

COMPARISON OF CONSUMPTION AND PURCHASE HABITS FOR UNIVERSITY STUDENTS FOR INDUSTRIALLY KEPT PIGS AND MANGALICA PIGS

ABSTRACT

The aim of the study is to compare the preferences for the purchase and consumption of industrially kept pigs and mangalica pigs. The research was conducted among the students of the Faculty of Economics and Business of University of Debrecen in October 2019, in the form of an online questionnaire. Descriptive statistical methods, chi-square tests, Spearman rank correlation indexes, factor analysis and two-step cluster analysis were used to analyze the data obtained from the survey. Based on the results, it can be said that there are differences in consumer perceptions of industrially kept pigs and mangalica pigs among a number of sociodemographic factors. Factor analysis was used to delimit three factors in the case of industrially kept pigs (“Hungarian-brand-fresh product” aspects, factors related to health awareness, aspects of a marketing nature), while in the case of mangalica pigs one factor was identified. Next, I used a two-step cluster analysis using the isolated factors, where several sociodemographic variables were tested. The best fit was shown by the combination of gender and highest educational level. Based on these, it can be concluded that in the case of industrially kept pigs, the factors considered in the purchase were the most important for women and men with higher education in the case of two factors (“Hungarian-brand-fresh product” aspect and marketing aspects) and for mangalica pigs. While in the case of industrially kept pigs, the third factor (factors related to health awareness) that we took into account in the purchase proved to be the most important for men with a secondary education.

Keywords: industrially kept pigs, mangalica pigs, buying habits, consumption habits, preferences

JEL Code: I12, M31

INTRODUCTION

The importance of animal husbandry in Hungary has started to decline in recent years. The pig sector is characterized by a steady decline in livestock. While in 2004 4.06 million pigs were kept in the country, by 2019 the number of pigs decreased to 2.63 million individuals (CSO, 2021a). This is due to the fact that competition has greatly increased, producers have to comply with increasingly strict animal welfare and environmental standards, and a number of new procurement opportunities have opened up for slaughterhouses, for which domestic producers are not sufficiently prepared (CSONKA, 2012). According to the latest data from the Central Statistical Office, poultry meat accounts for the largest share of per capita meat consumption, followed by pork (HCSO, 2021b; HCSO, 2021c). Thus, pork is one of the most consumed types of meat in Hungary.

The mangalica pig, which is a native and traditional pig breed, plays an outstanding role in Hungarian agriculture. Consequently, its preservation is of paramount importance (BALOGH et al., 2016). Hungary has a history of nearly two hundred years, which, however, cannot be said to be entirely successful, as its stock has declined significantly over the years (HNAMB, 2020). However, it is important to highlight that the number of registered sows has started to increase in recent years (MM, 2020). Mangalica is a typical fatty pig that can produce up to 70% fat in terms of body weight (TÓTH, 2012). Mangalica pork meat contains special nutrients therefore can be classified as a functional food (CORDIŞ et al., 2015), as well as tasty, soft, and juicy, and therefore suitable to produce high-quality, traditional meat products (SZENTE et al., 2011; BALOGH et al., 2013).

Several similar research have been conducted on this topic at the domestic and international level.

Domestic research has focused on mangalica pigs and their products, and international research has focused on industrially kept pigs and other meats and meat products. SZENTE et al. (2011) examined consumer behavior in the market for mangalica products with the participation of 1,200 domestic consumers. Among their results, they highlighted that consumer with a high level of education, mostly in intellectual work, living in a big city, regularly buy some product made from mangalica pigs. Their motivation for this is based on Hungarian origin, the value of enjoyment and the maintenance of health. In addition, it was pointed out that among the processed products, the consumption of bacon, fat, salami

and various types of sausages is quite common among the respondents. SZIGETI and co-researchers (2015) surveyed consumer perceptions of traditional mangalica products through a national sample of 1,000 people. Both quantitative and qualitative methods were used for the analysis. Among their conclusions, they pointed out that more than half of the domestic consumers are characterized by the consumption of traditional mangalica pork and products made from it, which are mainly obtained from a butcher shop and producer. BALOGH et al. (2016) examined consumer preferences related to a traditional mangalica product (mangalica salami) involving 309 individuals using a discrete choice experiment. Among their results, they pointed out that the indication of origin (certificate of the Hungarian National Association of Mangalica Breeders (HNAMB)) is a decisive aspect in decision-making and has a positive effect on consumers' sense of usefulness. The aim of the study by CZINE et al. (2020) was to identify the most important product characteristics that influence consumer decisions about a traditional product (mangalica sausage). In their study, they used a discrete choice experiment in which they estimated three models (multinomial logit, mixed logit, latent class). Based on their latent class model estimates, they identified three classes with different preferences (price sensitive, loyal to label, label neutral). Their price sensitive group included significantly older lower-income male consumers, who are extremely price-sensitive and prefer the origin-marked product from the producer market with 75% mangalica meat.

