

## Development of consumption and prices of selected types of meat on the Slovak market in the decade 2012 – 2021

### Vývoj spotreby a cien vybraných druhov mäsa na slovenskom trhu v období dekády 2012 – 2021

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#### ABSTRACT

The consumer price of food products is an important economic factor that significantly affects the level of food consumption. In this paper it is analysed the development of consumption and prices of selected types of meat in the Slovak Republic in the period 2012 - 2021, specifically pork, beef, and poultry. The basic hypothesis in examining the impact of price changes on consumption was the claim that an increase in the price of a particular meat will be reflected in a decrease in its consumption. Analysed data proved that Slovak consumers prefer pork and poultry to beef. The average Slovak household spends about 30% of total food expenditure on meat. In Slovak households the development of the share of expenditure on food, beverages and tobacco in total household expenditure showed an increasing trend. Slovak households spent 23.79% of their total expenditure on food in 2021, which was 27.02 percentage points (p.p.) more than in 2012. Poultry meat contributed the most to the increase in consumption, which since 2012 has recorded an average year-on-year increase in consumption of 106.02 p.p., beef with an average year-on-year increase in consumption of 105.1 p.p., and pork 102.69 p.p. The consumption of these three main types of meat increased by 37.52% from 2012 to 2021. Based on the development on the meat market in the current period, it can be assumed that inhabitants will prefer fine types of meat, while the price relationships of individual types continue to play an important role.

**Keywords:** pork, beef, poultry, price index

#### ABSTRAKT

Spotrebiteľská cena potravinárskych výrobkov je dôležitým ekonomickým faktorom, ktorý výrazne ovplyvňuje úroveň spotreby potravín. V príspevku je analyzovaný vývoj spotreby a cien vybraných druhov mäsa v Slovenskej republike v rokoch 2012 - 2021, konkrétne bravčového, hovädzieho a hydinového mäsa. Základnou hypotézou pri skúmaní vplyvu cenových zmien na spotrebu bolo tvrdenie, že zvýšenie ceny konkrétneho druhu mäsa sa prejaví v znížení jej spotreby. Analyzované údaje preukázali, že slovenskí spotrebiteľia uprednostňujú bravčové a hydinové mäso pred hovädzím mäsom. Priemerná slovenská domácnosť minie na mäso približne 30 % celkových výdavkov na potraviny. V slovenských domácnostiach mal vývoj podielu výdavkov na potraviny, nápoje a tabak na celkových výdavkoch domácností rastúci trend. Slovenské domácnosti minuli v roku 2021 na potraviny 23,79 % z celkových výdavkov, čo je o 27,02 percentuálneho bodu (p. b.) viac ako v roku 2012. Najviac sa na náraste spotreby podieľalo hydinové mäso, ktoré od roku 2012 zaznamenáva medziročne priemerný nárast spotreby o 106,02 (p. b.), hovädzie mäso s priemerným medziročným nárastom spotreby o 105,10 p. b. a bravčové mäso o 102,69 p. b. Spotreba týchto troch hlavných druhov mäsa vzrástla od roku 2012 do roku 2021 o 37,52 %. Na základe vývoja na trhu s mäsom v aktuálnom období možno predpokladať, že obyvatelia budú preferovať jemné druhy mäsa, pričom cenové relácie medzi jednotlivými druhmi naďalej zohrávajú dôležitú úlohu.

**Klíúčové slová:** bravčové mäso, hovädzie mäso, hydinové mäso, cenový index

## INTRODUCTION

In Slovakia a meat consumption has historical tradition because suitable geographical conditions allowed the ancestors to make a living by wild animals in the forests and raised domestic animals for the subsistence. At present, meat and meat products are part of the menu of most people in Slovakia, whereas they buy these commodities in stores. This situation corresponds to the good economic situation in society and the resulting standard of living of the population. In addition, the inclusion of meat in the human diet is important from a nutritional point of view, because meat is an important source of protein, vitamins (especially group B), unsaturated fatty acids and minerals.

