# Meat Quality Perception in Argentina

Subjects: Social Issues | Food Science & Technology

Contributor: BEGOÑA PANEA , Testa M.L , Gabriela Grigioni

In Argentina, color and intramuscular fat are the main attributes of raw beef quality; however, it is necessary to clarify how consumers use them, in order to establish different marketing strategies. Consumer preferences are affected by multiple factors. Thus, the objective of the present study was to identify the Argentinian consumer's choice behavior regarding beef color and fat content. An online survey was carried out in Argentina. It inquired about socio-demographic characteristics, purchase and consumption habits and beliefs, showing pictures related to color, marbling and the amount of fat. Choice behavior was evaluated by asking why consumers chose a particular picture out of the ones shown. Several Kruskal–Wallis tests evaluated the different hypotheses. Three different decision trees using the CHAID analysis method were created. Multifactorial analysis was carried out for clustering consumers. Regarding consumer beliefs, 90% of the respondents agreed with the sentence, "The two main characteristics defining beef quality at purchase time are meat color and marbling". Socio-demographic characteristics affected purchase habits and beliefs; they also affected perceptions about meat color and marbling. It was possible to build three consumer groups for future marketing strategies: "hedonic" focused on a pleasing sensory experience, "appearance" prioritized the visual aspects, and the "health-conscious" consumers were interested in their healthy nutrition.

consumer preferences in Argentina | beef | color | marbling

## 1. Introduction

With a total livestock population of 53.9 million cattle, Argentina produces more than 3 million tons of meat per year, and it was the fourth-largest producer of beef meat in 2018 [1]. Argentina is also well-known in the world for its good-quality beef product, and it is one of the major world exporters of beef. In addition, it is the second country in the world by per capita consumption of meat, which is around 100 kg per person/year. In Argentina, when buying beef, consumers base their choice mainly on color and intramuscular fat [2]. According to a survey carried out by the Argentinian Beef Promotion Institute [3], color, tenderness and intramuscular fat are the main beef quality attributes. However, it remains unclear whether consumers perceive and use these intrinsic attributes in different ways, especially since, in recent years, consumers have become increasingly aware of the relationship between food and health. In this sense, Argentinian meat consumption exceeds the nutritional recommendations for the prevention of chronic non-communicable diseases and some types of cancer. In Argentina, public health policies recommend a healthier diet [4], reducing the total meat consumption and increasing vegetables, fruits, and whole grains [5]. These recommendations may have changed the consumer perception of meat. On the other hand, the beef production system changed during the last two decades, due to a dramatic expansion in crop-growing areas, driven by increasing grain prices. This might also have produced a change in consumer perception [6], as the

traditional beef production system of Argentina, previously based on pasturing only, is now complemented by a feedlot finishing period (2–3 months), which produces meat with greater fat content.

Despite all this, Argentinian consumer preferences for meat are infrequently studied. The few perception surveys developed in Argentina have focused mainly on the urban population and, especially, that of Buenos Aires city [7][8][9][10]; but as far as we know, there is no survey that has been carried out across the entire country. However, according to Zapata et al. [11], there is a marked difference in the food consumption patterns between rural and urban households in Argentina. Moreover, the authors showed consumption as affected by multiple factors like availability, accessibility, and food choice, which in turn can be influenced by geographic location, demographic condition, income, socioeconomic level, globalization, commercialization, religion, culture and attitudes of consumers. For instance, meat perception by rural consumers may be determined by their own knowledge about animal production.

Argentina has six clearly differentiated regions in terms of population density, economic activities and the socio-economic characteristics of households [12]: the metropolitan area, including surrounding areas of Buenos Aires city (CABA-GBA), the Pampeana region, northwest region, northeast region, Cuyo region and the Patagonia region. The contrasts in lifestyles and cultures of the regions have led to the use of differentiated strategies by the supermarket chains [12].

## 2. Multiple Factor Analysis

**Table 1.** shows the percentage of variability explained by the two first factors for each of the multiple factor analyses (MAF) carried out, as well as the cosine squared for each variable in each factor.