The article by VERBEKE and VIAENE (1999) focuses on the evaluation of consumer beliefs, attitudes, and behaviors related to fresh beef, pork, and poultry. The survey was conducted through quantitative marketing research involving 320 Belgian fresh meat consumers. In their research, they used factor analysis, the aim of which was to determine the factors that form freshness for different types of meat. As a result, in the case of beef, pigmeat and poultrymeat, the first factor was defined as the "safety factor", the second as the "comfort factor" and the third as the "additional factor". The interpretation of the factors differs from the type of fresh meat considered. Article by GLITSCH (2000) summarizes the results of a consumer survey conducted in six European countries in order to obtain comparable information on consumer behavior and assessment of the quality of fresh meat. The assessment of meat quality consisted of two stages, a stage before the actual purchase and a stage after the purchase during meat eating. In the first stage, price was considered the least important factor in assessing quality in all countries except the United Kingdom; in the case of beef and pigmeat, the place of purchase has become one of the most important factors in all countries except Sweden and the United Kingdom; and among the internal characteristics, color proved to be the most important factor in the case of beef, pork and chicken. In the second stage, flavor was one of the most significant quality characteristics and freshness became the most important factor in terms of safety for all three types of meat. Based on their results, the authors concluded that it would be worthwhile to use appropriate indications for manufacturers and retailers to inform consumers about the freshness of the product. A study by BRYHNI et al. (2002) focuses on how the consumer perceives the eating quality of pork. The questionnaire survey was conducted among pork consumers (N = 526) in Denmark, Norway and Sweden. Multivariate statistical methods were used to examine differences between consumers. Consumers considered the taste of pork to be the most defining trait. Among the aspects considered in its purchase, the most important was the fact that pork can be used in the preparation of many dishes, and the least important factor was the fact that pork could be served at social events. The biggest differences between consumers were by country, while smaller differences were by age and gender. Swedish consumers reported a higher frequency of consumption and were more satisfied with the quality of pork than Norwegian and Danish consumers. In terms of age, 16-35-year-olds are less likely to consume pork than those older than 35 years. The aim of the article by SHI et al. (2005) was to identify differences in eating habits and preferences among adolescents along sociodemographic characteristics. To this end, 824 students from eight Chinese high schools were interviewed in a questionnaire survey. The questions were related to food, frequency of meals, food preferences, and sociodemographic characteristics. Socio-economic conditions and urban location were positively associated with higher consumption of high-energy foods such as food of animal origin and dairy products. Boys consumed food of animal origin more often, and fruits and vegetables less often than girls. Urban students and students in high socio-economic status were more likely to consume animal foods, fruits, yogurt, milk, and soft drinks. The aim of the study by GUENTHER et al. (2005) was to provide information on meat consumption and factors explaining differences between certain subgroups, and to assess how knowledge and attitudes about nutrition, healthy diet, and health awareness affect meat consumption. The survey involved 4,802 children and

9,460 adults. The study focused on chicken, beef, pork and pork products. Relationships between types of meat intake, dietary characteristics, and demographic factors were examined using a two-step, multivariate regression model. The results suggest that individuals in higher-income households consume relatively more chickens, while those in low-income households consume more pig products. Those who did not consume beef and only consume smaller amounts of chicken thought their fat intake was low. Beef and pork consumers were more likely to think that their diet was too high in fat, but considered it less important to consume low in fat foods. The region of residence of the respondents also influenced the probability of consuming meat, and high education was associated with lower consumption of beef and pork. Overall, therefore, the likelihood of selecting certain types of meat and the amounts consumed are largely determined by sociodemographic factors, and are also influenced by knowledge and attitudes about diet and meat products. The aim of the review by KIEFER et al. (2005) was to describe eating and dieting habits by gender. As a result of the studies, it can be said that women consume more food and have more nutritional knowledge than men. Women consume more fruits, vegetables, cereals, milk, dairy products, and whole grains, while red meat, especially pork, sausages, eggs, alcohol, and foods high in sucrose, are more common in men. Women eat sparingly and diet more often. Men prefer to control their body weight with exercise and implement diets only for health reasons. Eating disorders are more common in women, while the likelihood of obesity is similar between the sexes, but overweight is more common in men. The research by CAINE-BISH and SCHEULE (2009) aimed to identify dietary preferences for school-age children and adolescents in terms of gender and age. The survey is conducted in 3-12. grade students in schools in the northeast Ohio. Students completed an anonymous questionnaire about 80 different food preferences. They had to answer the questions on a 5-point likert-scale. Caine-Bish and Scheule used exploratory factor analysis to identify the factors of the main course and garnish, and used analysis of variance to determine differences by gender and school grade. As a result of the research, it can be said that boys preferred meat consumption and girls preferred fruits and vegetables. In addition, gender differences in preferences were also shown for school departments. Eating preferences thus differ between the sexes, and these gender differences appear between lower primary school students, upper primary school students, and high school students. A study by PAPANAGIOTOU et al. (2012) sought to explore the concept of quality expected in relation to pork and compare it with consumers' intentions to purchase pork. The data collection took place in Greece. As a result of their Conjoint analysis, they have shown that quality expectations are often reflected in pork purchases. For respondents, the marbling of origin and the meat are important, while price is a less determining factor. They also pointed out that gender, education, place of purchase, and consumption habits also greatly influence people's willingness to buy. And KAYSER et al. (2013) examined attitudes and conducted a consumer survey aimed at gaining detailed insights into the wide variety of attitudes and social environments that may affect the amount of meat consumed. In their study, "low", "average" and "heavy" consumer groups were distinguished. Their study focused on the factors that, based on the literature and information received from experts, have the most influential influence on consumer decisions. In addition, sociodemographic factors such as age or income were considered. Based on their results, the so-called "low meat consumers" group placed the greatest emphasis on ethical issues related to meat consumption. ESCRIBA-PEREZ et al (2017) analyzed the consumer profile of each meat type. To this end, the average frequency of consumption of different types of meat was examined from two directions. Consumer segmentation was first performed using the food-related lifestyle (FRL) framework, during which 4 segments were identified, followed by analysis along sociodemographic factors. The variables used included gender, age, education, social class, number of people living in the household, number of children under 18 years of age living in the household, and place of residence. In the case of beef, significant results were obtained in both analyses, and in the case of turkey only in the analysis of FRL. In the case of other meats (chicken, pork, rabbit and lamb), there were significant differences only in the analysis of sociodemographic factors. Based on the results, it was concluded that there is no unique consumer profile tailored to each type of meat.