People's diet is essential to their lives, and experts advise that the diet should be varied and nutritionally balanced. Meat in the human diet is a source of high-quality proteins, while red meat significantly contributes to the intake of individual micronutrients, such as iron, zinc, selenium, vitamin D and vitamin B12 (Čech et al., 2022). Compared to the diet of the older generation, the eating habits of the younger generation are under the influence of modern trends such as vegetarianism, veganism, consumption of organic products, support of local plant and animal products, modification of diet for health reasons, diets focused on proteins, split diet, and many others (Pfeiler and Egloff, 2018). In the study (Bogueva et al., 2017) it is suggested social marketing based on the secondary health and environmental benefits of reduced red meat consumption.

Eating habits are different in every family and the composition of the menu are influenced by various factors, from economic and social, to changes in the meat market, to health and personal preferences of eating style. Nowadays, pork and poultry are mostly consumed in Slovak households. To a lesser extent, consumers buy beef, game, and fish. The consumption of meat and meat products in Slovak households depends on the disposable income, while this dependence is directly proportional, i.e., with a higher disposable income, the consumption of meat and meat products also increases. The analysis of meat consumption in Slovakia and neighbouring

European countries confirmed a higher consumption of meat per inhabitant than the global average; in Austria 95.3 kg of meat per inhabitant, Germany 88.4 kg, the Czech Republic 82 kg, Poland 80.2 kg, Hungary 71.2 kg and Slovakia 70 kg (Consumption is twice as high as ..., 2021) (Beef statistics, 2022).

"The development of eating habits in Slovakia in the period 1991-2011 underwent rapid structural changes. In this period, the demand for poultry meat increased by 8.05%, while the replacement in consumption is pork and poultry meat" (Bielik and Hupkova, 2011). In the last decade, the changes in the Slovak meat market were reflected in the reduction of the number of pigs in Slovak breeders and the increase in the import of pork and meat products to Slovakia. One of the reasons for the decrease in market prices of meat was the ban on the import of meat and meat products from the European Union to the Russian market (Serenčėš and Gálík, 2019).

Research of customers opinions and preferences is an important basis for changes and decisions of producers and sellers of meat and meat products. However, for consumers, price is one of the main factors influencing their purchasing behaviour. The results of studies in specific enterprises allow to improve their marketing tools and to obtain a better position on the agri-food market. As stated by Kozáková and Hornáčková (2021), for 62.4% consumers, meat and meat specialties of preferred producer are the main reason for purchasing in the corporate store.

Klepochová (2019) investigated the eating habits of Slovak residents within selected generations and compared their preferences when purchasing healthy foods. The survey showed that the Slovak population is generally considered to eat healthily. However, monitoring of selected groups of the Slovak adult population confirmed that the population's diet is still energy-rich with a large consumption of animal fats and proteins, which is subsequently manifested in increased overweight and obesity (Strategic framework of health care for the years 2014 – 2030, 2022).

## MATERIAL AND METHODOLOGY

Data on the research topic were obtained from databases available on the websites of the Statistical Office of the Slovak Republic (Database DATAcube, 2021a; Database DATAcube, 2021b) and National Agricultural and Food Centre, Branch: Research Institute of Agriculture and Food Economics (Situational and outlook reports, 2021).

Analysis of data was carried out by selected methods of quantitative research. Applied methods included analysis, synthesis, and the quantitative description of the observed category. It was also used the comparison method to evaluate data differences and a chain index, which is expressed by the relationship:

$$I_{R(t)} = \frac{Q_t}{Q_{t-1}}$$

where:  $Q_t$  – indicator in the current year,  $Q_{t-1}$  – indicator in the previous year.

In the case of price indices, it was used weighted arithmetic average of individual simple price indices, where it was applied the consumption structure from the base period as weights (Hindls et al., 2018). The Laspeyres price index, which expresses the average price change of various types of meat, is written in aggregate form:

$$I_{p(L)} = \frac{\sum p_1 \cdot c_0}{\sum p_0 \cdot c_0}$$

where:  $p_1$  – prices of the reporting period,  $p_0$  – prices of the base period,  $c_0$  – amount of goods sold in the base period.

