PAPER

HOW SENSORY AND HEDONIC QUALITY ATTRIBUTES AFFECT FRESH RED MEAT CONSUMPTION DECISION OF TURKISH CONSUMERS?

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ABSTRACT

The aim of the study is to explore how the sensory and hedonic quality attributes of the fresh red meat affect its consumption preference and amounts of Turkish consumers. The data obtained from 385 households in Erzurum were used for *Principal Component (PCA)*, *K-means Cluster* and *Multiple Regression/Correlation (MRC) Analyses.* The results of the study highlighted considerably that the sensory quality attributes on their consumption preference had a much bigger effect than the hedonic ones for each cluster. However, its price and their income accepted as the important indicators of the hedonic ones, but a much lower impact on all clusters.

- Keywords: Fresh red meat consumption, Principal Component, K-Means Cluster and Multiple Regression Analyses, Sensory and hedonic quality attributes -

INTRODUCTION

In recent years, the increases of the red meat prices due to the contractions in the meat supply covering the production, processing and marketing of the meat and the meat products obliged the political units of the government to import live red meat materials, and thus they have provided stabilization at some levels for the meat supply and price (YAVUZ *et al.*, 2013). However, the origins of the meat sources among the consumers consuming the fresh red meat have been considered as an important decision factor. A few portion of them, therefore, exhibited the buying attitude and behaviors within a moderate consumption trend of those preferred the meat sources imported while the others formed the purchase models with a positive motivation in the red meat consumption preferences based on the national meat sources.

There was a string relationship between the origin of the red meat sources as an indicator of the consumers' purchase decisions and both the sensory quality including in its intrinsic quality attributes and the hedonic quality consisting of its extrinsic quality attributes (BERNUES *et al.*, 2003). The strong motivational effects of their individual, demographic, socioeconomic, psychological and health characteristics, on the other hand, are among the primary preference factors, as well (TOPCU, 2012).

Turkish consumers' purchase decisions based on the food safety and quality of the fresh red meat have changed considerably due to its confidential and sensory quality attributes affected directly by microbiological insecurity (dioxin effect, BSE and salmonella diseases) of foreign-origined red meat sources, and by the contamination risks with various pollutants (antibiotic and hormones) in the last years (TOPCU, 2015; TOPCU and UZUNDUMLU, 2012). They have also concerned about deterioration of their health conditions with the meat consumption of the imported animals being exposed to genetic manipulations, and then about inheriting to the future generations of the negative phenomenon (TOPCU, 2012).

In addition to imported live animal sources, presence of unhealthy fresh red meats penetrating to domestic markets uncontrollably and illegally, unknown origin, exposing to some additives at levels threatening human health, and the pollution, contamination and microbiological insecurity of the manufacturing meats in the livestock farms and meat processing facilities under unhygienic conditions have caused the consumers to exhibit more sensitive purchase attitude and behaviours by considering the sensory quality attributes (YAVUZ *et al.*, 2013).

On the other hand, not only digestive and coronary heart diseases caused by obesity based on the passive lifestyles revealed the communication and information age but also chronic illnesses resulting from nutrition with the intensive protein diets consisting of the red meats and the impacts of the life circle of the mature people have gradually reduced the consumers' red meat consumption tendencies, and thus nowadays their purchase decisions towards the red meats have been changing habitually (REALINI *et al.*, 2013; TOPCU, 2012).

The analyses of the customers reviews/assessments about the intrinsic quality attributes having a direct relationship between the sensory quality and confidential attributes (food quality measured by the chemical and microbiological tests) of the red meats such as the structural and visual characteristics (REALINI *et al.*, 2013; McCARTY *et al.*, 2003) are of a much more importance. On the other hand, they also focus on the extrinsic quality attributes correlating with the hedonic quality attributes such as the actual product image, the cost to customer, the origin of the meat source, disposable income (TROY and KERRY, 2010; BURNUES *et al.*, 2003; McCARTY *et al.*, 2003), and reflecting the consumers' individual characteristics and determining their purchase decisions about the fresh red meat. Therefore, eliminating the factors affecting negatively their consumption satisfaction and loyalty accepted at the focal point of the production, consumption and marketing activities, determining the main attributes accelerating the consumption trends of the homogenous target consumers masses, and then designing the marketing tactic and strategies for them could provide the important advantages in terms of the efficiency of the production resources and the maximization of the expected utilities on all market dynamics.

The diet meeting the main requirements of the people by providing the metabolic energy needed for biological organisms consists of the plant and animal foods, and thus they must be consumed to sustain a healthy and balanced life of the people at an adequate level (TOPCU and UZUNDUMLU, 2012). In particular, the animal-derived proteins such as the meat, milk, eggs, cheese being of a sufficient level for the essential amino acids are also suitable in terms of digestion. About 75-80% of high-quality animal-derived proteins are transformed into the body proteins. In contrast, plant-derived proteins classified as low-quality protein have an insufficient level of some essential amino acids, and it is benefited from only 40% of their proteins since their digestion is fairly difficult (TOPCU, 2012).

