

RESEARCH ARTICLE

Determination of the factors affecting red meat consumption in Türkiye with the two-stage Heckman model

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ABSTRACT

Red meat consumption in the world is in a rapid upward trend and has reached a level that involves many sectors. Studies on red meat consumption have become a guide not only for policies for the red meat sector, but also for health and environmental practices. With its population size, structure and economy among emerging economies, Türkiye has an important place in red meat consumption. In the present study, red meat consumption in Türkiye and the factors affecting the amount of consumption were examined with the two-stage Heckman Model. According to the findings obtained, red meat consumption in Türkiye is mainly beef and lamb. It was found that factors such as income, religious belief, regionality, education and household size affect the amount of consumption. An important finding of the study was that only 29.1% of consumers had enough red meat consumption that meets the criteria for a balanced diet. This rate is a proof that people living in the country should reconsider their policies in terms of access to adequate and balanced food. On the other hand, the per capita consumption of red meat determined for Turkey in the study was found to be considerably higher than the official figures. This difference between the values can be reduced by improving the control system for keeping records in enterprises and by making adjustments in the calculation criteria.

Keywords: Consumer preferences; Beef; Lamb; Two-stage Heckman model

INTRODUCTION

Over the past two decades, the demand for red meat has increased by approximately 78%. The considerable increase in red meat consumption is directly related to world population growth, but the amount consumed per person varies depending on many factors within the dynamics of the countries themselves. They could be listed as individual factors such as socio-demographic characteristics, preferences, income levels, beliefs, eating habits of consumers as well as the characteristics of the region they live in such as changes in population structure, price formations, climatic conditions, geographical features (Gossard and York, 2003; Escriba-Perez et al., 2017; Milford et al., 2019).

While 59.4% of the red meat consumption in the world is met by pork, the remaining part is mostly beef and lamb. The type of red meat consumed is closely related

to regionality. While beef consumption is preferred more in North American countries, pork consumption is more common than other red meats in European countries. Lamb is mainly consumed in the Near East and North African countries due to their traditions (OECD/FAO, 2020). The main reason for this regional difference can be explained by the changes in the socio-economic, cultural and religious structure of societies. Today, consumption and diversity of red meat are not only limited to the dynamics of the countries themselves, but also have moved to a global status concerning the whole world as a result of globalization. On the one hand, food security is given importance with the trade and price policies developed to ensure the supply-demand balance in global markets. On the other hand, it is observed that international initiatives that draw attention to the increase in emissions due to the increase in red meat consumption, health risks and loss of animal welfare are emphasized. This indicates from another point of view that red meat

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consumption cannot be evaluated only within the borders of the country.

In the past years, red meat consumption was considered as a measure of development in many countries' economies (Henchion et al., 2014; Sans and Combris, 2015; Milford et al., 2019). The fact that the annual per capita red meat consumption by the OECD-FAO (2020) is 39.0 kg in developed countries, 15.84 kg in developing countries and 6.93 kg in underdeveloped countries shows that this strong belief continues today. However, this rapid increase in demand for red meat in recent years has also been considered as a threat to environmental sustainability, food safety and human health (Ranabhat et al., 2013; Petrovic et al., 2015). In this context, although it is important for individuals to include red meat, which is rich in both protein quality and quantity, in their diets, the necessity of optimal consumption within the framework of balanced and adequate nutrition should not be ignored. Therefore, as a measure of well-being, the sufficiency, not the amount, of consumed red meat should be taken into consideration. This fact indicates that studies on red meat consumption contribute not only to the economy but also to many other areas.

Countries such as Türkiye, with a high and young population and with emerging economies, play a decisive role globally on the red meat and associated sectors. For this reason, especially in terms of the global economic market, micro-studies aimed at determining the red meat consumption structure at the national level are important. The aim of the present study was to determine the red meat, mainly beef and lamb, consumption characteristics and related factors in Türkiye. There are many studies on the literature on red meat consumption in the world (Schmid et al., 2017; Phuong et al., 2014; Filippini and Srinivasan, 2019; Merlino et al., 2018). In Türkiye, on the other hand, the studies generally reflect regional characteristics, not the country in general (Yildirim and Ceylan, 2007; Lorcu and Bolat, 2012; Kibar et al., 2019). This study was prepared using primary data reflecting the general population of Türkiye. Therefore, it is more comprehensive than the previous studies and offers more consistent results. In addition, the differences in the red meat consumption characteristics in the country were evaluated in terms of regions, which further increase the importance of the study.

