals with the production and food self-sufficiency. We evaluate the level of production and food self-sufficiency of the Slovak Republic in the pork sector in relation to the common market of the European Union in the period 2017-2022. We quantify and compare the levels of self-sufficiency of the Slovak Republic with the EU in the pork sector. To determine the self-sufficiency rates, two methodological approaches were used, based on balance indicators and on the production of the processing industry. The results confirm the low degree of self-sufficiency of the Slovak Republic in pork meat, while the European Union has a surplus in this sector. The paper confirms the significant specialization and concentration of pork meat production in some EU member countries.

**KEYWORDS:** production self-sufficiency, food self-sufficiency, pork

**JEL CLASSIFICATION:** C00, Q02, Q11, Q17

## INTRODUCTION

Food self-sufficiency is an often-used term. Nevertheless, there is no generally accepted and universal definition. There are several understandings of food self-sufficiency that can be applied at different levels of analysis [17]. In its most basic form, FAO defined the concept of food self-sufficiency as the extent to which a country can satisfy its food needs from its own domestic production" [7]. This definition can apply at the individual, regional or country level. National food self-sufficiency has become a key indicator for food availability and a fundamental pillar of food security. Therefore, self-sufficiency is the main goal of agri-food policies, even though this goal is often not explicitly defined [2].

Currently, indicators of self-sufficiency expressed by the rate of self-sufficiency (SSR) [8] are standard indicators in agricultural and economic statistics. They are measured in calories, in

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physical or monetary units [1], [3], [10], [19]. Depending on the input data used, it is possible to determine the degree of self-sufficiency for a specific commodity or commodity group, as well as in an aggregated form for entire sector, i.e. for agricultural commodities and food products [18].

## MATERIAL AND METHODS

The Ministry of Agriculture and Rural Development of the Slovak Republic (MARD) [13], distinguishes two indicators of self-sufficiency: production and food self-sufficiency [14]. Production self-sufficiency shows the extent to which agricultural primary production can satisfy the demand and food needs of domestic consumers. Food self-sufficiency is the extent to which the food industry can satisfy the needs of domestic consumers from its own production [9]. The goal of our research is to evaluate the level of production and food self-sufficiency in the pork sector in Slovakia and in relation to the common market of the European Union.

Calculation of production self-sufficiency is based on pork balances, which are compiled and published annually by MARD as part of the situational and outlook report Slaughter pigs [16]. Based on data from commodity balances, production self-sufficiency is expressed as follows [11]:

| Production self-sufficiency = gross domestic production x 100 / domestic consumption (1) |
|---|

The calculation of European Commission is based on the same principle and procedures in the medium-term market outlook for basic agri-food commodities [4]. We use balance indicators to express the production self-sufficiency of the European Union.

The level of food self-sufficiency can be calculated based on the balances of pork in the Slovak Republic and the EU. We replace gross domestic production by net production, which is the result of the difference between gross domestic production and net exports of live pigs:

| Food self-sufficiency = net domestic production x 100 / domestic consumption (2) |
|---|

From the available data on the volume of production for the sale of own products of branches of the food industry in Slovakia published within the report POTRAV [20], it is possible to determine the degree of food self-sufficiency in a detailed breakdown by segments of the food industry. Based on the input data in natural measurement units, food self-sufficiency can be calculated as follows [12]:

| Food self-sufficiency = production x 100 / (production – export + import) (3) |
|---|

From the detailed data of the report POTRAV, we focus only on the production of pork meat from the primary processing of slaughter pigs in slaughterhouses. We use data on production and international trade of pork meat in individual EU member states from databases published by Eurostat [5], [6]. Since it is necessary to use data from two independent and incompatible databases – production of agricultural products and foreign trade exchange (Comext) – it is necessary to build a transfer bridge between the items of both databases. For this reason, we used foreign trade data for precisely defined HS items: HS 0203, HS 021011, HS 021012 and HS 021019 [9].

The detailed data of the report POTRAV allow to determine the level of potential food self-sufficiency, which expresses the share of theoretical production of food products corresponding to the fully utilized production capacities of the food industry [12]:

Potential self-sufficiency = production capacity x 100 / (production - export + import) ( 4)

We cover the period from 2017 to 2022. All data used for the European Union are the sum for 27 member states, i.e. excluding the United Kingdom.

