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Functional meat products: Examining attitudes and preferences of Slovak consumers

Funkčné mäsové výrobky: Skúmanie postojov a preferencií slovenských spotrebiteľov

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ABSTRACT

Current trends in the food market are influenced not only by the consequences of the COVID-19 pandemic but also by healthy lifestyles and sustainability. Therefore, functional meat products (FMP) are moving to food groups that could be more consumed due to their health benefits. The aim of the paper is to point out the attitude of Slovak consumers towards FMP consumption and to identify factors and reasons for consumption. The research is based on data obtained by conducting a questionnaire survey in Slovakia (n=1,138 respondents). By using statistical methods, consumer attitudes, preferences and reasons for FMP consumption were identified. The results showed that approximately 50% of consumers are regular consumers of FMP. Majority of consumers prefer fish, products with the addition of fish oil, omega 3 and 6 fatty acids, fiber and vitamins. Fat content is the most important factor related to the composition of FMP during the purchase process. The key reasons for consumption are to support their health and to eliminate the risk of developing different diseases. For the favorable development of the market with FMP, it is necessary to inform consumers about the importance of FMP consumption. The results of the consumer study can be a suitable basis for experts and researchers in the field of public health and can be used by producers of meat products for the development and production of new FMP based on consumer requirements and improvement of their marketing strategies.

Keywords: consumer attitudes, consumer preferences, functional meat products, Slovakia

ABSTRAKT

Súčasné trendy na trhu s potravinami sú ovplyvnené nielen dôsledkami pandémie COVID-19, ale aj zdravým životným štýlom a udržateľnosťou. Funkčné mäsové výrobky (FMV) je možné zaradiť k potravinovým skupinám, ktoré by mali byť vzhľadom na zdravotné benefity viac konzumované. Cieľom príspevku je poukázať na postoj slovenských spotrebiteľov ku spotrebe FMV, identifikovať faktory a dôvody spotreby. Výskum vychádza z realizovaného dotazníkového prieskumu na Slovensku (n=1138 respondentov). Aplikovaním štatistických metód boli identifikované spotrebiteľské postoje a preferencie spotrebiteľov, ako aj dôvody konzumácie FMV. Výsledky ukázali, že približne 50 % spotrebiteľov sú pravidelnými konzumentmi FMV. Väčšina spotrebiteľov preferuje ryby, produkty s prídavkom rybieho tuku, omega 3 a 6 mastných kyselín, vlákniny a vitamínov. Obsah tuku je najdôležitejším faktorom súvisiacim so zložením FMV v procese výberu a nákupu sledovaných potravín. Hlavnými dôvodmi konzumácie je podpora zdravia konzumentov a eliminovanie rizika vzniku rôznych ochorení u spotrebiteľov. Pre priaznivý vývoj trhu s FMV je žiaduce informovať spotrebiteľov o význame konzumácie FMV. Výsledky spotrebiteľskej štúdie môžu byť vhodným podkladom pre odborníkov a výskumníkov v oblasti verejného zdravia a taktiež môžu byť implementované výrobcami mäsových výrobkov v procese vývoja a výroby nových FMV s ohľadom na požiadavky spotrebiteľov, ale aj pre potreby zlepšenia marketingových stratégií.

Kľúčové slová: postoje spotrebiteľov, spotrebiteľské preferencie, funkčné mäsové výrobky, Slovensko

INTRODUCTION

Meat and meat products belong to the basic foods in the human diet because they provide all necessary nutrients for the human body because it is an important source of proteins, vitamins, minerals (iron, zinc), omega 3 and omega 6 fatty acids (Valsta et al., 2005; Zhang et al., 2010; Ostaszewski, 2018). Moreover, these compounds have enough potential and possibilities for the suppression of COVID-19 disease by boosting immunity (Tripathy et al., 2021). However, meat product consumption, mainly excessive red meat products and processed meat products consumption is sometimes associated with several adverse health consequences related to the high content of salt and preservatives, and being unsuitable sources of fat or additives (Teixeira and Rodrigues, 2021; Giromini and Givens, 2022; Händel et al., 2021). In the context of the mentioned, it is necessary to emphasize that the average consumption per capita in the world is about 35 kg. A similar average level of annual meat consumption is also recorded in developing countries. On the other hand, in OECD countries and developed countries the average annual meat consumption is much higher and its level is about 70 kg per capita (OECD/FAO, 2022). Slovak consumers consume meat and meat products at the level of 71 kg and the highest share of the total consumption of meat belongs to pork (Statistical Office of the Slovak Republic, 2022). For comparison in neighboring countries, Czech consumers consume more than 80 kg of meat annually and Polish and Hungarian consumers currently consume around 75 kg per capita and year (Czech Statistical Office, 2022; Hungarian Central Statistical Office, 2023; Statistics Poland, 2022). Based on the current development of meat consumption, lower meat consumption will not be expected in the future (Henchion, 2014; Font-i-Furnols and Guerrero, 2022).

However, it is desirable that meat and meat products consumption be at a lower level because the increasing global levels of meat consumption and animal production are a threat to the environment and to the health of consumers (Milford et al., 2019; Hielkema and Lund, 2021). Following the mentioned, it is necessary to encourage consumers to choose meat products with healthy ingredients and reduce their overall meat consumption.

The current lifestyle of consumers and consumer requirements of a healthy diet after the pandemic situation COVID-19 (Marinković and Lazarević, 2021) also led the meat industry to develop meat products that should be increasingly attractive, safe, clean and healthy, as well as to use of new processing methods and technologies (Teixeira and Rodrigues, 2021; Sanchez-Sabate and Sabaté, 2019; Plasek et al., 2020; Das et al., 2020; Biswas et al., 2011). Nowadays, there is an effort to shift consumer perceptions of meat products from traditional food to a novel and healthy option by incorporating healthy ingredients or reducing harmful ingredients. Thus, producers of meat products adjust their recipes to meet changing market demands (Fernández-Ginés et al., 2005).

In the current food market, there are two key strategies for the production of functional meat products (FMP). The first strategy for the development of FMP is based on the addition of new ingredients, thereby enriching meat products with nutritional value and bioactive compounds (Ruiz-Capillas and Herrero, 2021; Khajavi et al., 2020; Bhat and Bhat, 2011). Consumers are able to choose from a wide variety of FMP with added ingredients and the most preferred are FMP with the addition of omega 3 and omega 6 fatty acids, fish oil, FMP with the addition of fiber, FMP with the addition of natural extracts with vitamin E, FMP with probiotics and prebiotics, as well as FMP with increased antioxidant content (Verma et al., 2009; Pogorzelska-Nowicka et al., 2018; Munekata et al., 2022; Das et al., 2020; Ravani and Sharma, 2022; Bharti et al., 2015). According to Kumar et al. (2013), it is possible to improve the functional value of meat products by adding vegetable proteins, whey proteins, garlic, sage, minerals, herbs and spices. The second strategy for developing FMP involves reducing or eliminating unhealthy ingredients, which may be replaced by healthier alternatives (Ruiz-Capillas and Herrero, 2021; Khajavi et al., 2020; Bhat and Bhat, 2011). In order to eliminate the risk of diseases, consumers prefer products with reduced

salt, nitrates, nitrites and saturated fat content (Zhang et al., 2010; Verma et al., 2009; Ravani and Sharma, 2022; Bharti et al., 2015; Abzhanova et al., 2022).