A person must consume 70 gr proteins per day for an adequate and balanced diet; therefore, it must be at least half of animal origin protein (SEKER *et al.*, 2011). The consumption amounts of the animal origin foodstuffs per capita are very low in Turkey, but that of the plant-derived foods is greater than that of the developed countries (KARKACIER, 2000). If people fed with cereal-based food products give more weight into

the animal origin ones in Turkey, and they gain the proper eating habits, it could be contributed significantly to the improvement of the life quality of the community.

Today, the consumption levels of the animal-origin products are considered as a development indicator of the countries, and thus as their socioeconomic structures improves, the consumption amount of the protein foods increases in contrast to reduce that of the carbohydrate foods (YAYLAK *et al.*, 2010). As a result of all this, the meat includes an important part of people's daily diets in USA, EU and other developed countries, and it meets 15%, 40% and 20% of the energy, protein and fat requirements per day, respectively, but its consumption fluctuates significantly in various regions of the world (DANIEL *et al.*, 2011). For example, while the annual meat consumption amounts per capita in 2011 were calculated as 142, 125, 82 and 80 kg in Austria, USA, Germany and UK, representing the leader countries in the meat production and consumption, respectively, it was only 12 kg in Turkey. According to the data obtained from the research area (Erzurum), on the other hand, the annual meat consumption amount per capita calculated as 17.8 kg in 2008, 12.5 and 11.5 kg in 2011 and 2012 were found (TOPCU and UZUNDUMLU, 2012).

The substitution of the imported red meats instead of the red meat derived from the animal husbandry based on a quality pastures and a wide variety flora having a significant impact on the red meat quality caused the consumers' preferences shift to other meat groups in the research area, and their red meat consumption trends decreased significantly by influencing negatively its sensory and hedonic quality attributes (TOPCU and UZUNDUMLU, 2012).

As stated above, the annual red meat consumption amount per capita in the research area and Turkey was about 5-8 times less than that in developed countries, but this difference continued to increase steadily, in the last five years. Especially, there has been an increasing trend towards the poultry meat consumption due to the dissatisfactions of not only the sensory quality attributes at the meat production, manufacture and retail levels based on the imported meat materials but also the hedonic quality attributes pointing the actual product images. However, it has been experienced the significant changes such as the region origin and the types of the red meat sources in the consumption preferences of the consumers obtained from the red meats about 58, 34 and 36% of the total meat consumption in the developed countries, Turkey and the research area, respectively (McAFEE *et al.*, 2010; LICHTENSTEIN *et al.*, 2006).

The red meat consumption amounts at much low levels in Turkey and the study area could result from not only the sensory and hedonic quality attributes of the fresh red meat but also the socioeconomic and individual attitudes of the consumers and the confidence to the manufacturer, marketer and retailers (REALINI *et al.*, 2013; TROY and KERRY, 2010; McCARTY *et al.*, 2003). However, the supply amount of the fresh red meat in the research area is higher than its demand amount due to its high sensory quality attributes resulting from the advantages of the organic cattle fattening farming based on the quality pastures and rich flora varieties under the agroecological and topographical properties at the high mountainous areas of the region (TOPCU and UZUNDUMLU, 2012). The consumers, therefore, considering the advantages of both the hedonic quality attributes reflecting the images of the core and actual products focused on the numerous factors of the marketing mix and higher sensory quality attributes have preferred and consumed intensively them. As a result, the consumers residing in the research region and migrating from the research area to the different regions of Turkey have not only maintained their demands for the red meats with the region of the origin to provide much higher main utility but also contributed to the regional/rural development through the improvement of the farmer families' life qualities.

On the other hand, the inefficient policies implemented to meet the fresh meat deficit without effect on the rural/regional developments and the sensory quality attributes affecting negatively the consumer satisfaction with the penetration of the imported red meat to domestic markets caused by the supply contraction of the red meat have led the consumers with dissatisfactions to reflect the different purchase decisions, in the last decade. All these individual responses of the consumers about the fresh red meat and their purchase decisions have emerged as the acceptable results of the relationships between the sensory and hedonic quality attributes.

This study, therefore, was designed to reach all the objectives mentioned above. In this scope, the main aims of the study are to determine how the sensory and hedonic quality attributes affect the fresh red meat consumption decisions of Turkish consumers; and then to construct the target homogenous consumer segments based on their consumption frequencies, and finally to analyze the effectiveness of the factors effecting on their consumption amounts.