## RESULTS AND DISCUSSION

The food value chain of pork meat in Slovakia is one of the most problematic, as it significantly contributing to the constant increase of negative balance of international trade with agricultural and food products [15]. The negative balance in pork meat is increasing also due to the increasing demand for meat by Slovak consumers. While in 2017, the average annual consumption was 62.8 kg of meat per consumer, in 2022 it was 71.0 kg (index 2022/2017 = 113.1%). According to the data of the Statistical Office of the Slovak Republic, consumption of pork meat had a share of 55% in total meat consumption (Figure 1).

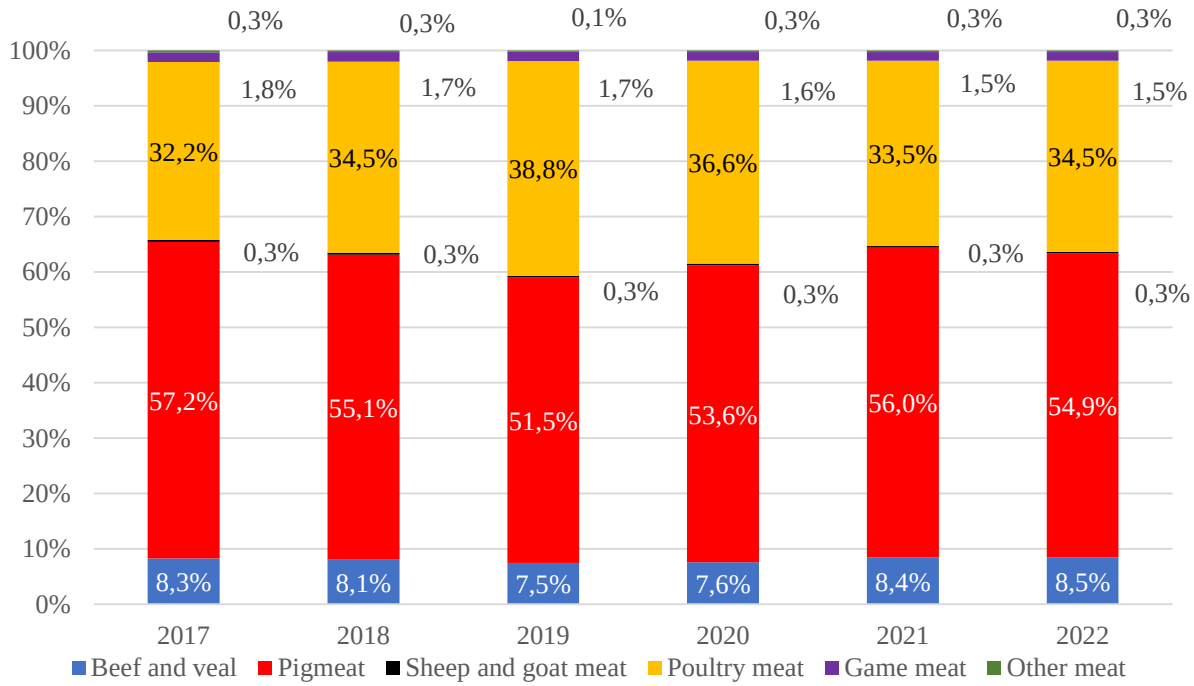


**Figure 1** Structure of meat consumption in the Slovak Republic (in %)
Source: [21], own processing

Domestic production is unable to respond to the growing demand for pork meat. After peaking in 2021, domestic production decreased sharply. In 2022, gross domestic production of pork meat was only at the level of 89.4% of the production in 2017 and only at the level of 82.0% of the production in 2021. This represents a decrease of 8.5 thousand tons of Carcass-weight equivalent (CWE), respectively 15.6 thousand tons CWE (Figure 2). The reason for

the negative development of domestic production is the constant decrease in numbers of pigs in Slovakia. In 2022, the number of pigs decreased by 15.9% year-on-year and even by up to 38.0% compared to 2017 [5].