The results of other studies showed that it is also possible to consider chicken, pork and beef liver as functional foods, as they are characterized by significant nutritional properties resulting from a high proportion of minerals and proteins. However, offal is not classified as a frequently consumed part of meat. Therefore, it would be possible to valorize offal by transforming it into more convenient foods that are adapted to the current food consumption lifestyles or by developing new functional ingredients for the food industry (Toldrá et al., 2012; Llauger et al., 2021). Sarojnalini and Hei (2019) pointed out that fish is also a functional food. It is also possible to state that meat products enriched with omega 3 and omega 6 fatty acids are considered functional meat products. The main source of these products is fish and fish oil (Zhang et al., 2010; Arihara, 2006; Hathwar et al., 2012; Fernández-Ginés et al., 2005; Ostaszewski, 2018).

Consumers who consume FMP have more benefits compared to consumers who consume traditional meat products, which can be observed in improved health and positive effects on prevention and protection against various types of diseases (Kumar et al., 2013). Ostaszewski (2018) stated that the major health benefits of FMP are prevention and protection against cancer and cardiovascular diseases, support of the nervous system and a positive effect on blood pressure and hypertension. Moreover, FMP has also positive effect on the immune system and circulatory systems, reduces total cholesterol and increases high-density lipoprotein (Hathwar et al., 2012; Fernández-Ginés et al., 2005; Estévez, 2021). Other studies showed that FMP consumption improves the intestinal microflora, prevents food allergies or eliminates the risk of cancer (Zhang et al., 2010; Agrawal, 2005; Arihara, 2006; Munekata et al., 2022), as well as to suppress the appetite and slow the absorption of glucose and fat (Hathwar et al., 2012; Borderías et al., 2005; Zinina et al., 2019). The importance of FMP consumption is also increasing due to the impact of the COVID-19 pandemic, especially for consumers with low and weakened immunity (Tripathy et al., 2021).

From a future perspective, FMP have a chance of long-term survival in the meat market (Bharti et al., 2015), because of the health benefits for consumers and are also tasty, safe, affordable and easy to manufacture (Grasso et al., 2014). However, it is necessary to inform consumers about the functional value of meat and meat products (Arihara, 2006) and to convince them that they are suitable carriers of functional ingredients (Grasso et al., 2014). On the other hand, it is important to emphasize that the success of a FMP on the market and its acceptance depend on legislative aspects, supermarket simulation studies, sensory assessment, as well as on the main characteristics of the product, its commercial viability and on the nature, extent and management of collaboration between related disciplines (Hathwar et al., 2012). Grasso et al. (2014) emphasize that a broad multidisciplinary approach contributes to the success of establishing meat producers and processors in the growing markets of FMP. Moreover, the production of FMP could be also a very suitable opportunity for producers who were negatively affected by the pandemic situation related to various measures and restrictions that ultimately led to a decrease in the quality, productivity and competitiveness of the livestock industry (Rahimi et al., 2022).

Following the above, it is important to note that the future market for meat and meat products will be determined by meat products beneficial to the health of the consumer. For this reason, it is necessary to understand consumer attitudes and perceptions of FMP. The aim of the paper is to explore the attitudes of Slovak consumers towards FMP.

Based on the theoretical background and the aim of the paper, the following research questions were formulated:

1. Which FMPs are the most consumed by Slovak consumers?
2. What are consumer attitudes and perceptions towards FMP in Slovakia?

MATERIALS AND METHODS

The study is based on a consumer survey examining consumer behavior in the functional food market during the pandemic situation. The questionnaire survey was carried out in 2021 on a sample of 1,138 respondents in Slovakia using the snowball sampling technique. The aim of the study is to point out the attitudes of consumers towards FMP consumption and to identify the key factors, expectations and reasons for consumption of FMP. Respondents were informed that they agree to data processing for research purposes by filling out and sending the questionnaire. All respondents answered 7 closed socio-demographic questions and 1 closed question regarding the frequency of FMP consumption. Consumers who consume FMP further answered 5 questions, of which 4 were scaling questions and 1 closed question. Consumers who do not consume FMP answered 1 closed question regarding the reason for non-consumption.

Respondents who participated in the survey were divided according to selected socio-demographic characteristics: gender, age, education, place of residence, number of members in the household, monthly income of household and eating habits (Table 1).

Firstly, the survey was focused on the consumption of FMP generally and the examining the influence of selected socio-demographic characteristics on the frequency of this food category. Using the Chi-square test of Independence, the dependences between the frequency of consumption of FMP and gender, age, education, place of residence, members in households, monthly income of household and eating habits of respondents were analyzed.

The purpose of the next part of the research was to analyze the behavior of only those respondents, who regularly and occasionally consume FMP. The frequency of consumption of FMP, namely fish, fish products enriched with fish oil, beef liver, chicken liver, pork liver, low-calorie meat products enriched with fiber, meat products enriched with vitamins, minerals, omega 3 and omega 6 fatty acids, prebiotics and probiotic cultures of microorganisms, was examined.

Furthermore, the factors that are noticed by consumers in the process of purchase and consumption were identified. Consumers evaluated the factors related to ingredients of FMP such as the addition of vegetable proteins (soy protein) and nuts, the addition of natural antioxidants, the addition of vitamins C and E, minerals, fiber, the addition of omega 3 fatty acids, reduced allergens (vegetable and egg proteins), reduced salt and fat using a 5-point Likert scale (1-least important, 5-most important). Friedman test and applying its post hoc test Nemenyi's procedure pointed out the differences in the evaluation of these factors and these results were shown by the Demsar plot.

The survey was also focused on identifying the key aspects of the expected consumption of FMP. On a 5-point scale (1-least important, 5-most important), consumers determined the key reasons for FMP consumption: reducing the risk of heart and cardiovascular diseases; reducing the risk of gastrointestinal diseases; reducing the risk of diabetes; preventing certain oncological diseases; reducing the risk of obesity; reducing the risk of kidney stones, chronic kidney disease; reducing "bad" cholesterol and increasing "good" cholesterol; supporting the good eyesight, stronger teeth and bones, hair and nail growth; supporting the central nervous system and mental health strengthening immunity. For more in-depth analysis, the categorical principal component analysis (CATPCA) was used and identified hidden relationships between the reasons for consuming FMP. An important part of the survey was also the questions focused on the future consumption of FMP. By applying the Chi-square test of Independence, the dependences between the future consumption of FMP and eating habits as well as the current frequency of FMP consumption were examined. Eating habits were represented by items balanced diet, unbalanced diet and flexitarianism. The respondents were familiar with the characteristics of a balanced and unbalanced diet as follows: a balanced diet represented the consumption of all foods under the conditions of a rational diet, and an unbalanced diet represented the consumption of all foods without considering a healthy and rational diet, as well as the consumption of fast food and semi-finished products.