The second index is Paasche price index that expresses how the prices of products sold in the reporting period have changed compared to the prices of the base period according to the number of goods sold in the reporting period:

$$I_{p(P)} = \frac{\sum p_1 \cdot c_1}{\sum p_0 \cdot c_1}$$

where:  $p_1$  – prices of the reporting period,  $p_0$  – prices of the base period,  $c_1$  – quantity of goods sold for the reporting period.

The third index is the Fisher index which expresses the geometric mean of the product of two aggregated Laspeyres and Paasche price indices:

$$I_{p(F)} = \sqrt{\frac{\sum p_1 \cdot c_0}{\sum p_0 \cdot c_0} \cdot \frac{\sum p_1 \cdot c_1}{\sum p_0 \cdot c_1}}$$

When comparing two price levels (applied to the same consumption from the current period), there were used statistical methods of regression and correlation analysis to estimate the development of observed indicators in the future. When building a time series trend function model and estimating parameters, it is important the quality level of the model, i.e., it is examined the signification of the differences between empirical values  $y_1, y_2, \dots, y_n$  and theoretical values  $\hat{y}_1, \hat{y}_2, \dots, \hat{y}_n$ . The logarithmic trend is used in practice mainly for its applicability in economic areas. It is expressed by the following formula:

$$\hat{y}(x) = \beta_1 + \beta_2 \cdot \ln(x)$$

In the next part, data on the development of prices and consumption of three selected types of meat in the period 2012-2021 will be evaluated by quantitative methods. In addition, the estimation of the future meat consumption of Slovak consumers will be given.

## RESULTS AND DISCUSSION

The consumer price of food is one of the important factors influencing the level of consumption. The basic hypothesis in examining the impact of price changes on consumption was the claim that an increase in the price of specific meat will be reflected in a decrease in its consumption. There were analysed changes in consumption and prices for the period 2012 to 2021, and from these data it was calculated the average change in the individual meat examined.

Food has a leading role in the consumer basket (food and soft drinks account for more than a quarter of expenditure, housing and energy are in the second place with a fifth of expenditure) and are perceived by consumers as a key asset. The indicator of the share of expenditure on food, beverages, and tobacco in total household expenditure documents how much money from the available resources of the population is spent on satisfying nutritional needs, and how much money is tied up to satisfy other needs.

From 2012 to 2021, the development of the share of expenditure on food, beverages, and tobacco in total household expenditure in Slovak households showed an increasing trend, except for 2015, when the share of expenditure decreased by 16.59 percentage points (p.p.) compared to the previous one. In 2021, this indicator was 28.34% and has increased by 12.19 p.p. since 2012 (Table 1). If this indicator is compared with the previous year 2019, it increased by 22.47 p.p. and compared to 2020 by 16.48. Its values in the observed period ranged from 21.72% (in 2015) to 28.34% (in 2021).

In 2021, Slovak households spent 23.79% of their total expenditures on food, which is 27.02% more than in 2019. According to the latest data from the European Statistical Office Eurostat, in 2020 Romanian households spent the most on food, beverages and tobacco (26.4%), followed by Estonian (21.6%), Bulgarian (20.7%) and Lithuanian households (20.5%). Households spend the smallest share of their total expenditure on food in Luxembourg (9.5%), Ireland (9.8%) or Austria (11.3%). The highest growth in expenditure on food, beverages, and tobacco in 2020 compared to 2019 was recorded in Greece (an increase of 3.5%), Spain (+3.3%) and Croatia (+3.2%). The trend in the share of expenditure on food, beverages and tobacco in total household expenditure copies the development of consumption of certain types of food and consumer food prices. The average Slovak household spends about 30% of total food expenditure on meat.

Meat consumption in Slovakia has been on the rise since 2012, except for 2014 (Table 2). In 2021, the total consumption of 72.2 kg of meat was recorded, compared to 2012 it was higher by 37.52% (19,7 kg), compared to 2020 by 2.3 kg (3.77%) and compared to 2019 by 2.9 kg (4.18%). Poultry meat contributed the most to the increase in consumption, which has recorded an average year-on-year increase in consumption of 106.02 p.p. since 2012, and beef with an average year-on-year increase in consumption of 105.1% and pork 102.69%.