It is thought that the results of the study could contribute to the development of macro and micro scale country policies on the basis of adequate and balanced nutrition as well as shed light on medium and long-term planning on a global scale. In addition, the study is considered important in terms of providing the opportunity to compare economies with similar structures, and could guide the future studies on the subject in the coming years.

MATERIALS AND METHODS

Study area and sample selection

The main material of this study, which was carried out in 17 provinces in Türkiye, consisted of the questionnaire data obtained through face-to-face interviews in an eight-month period from February to October 2019. Regional statistics of various dimensions are needed to develop regional policies on economic and social problems. Accordingly, NUTS Level 1 (Statistical Classification of Regional Units Level 1) was taken into consideration in the selection of the regions and provinces to conduct the surveys. Surveys were conducted with household heads. The selected consumer profile was considered as the person responsible for home shopping and purchasing meat or meat-based products. In this study, simple random sampling method was employed to determine the sample volume that would best represent Türkiye.

Accordingly, based on the assumption of 20 million households calculated using total population and average household size of Türkiye, the sample volume was determined as 2,656 using the Equation 1, and was distributed proportionally by taking into account the populations of the selected provinces in Table 1 (Cicek and Erkan, 1996).

$$n = N * (q * p) / ((N - 1) * D^2) * (q * p) \quad (1)$$

Where n is the sample volume, N is total number of households (20 million), q and p probabilities (0.50 and 0.50), D is d/t, t is confidence interval (99%), and d is deviation from the mean (2.5%).

Econometric model

As in many products in Türkiye, there are price differences in red meat on a monthly and regional basis due to reasons such as inflation and supply-demand balance. Considering the eight-month data collection process of the study, it was not thought appropriate to make a demand forecast in this study assuming that the obtained price and expenditure data would not give rational results. In many studies on consumption, a two-stage analytical approach is preferred (Rabbi et al., 2019). The main reason for the adoption of such methods is that the consumption of red meat involves a two-way decision; the decision to consume and the amount to be consumed. A problem frequently encountered in consumption research is that the amount of consumption cannot be observed for those who do not consume the product. Determining the amount of consumption according to the characteristics of only those who consume the product causes bias and inconsistency in the results obtained (Heckman 1979;

Keogh et al., 2019). Therefore, the two-stage Heckman Model, which takes into account the problem of zero observation in the data analysis, developed by Heckman (1979) was used in the present study. In the first phase of the two-stage Heckman model, a probit regression was calculated using Equation 2 to predict the likelihood that people in households would consume red meat. This regression is used to estimate the inverse Mills ratio (IMR; λ), which is used as a tool in the second regression (Equation 3). According to Greene (2003), the term IMR corrects the problem of selection bias. If the term (λ_i) is statistically significant, there is a problem of selection bias in the sampling and it should be included in the Heckman model in the second stage (Heckman, 1979). In the second stage, Heckman model was estimated (Equation 4) using IMR.

$$Z_i^* = \omega_i \gamma + u_i \text{ and } z_i = 1 \text{ if } z_i^* > 0 ; z_i = 0 \text{ if } z_i^* \leq 0 \quad (2)$$

$$\lambda_i = \varphi(a_i + \omega_i \gamma) / \Phi(a_i + \omega_i \gamma) \quad (3)$$

$$Y_i = X_i \beta + \gamma \lambda_i + \varepsilon_i \text{ if } z_i^* > 0 \quad (4)$$

In Equation 2, $Z_i = 1$ if a household consume red meat and $Z_i = 0$ otherwise, ω_i is vector of explanatory variables, γ is vector of the coefficient estimates and is error term. In Equation 3, φ is the standard normal density function and Φ is standard distribution function, while in Equation 4, Y_i is meat consumption amount, X_i is the vector of the explanatory variables and is the error term.