Current frequency of FMP were represented by items at least once a week, once a month, occasionally. Data obtained by the questionnaire survey were processed in Microsoft Excel and evaluated by using statistical software XLSTAT 2022.4.1. For the purposes of statistical testing, a significance level was set to 0.05.

Table 1. Socio-demographic characteristics of sample

		Total sample		Consumers of FMP	
		n	%	n	%
Gender	Male	482	42.4	290	39.7
	Female	656	57.6	440	60.3
Age	≤ 24 years	469	41.2	325	44.5
	25 – 49 years	422	37.1	263	36.0
	≥50 years	247	21.7	142	19.5
Education	Elementary	38	3.3	25	3.4
	Secondary	905	79.5	585	80.1
	University	195	17.1	120	16.4
Place of residence	Rural	643	56.5	422	57.8
	Urban	495	43.5	308	42.2
Members in household	1 member	79	6.9	39	5.3
	2 members	216	19.0	131	17.9
	3 members	222	19.5	136	18.6
	4 members	428	37.6	295	40.4
	≥ 5 members	193	17.0	129	17.7
Monthly income of household	≤ 800 euro	88	7.7	41	5.6
	801–1,600 euro	444	39.0	290	39.7
	1,601–3,000 euro	451	39.6	298	40.8
	≥3001 euro	155	13.6	101	13.8
Eating habits	balanced diet	498	43.8	378	51.8
	unbalanced diet	552	48.5	320	43.8
	fast food	19	1.7	5	0.7
	flexitarianism	48	4.2	27	3.7
	vegetarianism, veganism	21	1.8	0	0.0

RESULTS

A consumer survey conducted on a sample of 1,138 respondents in the Slovak Republic showed that almost 18% of Slovak consumers are not consumers of functional foods and another 18% are not consumers of FMP. This is mainly due to insufficient information related to necessity of functional foods consumption and the higher prices of these products compared to traditional meat products. In the context of the above, it can be concluded that 64% of consumers involved in the questionnaire survey consume meat products with the addition of ingredients, which have a beneficial effect on their health. In connection with the consumption of FMP, the existence of statistically significant differences between the frequency of consumption of FMP and the selected demographic characteristics of the respondents was examined. Based on the results of the survey and using the Chi-square test of Independence, it could be stated the following conclusions (Table 2). The frequency of FMP consumption was evaluated differently by gender. Men consume FMP less often compared to women, and up to 40% of men do not consume FMP at all. The consumption is more frequent by women and is at least once a week or a month.

Furthermore, differences in the frequency of consumption of FMP and the number of members in Slovak households were identified. Slovak households with more members consume functional foods more often compared to households with 1 member. The above can be justified by the fact that these are households with children and it is necessary to take care of their health from an early age and prevent the occurrence and development of various diseases by consuming FMP. On the other hand, it is important to note that more than 50% of Slovak households consume FMP only occasionally or not at all. The eating habits of consumers also have a significant impact on the frequency of consumption of FMP. Non-consumers of FMP are vegetarians and vegans, and partially also flexitarians, who tend to reduce their meat consumption. FMP are not consumed even by consumers who prefer fast food and semi-finished foods, as they mostly consume meat products that do not acquire a functional character. Consumers who include all food groups in their diet regarding health aspects are the most frequent consumers of FMP. An interesting finding was also the fact that even consumers who think they do not eat healthy food consume FMP on a regular basis. Furthermore, the results showed that other demographic characteristics such as age, education, place of residence and monthly household income do not affect the frequency of FMP consumption.

For the purposes of further research, consumers who do not consume FMP were excluded, and the attitudes of 730 Slovak consumers who consume FMP occasionally and regularly were examined. Consumers evaluated the frequency of consumption of selected FMP, namely fish, products enriched with fish oil, beef, chicken and pork liver, low-calorie meat products enriched with fiber, meat products enriched with prebiotics and probiotic cultures of microorganisms, vitamins, minerals, omega 3 and omega 6 fatty acids. The frequency of consumption of selected FMP is shown in Figure 1. It could be concluded that the most frequently consumed FMP are fish and products enriched with fish oil, which are regularly consumed by more than 60.0% of Slovak consumers. Slovak consumers also consume meat products enriched with vitamins (49.7%), omega-3 and omega-6 fatty acids (47.4%), minerals (46.3%) and low-calorie meat products with added fiber (43.8%) at least once a month. Furthermore, meat products enriched with prebiotics and probiotic cultures of microorganisms are less consumed, which are consumed at least once a month by only 38.8% of the consumers. Liver from pork, beef and chicken are the least frequently consumed FMP. Based on the results, it can be stated that 33.0% of consumers consume chicken liver, 20.9% pork liver and only 17.0% consume beef liver at least once a month.

Consumers of FMP also evaluated factors related to the ingredients in FMP. Based on the results and the means it could be stated that factors related to the composition of FMP, mainly added and reduced ingredients are not very important for Slovak consumers.

Table 2. Differences in frequency of FMP consumption based on demographic characteristics of respondents

		Every day		Several times a week		Once a week		Once a month		Occsionally		No consumption		*P*
		n	%	n	%	n	%	n	%	n	%	n	%	
Gender	Man	29	6	119	25	46	10	19	4	77	16	192	40	<0.001
	Woman	20	3	163	25	103	16	47	7	107	16	216	33	
Age	≤ 24 years	25	5	117	25	67	14	32	7	84	18	144	31	0.136
	25 – 49 years	15	4	104	25	57	14	20	5	67	16	159	38	
	≥50 years	9	4	61	25	25	10	14	6	33	13	105	43	
Education	Elementary	1	3	15	39	3	8	5	13	1	3	13	34	0.117
	Secondary	39	4	226	25	120	13	47	5	153	17	320	35	
	University	9	5	41	21	26	13	14	7	30	15	75	38	
Residence	Urban	22	4	116	24	63	13	27	5	78	16	187	38	0.775
	Rural	25	4	166	26	86	13	39	6	106	16	221	34	
Members in households	1 member	6	8	13	16	3	4	2	3	15	19	40	51	0.001
	2 members	6	3	56	26	28	13	10	5	31	14	85	39	
	3 members	16	7	38	17	26	12	14	6	42	19	86	39	
	4 members	11	3	127	30	67	16	27	6	63	15	133	31	
	≥ 5 members	10	5	48	25	25	13	13	7	33	17	64	33	
Monthly income of household	≤ 800 euro	3	3	21	24	7	8	2	2	8	9	47	53	0.188
	801–1,600 euro	21	5	117	26	57	13	28	6	67	15	154	35	
	1,601–3,000 euro	18	4	106	24	61	14	29	6	84	19	153	34	
	≥3001 euro	7	5	38	25	24	15	7	5	25	16	54	35	
Eating habits	balanced diet	27	5	141	28	78	16	44	9	88	18	120	24	<0.001
	unbalanced diet	22	4	135	24	66	12	16	3	81	15	232	42	
	fast food	0	0	2	11	1	5	1	5	1	5	14	74	
	flexitarianism	0	0	4	8	4	8	5	10	14	29	21	44	
	vegetarianism/ veganism	0	0	0	0	0	0	0	0	0	0	21	100	

