

UNDERSTANDING GENDER DIFFERENCES IN MEAT CONSUMPTION WITH AN EMPHASIS ON THE PERCEPTION OF THE QUALITY AND HEALTH ASPECT OF MEAT

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ABSTRACT

Meat consumption has been growing globally in recent years and consumers can choose from a wide range of meat products. However, meat quality and health aspects are often discussed. The aim of the paper is to point out the development of meat consumption in Slovakia and to examine gender differences in poultry, pork and beef consumption, as well as to identify the importance of quality and health in meat choice. Data related to meat consumption in Slovakia for the last 10 years were evaluated and a consumer survey was conducted in Slovakia on a sample of 1,409 respondents, of which 1,372 were meat consumers. Using mathematical and statistical methods, it was pointed out the increasing meat consumption, as well as gender differences in meat consumption with an emphasis on higher poultry, pork and beef consumption by men compared to women. The results further showed that meat quality is considered equally by men and women, and key indicators are meat origin and composition. Furthermore, women prefer the consumption of Slovak meat and choose meat products based on the meat content, emulsifiers, proteins, water and fat content, while men focus on the meat content, emulsifiers and proteins. It can be also concluded that men respect the health principles in meat consumption less than women, and women are more afraid about food scandals and meat adulteration, which may negatively affect meat quality and safety. The results of the study provide valuable information for scientific research purposes, for meat companies and for consumers.

Keywords: meat consumption, quality, origin, composition, health, gender, Slovakia

INTRODUCTION

Meat consumption has been increasing during the last years and it could be caused by growing human population, as well as by affluence increases (Godfray *et al.*, 2018; Font-i Furnols & Guerrero, 2022) and is determined by different factors. Firstly, meat consumption depends on the business-political factors, including the liberalization of trade, the factor of globalization (Thow, 2009). Further there are also factors affecting the production of meat products with an emphasis on problems with the breeding of farm animals, and subsequent production, processes of industrialization in production (Rivera-Ferre, 2009). The last group, but very significant, are socio-economic factors including the gross domestic product and its redistribution among the population, living standards, changes in eating habits and individual consumer behaviour (Šrédľ *et al.*, 2021; Predanócyová *et al.*, 2019). Many studies pointed out the fact that the increasing meat consumption is driven mainly by increasing average individual incomes (Filippini & Srinivasan, 2019). On the other hand, meat consumption in large quantities can have a negative impact on the environment and people's health (Godfray *et al.*, 2018). Therefore, it is necessary to deal with the other factors determining meat consumption mainly the health aspect and quality aspect.

Meat is one of the most nutritious and popular foods that play a key role in the human diet and is an essential component of a healthy and balanced diet (Ahmad *et al.*, 2018; Pereira & Vicente, 2013). Meat has a high nutritional value (Laskowski *et al.*, 2018) and for the human body is a contributor to several nutrients. It contains long-chain omega 3 fatty acids, proteins, vitamins and minerals such as vitamin B12, selenium, iron, zinc, sodium, phosphorus (Geiker *et al.*, 2021; Sui *et al.*, 2017; Pereira & Vicente, 2013). Significant components that meat contains are proteins, which have a high biological value (Jurcaga *et al.*, 2022; Laskowski *et al.*, 2018; Richi *et al.*, 2015). Protein is an important part of the human diet, as it supports the growth, development and regeneration of the human body (Bohrer, 2017). The consumption of proteins also serves to support the immune system, as they help the production of antibodies that protect the human body from infections (Kameník, 2014). Most animal sources, including meat, provide proteins with high digestibility and an optimal composition of amino acids for human needs (Turck *et al.*, 2022). Meat is also an important source of minerals such as iron, magnesium, phosphorus, sodium and others. Iron is considered a key mineral which supports the formation of haemoglobin and normal muscle activity. Magnesium maintains blood pressure and calcium together with

phosphorus are important for the healthy teeth and bones. Furthermore, sodium regulates water content of the body and zinc helps to wound healing (Kralík *et al.*, 2018; Ahmad *et al.*, 2018).

Meat also contains fat, salt and nitrates. The high content of fat can negatively affect health, especially if meat is consumed excessive (Ahmad *et al.*, 2018). However, the fat content depends for example on the species or on the feeding system (Pereira & Vicente, 2013) and on the type of meat. Processed meat products contain more saturated fat than fresh meat. Consumer perception of the health risks associated with the consumption of processed meat products can be changed by reducing the content of harmful ingredients in products such as saturated fat, salt and nitrates, which will improve the nutritional quality of meat products (Olcay, 2020; Hung *et al.*, 2016; Grasso *et al.*, 2014). In the context of the mentioned, the choice of meat and meat products is influenced by fat content in the consumer decision-making process (Banović *et al.*, 2016). Bunett *et al.* (2020) stated that there are two groups of consumers: consumers who prefer meat and meat products with a lower fat content, and consumers who prefer meat and meat products with an increased fat content. Reducing salt has negative effects on the meat product quality, products acceptability as well as consumer perception (Petit *et al.*, 2019). Moreover, reducing the salt content can change the appearance, taste, or texture of meat (Jaenke *et al.*, 2017). Despite of the mentioned some consumers prefer products with reduced salt content (Petit *et al.*, 2019). Currently, there is a pressure from consumers to produce meat products with a reduced amount of nitrates (Karwowska & Kononiuk, 2020). However, nitrates have a positive effect on improving quality characteristics and microbiological safety (Govari & Pexara, 2018). On the other hand, consumers prefer natural additives added to meat products due to health risks (Karwowska & Kononiuk, 2020).

In most countries, meat consumption has been increasing especially since the 1980s. Over the years, the eating habits of consumers have also changed significantly (González *et al.*, 2020). Excessive meat consumption is often associated with an increased risk of cardiovascular disease and type 2 diabetes (Salter, 2018). Long-term consumption of red and processed meat can lead to increased risk of cardiovascular disease, certain forms of cancer and type 2 diabetes (Laskowski *et al.*, 2018; Richi *et al.*, 2015). On the contrary, adequate meat consumption can have a positive effect on body weight control, especially due to its high protein content. A treatment study that poultry meat consumption has a neutral or positive effect on the risk of diseases such as cardiovascular disease, diabetes and cancer (Maragoni *et al.*, 2015; Giromini & Givens, 2022).