In order to explain the amount of consumption, the socio-economic and cultural structure of the households and the attitudes and behaviors of the head of households towards red meat were taken into account and detailed in Table 2. For the sake of ease of comparison and to determine the significant differences among the groups, the variables in the study were used in categorical form.

RESULTS AND DISCUSSIONS

Red meat consumption of households was in the form of beef and lamb. In surveying the amount of beef or lamb consumed by households, determining only the amount of consumption in households consuming meat can lead to the problem of bias and inconsistency in the results. Therefore, in the first stage of this research, the probability of households consuming red meat was examined according to the factors in Table 3 as beef and lamb would be separate.

No significant relationship was found between the education level of the head of household and the likelihood of consuming red meat in households. When the results are examined, it could be stated that the probability of consuming beef may increase by 0.10 times in EDU3 (education level of high school and above) compared to in EDU1 (education level of below high school). On the other hand, when evaluated in terms of household size, the probability of consuming beef and lamb gives different results. As the household size decreases, the probability of consuming beef decreases, while the opposite is the case for lamb.

As in many countries, beliefs can be effective in red meat consumption in Türkiye. During the Muslim feast of sacrifice (Eid Al-Adha), sheep and cows are slaughtered in many households. Some part of the meat is handed out to the poor, relatives and neighbors while some part is reserved for the consumption by the household itself. This situation affects the red meat consumption status of the households. Previous studies indicated that as expected the practice of sacrifice has a positive effect on the possibility of consuming beef and lamb in households. Compared to households that do not practice sacrifice, the probability of consuming lamb increases by 0.22 times and the probability of consuming beef by 0.04 times in households that do not practice sacrifice. This significant difference between the

Table 1: Distribution of sample size by region

NUTS LEVEL 1 Regions	2017 population	Ratio in Türkiye Population (%)	Number of questionnaires conducted	Surveyed provinces
Istanbul	15 029 231	18.6	494	İstanbul
West Marmara	3 503 809	4.3	114	Balıkesir
Aegean	10 383 963	12.9	342	İzmir (200), Uşak (142)
West Marmara	7 824 597	9.7	258	Eskisehir (158), Düzce (100)
West Anatolia	7 871 847	9.7	258	Ankara (158), Karaman (100)
Mediterranean	10 303 984	12.6	334	Adana (200), Isparta (134)
Central Anatolia	3 997 447	5.0	133	Kayseri
West Black Sea	4 574 182	5.7	151	Samsun
East Black Sea	2 633 417	3.3	88	Trabzon
Northeast Anatolia	2 188 214	2.7	72	Erzurum
Central East Anatolia	3 854 869	4.8	128	Malatya
Southeast Anatolia	8 665 165	10.7	284	Gaziantep (150), Mardin (134)

coefficients is due to the fact that the slaughtering of cattle is carried out by the combination of multiple households.

Another factor that is effective on red meat consumption is regionality. The place where societies live and their

consumption habits are largely parallel. Türkiye has a different structure in many respects from East to West and from South to North. This situation is also evident in consumption habits. The findings clearly reveal this fact.