Germany (88.4 kg) and Austria (95.3 kg), for example, have high per capita meat consumption. The average Czech indulges more than 82 kilograms of meat per year, Poland 80.2 kg and Hungary 71.2 kg (A Slovak eats 70 kg of meat per year, ..., 2021). Households are spending more and more money on food and are therefore considering the quality and volume of food consumed. In Slovakia, there is still low consumption of beef and a constant increase in its price.

In the next part it is presented analysis of consumer prices and consumption of selected kinds of meat: beef, pork, and poultry. From the point of view of the established Recommended Food Rations (RFR), the consumption of beef in Slovakia between 2012 and 2021 fell below the limit of rational consumption (17.4 kg per inhabitant per year) and ranged from 3.6 (year 2012) to 5.51 kg (year 2021). The highest increase in consumption was recorded in 2013, by 22.22% compared to the previous year (Figure 1).

**Table 1.** Share of expenditure on food, beverages, and tobacco in total expenditure of households in the Slovak Republic (%)

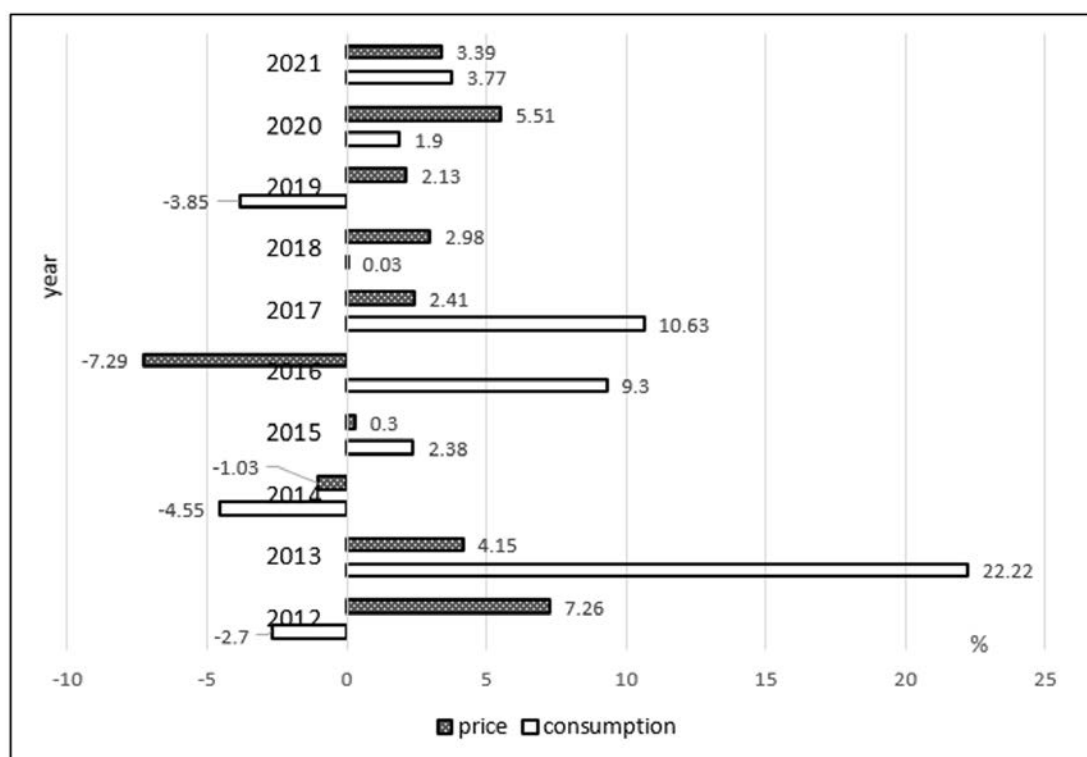
Indicator	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Index 21/19
Expenditure for:											
Food, drinks, and tobacco	25.26	26.01	26.04	21.72	21.88	22.34	22.74	23.14	24.33	28.34	1.22
Of this:											
Food	21.14	21.83	21.69	17.91	18.09	18.57	18.99	18.73	20.50	23.79	1.27
Drinks	2.58	2.60	2.62	2.44	2.42	2.39	2.38	3.06	2.48	2.98	0.97
Tobacco	1.54	1.58	1.73	1.37	1.37	1.38	1.37	1.35	1.35	1.57	1.16

