

Analyzing post modern consumer behavior and beef consumption patterns: Insights from Sicilian market

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ABSTRACT

In current events, consumers are subject to various stimuli (advertising campaigns, popular magazines, social) that affect their marginal consumption propensity. However, as Economic Theory teaches us, the marginal propensity to consume does not necessarily translate into consumer spending. This is strongly affected by consumers' eating habits and other variables that determine where the consumption phenomenon occurs. The study aims to analyze post-modern consumer behavior toward beef consumption. An online questionnaire was administered to 535 Sicilian participants to achieve this goal. Statistical analyses were performed by R statistical software, using two-tailed P-values, and setting statistical significance at $P \leq 0.05$. The results show that consumption choices are influenced by beef meat's impact on health. In addition, consumers consider the origin and certifications of the raw material to be extremely crucial.

Introduction

Meat is defined by the International Agency for Research on Cancer (IARC, International Agency for Research on Cancer 2018) as fresh unprocessed muscle meat from beef, veal, pork, lamb, mutton, horse or goat, that is usually consumed cooked. Red meat represents a mainstay food of the Mediterranean diet. It is very present in today's society and consumers' diets in high per capita income societies. Beef meat is important because it is a primary source of excellent-quality protein, since it provides all the essential amino acids the human body cannot produce. It is rich in easily absorbable iron for the proper functioning of all organs. Finally, it provides vitamin B12, which is involved in essential functions by intervening both in the formation of red blood cells and in energy transformation processes (Pereira and Vicente, 2013). Over the years, Italian families have changed their meat consumption choices for economic, nutritional, ethical, and social reasons.

All these reasons have led to changes in meat purchasing habits regarding expenditure and quantity. Spending on food consumption at home in 2021 is about 87.3 billion euros, up 7.5 % from the pre-crisis year (2019). There is a noteworthy figure regarding meat consumption in 2020, which had a significant increase reaching +9.8 % for meat, and +14.5 % for eggs (ISMEA, 2020¹). (This last data is of relevant importance for two reasons. From an economic point of view, meat and eggs represent substitute goods, that is, economic goods that can satisfy the same need. The second is in the nutritional field, as consumers have increased the consumption of eggs for multiple reasons, i.e. because they represent a viable protein alternative to meat and are rich in vitamin A, vitamin E, iron, and zinc (Secchiari, 2008). According to ISTAT (National Institute of Italian Statistics),² the average expenditure of Italian families per month on food is about 468 euros, allocating about 101 euros for meat products, mainly about 32 euros for beef. In the agribusiness sector, inflation plays a key role because consumers are losing

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¹ <https://www.ismea.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/9430>.

² Italian government agency that collects, analyzes, and disseminates statistical data about Italy. This is responsible for gathering information on a wide range of subjects, such as population, economy, employment, environment, education, health, and many more. Statistical data are utilized for economic planning, research, public policy formulation, and the production of key indicators on the country's performance. To support government decisions, market analysis, academic research, and other purposes, ISTAT plays a crucial role in providing accurate and reliable information.

their purchasing power justified by increases in energy costs, packaging, transportation, etc.; According to Coldiretti (ABC 2023) consumer prices of food products spiked by 4.6 %. Economically, inflation results in an income effect that combines with the substitution effect (Chrystal and Lipsey, 2001). Specifically, for low- and middle-income consumer groups, higher food prices result in a situation where more disposable income must be spent to purchase the same quantity and quality of goods. Instead, the substitution effect is manifested in consumers' choices that change their preferences from high-priced to low-medium-priced products with the same nutritional value (e.g., from first-cut meats to second-cut meats or red to white meats, etc.). Many studies have examined consumer preferences for beef meat, revealing a number of factors that influence purchasing choices (Cardona et al., 2023; Font-i-Furnols, 2023; Font-i-Furnols and Guerrero, 2022). The origin of meat is a significant factor in the consumer's meat-buying behavior, as demonstrated by studies (Pinto da Rosa et al., 2021; Sasaki et al., 2022). In their food choices, consumers pay attention to the production method and certification of the production method (Jin and Zhou, 2014; Gaspar et al., 2022) examined traceability of quality certifications as a factor in the preference for Iberian products treated in Spain. Liu et al. (2022) study on the influence of origin on the assessment of quality of defective foods has demonstrated that even though the product may not be appealing, its location and origin can enhance its perceived quality. Cubero Dudinskaya et al. (2021) demonstrated that the information labeling of a product with its origin has a positive impact on consumer preferences.