MATERIAL AND METHODS

Material

The preliminary data used in this study were obtained from a survey consisting of Turkish consumers' attitude and behaviors with respect to the fresh red meat consumption de-

cisions conducted in Erzurum,[1] Turkey. In order to determine the sample size (selected statistically from the local household consumers through simple random sampling method) population minimizing sample bias and representing the main population correctly, the city center was divided into three districts covering Aziziye, Palandoken and Yakutiye districts with 6.562, 30.022 and 44.075 households at the west, south and north-east parts of Erzurum, respectively (ANONYMOUS, 2013).

METHODS

Method used in determination of the sample size

In order to calculate the sample size for each district, the following formula was used (TOPCU *et al.*, 2010).

$$n = \frac{Z^2 * p * (1 - p)}{c^2} = 385$$

Where, n = sample size, Z = z value (1.96 for 95% confidence level), p = percentage making a choice (0.5 used for sample size needed), c = confidence interval (used 0.05 = ±5). Then, based on the population of each district, the weighted sample size and distribution of the surveys for each district were determined proportionally. A total of 385 surveys were distributed with 52, 136 and 197 questionnaires allocated to the Aziziye, Palandoken and Yakutiye Districts, respectively.

Methods used in the preparation of the questionnaires

Participants of the survey were asked to respond to each statement indicating the significance level of the fresh red meat attributes for them. A liker-type scale was used (where 1 refers to the least important and 5 refer to the most important attribute). Table 1 reported that 35 attributes of the fresh red meat consisted of 17 sensory quality attributes and 18 hedonic quality ones (TOPCU, 2015; TOPCU and UZUNDUMLU, 2012). Of five numeric variables referring to the consumers' socioeconomic characteristics, on the other hand, two referred to their monthly fresh red meat consumption amount and purchase frequency and three included in their monthly income (₺), the price per kg of the fresh red meat (₺/kg), and the share of its expenditure within total food one.

Methods used in the statistics analyses

After editing and coding, the primary data were first used in *Principal Component Analysis (PCA)*[2] to determine the main factors related to the product attitudes influencing on the consumers' fresh red meat purchase patterns. *PCA* is a data reduction technique that reduces the number of variables used in an analysis by creating new variables (called factors) that combine redundancy in the data (SPSS 15.0, 2006). The first step in *PCA* is to determine the number of relevant factors. This was conducted by *PCA* using the varimax rotation method *(VRM)*[3]. *PCA* was used initially to identify underlying aspects explaining a correlation among a set of the food product attributes. The purpose of *PCA* was to identify those attributes accounting for a relatively large proportion of the variance in the sample.

In the second and final step of the statistical analyses, the main factors obtained from *PCA* were used for *k-means cluster and multiple regression/correlation MRC Analyses,* respectively. In the second step, according to the fresh red meat consumption frequencies, therefore, the target consumers were separated to three homogeneous clusters including in light users (2-3 times per month), medium users (2-3 times per 15 days) and heavy users (2-3 times per week) (TOPCU, 2012), and then the main factors were allocated to the homogeneous consumer clusters based on the meat consumption frequencies of the target consumers by *k-means cluster analysis.*

In the final step, *MRC analysis* was used for the measurements of the efficiency of the main factors and socioeconomic variables (independent variables) effecting on the consumers' meat consumption amounts (dependent variable). In the *MRC* model taken into consideration the variables related to the main factors obtained from the *PCA* and some socioeconomic characteristics of the consumers, therefore, it was tried to measure the relationships between monthly consumption amount of the fresh red meat per household as a dependent variable and the main factors including in their sensory and hedonic quality attributes as long with the consumers' socioeconomic characteristics called as the independent variables.

In order to test whether or not the normal distribution of the main factors' group scores de-

[1] Erzurum (39°45'N latitude and 41°15'E longitude) is located in the north-east region of Turkey and is on the Silk Road. Erzurum is one of the biggest provinces in the region with a total population 778.195, and the city centre population is 509.474.

[2] A factor extraction method used to form uncorrelated linear combinations of the observed variables. The first component has the maximum variance. Successive components explain progressively smaller portions of the variance and are all uncorrelated with each other. PCA is used to obtain the initial factor solution. It can be used when there is a single correlation matrix.

[3] This method is an orthogonal rotation method that minimizes the number of variables that have high loading on each factor. It simplifies the interpretation of the factors.

rived from *PCA* and socioeconomic variables collected from the consumers exhibited, was applied the various transformations techniques, and finally logarithmic transformation one providing the closest distribution to the normal was chosen. On the other hand, the parameter coefficients were estimated by using *ordinary least squares (OLS).* Individual and group significance of these coefficients were tested using *t* and *F* tests, respectively. In order to evaluate whether to be any econometrical problem among the variables, it was tested the overall multicollinarity and auto-correlation problems by considering *the variance-inflating factor (VIF)* and *Durbin-Watson d statistics*, respectively. Multicollinearity among variables was detected by calculating *(VIF)* (GUJARATI, 2005; SPSS 15.0, 2006).