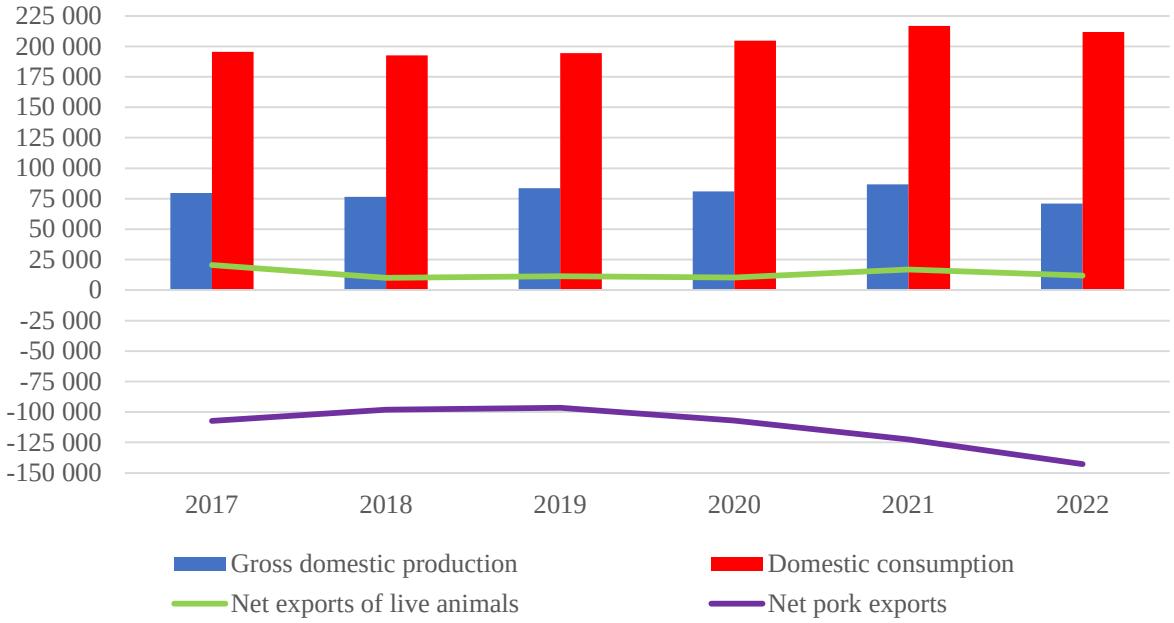


**Figure 2** Development of balance indicators on the Slovak pork market (in t CWE)
Source: [16], [21], own processing

On the other hand, the total domestic consumption of pork meat increased. From 2017 to 2021, consumption in Slovakia increased gradually (index 2021/2017 = 110.9%), while in the following year 2022 we record a slight decrease. Domestic production responds inadequately to high domestic demand. Despite this, Slovakia is a net exporter of live pigs. In the last period, almost 12 thousand tons CWE of live animals were exported from Slovakia. This is a significant part of the domestic production, which, instead of being processed and placed on the domestic market, was exported unprocessed with low value added. Consequently, domestic demand is mostly satisfied by the import of pork and pork products. In 2017 the net export of meat and meat products with high added value reached the level of -107.4 thousand tons CWE. In 2022 it was -142.6 thousand tons CWE (a total increase by 32.8%). The growth of domestic consumption was covered by the increase in the volume of pork imports.

**Table 1** Development of balance indicators on the EU pork market (in th t CWE)

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| **Gross domestic production** | 22,799 | 23,180 | 23,016 | 23,215 | 23,627 | 22,292 |
| **Net exports of live animals** | 44 | 50 | 42 | 22 | 43 | 42 |
| **Net pork exports** | 3,343 | 3,413 | 4,015 | 4,784 | 4,655 | 3,846 |
| **Domestic consumption** | 19,414 | 19,743 | 18,981 | 18,436 | 18,962 | 18,428 |

Source: [4], own processing

Development of balance indicators for the entire European Union was different to the development in Slovakia. It shows a stable and balanced trend (Table 1). Gross domestic production was around 23.0 million ton CWE, while domestic consumption was on average at the level of 19.0 million ton CWE European Union is only minimally involved in trade with live pigs. While the net export of live pigs in the Slovak Republic accounts for an average of 17.0% of the total gross domestic production, in the European Union this share is only 0.2%. At the same time, the EU is world's largest pork meat exporter.