The present paper examines consumer behavior regarding beef meat with a particular focus on origin of the product and quality certifications such as GPI, PDO, the promotion influence and the impact of the beef can have on health. Through a survey and processing data by R-software using two-tailed P-values, there is a relation between income and consumption frequencies to determine the significance of a possible relationship between these two variables and to make informed decisions based on statistical results. This paper is organized as follows: (i) Introduction (ii) Beef Sector in Italy (iii) Research Methodology (iv) Results and Discussions v) Conclusions.

Beef sector in Italy

Regarding consumption, Fig. 1 shows the evolution of per capita consumption of beef meat in Italy. As can be seen, in 1961, per capita

consumption was equal to 14.85 kg; in 1971, it was 25.34 kg; in 1981, it reached about 26 kg; in 1991, it reached a peak of 27.53 kg; after that, per capita meat consumption began to decline until it came back 16 kg in 2021 (ABC 2023b.).

There are many reasons for this trend; the evolution of meat consumption highlights all the socioeconomic characteristics of Italian society, which went from the economic boom of the 1960s to the energy crises of the 1970s and then stabilized on the phenomena of widespread consumption in the 1990s. Subsequently, in Italian society, which is common to all post-modern societies, there is greater attention to food sustainability, reason why animal proteins are replaced by vegetable ones (Belletti and Marescotti, 1996). Thus, there has been a passage from a 1960s society that wanted to eat meat but could not as a function of limited per capita disposable income to a post-modern society where despite high average disposable income, limits meat consumption because of environmental sustainability issues and as a function of health indications that tend to reduce red meat consumption. The extremes of the graph (the 1960s and today) arrive at a substantial equivalence in consumption; what there is between the extremes can be explained by the evolution of Italian society. From the ISMEA (ABC 2023c.), the value of production of basic meat prices is reported to be 2911 million euros in 2021. The beef industry, represented by service content products, the meat processing and marketing stage, has a turnover of 5890 million euros. After all, these products meet consumer expectations for safe, healthy, nutritive, tasty and convenient food available in a wide variety and at affordable prices. In addition, this figure highlights that Italy belongs to the most industrialized countries where services combined with food products increase the value of industrial productions. However, the meat sector suffers from a strong dependence on foreign countries; with a degree of supply of about 51 %. This is given by the fact that the production costs, on average, are higher than European and international competitors, so very often, the large-scale retail trade or other food distribution industry operators prefer to buy meat from abroad (where they have a relatively lower price) than Italian productions. Another fact to pay attention to is the location of livestock farms; since most of them are in the Po Valley, where the weight of beef herds in the total cattle herd is very high. More than 20 % of national beef cattle are raised in Piedmont, 19 % in Veneto and 13 % in Lombardy. In particular, these regions have a high level of know-how in intensive livestock farms specializing in fattening calves of French breeds and a high level of specialization in the industrial stage