MRC model could be written as following equation:

$$FMCONS = f(AROMA, MICSAF, CRERIS, VISQLY, IMAG, NUTVAL, COSCON, MESDUR, ORGLOC, FORORG, MEPRC, DISINC, e_i)$$

Dependent Variable

FMCONS:	*Monthly fresh red meat consumption amount (kg)*

Independent Variables

AROMA :	*Aroma of the fresh red meat (sensory quality attribute)*
MICSAF :	*Microbial safety (associated with sensory quality attributes)*
CRERIS :	*Chemical residue-related risk (associated with sensory quality attributes)*
VISQLY :	*Visible quality (sensory quality attribute)*
IMAG :	*Accual fresh meat image (hedonic quality attribute)*
NUTVAL :	*Nutritional value (associated with sensory quality attributes)*
COSCON:	*Cost to the consumer (hedonic quality attribute)*
MESDUR:	*Meat sources and its durability (associated with hedonic quality attribute)*
ORGLOC:	*Local-origined organic meat willingness (hedonic quality attribute)*
FORORG:	*Foreign-origined meat willingness (hedonic quality attribute)*
MEPRC :	*The price of the meat ($) (hedonic quality attribute)*
DISINC :	*The disposable income (hedonic quality attribute)*

All analyses were run in sequence with the SPSS 15.0 statistical software. These techniques were used widely to analyze the meat attributes playing the important roles on the consumers' consumption preference and amounts in marketing studies (TOPCU and UZUNDUMLU, 2012; KRYSTALLIS *et al.*, 2007; DIEZ *et al.*, 2006; OLIVER *et al.*, 2006; VERBEKE and VACKIER, 2004; BERNUES *et al.*, 2003).

RESULTS AND DISCUSSION

Results of PCA related to the sensory and hedonic quality attributes of fresh red meat

Kaiser Normalization (KMO) which compares partial correlation coefficients with observed ones including in the sensory and hedonic quality attributes effecting on the fresh red meat consumption preferences of the Turkish consumers was calculated as 0.85, and this means that the data set for the *PCA* was at a perfect level since the test score was greater than 0.5 (Table 1). On the other hand, the *chi-square value* calculated for *Bartlett's test of Sphericity statistics* of their main factors with respect to the consumers' meat consumption preferences was calculated as 5060.68 *(p: 0.000),* and thus *the unit matrix hypothesis* was rejected ($p<0.01$). The *PCA* using *varimax rotation method* grouped the thirty-seven variables related to the sensory and hedonic quality attributes for fresh red meat into the ten main factors with Eigen-values greater than 1, and the main factors explained the 71% of the total variance (Table 1).

As shown in Table 1, the results of the study showed that *aroma (F1)* and *visible quality (F4)* affecting the fresh red meat consumption preferences of Turkish consumers by explaining about 29.6 and 5.3% of total variance constituted directly the first and second sensory quality factors, respectively. By having an important impact on the quality attributes of *F1* and *F4;* moreover, *microbial safety (F2)* and *chemical residue-related risk (F3)* associated much closely with the sensory quality attributes of the fresh red meat were interpreted as the second and third sensory quality factors indicating about 7.5 and 7.1% of total variance. The same main factors for the sensory quality attributes based on the various similar variables taken into consideration by TOPCU and UZUNDUMLU (2012), KERGOAT *et al.* (2010), TROY and KERRY (2010), AASLYNG *et al.* (2007), KRYSTALLIS *et al.* (2007) were reported in their previous researches, as well.

On the other hand, the results of the present study indicated that *actual product image (F5); nutritional value (F6), cost to the consumer (F7) and meat sources and durability (F8) of the fresh meat; local-origined organic meat willingness (F9)*

Table 1 - The measurement results of *PCA* with regard to the sensory and hedonic quality attributes based on the fresh red meats consumption decisions of Turkish consumers.