**Table 2** Self-sufficiency rate in the pork sector (in %)

| | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** |
|---|---|---|---|---|---|---|
| **Production self-sufficiency** | | | | | | |
| **Slovak Republic** | 40.7 | 39.7 | 43.0 | 39.5 | 40.0 | 33.6 |
| **European Union** | 117.4 | 117.4 | 121.3 | 125.9 | 124.6 | 121.0 |
| **Food self-sufficiency** | | | | | | |
| **Slovak Republic** | 30.2 | 34.5 | 37.2 | 34.4 | 32.3 | 27.9 |
| **European Union** | 117.2 | 117.2 | 121.0 | 125.8 | 124.4 | 120.7 |

Source: own calculation

Based on the balance indicators we determine the level of production and food self-sufficiency of the Slovak Republic and the EU in the pork sector (Table 2). The rate of production self-sufficiency (1) of the Slovak Republic decreased due to growing consumption. Domestic production covered 40.7% of domestic consumption in 2017, 43.0% in 2019, and in 2022 the rate of production self-sufficiency was only 33.6%. Two thirds of the domestic demand were covered by imports of pork meat.

European Union can fully cover domestic consumption with own production in the long run and to place significant overproduction on the markets of third countries in the form of processed meat or meat products.

Due to the relatively high share of the net export of live animals in the total production in Slovakia, the level of food self-sufficiency (2) is significantly below the level of production self-sufficiency. The rate of food self-sufficiency increased from 30.2% in 2017 to 37.2% in 2019. However, in the following 3 years, the rate of food self-sufficiency shows a significant decrease and in 2022 it was only 27.9%. Slaughter pigs processed in Slovakia currently cover only 28% of domestic consumption of pork, and the remaining almost 72% are imported.

Export of live pigs from the EU is low and does not threaten the level of food self-sufficiency of the EU common market. The level of net production of EU member countries is able to fully cover the total consumption in EU. And at the same time, it is generating surplus of processed pork meat exported to third countries.

Available data allow to determine and evaluate the level of food self-sufficiency also from the point of view of the production of the processing industry (3). The level of food self-sufficiency in Slovakia measured by the production of the processing industry, is on average 10.1 percentage points higher than the level of food self-sufficiency based on balance indicators. Despite this, the Slovak processing industry was able to cover only 42.8% of the estimated domestic pork consumption (Table 3).

As for European Union food self-sufficiency rate, measured by the primary production of the processing industry, is on average 4.7 percentage points lower than the level of food self-sufficiency calculated based on balance indicators. Even from the point of view of the processing industry, EU as a whole has a significant surplus in pork production.

**Table 3** Food self-sufficiency rate in the pork sector measured through the production of the processing industry (in %)

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| **Slovak Republic** | 40.0 | 46.6 | 48.7 | 47.2 | 41.9 | 32.4 |
| **European Union** | 113.2 | 113.0 | 116.0 | 120.4 | 119.3 | 116.1 |

Source: [5], [6], [20], own processing

Pig breeding and pork production in the European Union are concentrated in several member states [5]. Two thirds of pig farms (66.2%) and pork production of the EU (68.6%) are concentrated in only five member countries: Spain, Germany, France, Poland and Denmark. Despite significant specialization, member states have significantly different levels of food self-sufficiency (Figure 3). While the high concentration of pigs in Spain, Germany and France can fully cover their domestic consumption and create surplus that is exported, the situation in Poland is different. High number of pigs (on average 11 million) in Poland only covers about 90% of domestic consumption. The opposite extreme in Europe is Denmark, where pork production is three times higher than domestic consumption.