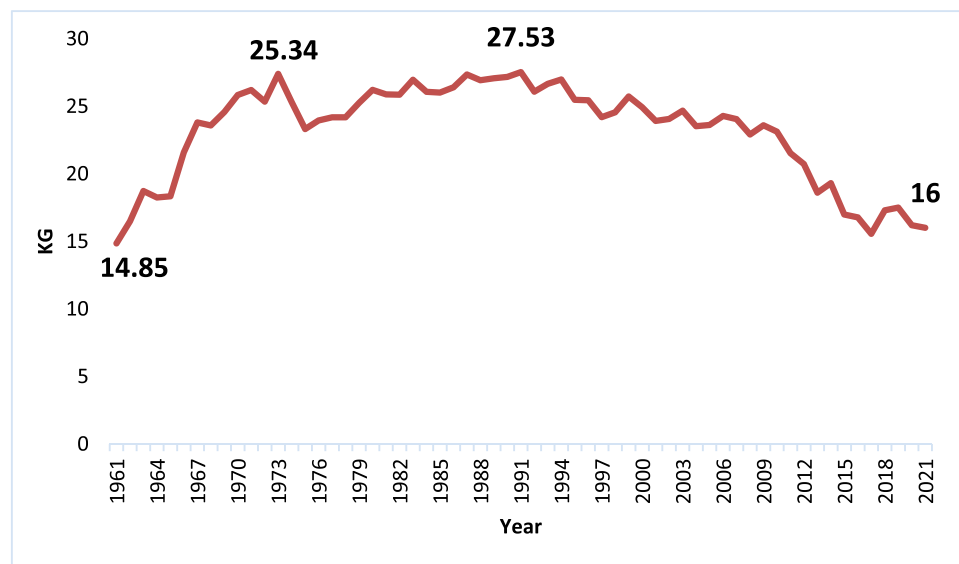


Fig. 1. Evolution of per capita beef meat consumption in Italy from 1961 to 2021. Source: Food and Agriculture Organization of the United Nations.

and the use of advanced technologies in processing cuts and semi-finished meat products. In the southern areas, there are many small farms. The prevailing orientation is meat production, with Sicily concentrating at 10.6 % of the national meat herd and Sardinia at 8.3 %. This is a weakness of southern regions characterized by the small size of herds, especially in marginal areas and the poor level of organization in the concentration of supply of small farmers in central and southern regions. To solve this gap, native breeds can be enhanced through their link with the territory and traditions of the area they belong to. For example, in Sicily, an increased consistency of local cattle, such as those of the Cinisara breed, should be linked to the major consumers' attention towards the Italian origin of fresh beef. Given the dependence on foreign countries, in terms of beef imports in 2021, the value is around 1737 million euros for meat. While for exports at approximately 431.6 million euros. This is because, on average, production costs are higher than their European competitors. Therefore, countries such as Poland, France and the Netherlands dominate the market by capturing most imports. In addition, these countries enjoy lower labor prices than Italy and high specialization in plants and technologies. This prompts large retail groups to buy meat from these countries because the price is relatively lower, and a markup can be applied, which guarantees even higher margins than Italian production.

Materials and methods

To achieve the objectives of the present study, a questionnaire was submitted to a sample of consumers, and data were obtained from the nine most important cities in Sicily. Precisely, the questionnaire consists of two sections. The first section concerns the socio-demographic characteristics of the consumer, i.e., age, level of education, income, and residence; whereas, the second section concerns specific aspects related to meat consumption: how promotions influence consumption decisions, the importance of certifications and product origin, and the impact on health. The survey was conducted from December 7, 2021, to January 7, 2022, among the Sicilian population using an online platform accessible from any device with an Internet connection. The questionnaire was disseminated through private social networks (Facebook, Instagram and WhatsApp) and personal mailing lists. Survey questionnaires carried out via social networks can provide an effective and streamlined method for acquiring data from a diverse user base, especially for studying phenomena where conventional survey approaches are challenging but have limitations. One limitation worth noting is the problem of self-selection bias. Survey participants may voluntarily participate, driven by their interests or motivations, contributing to a non-representative and biased sample that does not precisely represent the general user population. In social network surveys, privacy considerations are crucial as sharing personal data is frequently required. This may deter some users from participating or raise concerns about confidentiality and data security. Digital surveys may also exclude segments of the population that do not have access to the internet or are inactive on the platform, which could be crucial. Moreover, the structured approach adopted in many online surveys may limit feedback scope, making it hard to comprehend complex attitudes, opinions, or experiences. Therefore, although such surveys provide numerous advantages, particularly due, for example, to overcome many territorial constraints or the difficulties linked to the pandemic, it is necessary to recognize these limitations in interpreting and applying the findings.

Statistical analyses were performed using R statistical software (R for Unix/Linux version 4.1.1; The R Foundation for Statistical Computing, Vienna, Austria). For all analyses, two-tailed P-values were used, and statistical significance was set at $P \leq 0.05$. Descriptive statistics (percentages, means and SD) were used to summarize the data. Differences between groups were assessed using chi-square tests for categorical variables and one-way analysis of variance (ANOVA) for normally distributed variables. The study was conducted in full compliance with privacy regulations Art. 13 of EU Regulation 2016/679 and Art. of

Legislative Decree 197/2003. All participants were fully informed of the requirements of the study and were appropriately warned before completion that this would be an anonymous questionnaire.