Factos interpretions and the variables	Factor loadings*									
	F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**	**F10**
AROMA *(F1: AROMA)*										
Flavour	**0.841**	0.078	0.121	0.127	0.032	0.127	0.102	0.039	0.015	0.029
Succulence	**0.831**	0.076	0.061	0.138	0.047	0.076	0.014	-0.007	-0.035	-0.014
Smell/odour	**0.750**	0.083	0.115	0.083	0.205	0.051	0.026	0.165	-0.035	-0.038
Juiciness	**0.705**	-0.003	0.086	0.146	0.017	0.178	0.054	0.120	0.099	0.277
Visible fat	**0.530**	0.251	-0.021	0.070	-0.014	0.246	0.217	0.068	0.355	-0.333
MICROBIAL SAFETY *(F2: MICSAF)*										
Dioxin scare	0.079	**0.880**	0.192	0.088	0.103	0.071	0.037	0.008	0.112	-0.019
Salmonella disease	0.088	**0.875**	0.096	0.120	0.096	0.162	0.053	0.040	0.049	0.006
BSE	0.081	**0.802**	0.133	0.151	-0.004	0.130	0.119	0.050	0.044	0.011
Trustworthiness	0.090	**0.666**	0.073	0.119	0.209	0.262	0.163	0.122	-0.188	-0.242
CHEMICAL RESIDUE-RELATED RISK *(F3: CRERIS)*										
Meat manufacturing methods	0.139	0.161	**0.698**	0.090	0.178	0.108	0.087	0.086	0.059	-0.013
Antibiotic residues	0.128	0.352	**0.687**	0.022	0.220	0.172	0.010	0.064	-0.111	0.193
Hormone residues	0.017	0.449	**0.603**	0.153	0.092	0.148	0.065	0.156	-0.163	0.122
VISIBLE QUALITY *(F4: VISQLY)*										
Freshness of the meat	0.346	0.164	0.010	**0.789**	0.028	0.155	0.085	-0.038	0.032	0.039
Meat part obtained from the animal	0.038	-0.007	0.077	**0.772**	0.084	0.091	0.098	0.211	0.013	0.080
Natural structure of the meat	0.197	0.103	0.138	**0.762**	0.161	0.164	0.074	-0.015	0.064	0.065
The meat colour	0.104	0.234	0.093	**0.740**	0.149	0.121	0.119	0.154	0.001	-0.078
Tenderness	0.140	0.053	0.342	**0.527**	0.077	-0.012	0.210	0.231	0.237	0.244
ACCUAL FRESH MEAT IMAGE *(F5: IMAG)*										
Brand name	0.179	-0.020	0.239	0.113	**0.769**	-0.006	0.041	0.021	0.145	0.016
Package	0.029	0.142	0.012	0.130	**0.672**	0.133	0.306	0.274	-0.006	0.080
Advertisement	-0.066	0.002	0.141	0.181	**0.647**	0.055	0.152	0.251	0.398	-0.114
Free of additives/natural product	0.264	0.144	0.190	0.091	**0.627**	0.193	0.173	-0.044	-0.030	0.005
Labelling	0.134	0.134	0.156	0.068	**0.605**	0.151	0.474	0.131	-0.151	0.055
NUTRITIONAL VALUE *(F6: NUTVAL)*										
Brand name	0.112	0.111	0.200	0.216	0.153	**0.832**	0.000	0.091	0.070	0.072
Package	0.206	0.153	0.230	0.183	0.115	**0.820**	0.056	0.097	0.114	0.109
Advertisement	0.248	0.254	0.147	0.139	0.072	**0.764**	0.168	0.018	-0.064	0.021
Organic product	0.172	0.029	0.188	0.100	0.175	**0.754**	0.171	0.095	0.064	-0.044
COST TO THE *CONSUMERS (F7: COSCON)*										
Discounts in the meat prices	-0.019	0.136	0.220	0.158	0.143	-0.031	**0.707**	0.065	0.295	0.006
The initial price of the meat	0.120	0.114	0.040	0.069	0.253	0.098	**0.702**	-0.030	-0.103	-0.029
Outlets/sales points of the meat	0.187	-0.034	0.097	0.146	0.154	0.087	**0.693**	0.238	0.196	0.041
WILLINGNESS TO BUY MEAT SOURCES AND ITS DURABILITY *(F8: MESDUR)*										
Beef	0.180	0.068	0.144	0.212	0.002	0.064	0.113	**0.777**	0.030	-0.037
Sheep and goad meats	0.052	0.024	0.036	0.026	0.253	0.046	-0.017	**0.747**	0.221	0.049
The shelf life of the meats	0.330	0.050	0.245	0.063	0.105	0.104	0.327	**0.551**	-0.128	-0.024
LOCAL-ORIGINED ORGANIC MEAT *(F9: ORGLOC)*										
Willingness to buy local-orig. meat	0.301	-0.055	0.159	0.124	0.094	0.309	0.020	-0.007	**0.593**	0.127
Willingness to buy organic meat	0.068	0.192	0.076	0.222	0.136	0.239	0.137	0.235	**0.582**	0.130
WILLINGNESS TO BUY FOREIGN-ORIGINED MEAT *(F10: FORORG)*										
Willingness to buy foreign-orig. meat	-0.055	0.145	-0.019	0.029	0.107	0.063	0.118	0.113	0.062	**0.803**
Eiqen-values	*10.655*	*2.689*	*2.554*	*1.914*	*1.545*	*1.452*	*1.233*	*1.173*	*1.119*	*1.034*
Share of explained variance (%)	***29.598***	***7.468***	***7.095***	***5.318***	***4.292***	***4.033***	***3.426***	***3.263***	***3.109***	***2.872***
Cumulative share of that (%)	***29.598***	***37.066***	***44.160***	***49.478***	***53.763***	***57.803***	***61.229***	***64.492***	***67.600***	***70.472***
KMO (Kaiser-Meyer-Olkin) statistic	***0.848***									
Bartlett's test of Sphericity										
										[Chi - square (^{2}, *df*:630):5060.68](p:0.000)