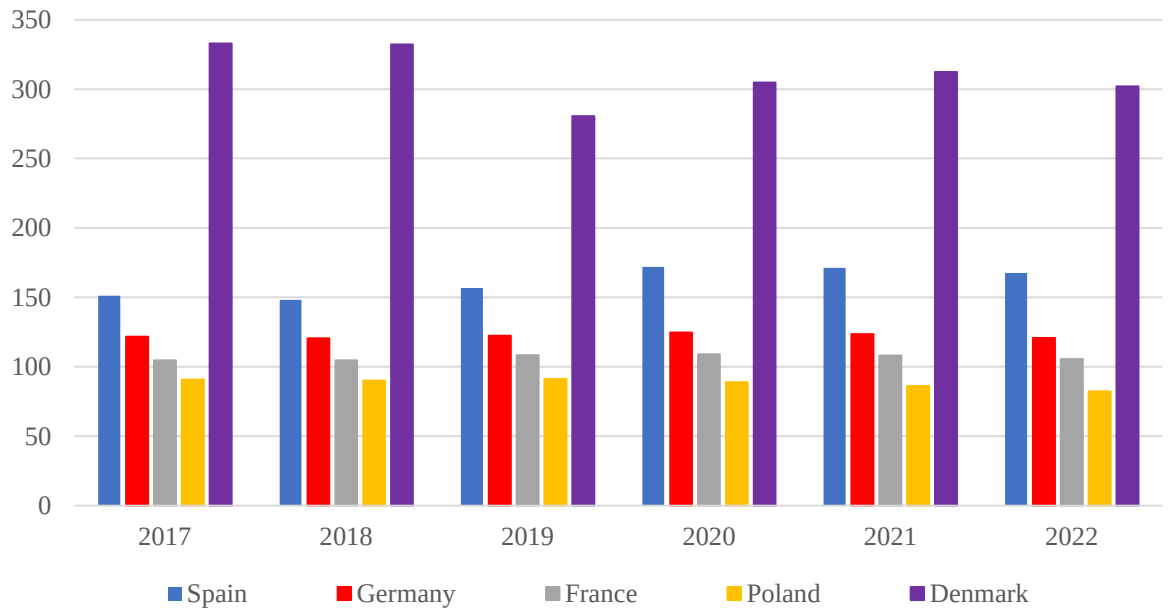


**Figure 3** Food self-sufficiency rate of selected EU countries in the pork sector (in %)
Source: [5], [6], own processing

A different perspective of levels of food self-sufficiency offers the calculation of potential self-sufficiency (4). It focuses on reserves that exist in processing. Data show that the rate of

potential food self-sufficiency has decreased sharply over the last 6 years in Slovakia (Table 4). The reason is a sharp decrease in declared processing capacities. In 2017, the processing industry in Slovakia declared capacities for slaughter processing of 165.2 thousand tons of pork. In 2022 it was only 108.6 thousand ton. Despite the sharp decline in 2022, with full use of existing processing capacities Slovakia was able to cover almost 55% of the estimated domestic consumption by domestic production. In 2022 the potential self-sufficiency rate was 22.1 percentage points higher than food self-sufficiency measured through the actual production of the processing industry. With full use of the existing processing capacities, the domestic production of pork and pork products would become more efficient on the one hand, and the rate of processing of slaughter pigs would increase on the other hand. This would decrease in the negative net export of pork meat in Slovakia.

**Table 4** Potential food self-sufficiency rate of the Slovak Republic in the pork sector (in %)

| **Year** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** |
|---|---|---|---|---|---|---|
| **Potential self-sufficiency** | 83.4 | 77.1 | 65.3 | 64.6 | 60.8 | 54.5 |

Source: [6], [20], own processing

## CONCLUSIONS

The degree of self-sufficiency depends on the domestic production and consumption. In the case of animal commodities, production is determined by the number of animals and the achieved production parameters. On the other hand, domestic consumption is influenced not only by consumer preferences and habits, but also by the performance of the food processing industry. The low level of production and food self-sufficiency in the pork value chain in Slovakia is the result of the conflicting development in both main factors – production and consumer preferences. The low number of slaughter pigs is reflected in the decline of domestic pork production. On the contrary, consumer demand is constantly growing, which is reflected in the increased consumption of meat, especially pork. There is a constant decrease in self-sufficiency of the Slovak Republic in pork meat. We conclude that Slovak pig farmers are currently able to supply the domestic market with only a third of the demanded volume of pork meat. Due to insufficient and inefficient processing capacities, the Slovak food industry is only able to cover consumer demand by 28 up to 32%. The different results of the food self-sufficiency rate are caused by differences in the methodology and mainly in the input data used. It is obvious that even with the full use of the existing production capacities, Slovakia would significantly depend on the import of pork meat. To increasing the level of self-sufficiency Slovakia must invest and expand the processing capacities of the meat industry and especially massively increase the number of pigs. However, expanding pig farming in Slovakia has economic, social, and environmental obstacles. Pig farms cause environmental problems and reduce the quality of life of residents. The efficiency and competition on the pork market also plays an important role. The analysis showed that pig breeding and pork meat production is highly concentrated and specialized in the EU. In addition, the European Union generates a high surplus in the pork sector and has a stable position as the world's largest exporter.

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