**Table 1.** Eigenvalue and percentage of variability explained by the first two factors for each of the three Multiple Factor Analysis carried out, and cosine squared for each variable in each factor. The criterion “none of the above” was excluded from the analysis. When the sum of the cosine squared in the two factors was >0.4, the criterion was chosen for the hierarchical cluster (values in bold).

| | | Factor 1 | Factor 2 |
|---|---|---|---|
| Picture 1 (based on color) | Eigenvalue | 1.141 | 1.004 |
| | Variability (%) | 22.286 | 19.606 |
| | Cosine squared | | |
| | *Fresh* | **0.056** | **0.650** |
| | *Tender* | **0.335** | **0.186** |
| | *Tasty* | **0.488** | **0.110** |

| | | Factor 1 | Factor 2 |
|---|---|---|---|
| | *Juicy* | **0.395** | **0.006** |
| | *Healthy* | 0.077 | 0.192 |
| | *Cheap* | 0.004 | 0.000 |
| Picture 2 (based on marbling) | Eigenvalue | 1.489 | 0.583 |
| | Variability (%) | 48.854 | 19.116 |
| | Cosine squared | | |
| | *Tender* | **0.441** | **0.307** |
| | *Tasty* | **0.515** | **0.214** |
| | *Juicy* | **0.464** | **0.112** |
| | *Healthy* | **0.533** | **0.131** |
| | *Cheap* | 0.008 | 0.002 |
| | Eigenvalue | 1.415 | 1.052 |
| | Variability (%) | 20.699 | 15.382 |
| | Cosine squared | | |
| | *Tender* | **0.436** | **0.016** |
| | *Tasty* | **0.484** | **0.000** |
| Picture 3 (Rib) (based on marbling) | *Juicy* | **0.611** | **0.015** |
| | *Healthy* | 0.031 | 0.001 |
| | *Cheap* | 0.029 | 0.009 |
| | *Less waste* | 0.099 | 0.252 |
| | *Fat color* | **0.004** | **0.575** |
| | *Fat amount* | 0.017 | 0.046 |
| | *General color* | **0.000** | **0.687** |

In the MAF of Picture 1, the first two factors explained 41.9% of the variability. “Tender”, “tasty” and “juicy” criteria presented a sum of cosine squared > 0.4 and were therefore selected for the hierarchical cluster. In the MAF of Picture 2, 68% of the variability was explained by the first two factors and the selected criteria were “tender”, “tasty”, “juicy” and “healthy”. In the MAF of Picture 3, 36.1% of the variability was explained by the first two factors and selected criteria were “tender”, “tasty”, “juicy”, “fat color”, and “general color”.

Three groups of consumers were obtained from the cluster analysis, with a cophenetic correlation of 0.456. The description of consumer profiles (clusters) according to their socio-demographic variables, purchase habits and beliefs, and by their choice behavior, are shown in **Table 2**; **Table 3** respectively.

**Table 2.** Percentages of each socio-demographic characteristic, purchase habits, and beliefs for each of the consumer groups obtained in the cluster analysis.

| Description | | Consumer Group | | | *p*-Value |
|---|---|---|---|---|---|
| | | Hedonic (38.3%) | Health-Conscious (37.4%) | Appearance (24.2%) | |
| Gender | Male | 65.6 * | 64.4 | 64.2 | 0.841 |
| | Female | 34.4 | 35.6 | 35.8 | |
| Age | ≤35 | 41.1 | 42.4 | 46.7 | 0.195 |
| | 36–55 | 38.1 | 38.6 | 34.5 | |
| | >55 | 20.8 | 19.6 | 18.7 | |
| Highest education level reached | Primary school | 1.2 | 1.5 | 1.9 | 0.272 |
| | Secondary school | 26.1 | 23.7 | 21.1 | |
| | Tertiary or higher | 72.7 | 74.8 | 77.0 | |
| Occupation | Crop production | 33.8 | 27.2 | *22.2* | 0.003 |
| | Meat production | *22.8* | 28.9 | 29.3 | |
| | Livestock or meat commercialization | 37.0 | 3.0 | 2.1 | |
| | Human health | 4.9 | 4.75 | 8.3 | |
| | None of the above | 34.9 | 36.2 | 38.0 | |
| Are you the person in charge of beef buying at home? | Yes | 80.6 | 82.3 | 81.1 | 0.683 |
| | No | 19.4 | 17.7 | 18.9 | |