Based on the above, the aim of my research was to find out whether there is a difference in consumer preferences for industrially kept pigs and mangalica pigs along different sociodemographic characteristics. Furthermore, if there is a discrepancy along what factors it manifests itself.

My hypotheses were as follows:

H1: There is a significant difference in consumer preferences for industrially kept pigs and mangalica pigs along certain sociodemographic factors.

H2: The criteria considered for the purchase of industrial pigs and mangalica pigs can be separated into distinct factors.

MATERIALS AND METHODS

My study was based on a questionnaire survey conducted among students of the Faculty of Economics of the University of Debrecen in the autumn of 2019. Completion was voluntary and anonymous. Because I used a convenience sampling procedure, the sample is not representative, so the results cannot be generalized.

The questionnaire consisted of three parts. In the first part, I asked questions about pigs kept industrially. These questions focused on the consumption of pork and pork products and the factors considered in the purchase. In the second part, questions related to mangalica pigs were formulated. Here, it was asked whether the respondents consume mangalica pork and a product made from mangalica, and how important each of the factors listed is when purchasing. In the third part, demographic questions are listed, the descriptive statistics of which are given in Table 1.

Table 1. Demographic characteristics of the respondents

Demographic variable (N=324)		Mean (S.d.)	Frequency	Percent (%)
Gender	Male		100	30.86
	Female		224	69.14
Age (years)		21.07 (3.53)		
Highest level of education	Secondary education		268	82.72
	Higher education		56	17.28
Place of residence	Rural		60	18.52
	Town		131	40.43
	County town		35	10.80
	Capital		98	30.25
Number of people living in the household (persons)		3.72 (1.02)		
Monthly net income (per capita) of the household	I don't want to answer		65	20.06
	Less than 100 thousand HUF		35	10.80
	100-200 thousand HUF		106	32.72
	200-300 thousand HUF		71	21.91
	More than 300 thousand HUF		47	14.51

Source: Own construction

The analysis was performed with IBM SPSS Statistics 25. During data processing, I performed descriptive statistical methods, Chi-square tests, Spearman rank correlation studies, factor analysis (Principal Component Analysis – PCA), and two-step cluster analysis.

Factor analysis is a multivariate statistical method that models the correlations of variables. For factor analysis, independent variables are known. The method can only be performed on a dataset if it is properly correlated (TÓTHNÉ, 2011). Factor analysis can be used to find common factors that characterize preferences and are related to several variables examined. These latent variables are the factors. The aim of the analysis is to reduce the number of variables, therefore the number of factors obtained during the study should be less than the number of initial variables (VARGA and SZILÁGYI, 2011).

Cluster analysis is a multivariate method that aims to explore structures and create a relatively homogeneous subset by simultaneously considering the characteristics of a relatively heterogeneous population (SIMON, 2006). Cluster analysis does not differentiate between dependent and independent variables, but examines the interrelationships within a set of variables (MALHOTRA and SIMON, 2009). Two-step cluster analysis is used to analyze large number of databases when hierarchical and K-means clustering are less efficient. The method can be applied to both categorical and continuous variables. The number of clusters is usually determined based on some information criterion (e.g., Bayesian information criterion (BIC)) (MCINTYRE and BLASHFIELD, 1980; HADI et al., 1992).

RESULTS AND DISCUSSION

RESULTS

Based on the answers to the questions related to the consumption and purchase of industrially kept pigs and mangalica pigs, the following findings were made.

All the respondents used to consume pork with some regularity, however, only 37.3% of the respondents also consume mangalica pork. I also asked about the consumption of various products made from pork and mangalica in the questionnaire. The following figures show the proportion of respondents consumed from industrially kept pigs and mangalica pigs.