Source: (Database DATAcube, 2021a)

**Table 2.** Consumption of meat in the Slovak Republic (in kg per capita)

Indicator	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Index 21/19
Meat in total	52.5	53.3	47.9	50.6	58.4	62.8	64.3	69.3	69.9	72.2	1.38
Of this:											
Beef	3.6	4.4	4.17	4.27	4.68	5.14	5.17	5.21	5.31	5.51	1.06
Veal	0.0	0.0	0.04	0.03	0.09	0.03	0.03	0.02	0.02	0.02	-
Pork	30.0	30.9	29.5	30.9	35.4	35.9	35.4	35.7	37.5	37.7	1.26
Poultry	17.7	16.9	14.5	14.1	16.9	20.2	22.2	26.9	25.6	28.3	1.60

Source: (Database DATAcube, 2021b)

**Figure 1.** Development of beef consumption and prices in the period 2012-2021 (% of annual changes)

Source: author's calculations

The consumption of this type of meat has increased by 53.06% over the last ten years, while the price has increased by 12.62%. The exceptions are the years 2014 and 2016, when it was recorded a decrease in the price of beef. In 2014, both consumption (by 4.55%) and prices (by 1.03%) decreased. When the price of beef decreased by 7.29% in 2016 compared to the previous year, consumption increased by 9.3%. The prices of beef evolved depending on the type of meat. The prices of

bone-in loin had an increasing trend in the monitored period, except for 2016. The difference between the maximum (5.59 € in 2021) and the minimum price (in 2016) was 1.09 € per kilogram. In 2021, the price was 5.07% higher compared to 2020 and 13.16% (by 0.65 €) compared to 2019. Boneless beef rump prices ranged from 9.09 € (in 2021) to 8.04 € (in 2016). The pandemic did not affect beef consumption per capita. Its per capita consumption in 2021 increased by 3.77% compared



to 2020 and by 5.76% compared to 2019. In 2021, it was recorded an increase in the price of beef by 3.39% compared to 2020, and by 9.09% compared to 2019. In the coming years it is possible to expect a slight increase in beef consumption by 2.2% (according to increasing trend:  $y=0.57\ln x+3.61$ ).

Pork is a popular meat in Slovak households, especially for celebrations and other occasions. Its consumption per capita is 37.7 kg (year 2021), while only 12 kg is of Slovak origin. The rest is imported from EU and non-EU countries. The import of meat has a negative impact on Slovakia's food security. Domestic production cannot respond to the deficit of resources and the decimated food industry, and it is unable to meet the growing consumer demand for Slovak food. Most consumers are aware of changing their eating habits in favor of maintaining the balance in nature. This requires a sufficient selection of organic foods with clear and sufficient information about the origin and favorable prices.

In Figure 2, we see the assessment of pork consumption and prices in the period 2012-2021(%). During the observed period, the consumption of pork increased (by 25.67% with a price increase of 9.93%) and covered the RFR in 2021 (22.2 kg per inhabitant per year) to 169.82%. In 2012 and 2018, when the price of pork increased, consumption decreased. On the contrary, in the period of 2015-2016 and in 2021, as the price of pork decreased, households increased its consumption. The development of prices for individual types of dishes was differentiated. In 2021, compared to 2020, prices decreased for all types of pork (for loin by 9.18%, neck by 9.04%, belly by 6.88%, for thigh by 9.44% and shoulder by 11.35%). If these prices are compared with the prices in 2019, only pork belly saw a price increase of 5.67% (from 4.23 € to 4.47 €), while prices for other types were lower. The average prices of pork in the monitored period ranged from 3.5 € (year 2016) to 5 € (year 2020) per kilogram. Based on the created trend ( $y=1.43\cdot\ln x+31.52$ ) the pork consumption is expected to increase in next years and the estimate is about 5.3%.