Table 2: Study variables and their descriptive statistics

Variable	Description	Mean	Std. dev.
Dependent variable			
dy ₁	1 if consuming beef, 0 if not	0.88	0.33
dy ₂	1 if consuming lamb, 0 if not	0.70	0.46
y ₁	Beef consumption (per capita/year)	16.03	13.18
y ₂	Lamb consumption (per capita/year)	8.71	10.22
Independent variable			
Household income		5489.59	5731.76
INC1*	1 if household monthly income ≤3000 TL, if not 0	2342.51	542.92
INC2	1 if household monthly income 3001TL-5999TL, if not 0	4355.47	616.45
INC3	1 if household monthly income ≥6000TL, if not 0	9937.41	8285.97
Education level			
EDU1*	1 if education level of household head<high school 1, if not 0	0.37	0.48
EDU2	1 if education level of household head=high school 1, if not 0	0.28	0.45
EDU3	1 if education level of household head>high school 1, if not 0	0.36	0.48
Out-of-home consumption	1 if household members consume red meet outside home, if not 0	0.56	0.49
Household size		3.49	1.37
HSIZE1*	1 if household size ≥4, if not 0	0.49	0.50
HSIZE2	1 if household size=1, if not 0	0.05	0.23
HSIZE3	1 if household size=2-3, if not 0	0.46	0.49
Muslim sacrifice feast	1 if household practice sacrifice, if not 0	0.77	0.42
Region			
REGION1*	1 if household live in East and Southeast Anatolia, if not 0	0.18	0.39
REGION2	1 if household live in West, if not 0	0.36	0.48
REGION3	1 if household live in Western and Central Anatolia, if not 0	0.21	0.41
REGION4	1 if household live in South, if not 0	0.13	0.33
REGION5	1 if household live in North, if not 0	0.13	0.33
PC	1 if the price of red meat matters for household head, if not 0	0.34	0.48
PP	1 if read meat is purchased from butcher, if not 0	0.20	0.40
NCI	1 if there is individual in household who do not consume red meat, if not 0	0.13	0.34
FS	1 if red meat consumption is considered insufficient, if not 0	0.43	0.49

* represents the reference variable.

Table 3: First stage probit result

	Beef			Lamb		
	Coef (S.E)	z	dy/dx	Coef (S.E)	z	dy/dx
Education level (EDU1)						
EDU2	0.12 (0.08)	1.50	0.02	-0.08 (0.07)	-1.11	-0.02
EDU3	0.59 (0.09)	6.76***	0.10	-0.04 (0.07)	-0.63	-0.01
Household size (HSIZE1)						
HSIZE2	-0.32 (0.15)	-2.06***	-0.06	0.43 (0.13)	3.16***	0.13
HSIZE3	-0.31 (0.07)	-4.42***	-0.06	0.15 (0.06)	2.67***	0.05
Practicing sacrifice-SC	0.25 (0.08)	3.21***	0.04	0.73 (0.06)	11.44***	0.22
Region (REGION1)						
REGION2	0.72 (0.09)	8.35***	0.13	-0.05 (0.08)	-0.64	-0.02
REGION3	0.85 (0.10)	8.20***	0.15	-0.41 (0.09)	-4.88***	-0.12
REGION4	0.18 (0.11)	1.66*	0.03	0.21 (0.11)	2.04**	0.06
REGION5	2.03 (0.28)	7.34***	0.36	1.07 (0.13)	8.40***	0.32
Constant	0.39 (0.10)	3.97***		-0.26 (0.09)	-2.84***	

***, ** and * 1, 5 and 10%, respectively

^bVariable in parenthesis is the reference variable.

As a matter of fact, compared to the East of the country, the probability of consuming beef increased by 0.13 times in Western and Central Anatolia and 1.15 times in Northern and Southern regions, respectively. In the case of lamb, this situation varies. Compared to the East of the country, households in the Western and Central Anatolia Region are less likely to consume lamb (0.12), while households in the Southern and Northern regions are more likely to consume more lamb.

Table 4 shows the results of the second stage of Heckman's model. The IMR value was significant and negative. This means that the error terms of both the selection equation and the result equation are negatively correlated. The significant IMR value indicated the bias of sample selection and confirmed the necessity for using Heckman's two-stage model. In this study, the associations of red meat consumption amount per capita in households with household income, education level of the head of household, household size, geographical location, religious beliefs, meat consumption level considered sufficient, out-of-home consumption habit and caring for the price of meat were examined (Table 4).

According to the findings obtained, household income, which is the primary economic factor in the amount of beef and lamb consumption per capita, had a positive

effect on meat consumption. This finding could indicate that the amount of beef and lamb consumption per capita may increase in middle- (INC2) and high-income (INC3) households compared to low-income ones (INC1). This can be explained by the fact that households in the low-income group allocate more of their expenditures to essential goods and consume less of the relatively expensive foods such as red meat less (Rask and Rask, 2011). The linear relationship between red meat consumption and income, especially in developing countries, which is widely accepted in the literature (Stoll-Kleemann and O'Riordan, 2015; Zhang et al, 2018), is consistent with the results of the present study. In addition, similar results were reported for Türkiye (Sengul and Tuncer 2005; Lorcu and Bolat, 2012; Aydogdu and Kucuk, 2018).