Meat quality is becoming an increasingly important attribute to satisfy consumer needs (Guo & Greaser, 2022). Currently, consumers consider various quality characteristics when buying and consuming meat. Consumers evaluate the intrinsic quality cues of meat and meat products, which are colour, taste, freshness, fat content, textures, nutritional value and others (de Araújo et al., 2022; Rajić et al., 2022). According to Gondoková et al. (2020) consumers are influenced by meat colour, which is perceived as key quality attribute. The meat color also affects the consumer perception of the freshness of the meat (Kralík et al., 2018; Ristić et al., 2017). The extrinsic cue of the meat, such as information on the label about the origin, durability, certification logos and others, are also important in quality evaluation of meat. In addition to these attributes, animal welfare, environmental impact and sustainability are also important in meat and meat products choices (de Araújo et al., 2022). According to the study by Aboah and Lees (2020), the country of origin is the most important indicator in the evaluation of meat quality by consumers. Slovak consumers are also focused on the meat origin country, which may be due to the past food scandals on the market of meat and meat products. The quality of Slovak meat regarding nutrition aspect is evaluated at the higher level compared to imported meat. On the other hand, content of fat, cholesterol and salt was rated as average (Polnoinfo.sk, 2022).

According to the above, we can conclude that meat is an important component of a balanced human diet. Consumers expect that consumed food is healthy and safe (Nagyová et al., 2019). However, confidence in food safety can be negatively affected by food scandals that have appeared on the food market (Bánáti, 2011; Momtaz et al., 2023). In the research conducted by Fikselová et al. (2020) Slovak respondents stated that the most adulterated is precisely meat and meat products. Consumers are more attentive when choosing food and are more interested in the quality and safety of food. Concerns about food safety are increasing among consumers, which negatively influence consumer uncertainty and the purchase of a product (Niewczas-Dobrowolska, 2022; Fikselová et al., 2020).

Consumption patterns and quality and health perception toward meat and meat products can be affected by gender. Gender differences in meat consumption are related to social norms and cultural beliefs. Meat consumption symbolizes masculinity (Prattala et al., 2006). Lombardo et al. (2019) point out that men more often prefer meat and meat products, mainly processed, compared to women. Men have a higher consumption of red meat, which is considered a protein-rich food and high-energy type of food and symbolizes strength, virility and power (Kildal & Syse, 2017; Kubberød et al., 2002). On the contrary, women prefer mainly poultry meat, and they limit red meat consumption mainly because of sensory factors such as bloodiness in meat, difficulties coping with eating a fellow animal, and private body concern (Kubberød et al., 2002). Moreover, men have lower consumer awareness of nutritional properties and prefer uncomplicated food choices with an emphasis on pleasure (Lombardo et al., 2019). In the context of the above Rimal (2005) emphasize that women consider nutritional properties of meat and meat products in making purchase selections and female respondents had a more positive attitude toward meat labels than male respondents.

Based on the mentioned aspects related to the current meat market and the consumption of meat and meat products, it is necessary to know the key determinants influencing the choice of meat and meat products with a future perspective. In the context of the above, the aim of the paper is to point out the development of the consumption of meat and meat products divided by individual types of meat in the Slovak Republic and to explore gender differences in the consumption of individual types of meat as well as to identify the importance of quality and health in the choice of meat and meat products. Currently, the consumption of meat and meat products is a discussed issue due to its excessive consumption and impact on the health of consumers and the environment, but also because of the adulteration of meat products and the health safety of these products. The consumer study is based on a consumer survey conducted in the Slovak Republic on a sample of 1,409 respondents, of which 1,372 are consumers of at least one type of meat and meat products. The study tries to explore the annual consumption of meat and meat products, divided into individual types, and to identify differences in the amount of consumption between men and women. Considering the current issue regarding the quality and health impact of meat consumption, the study examines quality attributes with an emphasis on origin and composition, as well as health aspects related to meat consumption and identifies gender differences. The consumer study will enrich the literature on consumer behaviour with a new perspective on gender differences in the amount of consumption and the perception of quality and health as key determinants of meat consumption. In previous studies, meat consumption from this point of view was not considered, and therefore it is possible to fill the current scientific research gap. Besides the theoretical contribution, the study provides practical implications and the results are beneficial for enterprises in the meat industry in the creation and implementation of marketing strategy and communication with customers. In addition, the results can be beneficial for consumers to increase consumer awareness and support responsible behaviour.

In the context of the paper aim and based on the above mentioned, the following research questions were formulated:

RQ1: What are the gender differences in the consumption of meat and meat products in the Slovak Republic?

RQ2: What are the gender differences in the perception of quality and the health aspect in the consumption of meat and meat products?

MATERIAL AND METHODS

Data collection

The consumer study is based on an evaluation of the development of the consumption of meat and meat products, as well as on a consumer survey aimed at measuring consumption patterns and examining quality and health as determinants of meat consumption.

The consumption development of meat and meat products was evaluated for the period from 2012 to 2021 in the Slovak Republic. The development of meat consumption was assessed in total as well as individually for each type of meat, poultry, pork, and beef. Data for evaluation purposes were obtained from the Statistical Office of the Slovak Republic.

The consumer survey was focused on examining the amount of meat and meat products consumed by individual types, as well as exploring the impact of quality and health aspects on meat consumption. The survey was conducted in 2020 in the Slovak Republic on a sample of 1,409 respondents, of which 1,372 were consumers of at least one of the three types of meat. The questionnaire survey was carried out using the snowball method, which is used as a common method for data collection in qualitative research. Consumers involved in the questionnaire survey were divided according to demographic characteristics into eight categories (gender, age, place of residence, education, economic status, number of members in the household, monthly income of the respondents, monthly income of the household). Table 1 shows the demographic profile of all respondents and respondents consuming at least one type of meat, who were selected for the purpose of fulfilling the aim of the paper.