Results and discussions

The web survey ended on January 7, 2022, and the data were collected after careful analysis: 535 participants between the ages of 15 and 82 (of whom only 6 claimed not to eat meat) completed the questionnaire. The male respondents accounted for 58 % of the participants, or 311, the 219 women made up 41 %, and finally, the participants who did not identify with these genders were about 1 %. The respondents were 42.6 ± 16.2 years old. The age groups in Table 1 show the number of participants of each age who contributed to the questionnaire.

The 0–30 age group represents the highest percentage (34 %). In contrast, the 55+ age group expresses 29 %. The 31–45 age group represented 19 % of the participants, and finally, the 46–55 age group had a percentage of 18 %. The educational level of respondents is 192 (36 %) with a high school diploma, 190 (35 %) having a master's or doctoral degree, 144 (27 %) holding a bachelor's degree, and 9 (2 %) with a high school diploma. Regarding annual income, 185 (35 %) people earn between 15,000 and 28,999 €, 168 (31 %) between 0 and 14,999 €, while 114 (21 %) in the range of 29,000–49,999 €, instead the smallest part, i.e. 68 (13 %) have a high income greater than or equal to 50,000 €. Most of the respondents' catchment area, selected from the 9 Sicilian capitals, is registered in Palermo with 339 responses, followed by Agrigento with 69, to continue 32 Caltanissetta, 28 Messina, 21 Trapani, 18

Catania, 14 Siracusa, 8 Enna and finally, 6 Ragusa. The second section of the survey focused on beef consumption habits regarding the influence of information such as promotions, provenance, health impact, and certifications in consuming this good. For this purpose, the six questionnaire respondents who do not consume meat were excluded from further analysis. "Trade promotion" is an activity carried out for a predetermined and limited period to increase consumer demand and stimulate sales. Promotions offer to potential customers an additional reason to purchase services or products, stimulated by the offer's time window and other features. Offering a discount is a proven way to win customers, increase sales and eventually dispose of merchandise stock. "Stock" in economics is defined as a given existing quantity measured at a specific time (Chrystal and Lipsey, 2001).

In Fig. 2, through the linear scale methodology, 1 indicates no interest, and 6 indicates very much interest in promotions. It is inferred that 250 (47 %) consumers are unaffected by promotions, while only 26 (5 %) people state that they are very interested. In this case, consumers perceive products on promotion as cheap. Price is a key element in

Table 1
"Socio-demographic features of the sample

Socio-demographic characteristics of the considered sample		N ^o	%
Sample (n=535)			
Gender	Male	219	41
	Female	311	58
	Unspecified	5	1
Age	< 30	181	34
	31 - 45	103	19
	46 - 55	95	18
	> 55	156	29
Educational Status	Lower Secondary School	9	2
	Upper Secondary School	192	36
	Bachelor Degree	144	27
	Master Degree or PhD	190	36
Income (€)	0 - 14999	168	31
	15000 - 28999	185	35
	29000 - 49000	114	21
	≥ 50000	68	13

Source: author's elaboration.

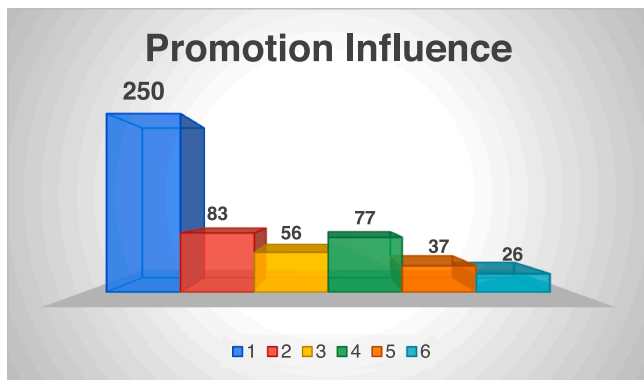


Fig. 2. Promotion influence according to Likert scale. Source: author’s elaboration.

consumer choices. Generally, it is used as an indicator of quality when more information is needed to evaluate the product; a particularly high price protects from a poor quality product (Aalhus et al., 2004; Imami et al., 2011; Simon et al., 2013).