It is thought that with the increase in the level of education, the awareness level of consumers on food and health issues increases (Wang et al., 2004; Islam et al., 2018). This situation leads to different ways of discussing the relationship between education level and meat consumption in the literature. On one hand, it is emphasized that red meat consumption will decrease as the level of education increases due to reasons such as healthier food preferences and reaching a sufficient level in meat consumption (Gossard and York, 2003; Assis et al., 2015) while, on the other, positive relationships were reported

Table 4: Second stage OLS results

	Beef		Lamb	
	Coef. (S.E)	z	Coef. (S.E)	z
Household income (INC1)				
INC2	2.65[0.57]	4.64***	3.07[0.52]	5.90***
INC3	6.62[0.64]	10.40***	6.03[0.59]	10.20***
Education level (EDU1)				
EDU2	1.39[0.63]	2.21**	0.03[0.55]	0.05
EDU3	0.50[0.99]	0.51	-0.54[0.56]	-0.97
Household size (HSIZE1)				
HSIZE2	14.73[1.17]	12.62***	17.35[1.14]	15.24***
HSIZE3	6.03[0.66]	9.19***	6.01[0.50]	12.12***
Out-of-home consumption (OC)	3.62[0.47]	7.70***	2.65[0.43]	6.12***
Practicing sacrifice (SC)	3.30[0.70]	4.71***	0.07[1.30]	0.05
Region (REGION1)				
REGION2	-3.06[1.53]	-2.00**	-4.07[0.62]	-6.56***
REGION3	-1.47[1.71]	-0.86	-0.83[1.00]	-0.82
REGION4	-2.85[1.05]	-2.72***	-1.60[0.82]	-1.96**
REGION5	-4.48[2.39]	-1.87**	-3.52[1.41]	-2.50**
PC	-0.92[0.48]	-1.90**	0.40[0.43]	0.93
PP	2.26[0.44]	5.48***	-0.33[1.21]	-0.27
NCI	-4.81[0.68]	-7.13***	-0.76[0.56]	-1.36
FS	-4.53[0.47]	-9.60***	-0.96[0.43]	-2.22**
Constant	12.69[2.88]	4.41***	9.52[3.05]	3.12***
IMR λ	-10.29[5.22]	-1.97**	-6.26[3.32]	-1.89**

***and ** 1% and 5% , respectively.

[] indicates standard errors.

() indicates reference variable.

between education level and the amount of red meat consumption on the grounds that the increase in the level of education contributes to the increase in income (Imam et al., 2009; Dhraief et al., 2013; Soro and Gultekin, 2020). In the present study, no significant relationship was found between the education level of the head of household and the amount of meat consumption per capita in households. Therefore, considered together, it could be concluded that education level does not play a decisive role in red meat consumption in Turkish households.

The household size may affect the income level as well as the distribution of income and consumption. According to the results obtained, it was found that there was an inverse relationship between the household size (HSIZE) and the amount of meat consumption. Although the increase in the household size has an effect on increasing the demand for red meat in the household, it may be a factor that leads to a decrease in the amount consumed per person (Bilgic and Yen, 2013; Phuong et al., 2014). On the other hand, the presence of individuals who do not consume red meat in households can affect the per capita red meat consumption. A significant negative relationship was found between the presence of individuals who did not consume red meat (NCI) and the amount of beef consumption. In other words, it can be stated that as the presence of individuals who do not consume meat in the household increases, other individuals in the household may consume higher amounts of red meat. This situation reveals the close relationship between the number of people who do not consume red meat in households and the consumption distribution from another perspective.