Table 1 Socio-demographic characteristics of sample

Socio-demographic characteristics		Whole sample		Sample of meat consumers	
		n	%	n	%
Gender	men	578	41.02	571	41.62
	women	831	58.98	801	58.38
Age category	<25 years	547	38.82	525	38.27
	26-35 years	311	22.07	301	21.94
	36-50 years	307	21.79	303	22.08
	>50 years	244	17.32	243	17.71
	Residence	rural	641	45.49	631
	city	768	54.51	741	54.01
Members in household	1 member	82	5.82	79	5.76
	2 members	286	20.30	274	19.97
	3 members	385	27.32	375	27.33
	4 members	423	30.02	417	30.39
	5 members	168	11.92	164	11.95
	>5 members	65	4.61	63	4.59
Economic status	student	441	31.30	420	30.61
	employed	688	48.83	676	49.27
	entrepreneur	124	8.80	121	8.82
	retired	107	7.59	107	7.80
	maternity leave	38	2.70	37	2.70
	unemployed	11	0.78	11	0.80
Education	elementary	48	3.41	46	3.35
	secondary	669	47.48	660	48.10
	university	692	49.11	666	48.54
Monthly income of respondent	<500 €	552	39.18	533	38.85
	500 – 1,000 €	526	37.33	518	37.76
	1,001 – 1,500 €	233	16.54	224	16.33
	>1,500 €	98	6.96	97	7.07
Monthly income of household	<1,000 €	250	17.74	243	17.71
	1,001 – 2,000 €	699	49.61	682	49.71
	2,001 – 3,000 €	334	23.70	323	23.54
	>3,000 €	126	8.94	124	9.04

Measures and analysis

The data related to the consumption of meat and meat products, specifically poultry, pork and beef consumption were processed using mathematical methods and the average growth coefficient was calculated:

$$k = \sqrt[n-1]{k_2 * k_3 * \dots * k_n}$$

Furthermore, the development trend of total meat and meat products consumption, poultry meat and meat products consumption, pork meat and meat products consumption, as well as beef meat and meat products was examined and was described by the linear regression functions:

$$y_i = \beta_0 + \beta_1 x_i \quad i=1,2, \dots, n$$

where: y_i - i -th observed value of the explained variable,
 β_0, β_1 - unknown parameters of the regression model,

x_{i-i-th} value of the explanatory variable,
 n - number of observations

The consumer survey was focused on questions related to meat consumption with an emphasis on aspects of quality and health. Consumers determined the amount of consumption of individual types of meat products in the number of portions consumed per week. Subsequently, we converted these portions into consumption amounts in kilograms per year and according to the level of consumption, consumers were divided into three groups for each type of meat and meat products. The mentioned groups were created based on the levels of recommended doses of individual types of meat (total, pork, beef, poultry) which are mainly determined regarding the health recommendations. These values are set by the Office of Public Health of the Slovak Republic, for total meat and meat products is 57.3 kg, for pork meat is 22.2 kg, for poultry is 15.0 kg, and for beef meat is 17.4 kg. Based on these doses, we were able to determine whether consumers have an insufficient level of consumption (below the recommended doses), adequate consumption (+/-10% of recommended doses) or excessive consumption of individual types of meat (above the recommended doses). For the total consumption of meat and meat products the following groups were created: consumption below 51.6 kg, consumption between 51.6 and 63.0 kg, consumption above 63.0 kg. For the consumption of poultry meat and meat products the following groups were created: consumption below 13.5 kg, consumption between 13.5 and 16.5 kg, consumption above 16.5 kg. For the consumption of pork meat and meat products the following groups were created: consumption below 19.9 kg, consumption between 19.9 and 24.5 kg, consumption above 24.5 kg. For the consumption of beef meat and meat products, the following groups were created: consumption below 15.6 kg, consumption between 15.6 and 19.2 kg, consumption above 19.2 kg.

As part of a questionnaire survey, consumers expressed their attitudes towards quality issues as a determinant of the consumption of meat and meat products. First, they determined the key quality indicator of meat and meat products and chose one of the following possible indicators: meat origin, composition and nutrition values, taste, appearance, higher price, quality mark on the product packaging or other indicators. Subsequently, consumers determined whether they preferred the Slovak origin in the meat and meat product choices according to individual types. In the next part, consumers evaluated the importance of determinants related to meat composition on a 10-point Likert scale, where 1 represented the unimportance of the determinant and 10 represented the high importance of the determinant. Consumers evaluated 9 selected determinants that they consider when choosing meat and meat product: % share of meat, proteins, minerals, vitamins, energy value, nitrates, emulsifiers, water, salt and saturated fatty acids.

An important part of the questionnaire survey was represented by questions related to the health aspect as a determinant of the consumption of individual types of meat and meat products. Consumers evaluated on a 10-point Likert scale the degree of respect for health principles when consuming poultry meat and meat products, pork meat and meat products and beef meat and meat products, where 1 represented no respect and 10 strong respects. In connection with health, consumers determined the positive health effects of consumption of individual types of meat.

The survey was completed by evaluating consumer attitudes towards possible factors that may negatively determine the consumption of meat and meat products in the future, namely food scandals, adulteration of meat and the composition of meat. Consumers evaluated the negative impact of these factors on future consumption on a 10-point Likert scale, where 1 represented the least negative impact and 10 represented the most significant negative impact.

Differences between men and women in total meat and meat products consumption and in individual types of meat and meat products consumption as well as in issues related to perception quality and health aspects were analysed using the Chi-square test of independence and the Mann-Whitney U test. The differences between the evaluated determinants related to meat composition individually in both genders, men and women, were analysed using the Friedman test and Nemenyi post-hoc test. For statistical testing the significance level of 0.05 was set and the statistical methods were conducted in XLSTAT 2022.4.1.