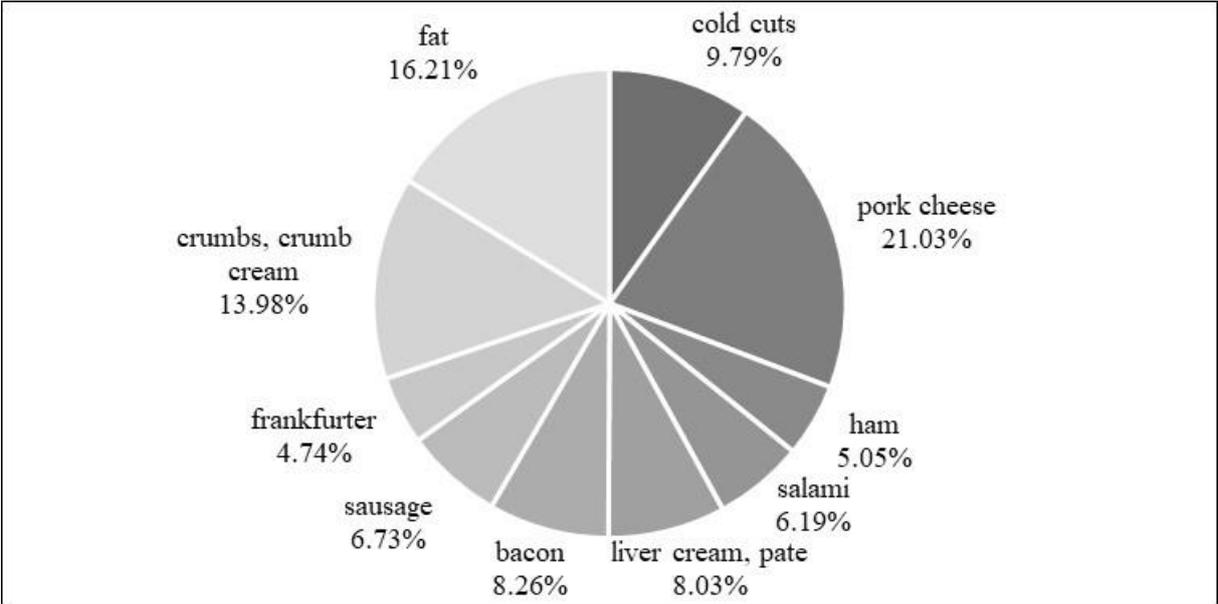


Figure 1: Distribution of consumption of industrially kept pig products

Source: Own construction

Figure 1. shows that the largest proportions of pork cheese, fat and crumbs, crumb cream made from pork are consumed by the respondents, while salami, ham and frankfurter are consumed the least.

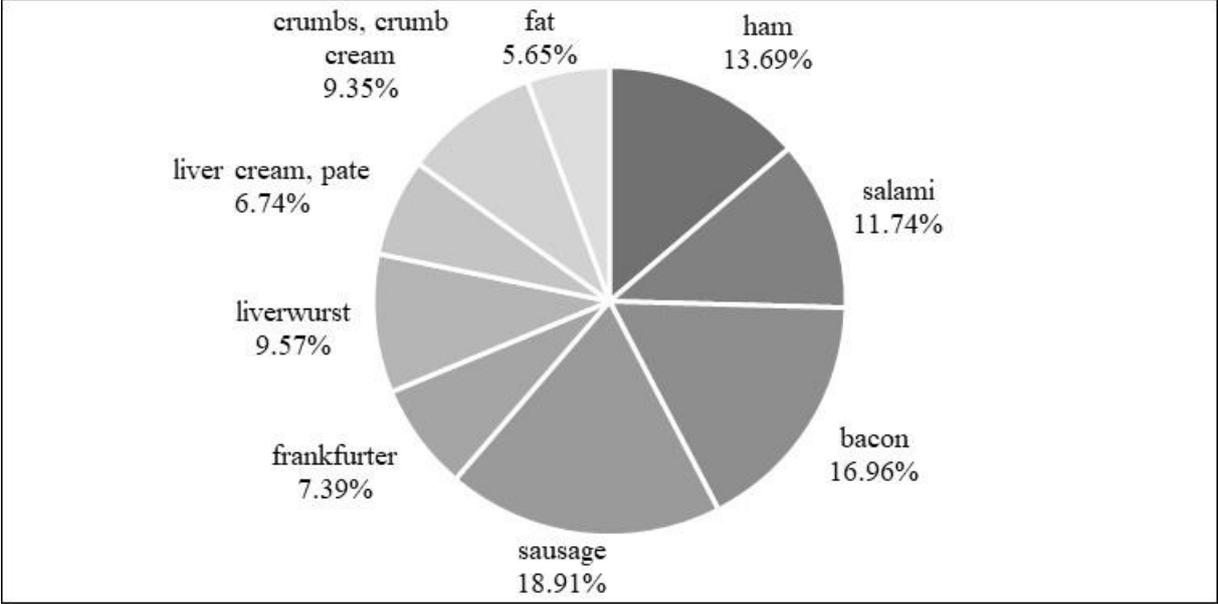


Figure 2: Distribution of consumption of mangalica products

Source: Own construction

Figure 2 shows that the highest proportions of sausage, bacon and ham made from mangalica are consumed by university students, while frankfurter, liver cream, pate and fat are the least consumed. I was also curious about the importance of certain factors when it comes to shopping. These factors were price, product ingredients, fat content, healthy nutrition, freshness, Hungarian product, manufacturer/brand and packaging in the case of industrial pigs, while price, product ingredients, fat content, healthy nutrition, freshness, Hungarian product, certified product of origin and packaging in the case of mangalica. Assessing importance, it was done on a scale from 1 to 5, where 1 – represented: not at all important, while 5 – represented: a very important opinion. This question also had to be answered by those respondents who do not consume mangalica pork because I was curious as to which factors they would consider relevant in the event of a possible subsequent purchase. The distributions, mean, and standard deviation values for each aspect are shown in Table 2.