Factors such as income growth, rapid urbanization, development in technology, time constraints, development of social life and participation into the labor force increase the tendency of individuals to consume food outside the home (Mao et al., 2016; Suren and Kucukkomurler, 2018). It is speculated that consumers tend to consume beef and lamb outside their homes due to the reasons such as the diversity seeking behavior of consumers or the lack of ability to cook meat (Liu and Deblitz, 2007). This fact can be directly reflected in the amount of red meat consumption. The results of the analysis showed that when the household members prefer to consume red meat outside their homes (OC), the amount of beef and lamb consumption per person may increase. Similar results were also reported by Liu et al. (2011), Mao et al. (2016) and Bai et al. (2020).

Religious beliefs have a significant impact on the amount and variety of red meat consumption (Lamidi, 2013; Filippini and Srinivasan, 2019; Tsitsos et al., 2020). It is known that livestock such as sheep, goat, cattle and camel are sacrificed during the Islamic feast of sacrifice, which is

celebrated four days a year in Islamic countries including Türkiye (Gagaoua and Boudechicha, 2018; Harrison et al., 2021). In Türkiye, sacrificed animals are mainly cattle and sheep. During this period, a significant increase in animal slaughtering, and meat consumption, is observed (Bhatti et al., 2019; Sorvillo et al., 2020). Storage facilities in the houses such as deep freezers ensure that the households consume the sacrificial meat for a long time after the feast. According to the findings, a significant positive relationship was found between the sacrifice status (SC) of households and the amount of beef consumption per capita ($p < 0.01$). Although it was found that sheep were preferred by 56.07% as the sacrifice animal, no significant relationship was found between lamb consumption and sacrifice (SC). This can be explained by the fact that the amount of meat to be shared is higher in cattle compared to sheep. On the other hand, in Türkiye the animal preference for sacrifice is closely related to regionality (Atay et al., 2004; Kizilaslan and Nalinci, 2013).

In the world, meat types vary according to regions (Gossard and York, 2003; Mao et al., 2016). Chern et al. (2002), Alem and Söderbom (2012) and Yang et al. (2020) concluded that the amount and type of consumed red meat vary in different regions of countries. Similarly, the amount of beef and lamb consumption varied on the basis of regions in the present study. The beef and lamb consumption status of consumers living in other regions of the country was examined and compared to the consumers living in the Eastern and Southeastern Anatolia Region (REGION1), which has the highest cattle and sheep presence in the country. Although the red meat consumption amounts of consumers living in the Eastern and Southeastern Anatolia Region (REGION1) were lower, it was concluded that when evaluated together with other factors, meat consumption per capita in other regions could be lower than that in the Eastern and Southeastern Anatolia Region of the country.

The fact that consumers care about the price can be considered as an indicator of sensitivity to price. Considering the macrodata statistics, beef prices in Türkiye are at a very high level due to insufficient supply in the face of high demand. As a matter of fact, while the average price of a kilogram of beef in the world in 2019 is \$4.76, it is well above the world average price with \$8.02 in Türkiye (Statista, 2021). This situation clearly reveals the price sensitivity of consumers. The results of the analysis showed that there was a significant ($p < 0.05$) inverse relationship between the amount of beef consumption and consumers' care about price (PC). This relationship was not significant for lamb consumption. Red meat prices determine the amount of consumption and at the same time is an effective factor in the consumption decision. At this stage of the analysis,

factors other than price that could affect the consumption of only consuming households are included in the model. For this reason, it is an expected result that the coefficients of the consumers care about price (PC) variable are low.

Another factor affecting the amount of red meat consumed per capita is the red meat purchasing location of the households. The butchery shops are preferred by 68.5% of the consumers buying beef and 45% of those buying lamb. Considering the results of the analysis, it was found that the per capita consumption of beef could increase in households that prefer the butcher (PP) to buy beef. The fact that butchers offer relatively more affordable meat and are more easily accessible than other meat selling places can have an impact on the amount consumed. Similar results were found in studies conducted in Türkiye (Yildirim and Ceylan, 2007; Lorcu and Bolat, 2012).