RESULTS

Development in consumption of meat and meat products in the Slovak Republic over time

As already mentioned, the consumption of meat and meat products is growing worldwide, and the Slovak Republic is no exception, where the consumption of meat and meat products has increased by 35.43% over the last 10 years. In 2012, the total average annual meat consumption was recorded at the level of 52.50 kg per capita and in 2021 the average consumption of meat and meat products reached a level of more than 71.0 kg per capita per year. The 10-year observed period was accompanied by slight fluctuations in consumption, which can be demonstrated by the fact that in 2014 consumption decreased slightly, but since 2015 it has been increasing again every year. In the monitored period, the average annual growth coefficient reached the level of 1.0343, which represents an average annual growth of 3.43%. According to the data of the **Statistical Office of the Slovak Republic (2022)**, the largest share of total meat consumption is pork, followed by poultry

and beef. The share of pork consumption represents more than 50% of the total meat consumption, and an average annual increase of 3.19% was recorded in the 10-year monitored period. The consumption of poultry meat in the monitored period represented approximately one third of the total consumption of meat and meat products in the Slovak Republic. The current consumption of poultry meat and meat products is at the level of 23.80 kg, and in the monitored period the consumption grew on average by 3.34% per year. The lowest share of meat consumption was represented by beef meat and meat products. The average annual consumption of beef reached the level of only 3.60 kg per capita in 2012, while in 2021 it was 6.00 kg. Despite the increasing consumption demonstrated by the average annual growth coefficient at the level of 1.0584, beef consumption is still low and the share in total meat consumption is less than 10%. The development of the consumption of meat and meat products, also divided into individual types, is shown in the following Figure 1.

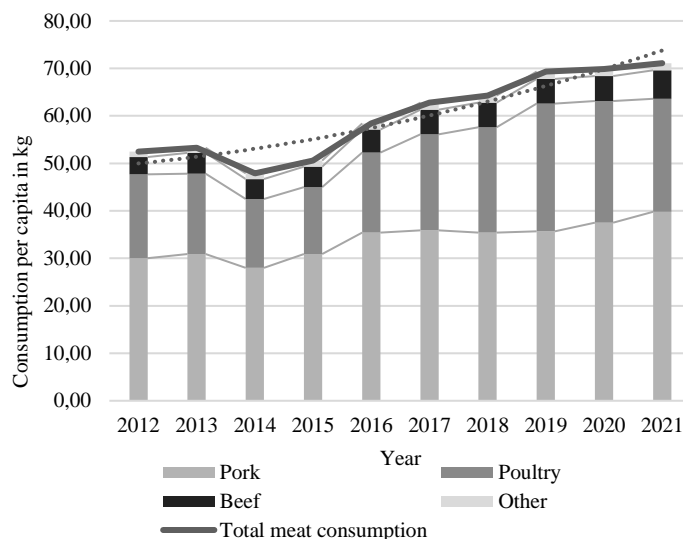


Figure 1 Development of annual meat consumption per capita in the Slovak Republic in 2012-2021

Source: Statistical Office of the Slovak Republic, 2022

We described the development trend of total meat consumption as well as development trend of consumption of individual meat using a linear regression function (Table 2).

Table 2 Development trend of meat consumption

	Regression function	Prediction accuracy (R ²)
Total meat consumption	$q_t = -5269.7 + 2.64303 * t$	0.856959
Pork meat consumption	$q_t = -2250.2 + 1.13273 * t$	0.83019
Poultry meat consumption	$q_t = -2490.4 + 1.24485 * t$	0.68106
Beef meat consumption	$q_t = -435.14 + 0.12818 * t$	0.897457

Gender differences in meat and meat products consumption

The results of a consumer study conducted in the Slovak Republic showed that 97.4% of consumers consume at least one type of meat and meat products from selected types. Based on the results, it can be concluded that the average consumer involved in the questionnaire survey annually consumes 73.79 kg of meat and meat products, of which meat represents 35.71 kg and meat products 38.08 kg. The largest share of the total consumption of meat and meat products is pork (35.89 kg), followed by poultry (28.73 kg) and beef (9.17 kg). The average annual consumption of meat divided into individual types of meat and meat products is specified in more detail in Table 3.

Table 3 Average annual meat consumption per consumer involved in the questionnaire survey (in kg)

	Total	Meat	Meat products
Meat and meat products	73.79	35.71	38.08
in that: poultry	28.73	16.58	12.15
pork	35.89	11.97	23.92
beef	9.17	7.16	2.01

Regarding the consumption of meat and meat products, we examined the influence of gender on the amount of meat consumption, as well as consumer attitudes

towards the quality and health aspect. The results show that women consume less meat and meat products than men. Based on the results in Table 4, it can be concluded that the average annual consumption of meat and meat products by women is 64.19 kg, while men consume an average of 87.41 kg of meat per year. For both women and men, it was identified that the most consumed is pork, followed by poultry, and the least consumed is beef meat and meat products. In the total annual consumption of meat by women (32.97 kg), the individual types of meat participate as follows: poultry meat (16.88 kg), followed by pork (10.51 kg) and beef (5.59 kg). Moreover, in the total annual consumption of meat products by

women (31.21 kg), pork meat products (19.29 kg) have the largest share, followed by poultry meat products (10.54 kg) and beef meat products (1.37 kg). For men, the total annual consumption of meat was recorded at the level of 39.61 kg, of which poultry meat (16.19 kg) and pork meat (14.04 kg) have the largest share and beef meat (9.38 kg) has the least share. In terms of the total consumption of meat products (47.80 kg), the most preferred are pork meat products (30.46 kg), followed by poultry meat products (14.42 kg) and beef meat products (2.92 kg).