| Description | | Consumer Group | | | |
|---|---|---|---|---|---|
| | | Hedonic (38.3%) | Health-Conscious (37.4%) | Appearance (24.2%) | *p*-Value |
| Where do you buy beef most often? | At the supermarket, packaged | 11.7 | 11.7 | 10.6 | 0.221 |
| | Butcher's at the supermarket | 20.3 | 17.6 | 16.4 | |
| | Traditional butcher's shop | 68.0 | 70.6 | 73.0 | |
| How often do you eat beef? | Daily | 15.7 | 16.8 | 18.2 | 0.221 |
| | Alternate days | 37.7 | 38.7 | 38.7 | |
| | Twice a week | 11.8 | 12.7 | 12.4 | |
| | Once a week | 30.7 | 29.4 | 28.0 | |
| | Once a month | 4.2 | 2.3 | 2.8 | |
| Do you agree with the following sentence: "The two main characteristics defining beef quality at purchase time are beef color and marbling" | Yes | 88.9 | 91.1 | 89.5 | 0.351 |
| | No | 11.1 | 8.9 | 10.5 | |

* Percentages higher than expected are marked in bold, and those lower than expected are marked in italics.

**Table 3.** Description of consumer profiles (clusters) according to their choice behavior. Percentages are of people who marked a criterion as used in the choice of each picture.

| Description | | Hedonic (38.3%) | Health-Conscious (37.4%) | Appearance (24.2%) | *p* |
|---|---|---|---|---|---|
| Based on the color of the following five steaks, which one would you choose? (Picture 1) | Option 1 (darker) | 1.5 | 1.6 | 0.8 | 0.923 |
| | Option 2 | 7.4 | 6.1 | 8.0 | |
| | Option 3 | 35.6 | 36.3 | 35.1 | |
| | Option 4 | 42.5 | 42.6 | 41.4 | |
| | Option 5 (lighter) | 13.1 | 13.4 | 14.6 | |
| | Fresh [1] | 62.3 | 63.6 | 79.6 | <0.001 |

| Description | | Hedonic (38.3%) | Health-Conscious (37.4%) | Appearance (24.2%) | *p* |
|---|---|---|---|---|---|
| Based on the marbling of the following two steaks, which one would you choose? (Picture 2) | Tender | 49.0 | 36.1 | 43.6 | <0.001 |
| | Tasty | 56.2 | 22.2 | 27.6 | <0.001 |
| | Juicy | 24.4 | 9.7 | 5.5 | <0.001 |
| | Healthy | 26.1 | 31.2 | 39.8 | <0.001 |
| | Cheap | 0.8 | 0.3 | 0.8 | 0.327 |
| | None of the above | 2.9 | 1.5 | 1.7 | 0.001 |
| | Option 1 (more marbling) | 13.2 | 14.9 | 12.4 | 0.452 |
| | Option 2 (less marbling) | 86.8 | 85.1 | 87.6 | |
| | Tender | 37.8 | 15.4 | 27.6 | <0.001 |
| | Tasty | 72.3 | 3.7 | 23.8 | <0.001 |
| | Juicy | 28.0 | 1.9 | 4.2 | <0.001 |
| In general, which of the following two ribs would you choose? (Picture 3) | Healthy | 56.1 | 94.6 | 23.8 | <0.001 |
| | Cheap | 0.0 | 0.0 | 0.0 | 1.000 |
| | None of the above | 3.3 | 0.7 | 3.2 | 0.001 |
| | Option 1 (less fattened) | 77.8 | 95.4 | 89.3 | <0.001 |
| | Option 2 (more fattened) | 22.2 | 4.6 | 10.7 | |
| | Tender | 36.6 | 13.5 | 19.2 | <0.001 |
| | Tasty | 72.6 | 1.2 | 12.4 | <0.001 |
| | Juicy | 26.6 | 3.1 | 2.1 | <0.001 |