Table 2. Descriptive statistics of factors considered during the purchase

Viewpoints	Industrially kept pig							Mangalica pig						
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	S.d.	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	S.d.
Price	2.5	7.7	29.9	38.6	21.3	3.7	1.0	31.2	6.5	19.7	24.4	18.2	2.9	1.5
Product ingredients	0.6	2.8	16.7	32.4	47.5	4.2	0.9	25.9	5.6	15.1	22.8	30.6	3.3	1.6
Fat content	2.8	8.6	33.7	32.4	22.5	3.6	1.0	27.2	7.4	25.9	24.7	14.8	2.9	1.4
Healthy nutrition	2.8	8.0	31.2	29.3	28.7	3.7	1.1	26.8	5.6	21.0	21.3	25.3	3.1	1.5
Freshness	0.0	0.3	3.4	13.6	82.7	4.8	0.5	25.6	3.7	8.7	12.0	50.0	3.6	1.7
Hungarian product	2.5	5.2	21.3	32.7	38.3	4.0	1.0	26.9	7.7	15.4	22.8	27.2	3.2	1.6
Manu- facturer/ Brand	2.8	9.0	24.4	37.6	26.2	3.8	1.0	-						
Certified product of origin	-							26.5	4.6	19.2	20.1	29.6	3.2	1.6
Packing	3.7	9.6	30.5	31.2	25.0	3.6	1.1	29.0	8.3	24.7	21.9	16.1	2.9	1.5

Source: Own calculation

Consumers considered the freshness, the ingredients of the product and the Hungarian product to be the most important in case the two type of pigs, and in the case of mangalica, even the origin of the product proved to be decisive.

In the following, I examined whether there is some level of relationship between gender, residence, education, and income, and the purchase and consumption of products from industrially kept pigs and mangalica pigs. Significant results are shown in Table 3.

Table 3. Results of Chi-square tests

Industrially kept pig	χ^2	Phi/Cramer
Gender - salami	7.714 **	0.154**
Gender - liver cream, pate	4.875**	0.123**
Residence - where to buy	27.635**	0.169**
Residence - liver cream, pate	9.677**	0.173**
Mangalica pig	χ^2	Phi/Cramer
Gender - sausage	10.868**	-0.183**
Gender - where to buy	11.260**	0.186**
Residence - mangalica pork	11.092**	0.185**

Residence - bacon	10.571**	0.181**
Residence - sausage	12.019**	0.193**
Residence - where to buy	26.230**	0.164**
Education - crumbs	3.914**	0.110**
Income - mangalica pork	11.971**	0.192**
Income - sausage	10.780**	0.182**

Note: ** Phi value was determined at 5% level, significant for 2x2 contingency tables, and Cramer's association coefficient for larger tables.

Source: Own calculation

Based on the results of Table 3, it can be clearly seen that there is a significant relationship between gender and the consumption of various industrially kept pork and processed mangalica pork products (e.g. salami, liver cream, pate). Based on the results of the Chi-square tests, it can be statistically confirmed that more men consume pork salami and mangalica sausage, and more women consume pork liver cream and pate. In terms of the place of purchase, there are justifiably more people in small towns who buy pork products than those living in the county seat. In a supermarket / hypermarket, there are justifiably more pig products in the county than in the village, and in a supermarket / hypermarket, more men buy mangalica products than women. There are statistically more people in the village than those who buy pork products elsewhere than in the county seat. In terms of residence, it can be justified that more people living in county seats consume pork liver cream than those living in small towns. Statistically, more people living in the county seat consume mangalica pork and sausage made from mangalica pork. Mangalica pork bacon is consumed or bought by several people living in the county seat at a producer / market, while fewer people living in the village consume bacon and buy less at a producer / market. In terms of educational attainment, mangalica pigs are demonstrably consumed by people with more tertiary education and less with secondary education. In terms of income categories, those with a monthly net income (per capita) of more than HUF 300,000 consume significantly more mangalica pork, while those with a net income of less than HUF 100,000 have statistically verifiably less. Verifiably more people with a net income of more than HUF 300,000 consume mangalica sausage. The value of the association coefficients was below 0.3 in all cases, therefore the relationships between the criterion categories can be considered weak.

In the next step, I used principal component analysis to find out if the number of aspects involved in the evaluation could be reduced. I did this from two directions. In terms of pigs kept industrially on the one hand and mangalica pigs on the other. Prior to principal component analyzes, I used Spearman's rank correlation test to find out if an overly strong correlation could be detected between certain factors. I did not find such a case. The PCA results are shown in Table 4 and Table 5.