Table 4 Average annual meat consumption per respondent involved to the questionnaire survey according to the gender (in kg)

	women			men		
	Total	Meat	Meat products	Total	Meat	Meat products
Meat and meat products	64.19	32.97	31.21	87.41	39.61	47.80
in that: poultry	27.43	16.88	10.54	30.61	16.19	14.42
pork	29.80	10.51	19.29	44.50	14.04	30.46
beef	6.96	5.59	1.37	12.30	9.38	2.92

Furthermore, consumers were divided according to the amount of the total consumption of meat and meat products, as well as individual types (poultry, pork, beef) in terms of recommended doses into three groups: below the level of recommended doses, the interval of recommended doses and above the level of recommended doses. Subsequently, the influence of gender on the amount of meat consumption and individual types of meat was examined. Based on the results, it can be concluded that the influence of gender was indicated in the case of the total consumption of meat, pork consumption and beef consumption. It is possible to state that men generally consume more meat and meat products compared to women. Annual total consumption below 51.6 kg prevails among women, while consumption above 63.0 kg prevails among men. From the point of view of the

consumed amount of individual meat types, it is possible to state that pork is consumed excessively by both men and women, while men show a higher consumption of pork and meat products compared to women. Beef is consumed insufficiently by both women and men but consume a higher amount of beef meat and meat products compared to women. Another finding was that poultry meat is consumed by both men and women approximately at the same level and statistical differences between men and women were not identified. Gender differences in the annual consumption of meat and meat products divided into individual types are specified in more detail in Table 5.

Table 5 Gender differences in annual consumption of meat and meat products

	women		men		p-value
	n	%	n	%	
Meat and meat products					
<51.6 kg	352	43.95	113	19.79	<0.0001
51.6-63.0 kg	132	16.48	69	12.08	
>63.0 kg	317	39.58	389	68.13	
Poultry meat and meat products					
<13.5 kg	122	15.23	90	15.76	0.097
13.5-16.5 kg	68	8.49	31	5.43	
>16.5 kg	611	76.28	450	78.81	
Pork meat and meat products					
<19.9 kg	347	43.32	112	19.61	<0.0001
19.9-24.5 kg	64	7.99	34	5.95	
>24.5 kg	390	48.69	425	74.43	
Beef meat and meat products					
<15.6 kg	672	83.90	361	63.22	<0.0001
15.6-19.2 kg	64	7.99	83	14.54	
>19.2 kg	65	8.11	127	22.24	

Gender differences in meat and meat products consumption regarding meat quality

The results of the consumer study showed that the most important determinant of consumption is the quality of consumed meat and meat products for Slovak consumers. In general, the quality of meat and meat products is perceived by Slovak consumers on the basis of origin (29.9%), including the country of breeding, the country of slaughter and the country of production of meat and meat products, followed by the composition of meat and nutritional values (25.7%), taste (17.6%), appearance (11.1%), higher price (9.7%), quality mark (4.9%) and other aspects, such as previous experience (1.2%).

In connection with the determination of quality indicators, statistically significant differences between men and women were examined. Based on the results of the Chi-square test of independence ($p = 0.58$), it can be concluded that gender has no influence on the key quality attribute of meat and meat products. This is an interesting finding, as the key quality indicator is evaluated equally regardless of gender and the amount of meat and meat products consumed. The results show that for Slovak women and men the key indicators of meat quality are the origin of the product and the composition of the meat. The importance of the attributes related to perception of quality of meat and meat products, which was evaluated by Slovak consumers is shown in the following Table 6 and points out the differences by gender.

Table 6 Gender differences in quality evaluation based on selected indicators

	women		men	
	n	%	n	%
Meat origin	253	31.59%	157	27.50%
Composition and nutrition values	208	25.97%	144	25.22%
Taste	130	16.23%	112	19.61%
Appearance	88	10.99%	64	11.21%
Higher price	75	9.36%	58	10.16%
Quality mark on the product packaging	37	4.62%	30	5.25%
Other indicators	10	1.25%	6	1.05%

We further examined the aspect of origin in the decision-making of consumers when consuming individual types of meat. The results of the consumer study point out the fact that Slovak consumers prefer meat of Slovak origin. Poultry of Slovak origin is preferred by 91.2%, Slovak pork is preferred by 85.6% consumers and 80.8% Slovak consumers prefer to consume beef produced by Slovak producers. The results further indicate that Slovak consumers prefer the following Slovak

producers and processors of meat and meat products: Mecom Group, s. r. o., Tauris, a.s., Hyza a.s., HSH, s.r.o, Berto sk, s. r. o., Mäso Melek, s. r. o., Róbert Gašparík s. r. o., Istermeat, a.s., Hydina Sk, s. r. o., Podtatranská Hydina a.s., Mäsokombinát NORD Svit, s. r. o., Eko Farma Važec, K&T mäso spol. s r. o., Hôrka, s. r. o., Mäsokombinát Púchov, a.s., Mäso Parížek, s. r. o., Hydina Kubus,

s. r. o., Svaman spol. s r. o. and other local producers and processors of meat and meat products.

In the context of the origin of meat and meat products, the statistically significant influence of gender on the preference for Slovak origin was also examined in

individual meat types. The results of the Chi-square test of independence confirmed statistically significant differences only in the case of poultry meat and meat products (Table 7).

Table 7 Gender differences in preference of Slovak origin of meat and meat products

		women		men		p-value
		n	%	n	%	
Poultry	no preference of Slovak origin	57	7.12%	64	11.21%	0.008
	preference of Slovak origin	744	92.88%	507	88.79%	
Pork	no preference of Slovak origin	109	13.61%	89	15.59%	0.304
	preference of Slovak origin	692	86.39%	482	84.41%	
Beef	no preference of Slovak origin	149	18.60%	115	20.14%	0.476
	preference of Slovak origin	652	81.40%	456	79.86%	

Besides the country of origin, we also focused on the composition of meat and meat products as one of the key quality indicators of consumed meat and meat products. Regarding the composition of meat, Slovak consumers evaluated 9 selected determinants related to meat composition, based on which they make decisions when consuming meat and meat products. They evaluate these determinants on a 10-point scale, where 1 representing an insignificant determinant and 10 representing a very significant determinant. Based on the results, it can be concluded that the % share of meat is a key determinant that affects Slovak consumers in meat and meat products choices.

In connection with the evaluation of meat consumption, we examined the influence of gender on the assessment of importance of determinants. Based on the applied

Mann-Whitney U test, it can be concluded that a statistically significant influence of gender was indicated for evaluation of all selected determinants ($p < 0.05$). By applying the Friedman test and the subsequent Nemenyi method, we examined the differences in the evaluation of the influence of individual determinants on meat and meat products choices individually for women and men. The results showed statistically significant differences in the evaluation in both women and men ($p < 0.0001$), which are graphically shown in the following graphs (Figure 2 – Figure 3).