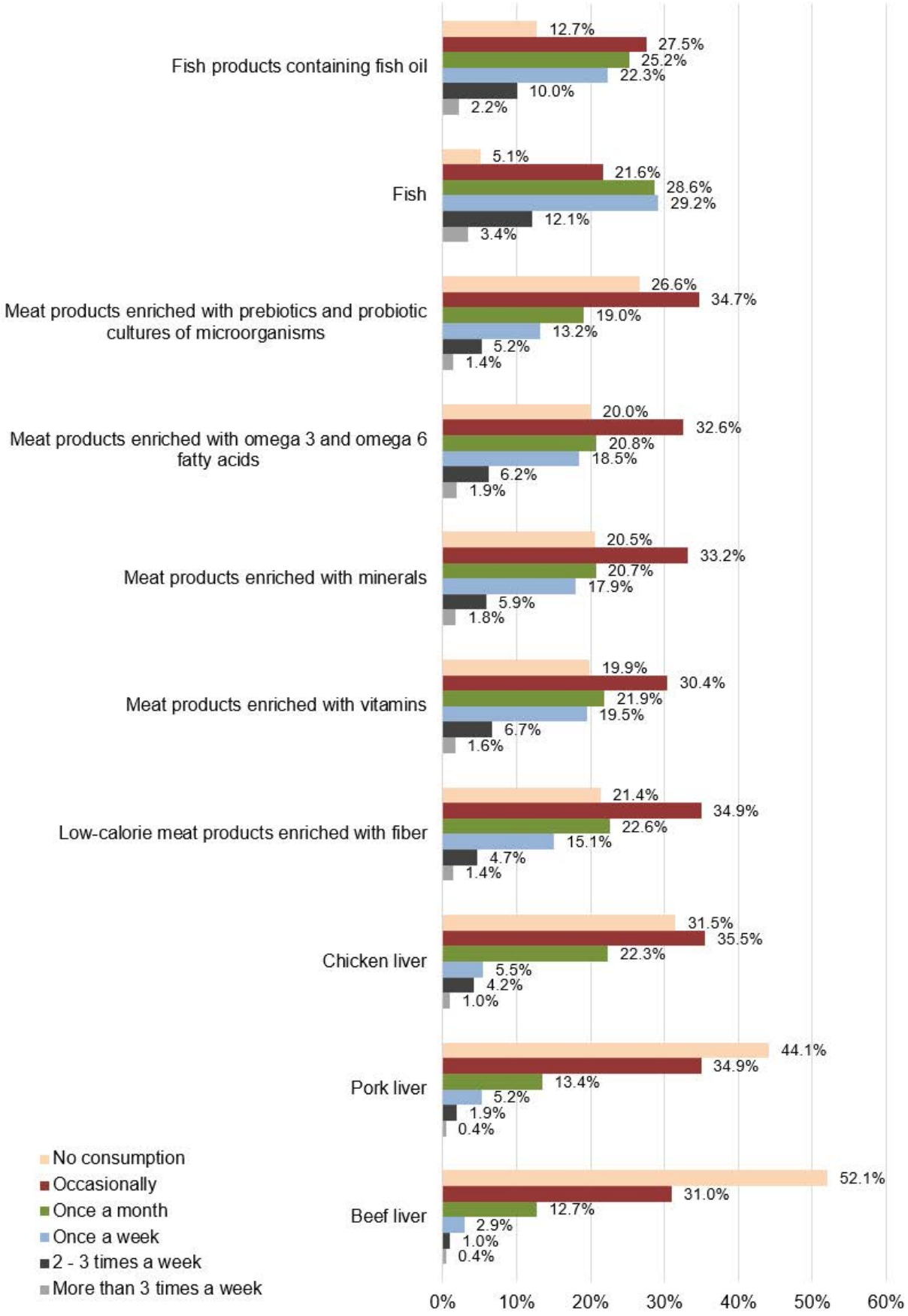

Figure 1. Frequency of FMP consumption

On the other hand, it is possible to conclude that the increased content of omega-3 fatty acids (mean = 2.85), the reduced fat content (mean = 2.78), as well as added vitamins, minerals and fiber in meat products (mean = 2.77) are the most noticed of all. Furthermore, the survey showed that the content of allergens (mean = 2.48), the content of vegetable proteins (mean = 2.49), the content of salt (mean = 2.50), and the content of natural antioxidants (mean = 2.57) are the least noticed of all in the decision-making related to FMP purchasing. Based on the above, it could be concluded that the consumption of FMP is determined by various factors. Using the Friedman test ($P < 0.001$) and applying its post hoc test Nemenyi's procedure, statistically significant differences between the selected factors in consumer evaluation were identified and these differences are graphically illustrated by the Demsar plot (Figure 2).

The consumer survey was also focused on the key aspects that consumers expect from the consumption of FMP, or the main reasons for consuming FMPThe results of the survey showed that Slovak consumers are looking for FMP because of the effects of consumption related to a decrease in "bad" cholesterol level and an increase in "good" cholesterol level (mean = 3.38). From the consumption of FMP, consumers also expect a reduction in the risk of gastrointestinal diseases (mean = 3.34), as well as the support of good eyesight, stronger teeth and bones, hair and nail growth (mean = 3.31).

For a deeper analysis of the reasons for consuming FMP, hidden relationships between the reasons were identified. Based on the results and the application of the categorical principal components analysis (CATPCA), two latent components were created, which can confirm the assumption about the existence of differences in the evaluation of the reasons for the consumption of FMP among consumers (Table 3).

The first latent component consists of the reasons for consumption, such as the support of good eyesight, stronger teeth and bones, hair and nail growth, support of the central nervous system and mental health, or strengthening of immunity in the viral period, e.g. COVID-19. These expectations from the consumption of FMP can be considered as supporting and improving the health of consumers, therefore the reason is named "supporting reason for the consumption of FMP". The second latent component includes reducing the risk of obesity, the risk of gastrointestinal diseases, heart and cardiovascular diseases, the risk of kidney stones and chronic kidney disease, the risk of diabetes and helping in regulating diabetes, supporting the prevention of some oncological diseases, especially cancer of the colon and organs of the digestive tract, as well as decreasing the level of "bad" cholesterol level and increasing "good" cholesterol level. All these reasons are related to the prevention and reduction of the risk of various diseases, and therefore this component was named as "preventive reason for the consumption of FMP."