As shown in Fig. 3, regarding the origin of meat, 327 (62 %) of the respondents are interested in the origin of the product. Several marketing studies indicate that evaluations made by consumers are significantly influenced by product origin: for consumers, information about the geographic origin can serve both to identify the product and to evaluate its quality (Curtis et al., 2006; Loureiro and Umberger, 2007; Erdem et al., 2010; Al-Sulaiti and Baker, 1998).

Regarding quality certifications, again (Fig. 4), consumers who expressed a positive opinion amounted to 423 (80 %). It is well known that Italy is the European country with the largest number of agrifood products with designation of origin and geographical indication recognised by the European Union. This further demonstrates the great quality of the productions, and especially the strong link that binds Italian agrifood excellence to its territory of origin. The EU’s Geographical Indications system favours the production system and the territory’s economy; protects the environment because the indissoluble link with the territory of origin requires the preservation of ecosystems and biodiversity; and supports the social cohesion of the entire community (Rocchi et al., 2021). At the same time, due to community certification, more guarantees are given to consumers with a higher level of traceability and food safety than other products (Bonazzi et al., 2021). In addition, certifications play an essential role in countering the phenomena of Information Asymmetry (Akerlof, 1978).

As shown in Fig. 5, 205 (29 %) respondents are attentive to the health impact that beef may have. This is supported by the fact that, in recent years, notable research institutes such as the IARC have made claims about the role of raw and processed red meat in increasing the cancer risk. However, this latter depends on the amounts and how specific components interact with the human organism. In addition to

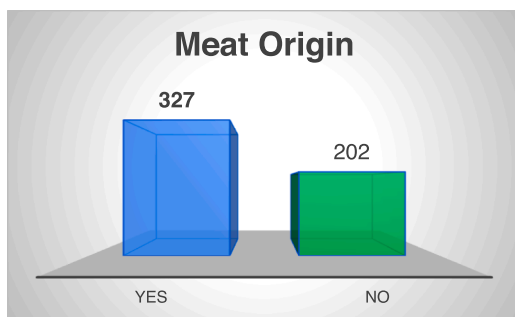


Fig. 3. Beef meat origin. Source: author’s elaboration.

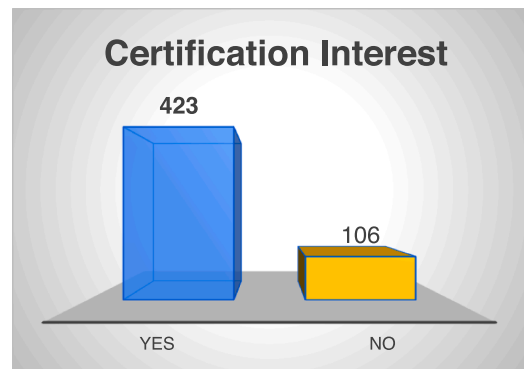


Fig. 4. Quality certification interest. Source: author’s elaboration.

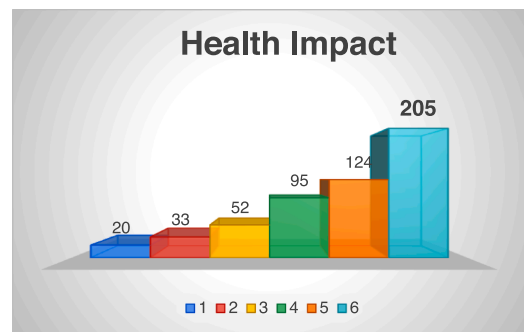


Fig. 5. Interest regarding beef meat health impact. Source: author’s elaboration.

protein, foods of animal origin contain many other substances, including saturated fats and iron in the heme group, which in excessive doses can cause an increase in cholesterol, blood insulin levels and inflammation of the intestinal tract, increasing the risk of certain diseases, including cancers, particularly colorectal cancers (González et al., 2020). According to IARC (IARC, International Agency for Research on Cancer 2018), consuming no more than 500 gs of red meat per week is recommended to limit cancer risk.