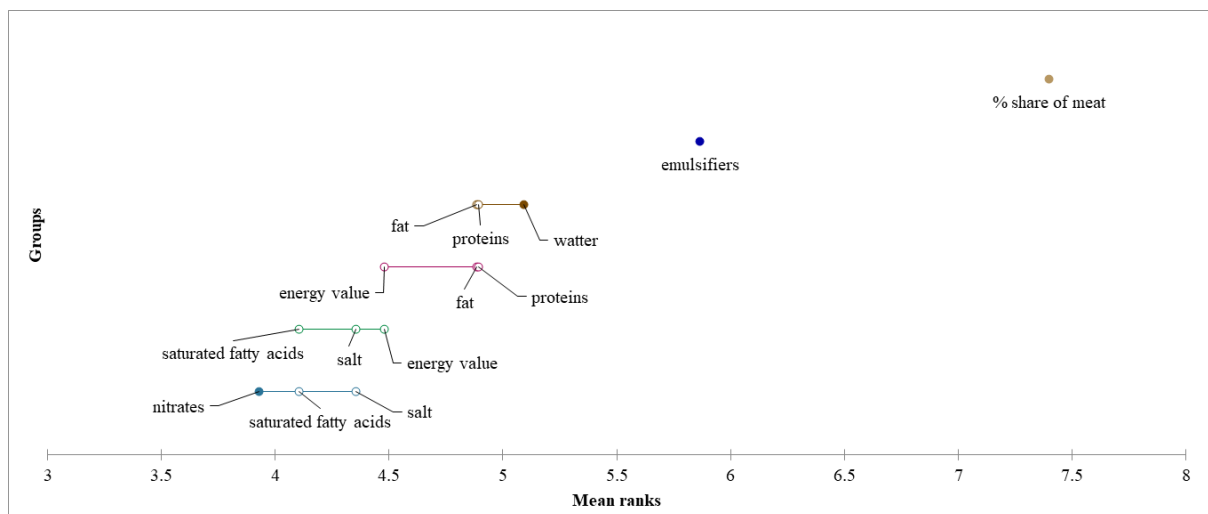


Figure 2 Differences in evaluation of determinants related to meat composition by women

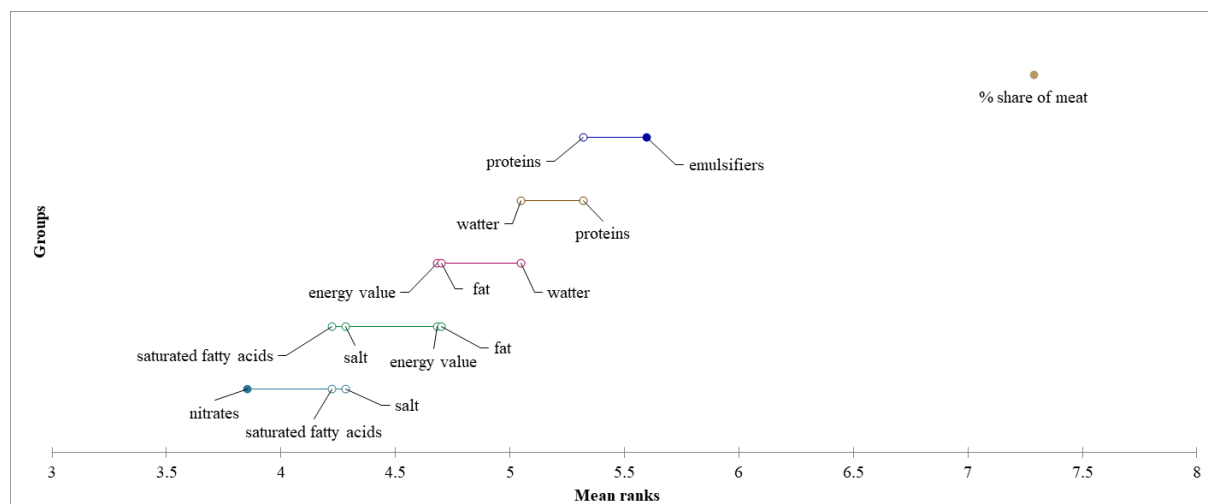


Figure 3 Differences in evaluation of determinants related to meat composition by men

Gender differences in meat and meat products consumption regarding health aspects

Meat and meat products belong to basic foods and their adequate consumption brings health benefits. The health aspect was examined as a determinant of the consumption of individual types of meat. The results of the survey showed that consumers state that poultry meat has positive effects on health mainly due to the high content of proteins and vitamins, low fat content and easy digestibility. In

connection with the consumption of pork, consumers positively assess its high content of proteins, vitamins and minerals (iron, zinc). The last type of meat was beef, and consumers especially highlight its high content of proteins, vitamins and minerals (iron) and the content of amino acids and unsaturated fatty acids, which have a positive effect on the health of consumers. In the context of conscious consumer behaviour and consumer awareness of positive health benefits, respecting health principles in the consumption of individual types of meat was examined. Consumers rated respecting health principles on a 10-point Likert scale,

where 1 representing no respect and 10 strong respect. Based on the results, it can be concluded that health principles are most respected in the consumption of poultry meat (mean = 6.46), followed by pork consumption (mean = 6.04) and beef consumption (mean = 5.92).

In the context of the consumption of meat and meat products, the gender differences in respect for health principles in the consumption of individual types of meat were examined. Based on the results of the applied Mann-Whitney U test, it is possible to state statistically significant differences in respecting health principles in connection with the consumption of all types of meat between men and women ($p < 0.0001$). The results indicate that women respect health principles more than men in the consumption of meat and meat products of all types.

The perception of quality and the health aspect in the context of the consumption of meat and meat products in the future can be influenced by several determinants. Slovak consumers evaluated the negative impact of food scandals, the composition of meat with an emphasis on antibiotic substances, emulsifiers, water and salt content in meat, as well as adulteration of meat for consumption on a scale from 1 to 10, with 1 representing the least negative impact and 10 the most significant negative impact. The results showed that Slovak consumers are most worried about adulteration of meat, which can significantly determine the level of meat consumption in the future, as well as the choice of meat and meat products.