The average consumption of poultry meat in the monitored period from 2012 to 2021 was 36.79% higher

than the RFR (15 kg per capita per year). Overall, the consumption of poultry meat increased significantly during this period (by 38% with a price increase of 0.4%).

The consumption of poultry meat has a fluctuating character (Figure 3). In 2016 and 2017, the reduction in price increased the consumption of this meat, while in 2014 and 2015 the consumption decreased. The largest increase in consumption was in 2019 (by 21.17% compared to the previous year). The price of poultry increased in 2012 and 2013 and consumption fell. Consumption has increased over the last four years, despite rising prices. Per capita consumption of poultry meat reached the value of 28.3 kg in 2021, which is an increase of 5.2% compared to 2019 and 0.71% compared to 2020. Affordability and simple preparation of poultry meat was appreciated by households in the period pandemic. Poultry meat consumption shows a growing trend and the expected consumption per capita should reach 29.28 kg, while we will consume 0.35% more annually (logarithmic trend:  $y=5.18\ln x+12.02$ ). Other factors also contributed to the growth in consumption, a more varied assortment, portioned poultry, lower fat content, lower CO<sub>2</sub> emissions than beef.

Consumption of the three main types of meat (beef, pork, poultry) increased by 37.52% between 2012 and 2021. The impact of the change in the price of three types of meat on the development of consumption was analysed in the case that the consumption per capita did not change and remained at the level of 2019 using the Laspeyres price index  $I_L$ . The value  $I_{L20}=1.0899$  represents that the prices affected the consumer's costs negatively in 2020, because they increased them by 8.99% at fixed consumption and by 1.66% in 2021. If it is considered consumption per capita at the level of 2021, the Paasche price index ( $I_{P20}=0.948$ ,  $I_{P19}=1.0152$ ) shows that, compared to the previous period, prices per kilogram of meat decreased by 5.2%, and in 2019, prices increased by 1.52%. According to Fisher's index ( $I_{F20}=1.0332$ ,  $I_{F19}=1.0159$ ) in 2020 the average price change of the three main types of meat was 3.32%. Compared to 2019, it is observed a price change of 1.59%.