Specifically, Table 2 shows that income is a determinant that causes consumers to change their attitudes about beef meat buying. This table displays the frequency of beef meat, fish, and other derivative consumption in relation to different income levels, along with the corresponding p-values for each category. For each income category, the table presents the consumption frequency of beef meat. For example, in the “0 - 14,999” income category, 7.93% of participants consume meat once a month, 10.4% once every two weeks, 47.0% once a week, and 34.8% more than once a week. The p-value (0.003) indicates a significant association between income and the frequency of beef meat consumption. The same pattern is applied to fish consumption. For instance, in the “0 - 14,999” income category, 22.6% of participants consume fish once a month, 21.3% once every two weeks, 36.0% once a week, and 20.1% more than once a week. In this case as well, the p-value (0.003) suggests a significant association between income and the frequency of fish consumption.

As for other derivatives (e.g., eggs, cheese, etc.), the data depict the consumption frequency for each income category. For instance, in the “0 - 14,999” income category, 5.49% of participants consume other derivatives once a month, 4.27% once every two weeks, 31.7% once a week, and 58.5% more than once a week. In this case, the p-value (0.881) indicates that there is no significant association between income and the frequency of other derivative consumption.

In summary, the table suggests that there are significant correlations

Table 2
Eating Habits: Beef meat, Fish, and Derivatives Consumption by Income Levels

Income	0 - 14999	15000 - 28999	29000 - 49999	≥ 50000	p-value
Number	N=164	N=184	N=114	N=67	
How often do you consume:					
a. Beef meat					0.003
1 time per month	13 (7.93%)	22 (12.0%)	11 (9.65%)	14 (20.9%)	
1 time every two weeks	17 (10.4%)	30 (16.3%)	24 (21.1%)	7 (10.4%)	
1 time per week	77 (47.0%)	75 (40.8%)	51 (44.7%)	31 (46.3%)	
More than 1 time per week	57 (34.8%)	57 (31.0%)	28 (24.6%)	15 (22.4%)	
b. Fish:					0.003
1 time per month	37 (22.6%)	28 (15.2%)	11 (9.65%)	7 (10.4%)	
1 time every two weeks	35 (21.3%)	39 (21.2%)	19 (16.7%)	12 (17.9%)	
1 time per week	59 (36.0%)	76 (41.3%)	57 (50.0%)	32 (47.8%)	
more than 1 time per week	33 (20.1%)	41 (22.3%)	27 (23.7%)	16 (23.9%)	
c. Other (e.g. eggs, cheese,...)					0.881
1 time per month	9 (5.49%)	4 (2.17%)	4 (3.51%)	2 (2.99%)	
1 time every two weeks	7 (4.27%)	7 (3.80%)	6 (5.26%)	4 (5.97%)	
1 time per week	52 (31.7%)	62 (33.7%)	45 (39.5%)	22 (32.8%)	
more than 1 time per week	96 (58.5%)	111 (60.3%)	59 (51.8%)	39 (58.2%)	

Source: author's elaboration.

between income and the frequency of Beef meat and fish consumption, but not between income and the frequency of other derivative consumption. The p-values indicate the significance of these associations.

In comparison, consumers with higher incomes lean toward more consumption of fish, which generally has a higher cost. No significant difference can be seen in the frequency of consumption of other food, such as eggs, cheese and other derivatives. The respondents appear to be highly sensitised to topics of current interest, such as origin, certifications, and the impact on the health of beef consumption. Possible explanations are that the sample of questionnaire respondents is a highly educated and high-income sample.