In the context of selected factors determining the perception of the quality and health safety of meat, the influence of gender on the assessment of factors as potentially negative determinants of meat consumption in the future was also examined. The results of the Mann-Whitney U test showed a statistically significant effect of gender on the evaluation of all selected factors ($p < 0.0001$). It can be stated that women evaluate the impact of all selected factors on the future meat and meat products consumption more negatively compared to men. Women are afraid of lower quality and health safety of meat in the future due to fraud in meat production, the addition of various substances to meat, especially antibiotics, emulsifiers, water and salt, which will affect the higher meat weight and longer durability of meat and meat products, as well as the spread of food scandals related to imported meat.

DISCUSSION

The results showed that the consumption of meat and meat products has been increasing in recent years in Slovakia. The growing level of consumption of meat and meat products can be justified primarily by the growing level of consumer incomes and consumer interest in animal foods. The growing consumption of meat is also possible due to its good availability in groceries and marketing activities of meat producers and processors. The prevailing consumption of pork and poultry meat is mainly caused by favourable prices compared to other types of meat, and prices of substitute meat products. In the future, however, it is possible that the market for meat and meat products will be determined by the quality and safety factors of meat and meat products, as well as by changing eating habits of consumers towards a sustainable diet. Moreover, the demand for meat can also be determined by rising prices related to the difficulty of breeding, eliminating animal epidemics and increasing production costs. However, the mentioned determinants of current and future consumption of meat and meat products cannot be mainly defined with certainty and specific impacts. Following the above, a consumer study conducted among Slovak consumers showed that the level of consumption of meat and meat products of the average respondent involved in the questionnaire survey is comparable to the data obtained from the Statistical Office of the Slovak Republic. The excessive consumption of meat and meat products can be explained by the fact that the Slovak Republic is characterized by a tradition of consuming animal foods and a strong meat culture. The results of the study further showed that the total consumption of meat and meat products is excessive, and men consume more meat than women. Lower meat consumption by women can be justified by the fact that women tend towards a healthy diet, prefer a varied diet, especially by trying to maintain a healthy lifestyle, following market trends and health recommendations. Moreover, women often make food purchasing decisions and make decisions about food consumption in the household and prepare meals for the whole family. On the contrary, the higher consumption of meat, especially red, among men can be justified by the fact that they pay less attention to a healthy lifestyle, often consume meals in restaurants and fast food, and consider meat as food with a high level of saturation due to the high content of protein. Furthermore, it was identified that poultry and pork meat are the most preferred among all consumers, but the consumption of red meat significantly predominates among male consumers. Consumer studies have already been carried out that examined meat consumption and the preference for consumption of individual types of meat and meat products and highlight similar conclusions. A study conducted by *Tschanz et al. (2022)* points out the fact that women consume less meat compared to men and even men consume twice as much red meat as women. Higher consumption of red meat by men is also confirmed by other studies (*Sares-Jáske et al., 2022*; *Nasreddine et al., 2020*). Men justify relatively high consumption of meat by considering it an important part of their diet (*Sares-Jáske et al., 2022*), and on the other hand, lower consumption of meat and meat products among women is justified by women's higher interest in health, body weight maintenance and animal welfare concerns (*Hagmann et al., 2019*). Moreover, according to *Clonan et al. (2015)* women are more interested in animal welfare compared to

men. The results of the surveys conducted by *Guiné et al. (2021)* and *Whitton et al. (2021)* showed that consumers prefer poultry meat, mainly chicken, followed by pork and beef. Poultry meat and meat products are the most preferred in several countries, which is confirmed by studies carried out by *Tschanz et al. (2022)*, *Aral et al. (2013)*, *Moskal and Michalska (2017)*, *Špička and Náglová (2022)*.

The consumer study further analyzed the impact of the health aspect and respect for health principles and principles of rational eating in the consumption of meat and meat products, where statistically significant differences between men and women were identified. The results from Slovakia show that women respect health principles more than men. This can be justified mainly by women's higher interest in healthy eating, as well as their higher awareness of the positive and negative effects of consuming individual types of meat and meat products. In order to ensure a varied diet for family members, they follow trends on the food market and pay attention to the composition of food with regard to the health benefits resulting from the consumption of specific meat products. The above confirms the results of the studies, which point to a higher consumption of red meat. A study conducted by *Van Wezemael et al. (2010)* examined the perception and evaluation of the healthiness of red meat by consumers, and the results showed that red meat, especially beef, is perceived as very healthy meat. *Giromini and Givens (2022)* point out that red meat can provide a rich source of bioavailable essential nutrients and high biological value protein. However, in the case of processed and packaged meat, consumers doubt their positive health effects (*Van Wezemael et al., 2010*). In addition, excessive consumption of red meat can carry the risk of developing new diseases or intensifying existing ones (*Libera et al., 2021*). On the other hand, when choosing meat, women avoid red meat and prefer meat with a lower fat content, which they consider healthier compared to men (*Banović et al., 2016*), and therefore women have a lower intake of micronutrients compared to men, including calcium, iron and zinc, which red meat is rich in (*Nasreddine et al., 2020*).