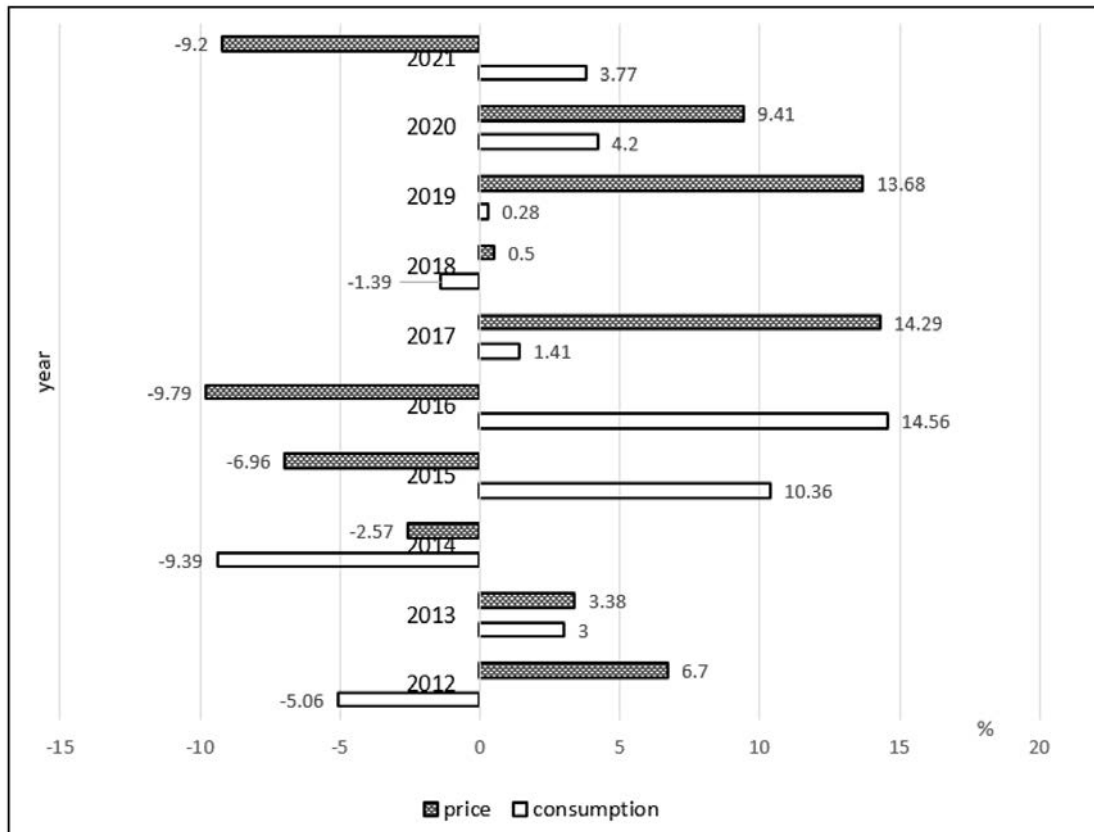


Figure 2. Development of pork consumption and prices in the period 2012-2021 (% of annual changes)

Source: author's calculations

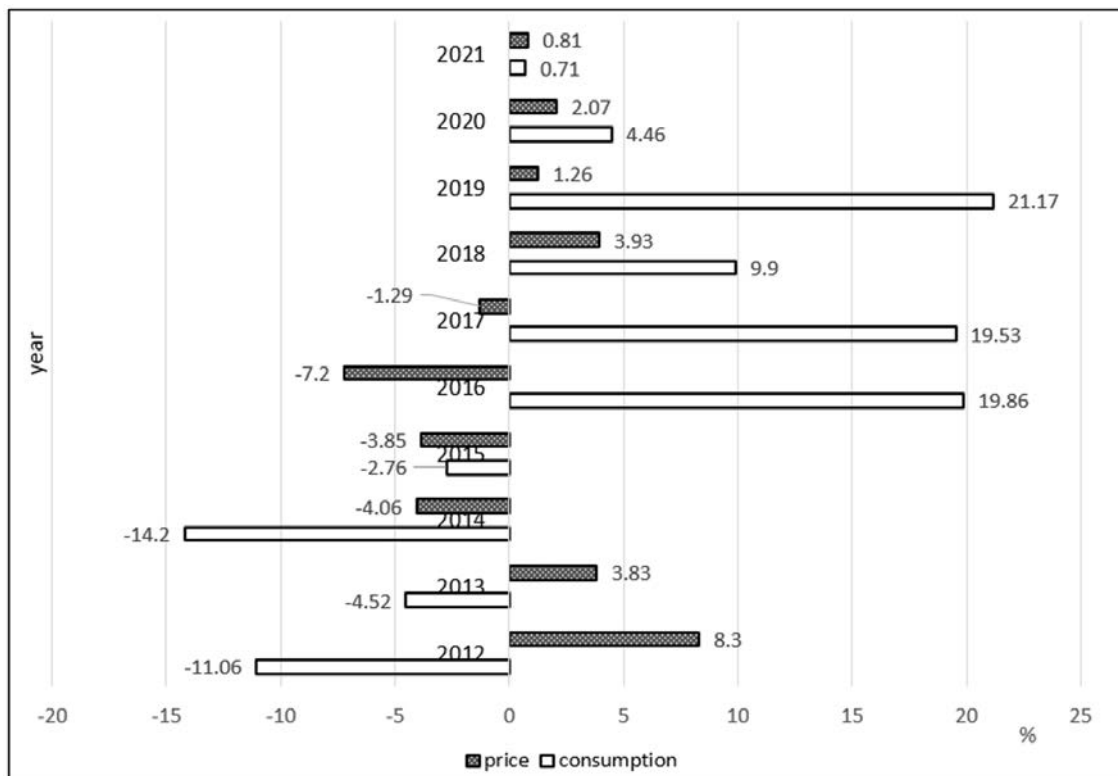


Figure 3. Development of consumption and prices of poultry meat in the period 2012-2021 (% of annual changes)