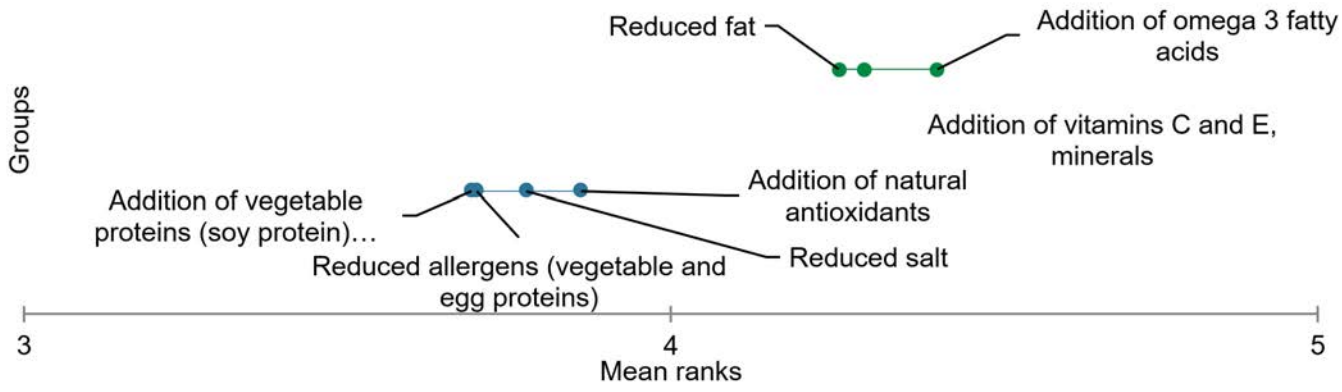

Figure 2. Factors related to ingredients affecting the consumption of FMP (Demsar plot)

Table 3. Categorical Principal Component Analysis (CATPCA) – Reasons for FMP consumption

Factors	Dimensions	
	1.	2.
Reducing the risk of heart and cardiovascular diseases	0.856	0.278
Reducing the risk of gastrointestinal diseases	0.850	0.269
Reducing the risk of diabetes	0.812	0.335
Preventing against certain oncological diseases	0.771	0.381
Reducing the risk of obesity	0.770	0.285
Reducing the risk of kidney stones, chronic kidney disease	0.765	0.394
Reducing "bad" cholesterol and increasing "good" cholesterol	0.686	0.399
Supporting the good eyesight, stronger teeth and bones, hair and nail growth	0.244	0.878
Supporting the central nervous system and mental health	0.362	0.786
Strengthening immunity	0.411	0.775

Based on the results of the study and also the importance of FMP consumption in order to improve the health of consumers, it is necessary to motivate consumers to consume them. In the context of the above, it was examined future FMP consumption of Slovak consumers in the next years. It could be concluded that two-thirds of consumers of FMP do not plan to change the amount of consumption. However, 28% of consumers are interested in gradually increasing the consumption of FMP, because they are aware of the importance of consuming these products. On the other hand, a positive result of the survey was that only 6% of consumers are thinking about reducing the consumption of FMP, which may be due to the rising prices of these products.

In connection with the future consumption of FMP, the correlation between the future development of consumption and the current frequency of FMP consumption, as well as the eating habits was examined (Table 4). The results of the Chi-square test of Independence (P = 0.0021) showed that consumers who consume FMP only occasionally will plan to increase consumption of FMP with a future perspective to a greater extent compared to consumers whose consumption is more frequent in the present. The majority of consumers who consume meat products at least once a month will not change consumption in the following years. On the contrary, more than 7.0% of regular consumers will assume to reduce FMP consumption in the future. This means that these consumers will decrease their consumption the most compared to infrequent consumers.

Furthermore, statistically significant differences were identified between the future consumption of FMP and the eating habits of consumers, which confirms the result of the Chi-square test of Independence (P = 0.00035). Consumers who consume all food groups regarding health aspects will expect a greater increase in their consumption of FMP in the next period compared to consumers who do not eat healthily or are flexitarians. The results of the survey also showed that almost 70.0% of consumers who do not consider the health aspect of their diet will not plan to change their consumption of FMP the most. On the contrary, flexitarians will plan to reduce meat consumption with a future perspective the most compared to other consumers who consume all food categories. It could be justified by the environmental and sustainability aspects, which can affect the consumption of FMP in the future.

Table 4. The future consumption of FMP depending on the frequency of current consumption and eating habits

		reduced consumption		unchanged consumption		increased consumption	
		n	%	n	%	n	%
Frequency of current consumption	at least once a week	13	7.1	115	62.5	56	30.4
	once a month	32	6.7	329	68.5	119	24.8
	occasionally	3	4.6	34	51.5	29	43.9
Eating habits	balanced diet	26	6.9	238	63.0	114	30.2
	unbalanced diet	15	4.6	226	69.5	84	25.9
	flexitarianism	7	25.9	14	51.9	6	22.2

Considering the results of the research and the importance of the representation of FMP in the diet of consumers, it is necessary to appeal to consumers to increase the consumption of healthy FMP. In the context of the above, the aim of the research was also to find out the opinion of consumers, how they perceive the future development of the market of FMP and which factors they consider significant. The results showed that increasing consumer awareness of FMP and their health effects can be considered very important in connection with the positive development of the future market for FMP. Consumer interest in healthy diets including functional food, as well as the improvement of the promotion of FMP directly in groceries and their labeling on food packaging, can be beneficial for the positive development of the FMP market in the future.

DISCUSSION

The results of the study showed that approximately two-thirds of Slovak consumers consume FMP. The most preferred are fish products containing omega 3 and omega 6 fatty acids, as well as meat products with an increased content of minerals, vitamins, and fiber. Slovak consumers also pay attention to the fat content and consume FMP in order to support their health, but also to prevent the risk of developing diseases. Another finding was that approximately 30% of Slovak consumers will plan to increase their consumption of FMP in the future, which can be positively influenced primarily by the increased awareness of Slovak consumers about the consumption of these products. The results of the study can be compared with the results of previous consumer studies carried out in other countries. FMPs are mostly processed meat products containing various ingredients. In recent years, emphasis has been placed on health and the addition of functional ingredients to meat products. Consumers especially prefer meat products with reduced salt and fat content, which are also suitable for children. Meat products containing minerals, vitamins, omega-3 fatty acids or plant additives are also attractive to consumers (Bermejo et al., 2014; Schnettler et al., 2018; Shan et al., 2017a).

In this context, Hung et al. (2016) emphasize that consumers with a higher frequency of consumption of processed meat products prefer to consume meat products with natural ingredients and reduced nitrite content. Other studies suggest that consumers express more support for the development of "healthier" processed meats by using less additives such as salt, fat and other additives than by adding healthy ingredients (Korzen et al. 2011; Landström et al., 2009).

Schnettler et al. (2018) state that the type of meat also affects the consumption of FMP and found that veal and pork are most preferred by consumers. Khajavi et al. (2020) emphasize that consumer acceptance of meat enriched with functional ingredients also depends on the taste of the meat product with a specific addition.