According to the OECD data for 2019, red meat consumption per capita in Türkiye is 13.8 kg/year, 9.5 kg of which is beef and 4.3 kg lamb. In the present study, the average annual amount of beef and lamb consumed per capita was found to be 16.03 kg/year and 8.71 kg/year, respectively, and these values were similar to the results of those reported in previous studies conducted in Türkiye. The main reason for the discrepancy between the official figures and the values determined in the field studies could be explained by the differences in the informal economy and calculations used to determine the consumption. According to the findings, the average per capita beef consumption in Türkiye is approximately 2.5 times higher than the world average (6.43 kg/year). The same is true for lamb consumption. As a matter of fact, while the average annual per capita consumption of lamb is 1.73 kg/year in the world, it is 8.71 kg/year in Türkiye. The important point here is not the amount of consumption per se but rather the amount of consumption in relation to the recommended level for a balanced and adequate diet.

The Heart Foundation (2012) and FAO (2016) recommended that the annual per capita consumption of red meat should be between approximately 15.6 and 26.5 kg/year. Considering these values, it can be stated that red meat consumption in Türkiye is sufficient in terms of the calculated average consumption amount. However, the analysis performed showed that the consumption of red meat decreased when the consumers found their consumption of red meat insufficient (FS). It can be said that this result is consistent with the fact that 43.9% of consumers considered their red meat consumption insufficient. As a matter of fact, when examined in detail, it is striking that only 29.14% of the consumers consumed the recommended amount of red meat, 33.3% of them did not consume enough, while 37.5% of them consumed

more than the recommended value. Considering the income scale, on the other hand, consumption below the average was 56.3% in the low-income group while 53.1% consumed more red meat than the recommended amount. This finding is in line with the linear relationship between income level and red meat consumption in the world. It could also be evaluated as an indicator that inequality in income distribution has a considerable effect on red meat consumption.

CONCLUSIONS

According to the findings of the two-stage Heckman model used to determine the factors affecting the amount of red meat consumption in Türkiye, different results were obtained for the consumption of beef and lamb. It was observed that income level, education level, religious belief and consumption outside the home had a positive effect on the per capita consumption of beef, while regionalism, household size, presence of individuals who did not consume red meat in household, considering red meat consumption sufficient and price variables had a negative effect. It was found that income and consumption outside home affected lamb consumption positively while regionality, household size and considering the red meat consumption sufficient had a negative effect on red meat consumption. These clear differences between consumers' beef and lamb consumption and factors affecting this amount could be explained by the fact that red meat consumption in Türkiye is mostly beef (68.8%). On the other hand, based on adequate and balanced nutrition criteria, the findings of the present study indicated that only 29.1% of consumers consumed sufficient red meat while others consumed excessive or insufficient red meat.

Another remarkable point as a result of the research was that the calculated consumption amounts of lamb (8.7 kg/year) and beef (16.0 kg/year) were almost twice the official figures released. The main reason for this could be the differences in the informal economy and consumption calculations. It is known that policies and regulations are mostly based on macro data statistics. In this context, it should not be overlooked that supporting official figures by extensive field studies could yield more rational results.

On a global scale, the demand for red meat in Türkiye is quite high. This can lead to many economic problems due to insufficient supply. The fact that the high production costs and inflation cause excessive volatility in product prices in Türkiye brings to the fore the red meat and livestock import practices of the country. While this shows that Türkiye is an important market in the red meat sector for exporting countries, it also reveals the necessity of

structural changes in the supply, price and trade policies to be developed within the country's own dynamics.

In addition, the optimization of red meat consumption in Türkiye depends on the policies to be developed considering the factors affecting consumption. Accordingly, the approach to red meat consumption should not only aim to ensure the balance of supply and demand, but also to take into account adequate and balanced nutrition. Therefore, food consumption should be approached holistically and more comprehensive studies on red meat consumption should be carried out. On the other hand, it is thought that the integration of the red meat industry with other related fields will provide an opportunity for optimization of red meat consumption. In addition, as in many other areas, it should be taken into account that the policies to be developed for red meat consumption that take into account regionality will bring more effective results in practice.

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AUTHORS' CONTRIBUTIONS

The authors contributed equally to each part of the study.

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