Conclusions and future research lines

Regarding meat consumption, in Italian society, there has been an increase in consumption since the 1960s; as whereas a function of the economic boom, incomes began to rise. This phenomenon peaked in the 1990s and then decreased until the present day. Socio-demographic phenomena, disposable income, and the role of consumer information toward food products have influenced this evolution. The experimental analysis shows that 47 % of consumers are unaffected by promotions, while only a minimal part states that they are very interested. In this case, consumers perceive promoted products as cheap. Accordingly, as Neoclassical Theory teaches us, the empirical analysis highlights that price is still a key element in consumption decisions. Generally, it is used as an indicator of quality when insufficient information is available to evaluate the product; a particularly high price protects against a poor-quality product. Moreover, the empirical and preliminary analysis showed that lower-income citizens tend to consume meat from other species besides beef more frequently. In comparison, higher incomes lean toward more consumption of fish, which generally has a higher cost. No significant difference is evident in the frequency of consumption of other food, such as eggs, cheese, and other derivatives. The

stakeholder of agri-food system, including producers, distributors and governments, can be affected by consumer preference towards beef. The stakeholder of agrifood system, including producers, distributors and governments, can be affected by consumer preference towards beef. Regarding producers, consumer preferences can influence demand, so they have to reshape their production to meet these preferences in order to maintain long-term, stable profitability in order to achieve business goals. Additionally, producers are required to provide detailed information on the labeling of their products. This includes details on production practices, origin, and quality. Transparency plays a crucial role in attracting consumers who seek specific characteristics in beef. Furthermore, being in a highly competitive market they must establish their unique identity by emphasizing product quality, labeling information, and other characteristics that align with consumer preferences. About distributors must be able to establish efficient relationships with producers who offer beef that meets market demand. This requires working with producers who follow specific certifications. They must also be able to communicate the characteristics of the beef products they offer in an incisive manner. This may include advertising campaigns, promotions and marketing strategies aimed at capturing consumers looking for specific qualities in meat. Understanding market demand is crucial for the government to implement policies that support local agriculture, such as tax incentives or programs for public institutions to purchase local products, to enhance the value of Italian production. Finally, consumer preferences are becoming increasingly important in the definition of the agri-food system, pushing stakeholders to adapt to the needs of a changing market characterized by an increasing attention to the origin of the raw material, certification and the impact of red meat on personal health. This can result in positive changes in production practices and products available to consumers, but it also requires well-structured cooperation from all actors in the agri-food system. In addition, the results showed that most consumers are interested in the origin of meat (62 % of respondents answered that the origin of the product is important). This aspect is crucial in our society, where the role of information acquires more and more weight in purchasing decisions, and the data from the experimental analysis confirms this. The aspect of certifications (80 % of respondents answered that certifications influence their purchasing behavior), common to the consumption phenomenon of many agribusiness products in post-modern societies, is essential as it should guide production and consumption choices. Economic Theory teaches us that information is a competitive advantage for both the firm and the consumer, as demonstrated in the paper.

The main limitations of this study can be summarized in the following points:

- Sample limited: The sample of participants in this research is limited to the Sicilian region, which may limit the generalizability of the results to the entire Italian or international population. Further research could involve more geographically diverse samples.
- Self-selection of participants: Because the research involved the distribution of the survey through social media and personal mailing lists, there is a risk of self-selection of participants, where people interested in the topic might be more inclined to participate.
- Self-reported responses: The research is based on participants' self-reported responses, which could lead to potential bias due to inaccuracies or bias in responses.
- Correlative, not causal results: The article provides correlative results on consumer preferences but does not establish causal relationships between the variables studied. This could be an interesting cue for future analyses to be conducted.

Starting from this limitation, it is possible to determine possible research lines for the future. In fact, as for possible future lines of research, these could delve further into consumer preferences regarding beef, focusing on specific subgroups of consumers. For example, it might be interesting to examine the preferences of vegetarian or vegan

consumers, as well as those of consumers with special dietary needs, such as athletes with protein and low-carbohydrate foods. Given the increasing focus on environmental sustainability, future research could explore how consumer preferences for beef are influenced by environmental and sustainability issues. This could include analysis of the environmental impact of beef production and how this information influences purchase choices. Future studies could examine how producers and distributors can more effectively communicate information about the origin, certifications, and health impacts of beef to consumers. This could include targeted marketing strategies and information campaigns. While this study focused on a specific region (Sicily), future research could examine beef consumption trends nationally or internationally to gain a more comprehensive view of consumer preferences.

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Ethical statement

The research “Analyzing Post-Consumer Behavior and Beef Consumption Patterns: Insights from Sicilian market” was conducted with respect for human and animal ethics

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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