Following the above, the consumption of FMP in the world is also determined by demographic characteristics,

which have been analyzed in several studies. The key determinant is the high proportion of women who make decisions about buying functional food for their families and have a more positive attitude towards functional foods compared to men (Babicz-Zielińska and Zabrocki, 2007; Olewnik-Mikołajewska et al., 2016). In connection with the socio-demographics of potential buyers, a qualitative study carried out by Shan et al. (2017b) suggests that parents buy enriched meat products with nutrients if their children are picky eaters. Olewnik-Mikołajewska et al. (2016) further add that the consumption of FMP is not affected by the respondents' age, place of residence, or household size, while Shan et al. (2017a) emphasize that none of the demographic variables appear to be significant predictors of the intention to purchase and consume FMP. The attitude of consumers towards FMP is also reflected in the amount of consumption (Carrillo et al., 2013; Urala and Lähteenmäki, 2004) as well as in the acceptance of healthier modified processed meat and meat products (Guàrdia et al., 2006; Hung et al., 2016). Shan et al. (2017a) stated that the key consumers of FMP enriched with healthy ingredients will be those consumers who positively perceive the health characteristics of processed meat.

The consumption of FMP is perceived as beneficial to health because meat products contain health-promoting components (Decker and Park, 2010). Consumer perceptions of healthier meat products are now mainly associated with production and processing techniques and methods; physical and chemical composition; nutritional quality; sensory properties; and social, ethical, or religious aspects (Teixeira and Rodrigues, 2021). The results of the study carried out by Shan et al. (2016) point out that the acceptability of consuming processed meat with the addition of healthy ingredients is not self-evident and consumer acceptance faces challenges, such as low awareness of processed FMP, trust in healthy additives, impact of additives on consumer health and perception of FMP safety.

There are various health-promoting ingredients that can be added to meat products to make them functional foods. The development of a new FMP is a challenge for meat producers and processors in the food market. For the consumer, this development represents a challenge in connection with trust in new FMP and the key potential problem is related to consumer perception and acceptance of new ingredients in meat products. The challenge for producers is the constant development of new products and communication with consumers regarding the health benefits of FMP and the motives for consumption. In this context, business intermediaries and distributors should ensure that consumers do not receive wrong and misleading information. It is important to promote the consumption of FMP. Current trends in the food market will bring a wider range of FMP in the coming years (Verma et al., 2009; Williams, 2005).

The results of the consumer study have both theoretical and practical implications and its results are beneficial for scientific purposes, food companies, policy makers and consumers. The study enriches the current scientific research area with a new perspective on consumer perception and attitudes toward the consumption of FMP, as well as the motives and factors determining their purchase and consumption regarding the negative consequences of COVID-19. Therefore, the results can be a tool for filling the research gap and a suitable basis for conducting studies in the future. The results of the study are also applicable to food companies. Meat producers and processors, who were weakened by the pandemic situation, can strengthen their position in emerging markets by developing new FMPs.

Moreover, meat producers and processors should pay attention to consumer eating habits and changes in meat purchase behavior due to the pandemic. The results are also helpful in the creation of marketing strategies in connection with the launch of new products on the market as well as obtaining a competitive advantage on the market. In the marketing communication of FMP, information regarding added or reduced ingredients in meat products should be emphasized, thereby changing the perception of meat and meat products as an integral part of a healthy diet. In terms of recommendations

regarding nutritional and dietary goals, the results of the study can be a suitable basis for policymakers in connection with the promotion of public health during a pandemic. The study also provides information to consumers with the purpose of increasing consumer awareness regarding the consumption of FMP and improving their health and immunity after overcoming COVID-19. In the context of the above, FMP represents an opportunity for the future direction of the meat and meat products market.

Despite the many benefits of the study, it is also important to focus on the limitations of the research. The main limitations are self-reported measures by respondents involved in the questionnaire survey. Moreover, the results of the study showed that only a minority of Slovak consumers have sufficient consumer awareness about functional food consumption. The other limitation is the territoriality of the research because the research was carried out on a sample of respondents from Slovakia. For future research, it is possible to conduct a comparative study aimed at exploring consumer attitudes towards the consumption of FMP between different countries.

CONCLUSIONS

The food market in the Slovak Republic has been dynamically developing and affected by new trends in consumer behavior, orientation towards the environment, sustainability and health benefits of individual food groups. The consumption of functional foods is becoming more relevant. The aim of the paper was to point out the attitude of Slovak consumers towards FMP consumption with a future perspective. Results show that over 50% of Slovak consumers regularly consume FMP, mostly on a weekly basis. The most frequently consumed FMP are fish, fish oil products, and FMP enriched with omega-3, omega-6, vitamins, and low-calorie meat with added fiber. Consumers prefer FMP with high omega-3 fatty acids, vitamins, minerals, fiber, and reduced fat. Consumers primarily consume FMP to support health and prevent diseases. The study suggests that most consumers don't intend to change their FMP consumption, but about a third of Slovak consumers are interested in increasing it due to health benefits awareness. To support the development of the FMP market, it is necessary to raise awareness of the health benefits of FMP, promote healthy eating and promote FMP. Motivating consumers to increase FMP consumption can benefit both consumers and meat industry producers by stimulating innovation in fortified products. In summary, our consumer study's findings have important implications for both the scientific community and practical applications. It enriches our understanding of consumer perception and attitudes towards Functional Meat Products (FMP). The results provide a foundation for future research and can benefit food companies by informing marketing strategies. Policymakers can also use this information to promote public health, while consumers can make more informed choices about FMP. However, it's important to acknowledge the study's limitations, such as the reliance on self-reported data and the focus on Slovak consumers. Future research can explore consumer attitudes towards FMP.

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REFERENCES

Abzhanova, S., Zhaksylykova, G., Kulazhanov, T., Baybolova, L., Nabiyeva, Z. (2022) Application of functional ingredients in canned meat production. Food Science and Technology, 42, e61122. DOI: https://doi.org/10.1590/fst.61122

Agrawal, R. (2005) Probiotics: An emerging food supplement with health benefits. Food Biotechnology, 19 (3), 227-246. DOI: https://doi.org/10.1080/08905430500316474

Arihara, K. (2006) Strategies for designing novel Functional Meat Products. Meat Science, 74 (1), 219-229. DOI: https://doi.org/10.1016/j.meatsci.2006.04.028

Babicz-Zielińska, E., Zabrocki, R. (2007) Consumer attitudes toward the pro-healthy value of food. ZYWNOSC-Nauka Technologia Jakosc, 6, 81-89.