* Bold numbers indicated the largest loading for each variable.

and foreign-origined meat willingness (F10) constructing the hedonic quality attributes of the fresh red meat consisted of about 4.3, 4.0, 3.4, 3.3, 3.1 and 2.9% of total variance, respectively (Table 1). When the obtained main factors related to the hedonic quality attributes in the present study were compared with the others presented by the results of the previous researches; while the *F5, F6 and F7* factors with respect to the hedonic quality were supported directly with the results of the studies conducted by FURNOLS *et al.* (2011), KRYSTALLIS *et al.* (2007), AUDEBERT *et al.* (2006), BERNUES *et al.* (2003) and VERBEKE and VACKIER (2004), the *F8, F9 and F10* factors focused on the attributes of the hedonic quality were of the strong relationships with the results of those presented by FURNOLS *et al.* (2011), NAPOLITANO *et al.* (2010), BERNUES *et al.* (2003), McCARTY *et al.* (2003).

As a result of all these, the sensory quality attributes explaining about 70% of the main factors effecting on the fresh red meat consumption preferences of Turkish consumers were of a much bigger influence than the hedonic quality ones.

Results of cluster analysis related to the sensory and hedonic quality attributes of fresh red meat

The sensory and hedonic quality attributes derived from the *PCA* and effecting on the fresh red meat purchasing patterns of Turkish consumers were separated into three homogeneous consumers segments through *k-means cluster* according to their red meat purchasing frequencies including the light, medium and heavy users. The main factors reflecting Turkish consumers' attitude and behaviors impacting on each homogeneous consumers segment were given in Table 2.

The results of the study showed that *the heavy users of the fresh red meat (C1)* preferred its consumption according to *the aroma and visible quality* being the main components of the sensory quality by taking into consideration *the local-origined organic meat willingness* accepted as an indicator of the hedonic quality attributes. Therefore, the homogeneous consumers in the *C1* determined their purchase attitude and behaviors by considering the sensory quality attributes of the red meat delivered from the animal materials fattened under the advantages of the superior agroecological characteristics of the study area. The fresh red meat presentations positioned at the retailer shelves by highlighting their core benefits, and causing no changes on the sensory quality attributes of them with the designation of the local-origined meat under the generic brands for the consumers in *C1* could have an important impact on their purchase patterns.

The results of the study also indicated that *the medium users of the fresh red meat (C2)* focused on the purchase patterns constructed by a combination of the factors affecting the sensory quality including in *the microbial safety* and *chemical residue-related risk* associated with willingness to obtain the salutary meats minimizing the negative effects on human healthy at the feeding and nourishment levels of the livestocks and the manufacture levels of the red meats. They, moreover, paid a major attention to the hedonic quality related to *the nutritional value* and *the cost of the ownership* minimizing their expenditures by being provided easily and

Table 2 - Final cluster centres and the number of cases in each cluster.

Main factors	Clusters*		
	Heavy users (C1)**	Medium users (C2)**	Light users (C3)**
AROMA (F1)	**0.465**	-0.122	-0.127
MICSAF (F2)	-0.751	**0.423**	-0.174
CRERIS (F3)	-0.641	**0.342**	0.073
VISQLY (F4)	**0.156**	-0.241	0.076
IMAG (F5)	-0.263	-0.034	**0.333**
NUTVAL (F6)	-0.955	**0.328**	**0.215**
COSCON (F7)	-0.042	**0.079**	-0.009
MESDUR (F8)	0.117	-0.890	**0.473**
ORGLOC (F9)	**0.330**	-0.423	0.108
FORORG (F10)	-0.078	-0.320	**0.222**
Disposable income *(DISINC)*	**3.570**	**3.280**	**2.980**
The prices of the meats *(MEPRC)*	**1.340**	**1.330**	**1.330**
Number of total cases in each cluster ***	81	193	111
% of total cases in each cluster	21%	50%	29%

* Bold numbers indicate the largest final cluster centre scores for each factor.

** According to F statistics, the final cluster center scors were found very importance ($p<0.01$).

*** The total number of the cases (n): 385.

comfortably to the consumer of *C2*. The implementations of differentiated actual product strategies based on the price discriminations under own brands of the manufacturers of the red meat with food safety that there was no negative impact on their health, therefore, could also affect positively their purchasing motivation by emphasizing the core benefits of the red meat for *C2*.