Table 4. Results of principal component analysis on responses to statements on buying preferences related to industrially kept pigs

Statement	PC1 ($\alpha = 0.588$)	PC2 ($\alpha = 0.713$)	PC3 ($\alpha = 0.337$)
Manufacturer/brand	0.796		
Hungarian product	0.769		
Freshness	0.569		
Healthy nutrition		0.813	
Fat content		0.798	
Product ingredients		0.715	
Price			0.801
Packaging			0.628

Note: Total explained variance: 64.095%; Bartlett's test of sphericity: $\chi^2 = 488.232$, $p < 0.001$; KMO = 0.665; Cronbach's $\alpha = 0.663$.

Source: Own calculation

Table 5. Results of principal component analysis on responses to statements on buying preferences related to mangalica pork

Statement	PC1 ($\alpha = 0.971$)
Product ingredients	0.943
Certified product of origin	0.939
Freshness	0.937
Fat content	0.922
Hungarian product	0.915
Healthy nutrition	0.910
Packaging	0.874
Price	0.861

Note: Total explained variance: 83.354%; Bartlett's test of sphericity: $\chi^2 = 3405.379$, $p < 0.001$; KMO = 0.939; Cronbach's $\alpha = 0.971$.

Source: Own calculation

In the case of industrially kept pigs, I managed to separate three components, the first of which included the manufacturer/brand, the Hungarian product and the freshness, so I named this component the "Hungarian-brand-fresh product" aspect. The second component includes factors related to health awareness (healthy nutrition, fat content and product ingredients), while the third component includes aspects of a marketing nature (price and packaging). As a result of the PCA for mangalica pigs, I found that all factors can be classified into one component.

I subjected the results of the PCA to further analysis to see if there are groups that can be created along certain consumer characteristics for the components. For this, I used a two-stage cluster analysis, where I also tested several sociodemographic characteristics (gender, place of residence, highest educational attainment, income) and the combination formed from them as a grouping variable. The best explanatory result was achieved through the inclusion of gender and highest educational level, the results of which are shown in Table 6 and Table 8.

Table 6. Results of the two-step cluster analysis (industrially kept pigs)

	"Hungarian-brand-fresh product" aspect		Factors related to health awareness		Marketing aspects	
	Mean	S.d.	Mean	S.d.	Mean	S.d.
Cluster 1	0.192	0.909	-0.063	0.847	0.111	1.039
Cluster 2	0.029	1.001	0.004	1.073	0.041	0.982
Cluster 3	-0.183	1.035	0.031	0.941	-0.158	1.006

Source: Own calculation

As a result of the two-step cluster analysis, I was able to identify three subgroups (Table 6). Based on the results of Table 6, it can be clearly seen that the component related to the "Hungarian-brand-fresh product" factors takes on the highest value in the case of the first cluster, while it has the lowest value in the case of the third cluster. Based on these, I can say that in the case of the former members, the most important, while in the case of the latter, the aspects that are included in the component are the least important. Regarding the second component, it can be stated that the third cluster has the strongest effect, while the first cluster has the weakest effect. The effect of the component on marketing aspects is most pronounced in the first cluster and least in the third cluster.

Table 7. Distributions of clusters (industrially kept pigs)

	Gender (%)		Highest level of education (%)	
	Male	Female	Secondary education	Higher education
Cluster 1	13.0	19.2	0.0	100.0
Cluster 2	0.0	80.8	67.5	0.0
Cluster 3	87.0	0.0	32.5	0.0

Source: Own calculation

Based on Table 7, it can be concluded that the first cluster includes men and women with level of higher education. The second subgroup consists of women with secondary educational level. Finally, the third cluster included men with secondary education.

Table 8. Results of the two-step cluster analysis (mangalica pigs)

	Mangalica aspects	
	Mean	S.d.
Cluster 1	-0.084	0.859
Cluster 2	0.091	1.019
Cluster 3	0.012	1.058

Source: Own calculation

As a result of the two-step cluster analysis of mangalica pigs, I was able to identify three subgroup (Table 8). Based on the results of Table 8, it can be clearly seen that the component for mangalica aspects takes the highest value in the case of the second cluster and the smallest value in the case of the first cluster. Based on these, I can say that in the case of the former members, the most important, while in the case of the latter, the aspects that are included in the component are the least important.

Table 9. Distributions of clusters (mangalica pigs)

	Gender (%)		Highest level of education (%)	
	Male	Female	Secondary education	Higher education
Cluster 1	87.0	0.0	32.5	0.0
Cluster 2	13.0	19.2	0.0	100.0
Cluster 3	0.0	80.8	67.5	0.0

Source: Own calculation

Based on Table 9, it can be concluded that the first cluster includes only men with secondary educational level. The second subgroup consists of men and women with level of higher education. Finally, the third cluster included women with secondary education.

DISCUSSION

The aim of my research was to examine and compare consumer preferences related to industrially kept pigs and mangalica pigs. I conducted my survey in the autumn of 2019 among the students of the Faculty of Economics of the University of Debrecen. The first part of my questionnaire included questions related to the consumption and purchasing behavior of respondents and then I assessed demographic factors. In my analysis, I used descriptive statistics, chi-square test, and multivariate statistical methods. Based on my research, I was able to show several relationships. In addition, I identified three components in the case of industrially kept pigs based on the statements in the questionnaire, while in the case of mangalica pigs, all factors could be classified into one component. Based on my two-step cluster analysis, I established further correlations.