Bermejo, L., López Plaza, B., Koester Weber, T., Milla, S., Iglesias, C., Reglero, G., Gomez-Candela, C. (2014) Impact of cooked functional meat enriched with omega-3 fatty acids and rosemary extract on inflammatory and oxidative status; a randomised, Double-blind, Crossover study. Nutricion hospitalaria, 30 (5), 1084-1091. DOI: https://dx.doi.org/10.3305/nh.2014.30.5.8048

Bharti, S. K., Pathak, V., Awasthi, M. G., Tanuja, Anita. (2015) Meat as a Functional Food: Concepts and Breakthrough. Meat Science International, 1 (1), 23-31.

Bhat, Z. F., Bhat, H. (2011) Functional Meat Products: A Review. International Journal of Meat Science, 1 (1), 1-14. DOI: https://doi.org/10.3923/ijmeat.2011.1.14

Biswas, A. K., Kumar, V., Bhosle, S., Sahoo, J., Chatli, M. K. (2011) Dietary fibers as functional ingredients in meat products and their role in human health. International Journal of Livestock Production, 2 (4), 45-54.

Borderías, A. J., Sánchez-Alonso, I., Pérez-Mateos, M. (2005) New applications of fibres in foods: Addition to fishery products. Trends in Food Science & Technology, 16 (10), 458-465. DOI: https://doi.org/10.1016/j.tifs.2005.03.011

Carrillo, E., Prado-Gascó, V., Fiszman, S., Varela, P. (2013) Why buying functional foods? understanding spending behaviour through structural equation modelling. Food Research International, 50 (1), 361-368. DOI: https://doi.org/10.1016/j.foodres.2012.10.045

Czech Statistical Office. (2022) Consumption of food and non-alcoholic beverages. Available at: https://www.czso.cz/documents/10180/165278791/2701392201.pdf [Accessed 30 November 2022].

Das, A. K., Nanda, P. K., Madane, P., Biswas, S., Das, A., Zhang, W., Lorenzo, J. M. (2020) A comprehensive review on antioxidant dietary fibre enriched meat-based functional foods. Trends in Food Science & Technology, 99, 323-336. DOI: https://doi.org/10.1016/j.tifs.2020.03.010

Decker, E. A., Park, Y. (2010) Healthier Meat Products as Functional Foods. Meat Science, 86 (1), 49-55. DOI: https://doi.org/10.1016/j.meatsci.2010.04.021

Estévez, M. (2021) Critical overview of the use of plant antioxidants in the Meat Industry: Opportunities, innovative applications and future perspectives. Meat Science, 181, 108610. DOI: https://doi.org/10.1016/j.meatsci.2021.108610

Fernández-Ginés, J. M., Fernández-López, J., Sayas-Barberá, E., Pérez-Alvarez, J. A. (2005) Meat Products as Functional Foods: A Review. Journal of Food Science, 70 (2). DOI: https://doi.org/10.1111/j.1365-2621.2005.tb07110.x

Font-i-Furnols, M., Guerrero, L. (2022) Understanding the future meat consumers. Meat Science, 193, 108941. DOI: https://doi.org/10.1016/j.meatsci.2022.108941

Giromini, C., Givens, D. I. (2022) Benefits and risks associated with meat consumption during key life processes and in relation to the risk of chronic diseases. Foods, 11 (14), 2063. DOI: https://doi.org/10.3390/foods11142063

Grasso, S., Brunton, N. P., Lyng, J. G., Lalor, F., Monahan, F. J. (2014) Healthy processed meat products – regulatory, reformulation and consumer challenges. Trends in Food Science & Technology, 39 (1), 4-17. DOI: https://doi.org/10.1016/j.tifs.2014.06.006

Guàrdia, M. D., Guerrero, L., Gelabert, J., Gou, P., Arnau, J. (2006) Consumer attitude towards sodium reduction in meat products and acceptability of fermented sausages with reduced sodium content. Meat Science, 73 (3), 484-490. DOI: https://doi.org/10.1016/j.meatsci.2006.01.009

Händel, M. N., Rohde, J. F., Jacobsen, R., Heitmann, B. L. (2021) Processed meat consumption and the risk of cancer: A critical evaluation of the constraints of current evidence from epidemiological studies. Nutrients, 13 (10), 3601. DOI: https://doi.org/10.3390/nu13103601

Hathwar, S. C., Rai, A. K., Modi, V. K., Narayan, B. (2012) Characteristics and consumer acceptance of healthier meat and meat product formulations—a review. Journal of Food Science and Technology, 49, 653-664. DOI: https://doi.org/10.1007/s13197-011-0476-z

Henchion, M., McCarthy, M., Resconi, V. C., Troy, D. (2014) Meat consumption: Trends and quality matters. Meat Science, 98 (3), 561–568. DOI: https://doi.org/10.1016/j.meatsci.2014.06.007

Hielkema, M. H., & Lund, T. B. (2021) Reducing meat consumption in meat-loving denmark: Exploring willingness, behavior, barriers and drivers. Food Quality and Preference, 93, 104257. DOI: https://doi.org/10.1016/j.foodqual.2021.104257

Hung, Y., de Kok, T. M., Verbeke, W. (2016) Consumer attitude and purchase intention towards processed meat products with natural compounds and a reduced level of nitrite. Meat Science, 121, 119-126. DOI: https://doi.org/10.1016/j.meatsci.2016.06.002

Hungarian Central Statistical Office. (2023) Per capita amount of available food [kg]. https://www.ksh.hu/stadat_files/mez/en/mez0061.html [Accessed 22 February 2023].

Khajavi, M. Z., Abhari, K., Barzegar, F., Hosseini, H. (2020) Functional Meat Products: The new consumer's demand. Current Nutrition & Food Science, 16 (3), 260-267. DOI: https://doi.org/10.2174/1573401315666190227161051

Korzen, S., Sandøe, P., Lassen, J. (2011) Pure meat – public perceptions of risk reduction strategies in meat production. Food Policy, 36 (2), 158-165. DOI: https://doi.org/10.1016/j.foodpol.2010.10.005

Kumar, S., Bhat, Z., Kumar, P., Mandal, P. (2013) Functional Meat and Meat Products. In: Mandal, P. K., Biswas, A. K., eds. Animal Products Technology. New Delhi, Delhi, India: Studium Press (India) Pvt. Ltd., pp. 404-455.