The results of the study, furthermore, explained that *the light users of the fresh red meat (C3)* tended to buy the fresh red meat with the hedonic quality attributes positioned to the focus point of the purchase attitude psychology alienated under *the actual fresh meat image* with *the foreign-origined meat willingness*, *its resources and durability*. They, thus, preferred the national or global brands exhibiting the actual fresh red meat image by turning to durable foreign-origined meat sources with long shelf life. It could be implemented the marketing tactic and strategies focused on the designs of the actual fresh red meat image under the name of the national and global brands for the consumers in *C3*.

Results of MRC analysis related to the sensory and hedonic quality attributes of fresh red meat

The results of the statistical tests in Table 3 reported that the *VIF* values with 1.06 and 2.47 indicating the scores between 1.00 and 2.50 determining the acceptable reference range and 1.85 *Durbin-Watson d statistics* positioned between d_u (1.96) and $4\text{-}d_u$ (1.68) referred that there were no the econometrics problems for *multicollinarity* and *auto-correlation* in the *MRC* model (GUJARATI, 2005; KALAYCI, 2005). According to the results diagnosing the econometrics problems, the data sets could be used directly for the *MRC* model.

The determination statistics, *OLS* estimates of the parameter coefficients and other statistic measurements such as *F* and *t*, collinearity and correlation matrix scores were given in Table 3. The results of the *MRC* analysis indicated that the determination coefficient *(R^2)* and adjusted *(adj.) R^2* was calculated as 0.51 and 0.50 in the *MRC* model, and thus all the independent variables explained the least 50% of the dependent variable. Rejecting the null hypothesis, furthermore, referring that there was no the relationships between the dependent variable and all the independent variables by making the parameter coefficients of them equal to zero, *F-statistic* was calculated as 6898 *(p:0.000)*. On the other hand, the partial regression coefficients of all the independent variables taking into consideration *t-statistics*, except for those that of *the microbial safety* (*MICSAF*), *the cost to the consumers* (*COSCON*), *the meat sources and its durability (MESDUR)* and *the foreign-origined meat willingness (FORORG)*, were statistically found to be meaningful ($t_{c(df;12;0.01/0.05)}$); and then the signs of their coefficients including in *the chemical residue-related safety (CRERIS)* and *the price of the meats (MEPRC)* with negative and the others with positive ones at the levels *(p:0.01* and *0.05*) were also found consistent with the economic theories.

The results of the *MRC* analysis also highlighted that *the visible quality* (*VISQLY*), *the aroma (AROMA)*, *the nutritional value (NUTVAL)*, *the accual fresh meat image (IMAG)*, *MEPRC*, *the local-origined organic meat willingness (ORGLOC)*, *CRERIS*, *the disposable income (DISINC)* were of very important impacts on the fresh red meat

Table 3 - The measurement results of the *MRC* analysis and some statistic tests.

n: 385	R^2: 0.51			Adj.R^2: 0.50		$F_{c(12;361)}$: 6.898*		DW d_c: 1.85	
Variables	**MRC model**			**Collinearity statistics**			**Correlations**		
	β:Coefficients[a]	**Std. error**	**t_c-value**	**p-value**	**Tolerance**	**VIF**	**Zero-order**	**Partial**	**Part**
Constant	1.478	0.563	2.623	0.009*	-	-	-	-	-
LOGAROMA	0.484	0.189	2.556	0.011*	0.374	2.472	0.027	0.133	0.121
LOGMICSAF	0.023	0.093	0.244	0.807	0.550	1.818	0.037	0.013	0.012
LOGCRERIS	-0.161	0.086	-1.868	0.053**	0.559	1.788	0.102	-0.098	-0.088
LOGVISQLY	0.553	0.194	2.844	0.005*	0.487	2.483	0.093	0.148	0.135
LOGIMAJ	0.245	0.086	2.845	0.005*	0.461	2.167	0.115	0.148	0.135
LOGNUTVAL	0.370	0.136	2.716	0.007*	0.413	2.418	0.035	0.142	0.129
LOGCOSCON	-0.107	0.084	-1.277	0.202	0.603	1.658	0.016	-0.067	-0.060
LOGMESDUR	0.008	0.081	0.095	0.924	0.682	1.465	0.022	0.005	0.005
LOGORGLOC	0.210	0.109	1.920	0.056**	0.428	2.338	0.078	0.101	0.091
LOGFORORG	0.004	0.026	0.156	0.876	0.778	1.285	-0.019	0.008	0.007
LOGMEPRC	-0.240	0.091	-2.633	0.009*	0.947	1.056	-0.140	-0.137	-0.125
LOGDISINC	0.106	0.072	3.791	0.001*	0.886	1.129	0.133	0.078	0.070

[a] The coefficients consisted of the standardized coefficients.
* (p<0.01) **(p<0.05).

consumption amounts of Turkish consumers ($p<0.01$ and 0.05). In relation to the profiles of the cluster segments based on the underlying dimensions of the sensory and hedonic quality attributes emerged from *PCA*, the satisfaction of *VISQLY* and *AROMA* identifying the sensory quality attributes of the fresh red meat supported by *ORGLOC* of Turkish consumers in *C1* increased considerably very high effects on their meat consumption amounts with 0.55 ($p<0.01$), 0.48 ($p<0.01$) and 0.21 ($p<0.01$) rates, respectively.