Compared to the basic concept of my research, a number of studies have been conducted both domestically and internationally. The authors discussed in the introductory section examined consumer preferences and attitudes about certain foods one by one, and several of them placed great emphasis on traditional mangalica pork, industrially kept pork, and other meats. Aspects of my study show similarities to the research of the following authors Verbeke - Viaene (1999) - freshness; Glitsch (2000) - price and freshness; Shi et al. (2005) - product ingredients; Szenté et al. (2011) - healthy nutrition; Papanagiotou et al. (2012) - certified product of origin and price; Czine et al. (2020) - price, product ingredients and proven product of origin. However, differences can also be discovered in Glitsch (2000) - color and aroma; Bryhni et al. (2002) - taste; Papanagiotou et al., (2012) - marbling of meat. Regarding the composition of the examined sample, we can see a rather divided picture in the case of research on similar topics in the domestic and international literature. While Verbeke - Viaene et al. (1999), Glitsch (2000), Bryhni et al. (2002), Guenther et al. (2005), Szenté et al. (2011), Papanagiotou et al. (2012), Kayser et al. (2013), Szigeti et al. (2015), Balogh et al. (2016), Escriba-Perez et al. (2017) and Czine et al. (2020) was not limited to a certain age group, whereas Shi et al. (2005) and Caine-Bish – Scheule (2009) targeted school-age youth in a similar way to me. The use of multivariable statistical methods

can be observed in similar research studies. Verbeke - Viaene (1999) factor analysis; Guenther et al. (2005) and Kayser et al. (2013) multivariable regression analysis; Caine-Bish - Scheule (2009) factor and variance analysis; Szente et al. (2011) and Szigeti et al. (2015) analysis of variance; Papanagiotou et al. (2012), Balogh et al. (2016) and Czine et al. (2020) used a preference evaluation procedure (the former using conjoint analysis and the latter using discrete choice experiment). My results that socio-demographic variables affect preferences are consistent with Caine-Bish - Scheule (2009), who described difference by gender and Bryhni et al. (2002) who found a difference by age and gender (although age did not appear to be a relevant factor in my research). Similarity can also be found with Shi et al. (2005), who by gender and place of residence; Guenther et al. (2005) who, by place of residence and education (for beef and pork consumption); Szente et al. (2011) who have residency and education; Papanagiotou et al. (2012) who have gender and education; Kayser et al. (2013) who age and income level; and Czine et al. (2020) who found differences between gender, age and income level.

Based on the results obtained from my studies, I can maintain my first hypothesis that there is a significant difference in consumer preferences for industrially kept pigs and mangalica pigs, among certain sociodemographic factors. Regarding my second hypothesis, according to which different factors can be distinguished on the basis of the criteria taken into account in the purchase of industrially kept pigs and mangalica pigs, I cannot draw a clear conclusion. The reason for this is that although I managed to delimit different factors in the case of industrially kept pigs, in the case of mangalica pigs the examined factors move together in the perception of consumers.

Within the limits of my research, it is definitely necessary to mention that my analyzed sample was not representative, so my conclusions are not suitable for generalization. In addition, as in previous research, consumer preferences for industrially kept pigs and mangalica pigs could be approached in a number of ways. Several additional sociodemographic and other factors can be included in the studies in order to identify additional variables that form the basis of segmentation.

ACKNOWLEDGMENTS

"This research was funded by National Research, Development, and Innovation Fund of Hungary grant number Project no. 130443."

REFERENCES

- Balogh, P., Békési, D., Gorton, M., Popp, J., Lengyel, P. (2016): Consumer willingness to pay for traditional food products. *Food Policy*, 61, 176-184. doi:10.1016/j.foodpol.2016.03.005
- Balogh, P., Szabó, P., Pocsai, K. (2013): Introduction of different mangalica breeds's prolificacy and rearing performances. *Research in Pig Breeding*, 7(2), 34-37.
- Bryhni, E. A., Byrne, D. V., Rødbotten, M., Claudi-Magnussen, C., Agerhem, H., Johansson, M., Lea, P., Martens, M. (2002): Consumer perceptions of pork in Denmark, Norway and Sweden. *Food Quality and Preference*, 13(5), 257-266. doi:10.1016/s0950-3293(02)00021-6
- Caine-Bish, N. L., Scheule, B. (2009): Gender Differences in Food Preferences of School-Aged Children and Adolescents. *Journal of School Health*, 79(11), 532-540. doi:10.1111/j.1746-1561.2009.00445.x
- Cordis, I., Mihaiu, M., Tabaran, A., Mihaiu, R., Dan, S. D., Reget, O., Cordea, D., Mureşan, C. (2015): Compositional Studies on Mangalitsa Meat Products for Public Consumption. *Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Veterinary Medicine*, 72(1), 57-61. doi:10.15835/buasvmcn-vm:10568
- Czine, P., Török, Á., Pető, K., Horváth, P., Balogh, P. (2020): The Impact of the Food Labeling and Other Factors on Consumer Preferences Using Discrete Choice Modeling—The Example of Traditional Pork Sausage. *Nutrients*, 12(6), 1768. doi:10.3390/nu12061768
- Csonka A. (2012): Strukturális folyamatok a vágósertés-piacon az EU-csatlakozás után. *Közép-Európai Közlemények*, 4(2), 115-122.
- Escriba-Perez, C., Baviera-Puig, A., Buitrago-Vera, J., Montero-Vicente, L. (2017): Consumer profile analysis for different types of meat in Spain. *Meat Science*, 129, 120-126. doi:10.1016/j.meatsci.2017.02.015
- Glitsch, K. (2000): Consumer perceptions of fresh meat quality: cross-national comparison. *British Food Journal*, 102(3), 177-194. doi:10.1108/00070700010332278