Source: author's calculations

It is evident that not only price affects consumption. Based on the situation on the meat market in current period, it can be assumed that the population will prefer delicate types of meat, while the price relations of individual types continue to play an important role. Pricing is also affected by the weather, the state of the harvest in Slovakia or in the world and the related prices of agri-commodities on world markets. It should be noted that livestock and other animal production generate up to a quarter of all greenhouse gas emissions that cause and accelerate global warming and climate change (A tax on meat and milk would radically reduce emissions ..., 2016). The most serious environmental impacts from food occur at the beginning of the production chain, but households influence these impacts through their dietary choices and demand for food-related services. People's eating and drinking habits exert considerable pressure on the environment. This is caused directly by transport to stores, storage, cooking and waste production; and indirectly - more importantly - the production, processing, and transport of food.

The price of meat and meat products is an important factor for consumers, which is reflected in the results of sales of these commodities. Research results (Rezitis and Tsonas, 2019) showed that retail food prices increase faster if food processor prices increase; on the contrary, in the case of a fall in the price of food for processors, the reduction in the retail price occurs much more slowly. Křížová (2018) analysed food consumption in relation to income and expenditure of Slovak households. She found that "in the development of consumer behaviour in the Slovak Republic, there is still a discrepancy between the reported economic growth and the slightly improving standard of living of the population".

Eating habits of Slovaks have undergone changes in the recent period; however, the research study confirmed that the consumption of pork and poultry prevails in Slovak households (Benda-Prokeinová and Hanová, 2016). Predanociová (2018) states that the consumption of pork and poultry meat is higher than the recommended consumption; the consumption is lower: for fish meat it is lower by 10% and for beef it is lower

by 72% compared to the recommended consumption. The Slovak consumer reacts to the increase in the price of meat by the consumption of a cheaper type, which is long-term poultry meat. Benda-Prokeinová (2015) looked over price elasticities for meat demand and found that demand responds inelastically to its own price changes.

Many studies are devoted to changes in the diet and eating habits, related to the reduction of meat consumption, or the deviation from the consumption of beef and pork (Hestermann et al., 2020). The goals include changing unhealthy eating habits, which are under the influence of the general diet of the population (Ohtomo, 2017). The goal of current research is environmental factors and the possibilities of reducing meat consumption in connection with reducing the carbon footprint of food. Another examined parameter of the production and consumption of animal products is the reduction of water consumption. Limiting animal products in the human diet offers the potential to conserve water resources and reduce the water footprint of food consumption (Jalava et al., 2014).

## CONCLUSION

The development of food prices is influenced by various factors. They also include wage costs related to remuneration for weekend and night work, or an increase in the minimum wage. Part of food pricing is also the development of energy and fuel prices, which affect logistics costs. Manufacturers' overheads are disproportionately rising, and these are reflected in consumer prices. Rising production costs, falling sales prices, reducing the number of farm animals, rising meat imports, the absence of systemic financial support for this sector, failure to address existing problems all contribute to the deteriorating situation of these sectors.

Results showed that the increase of consumer prices does not have a direct effect on the total volume of meat consumption in Slovak households. Kinds of meat with a higher consumer price are replaced with cheaper ones (mostly imported from abroad) which gradually increases the total consumption of meat.



The assumption for the future is that modernization and innovative technologies in agricultural practice will tend to more efficient and ecological meat production. Consumer concerns about the environment and climate change should lead to greater attention to the production process and the origin of food products. Other factors for changing consumer habits will likely be health and nutrition issues, as well as convenience associated with a shift in demand for more processed meat and semi-finished products.

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