When considered the credence quality characteristics assigned to the sensory quality attributes affecting the fresh red meat consumption amounts of Turkish consumers in *C2*, there was an adverse relationship between *CRERIS* (β: -0.16 $p<0.05$) and its consumption amounts, but not *NUTVAL* (β: 0.37 $p<0.01$). As minimized its *CRERIS,* and improved its *NUTVAL,* therefore, it could be increased those at a lower level than all the others. *IMAG* (β: 0.24 $p<0.01$) standing for the hedonic quality attributes and *NUTVAL* (β: 0.37 $p<0.01$) symbozing the sensory ones, on the other hand, had a moderate impact on those of them in *C3.* Overall, the average agreement of all the cluster members in relation to *the price of the meat (MEPRC)* exhibiting an adverse relation with its consumption amounts occurred at a moderate level (β: -0.24 $p<0.01$), but *the disposable income (DISINC)* having a linear relation with those substantiated at lower levels (β: 0.11 $p<0.01$) than the others.

The results of the present study confirmed briefly that the sensory quality attributes, especially *VISQLY, AROMA, NUTVAL*, on the fresh red meat consumption amounts had a much higher impact than the hedonic quality attributes such as *IMAG, MEPRC, DISINC*. In particular, the results emphasized that the pleasure of Turkish consumers provided from its consumption were under not only the effects of the numerous post-purchasing criterion (aroma, nutritional value, microbial safety, etc.) but also the impacts of the various pre-purchasing processes based on the visual quality cues (colour, freshness, natural structure, specific animal parts and meat outlets, etc.) impacting on their purchase decisions.

The results of the present study with regard to the sensory and hedonic quality attributes of the fresh red meat are in line with the results of the previous studies reported that the consumers paid particular much more attention to the sensory quality attributes of the red meat inspected visually in a pre-purchasing process (colour, freshness, natural structure, fat content, specific animal parts and meat outlets) (REALINI *et al.*, 2013; TROY and KERRY, 2010; AASLYNG *et al.*, 2007; VERBEKE and VACKIER, 2004), and then to its credence attributes perceived such as nutritional value (vitamin and protein content), microbial freeness (salmonella, dioxins, BSE) (KRYSTALLIS *et al.*, 2007; VERBEKE and VACKIER, 2004) and chemical freeness (hormones, antibiotics) (KRYSTALLIS *et al.*, 2007; VERBEKE and VACKIER, 2004) rather than the hedonic ones (meat image, price, income, country of origin) (FURNOLS *et al.*, 2011; NAPOLITANO *et al.*, 2010; KRYSTALLIS *et al.*, 2007; AUDEBERT *et al.*, 2006; OLIVER *et al.*, 2006; VERBEKE and VACKIER, 2004; BERNUES *et al.*, 2003).

CONCLUSIONS

The results of the study confirmed clearly that *the heavy users* in *C1* attributed a much more importance to the sensory quality attributes based on willingness to buy the local-origined organic meat endorsing the aroma as an indicator of the post-purchasing satisfaction followed by the fresh red meat consumption and the visual quality considered in the pre-purchasing process of it than the others. On the other hand, *the medium and light users* in *C2* and *C3* paid also a more attention to the sensory quality attributes including in the credence attributes such as the microbial and chemical freeness and the nutritional value of it than the members of *C1* as considered the efficiency scores of the sensory and hedonic quality attribute variables effecting on its consumption amounts of Turkish consumers in *MRC* model.

Consequently, the sensory quality attributes had a much bigger impact on its consumption decision and amounts of Turkish consumers than the hedonic quality attributes in the overall agreements with regard to the importance of all the factors. Therefore, the fresh red meat consumption amount in Turkey maintaining at a very low level of the annual fresh red meat consumption amount per capita (about 12 kg) when compared with the leading countries in the meat consumption could be increased meaningfully by the innovative red meat and meat products designed through the product and price differentiations under the production, manufacturing and marketing tactic and strategies taking into account first its core benefit based on the sensory quality attributes such as the visible quality, aroma and credence attribute, and then its actual benefit focused on the hedonic quality attributes (the country of the origin, its actual image and price and their disposable income) for each clusters.

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