- Guenther, P. M., Jensen, H. H., Batres-Marquez, S. P., Chen, C.-F. (2005): Sociodemographic, Knowledge, and Attitudinal Factors Related to Meat Consumption in the United States. *Journal of the American Dietetic Association*, 105(8), 1266-1274. doi:10.1016/j.jada.2005.05.014
- Hadi, A. S., Kaufman, L., Rousseeuw, P. J. (1992). Finding Groups in Data: An Introduction to Cluster Analysis. *Technometrics*, 34(1), 111. doi:10.2307/1269576
- HNAMB (2020): <http://www.moe.org.hu/en/association/introduction/> (2021. január 14.)
- Kayser, M., Nitzko, S., Spiller, A. (2013): Analysis of differences in meat consumption patterns. *International Food and Agribusiness Management Review*, 16(2), 43-56.
- Kiefer, I., Rathmanner, T., Kunze, M. (2005): Eating and dieting differences in men and women. *The Journal of Men's Health & Gender*, 2(2), 194-201. doi:10.1016/j.jmhg.2005.04.010
- KSH (2021a): Szarvasmarha-, sertés-, ló- és juhállomány (1851–). https://www.ksh.hu/docs/hun/agrar/html/tab11_5_1_1.html?fbclid=IwAR2iYNTIzU1sT_0i9C06vm3g5CUsT0mZV-CqyhGDqgpMZwDZH9BLCK7tvqk (2021. január 5.)
- KSH (2021b): Baromfihúsmérleg (1970–). https://www.ksh.hu/docs/hun/xstadat/xstadat_hosszu/elm07.html (2021. január 5.)
- KSH (2021c): Sertéshúsmérleg (1970–). https://www.ksh.hu/docs/hun/xstadat/xstadat_hosszu/elm01.html (2021. január 1.)
- Malhotra, N. K. - Simon J. (2009): Marketingkutató. Akadémiai Kiadó, Budapest, 832 p. ISBN: 9789630586481
- McIntyre, R. M., Blashfield, R. K. (1980): A Nearest-Centroid Technique For Evaluating The Minimum-Variance Clustering Procedure. *Multivariate Behavioral Research*, 15(2), 225-238. doi:10.1207/s15327906mbr1502_7
- MM (2020): Mangalicatenyésztők Országos Egyesülete (MOE). <https://magyarmezogazdasag.hu/cimkek/mangalicatenyesztok-orszagos-egyesulete-moe> (2021. január 14.)
- Papanagiotou, P., Tzimitra-Kalogianni, I., Melfou, K. (2013): Consumers' expected quality and intention to purchase high quality pork meat. *Meat Science*, 93(3), 449-454. doi:10.1016/j.meatsci.2012.11.024
- Shi, Z., Lien, N., Kumar, B. N., Holmboe-Ottesen, G. (2005): Socio-demographic differences in food habits and preferences of school adolescents in Jiangsu Province, China. *European Journal of Clinical Nutrition*, 59(12), 1439-1448. doi:10.1038/sj.ejcn.1602259
- Simon J. (2006): A klaszterelemzés alkalmazási lehetőségei a marketingkutatóban. *Statisztikai Szemle*, 84 (7), 627-651.
- Szente, V., Popovics, A., Tóth, P., Szakály, Z. (2011): Miért egyedi és különleges a mangalica? *Élelmiszer, Táplálkozás és Marketing*, 8(1-2), 67-73.
- Szigeti, O., Szendrő, K., Böröndi-Fülöp, N. (2015): Mangalicatermékek fogyasztói szokásai - kvantitatív és kvalitatív kutatás eredményei. *Élelmiszer, Táplálkozás és Marketing*, 11(1-2), 39-44.
- Tóthné P. L. (2011): A kutatómódszertan matematikai alapjai. Eszterházy Károly Főiskola, Eger, 134 p.
- Tóth, P. (2012): A mangalica története. (In: Osvárt J. (szerk.): A mangalica - A világhírű magyar fajta története, a legjobb magyar séfek receptjeivel), Boook Kiadó, Budapest, 214 p.
- Varga B. - Szilágyi R. (2011): Kvantitatív információképzési technikák. Nemzeti Tankönyvkiadó, Budapest, ISBN: 9789631972498
- Verbeke, W., Viaene, J. (1999): Beliefs, attitude and behaviour towards fresh meat consumption in Belgium: empirical evidence from a consumer survey. *Food Quality and Preference*, 10(6), 437-445. doi:10.1016/s0950-3293(99)00031-2