The results of the consumer study also point out the perception of the quality of meat and meat products, and Slovak consumers assess the quality of meat based on its origin and composition. In terms of origin, we identified that women prefer Slovak meat more than men, and the most perceived ingredients are the percentage of meat, emulsifiers, proteins, water, salt, and fat content. In this context, it can be concluded that Slovak meat is considered to be of high quality compared to foreign meat, and women are more aware of this fact than men. Furthermore, it can be concluded that in the process of meat purchase, women are more attentive and choose meat based on the composition, in which it is possible to observe differences between Slovak and foreign meat products. Women often have higher requirements for meat inspection process in order to purchase and consume safe food. Women are more interested in the production process, as well as the processing, distribution and sale of meat with regard to ensuring the safety of meat, as they mostly buy meat with the intention of preparing meals at home. The achieved results, as well as possible justifications, were also confirmed by other consumer studies. A study carried out by *de Araújo et al. (2022)* points out the fact that the price of meat affects the overall perception of meat products by consumers, and cheap products contribute to a negative perception of product quality. *Krystallis and Arvanitoyannis (2006)* state that consumers evaluate meat quality based on visual quality characteristics such as colour and freshness. Consumers consider nutritional value or chemical-freeness to be less important attributes. Consumers associate the country of origin of meat with microbial safety and are convinced that their domestic meat is the safest for consumption. According to a study conducted by *Wongprawmas et al. (2018)* consumers associate the quality of meat and meat products with their safety and evaluate them according to food safety certification, expiration date, and also the origin of the meat or brand reputation. Country of origin and place of purchase is an important factor for these consumers in quality evaluation, and consumers prefer domestic poultry and beef meat compared to imported meat. The preference for the consumption of domestic meat is also confirmed by study conducted by *Sasaki (2022)*. Another study conducted by *Popescu (2013)* found that the domestic origin of meat and meat products is preferred by consumers due to lower risk. *Shan et al. (2016)* connects better quality of meat and meat products with less salt, fat, preservatives and other additives. The results of the study conducted by *Di Vita et al. (2019)* show that high salt, nitrites and high fat content discourage consumers from buying and consuming meat and meat products. However, consumers positively evaluate the taste, color and juiciness, which can be affected precisely by the use of harmful compounds. Consequently, freshness can be considered a very important attribute of meat quality. In relation to quality, composition and health aspect of meat, *Hong et al. (2023)* examined two strategies, namely ingredient "reduction" and nutrient "addition". The results showed that consumers preferred an omega-3 addition (under the "addition" strategy category), followed by a reduced fat and a reduced salt (both under the "reduction" strategy category). *Špička and Náglová (2022)* conducted a study in which consumers were divided into 3 segments depending on consumer attitudes and preferences. The quality-conscious consumer segment focuses on price, taste, freshness, appearance and ease of meat preparation. The high content of meat, its freshness, products without additives with low salt, fat and water content are preferred by the segment of consumers who care about their health. As part of the study, a segment of self-conscious consumers was also created, which considers animal welfare, meat

without chemical additive, trader origin, eco-friendly production and organic quality as important attributes.

The consumer study in Slovakia pointed out the finding that women are afraid of the existence of food scandals, meat adulteration and additives that can negatively affect the quality and health safety of meat and meat products. Women are more strongly worried than men with the mentioned aspects because women are more carefully, more suspicious, monitor the current food market situation more, buy more food and they mostly choose food for all household members. They also care that household members, especially children, consume high-quality, healthy, safe meat and meat products from certified farms in the future. In this context, it is important to note that meat and meat products are among the most frequently adulterated foods, and the adulteration of foods together with the addition of artificial colorants in products is a global problem (Momtaz et al., 2023). The perception of the quality and health safety of meat and meat products is mainly determined by the addition of antibiotics and other additives (Bánáti, 2011). Fraud related to meat and meat products most often occurs in connection with the origin of the meat, the replacement of meat with other ingredients, non-compliance with the declared quantities, the type of processing and the addition of unmixed ingredients, such as water, flour, salt (Dooley et al., 2004; Ballin, 2010). In the context of the above, it is necessary for consumers to be more attentive and correctly identify the consumed meat and meat products, especially from the aspect of type, origin and composition (Kamruzzaman et al., 2012).

CONCLUSION

To conclude it could be stated that the consumption of meat and meat products is high worldwide, and therefore the topic of meat quality and the related effects of consumption on the health of consumers is becoming more relevant. The consumer study pointed out the growth of the consumption of meat and meat products in the Slovak Republic over the last 10 years, as well as gender differences in the consumption of meat and the perception of quality and health related to the consumption of individual types of meat. The results of a consumer study based on a consumer survey showed that men consume an average of 87.41 kg of meat and meat products per year, while women consume approximately 64.19 kg of meat and meat products. The study highlighted the fact that pork meat and meat products are the most consumed, followed by poultry meat and meat products and beef meat and meat products. Results also pointed out gender differences in the perception of quality attributes and the health aspect in meat and meat products consumption. An interesting finding was that even though men and women consider meat quality based on the same attributes, which are the origin and composition, differences in preferences for the origin and consideration of individual meat components related to meat choice were statistically confirmed. Women prefer meat of Slovak origin, especially pork and beef, more than men. In consumers' decision-making about meat and meat products men look at the percentage of meat, emulsifiers and proteins, and women also pay attention to the water and fat content. Women respect health principles regarding the consumption of all types of meat, which is also confirmed by their lower meat consumption compared to men. For the future, it is necessary to point out the factors that can determine the quality and safety of meat and meat products. In the context of the above, women are more concerned about the existence of food scandals, frauds committed in the meat industry, as well as the addition of meat with the aim of extending its shelf life or increasing its weight. The consumer study enriches the scientific research sphere with a new perspective on meat consumption with an emphasis on gender differences in the evaluation of quality and health when choosing and consuming individual types of meat. This study brings significant findings that have not yet been explored in existing studies and therefore can be a tool for filling the scientific research gap and a suitable basis for conducting studies in the future. In addition to theoretical benefits, the results of the study also have practical implications. Results are applicable to food companies in the meat industry, including producers, processors or distributors of meat and meat products. The market of meat and meat products should offer high-quality, health-safe products, and therefore the results of the study can be used by the mentioned subjects in the creation of marketing strategies and marketing communication with customers. The study provides findings that policy makers can use as a basis for implementing measures to support public health. In addition, the study involves information for consumers in order to increase their consumer awareness about the consumption of meat and meat products with an emphasis on the choice of meat with regard to quality and health. However, the consumer study also has limitations. Key limitations are self-reported measures by respondents involved in the questionnaire survey and the territoriality of the research. For future research, it is possible to expand the research to other countries and carry out a comparative study focused on gender differences in the issue of meat consumption and its determinants between several countries with the aim of consuming high-quality and health-safe meat and meat products.

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