Landström, E., Hursti, U.-K. K., Magnusson, M. (2009) Functional foods compensate for an unhealthy lifestyle. Some Swedish consumers' impressions and perceived need of functional foods. Appetite, 53 (1), 34-43. DOI: https://doi.org/10.1016/j.appet.2009.04.219

Llauger, M., Claret, A., Bou, R., López-Mas, L., Guerrero, L. (2021) Consumer attitudes toward consumption of meat products containing offal and offal extracts. Foods, 10 (7), 1454. DOI: https://doi.org/10.3390/foods10071454

Marinković, V., Lazarević, J. (2021) Eating habits and consumer food shopping behaviour during COVID-19 virus pandemic: Insights from Serbia. British Food Journal, 123 (12), 3970-3987. DOI: https://doi.org/10.1108/bfj-11-20201072

Milford, A. B., Le Mouël, C., Bodirsky, B. L., Rolinski, S. (2019) Drivers of meat consumption. Appetite, 141, 104313. DOI: https://doi.org/10.1016/j.appet.2019.06.005

Munekata, P. E., Pateiro, M., Tomasevic, I., Domínguez, R., da Silva Barretto, A. C., Santos, E. M., Lorenzo, J. M. (2022) Functional fermented meat products with probiotics—a review. Journal of Applied Microbiology, 133 (1), 91-103. DOI: https://doi.org/10.1111/jam.15337

OECD/FAO. (2022) OECD-FAO Agricultural Outlook, OECD Agriculture statistics (database). DOI: https://doi.org/10.1787/agr-data-en

Olewnik-Mikołajewska, A., Guzek, D., Głąbska, D., Gutkowska, K. (2016) Consumer behaviors toward novel functional and convenient meat products in Poland. Journal of Sensory Studies, 31 (3), 193-205. DOI: https://doi.org/10.1111/joss.12203

Ostaszewski, M. (2018) Meat and meat products as functional food. World Scientific News: An International Scientific Journal, 110, 147-158.

Plasek, B., Lakner, Z., Temesi, Á. (2020) Factors that influence the perceived healthiness of food—review. Nutrients, 12 (6), 1881. DOI: https://doi.org/10.3390/nu12061881

Pogorzelska-Nowicka, E., Atanasov, A., Horbańczuk, J., Wierzbicka, A. (2018) Bioactive compounds in functional meat products. Molecules, 23 (2), 307. DOI: https://doi.org/10.3390/molecules23020307

Rahimi, P., Islam, M. S., Duarte, P. M., Tazerji, S. S., Sobur, M. A., El Zowalaty, M. E., Ashour, H. M., Rahman, M. T. (2022) Impact of the COVID-19 pandemic on food production and Animal Health. Trends in Food Science & Technology, 121, 105-113. DOI: https://doi.org/10.1016/j.tifs.2021.12.003

Ravani, A., Sharma, H. P. (2022) Meat Based Functional Foods. In: Chhikara, N., Panghal, A., Chaudhary, G., Functional Foods. Beverly, Massachusetts, United States: Scrivener Publishing LLC, pp. 235-287. DOI: https://doi.org/10.1002/9781119776345.ch7

Ruiz-Capillas, C., Herrero, A. M. (2021) Novel strategies for the development of healthier meat and meat products and determination of their quality characteristics. Foods, 10 (11), 2578. DOI: https://doi.org/10.3390/foods10112578

Sanchez-Sabate, R., Sabaté, J. (2019) Consumer attitudes towards environmental concerns of meat consumption: A systematic review. International Journal of Environmental Research and Public Health, 16 (7), 1220. DOI: https://doi.org/10.3390/ijerph16071220

Sarojnalini, Ch., Hei, A. (2019). Fish as an important functional food for Quality Life. Functional Foods. DOI: https://doi.org/10.5772/intechopen.81947

Schnettler, B., Sepúlveda, N., Bravo, S., Grunert, K. G., Hueche, C. (2018) Consumer acceptance of a functional processed meat product made with different meat sources. British Food Journal, 120 (2), 424-440. DOI: https://doi.org/10.1108/bfj-04-2017-0211

Shan, L. C., Henchion, M., De Brún, A., Murrin, C., Wall, P. G., Monahan, F. J. (2017a) Factors that predict consumer acceptance of enriched processed meats. Meat Science, 133, 185-193. DOI: https://doi.org/10.1016/j.meatsci.2017.07.006

Shan, L. C., Regan, Á., Monahan, F. J., Li, C., Lalor, F., Murrin, C., Wall, P. G., McConnon, Á. (2017b) Consumer preferences towards healthier reformulation of a range of processed meat products. British Food Journal, 119 (9), 2013-2026. DOI: https://doi.org/10.1108/bfj-11-2016-0557

Shan, L. C., Regan, A., Monahan, F. J., Li, C., Murrin, C., Lalor, F., Wall, P. G., McConnon, A. (2016) Consumer views on "healthier" processed meat. British Food Journal, 118 (7), 1712-1730. DOI: https://doi.org/10.1108/bfj-11-2015-0447

Statistical Office of the Slovak Republic. (2022) Consumption of selected kinds of foodstuffs per capita. Available at: https://datacube.statistics.sk/#!/view/en/VBD_SLOVSTAT/ps2041rs/v_ps2041rs_00_00_00_en [Accessed 15 January 2023].

Statistics Poland. (2022) Statistical Yearbook of Agriculture 2021. Available at: https://stat.gov.pl/download/gfx/portalinformacyjny/en/defaultaktualnosci/3328/6/16/1/statistical_yearbook_of_agriculture_2021.pdf [Accessed 28 March 2022].

Teixeira, A., Rodrigues, S. (2021) Consumer perceptions towards healthier meat products. Current Opinion in Food Science, 38, 147-154. DOI: https://doi.org/10.1016/j.cofs.2020.12.004

Toldrá, F., Aristoy, M.-C., Mora, L., Reig, M. (2012) Innovations in value-addition of edible meat by-products. Meat Science, 92 (3), 290-296. DOI: https://doi.org/10.1016/j.meatsci.2012.04.004

Tripathy, S., Verma, D. K., Thakur, M., Patel, A. R., Srivastav, P. P., Singh, S., Chávez-González, M. L., Aguilar, C. N. (2021) Encapsulated Food Products as a strategy to strengthen immunity against covid-19. Frontiers in Nutrition, 8, 673174. DOI: https://doi.org/10.3389/fnut.2021.673174

Urala, N., Lähteenmäki, L. (2004) Attitudes behind consumers' willingness to use functional foods. Food Quality and Preference, 15 (7-8), 793-803. DOI: https://doi.org/10.1016/j.foodqual.2004.02.008

Valsta, L. M., Tapanainen, H., Männistö, S. (2005) Meat Fats in nutrition. Meat Science, 70 (3), 525-530. DOI: https://doi.org/10.1016/j.meatsci.2004.12.016

Verma, N., Sharma, S., Banerjee, S. (2009) Functional meat products: Developments & Challenges. Processed Food Industry, 12, 35-39.

Williams, P. (2005) The place for Functional Foods within hospitality: An opportunity? Journal of the Royal Society for the Promotion of Health, 125 (3), 108-109. DOI: https://doi.org/10.1177/146642400512500310

Zhang, W., Xiao, S., Samaraweera, H., Lee, E. J., Ahn, D. U. (2010) Improving functional value of meat products. Meat Science, 86 (1), 15-31. DOI: https://doi.org/10.1016/j.meatsci.2010.04.018

Zinina, O., Merenkova, S., Tazeddinova, D., Rebezov, M., Stuart, M., Okuskhanova, E., Yessimbekov, Z., Baryshnikova, N. (2019) Enrichment of meat products with dietary fibers: a review. Agronomy Research, 17 (4), 1808-1822. DOI: https://doi.org/10.15159/ar.19.163