| Description | | Hedonic (38.3%) | Health-Conscious (37.4%) | Appearance (24.2%) | *p* |
|---|---|---|---|---|---|
| | Healthy | 45.8 | 62.1 | 47.4 | <0.001 |
| | Cheap | 0.1 | 0.0 | 0.0 | 0.447 |
| | Less waste | 36.5 | 37.7 | 43.2 | 0.055 |
| | Better fat color | 9.2 | 0.5 | 61.3 | <0.001 |
| | Adequate fat amount | 48.7 | 48.9 | 50.1 | 0.886 |
| | Better general color | 24.4 | 2.0 | 100 | <0.001 |
| | None of the above | 1.6 | 1.4 | 0.0 | 0.026 |

[1] For each choice criterion, the table only shows the percentage of times in which a certain criterion was chosen. Percentages higher than expected are marked in bold and those lower than expected are marked in italics.

No differences between groups were found for consumer gender, consumer age, or beef consumption frequency ($p > 0.05$), but occupation differed between consumer groups ($p < 0.001$). In the same way, no differences were found between groups in the chosen Picture 1 or chosen Picture 2 categories ($p > 0.05$), but differences were found for the chosen Picture 3 category ($p < 0.001$) between the three different groups.

The first cluster ($n$ = 751, 38.3% of the sample) comprises respondents who showed a profile that could be termed as “hedonic”. To choose the pictures, they used the criteria “tender”, “tasty” and “juicy”, whereas “healthy” or “color” was less frequently chosen than expected. A greater proportion of them preferred the second option of Picture 3; that is, the most fattened. According to Smith and Carpenter [13], tenderness, flavor, and juiciness are the primary traits to describe overall beef palatability. Moreover, according to Lusk et al. [14], these primary traits are highly correlated with overall experienced quality, intention to purchase, and willingness to pay. Thus, this group is characterized by choosing based on palatability. In this group, we found the most people whose occupation was related to crop production (33.8%). The second group (n = 734, 37.4% of the sample) selected the criterion “healthy” in Picture 2 and in Picture 3, but they did not mark any of the other criteria as important and they cannot be defined in terms of occupation. Thus, they could be classified as “health-conscious”. They chose the less fattened Picture 3 as recommended by the WHO [15] to decrease the number of calories in their meals. The third group ($n$ = 475, 24.2%) chose “fresh” and “healthy” for Picture 1, no particular criteria for Picture 2 and “less waste”, “better fat color”, and “better general color” for Picture 3; that is, they were people that use general appearance to choose the pictures. Visual appearance characteristics are highly related to consumer expectations and are intrinsic quality cues [16]. Moreover, because these characteristics are used to access food quality, they are highly related to their choice at purchase [17]. Consumers from the third group were not worried about tenderness,

juiciness, taste, or health, although, curiously, they were mostly occupied in human health-related jobs. Although clusters could not be defined in terms of consumers' age, people in the "appearance" group tended to be the youngest (≤35 years old); this could explain their lack of concern with the "healthy" criterion.

Consumers are the last link of the production chain, and they have their own expectations about the product, associated with their beliefs and/or feelings. According to Deliza et al. [18], previous information and experiences form the expectation process. In this sense, the frequency of consumption influences the expectation process; indeed, it influences the perception of beef quality, as shown in the present study. Since there is little information about fresh meat, consumers have difficulties in forming their quality expectations. According to Grunert et al. [19], labeling and appearance are the main characteristics that form meat quality expectations. However, they do not seem to be very good predictors of meat-eating quality.

The three groups of consumers identified in Argentina are important for marketing strategies, as they have their own characteristics. While consumers in the "hedonic" group search for a pleasurable sensory experience, consumers in the "appearance" group search for visual aspects, and those in the "health-conscious" group are interested in a healthy diet.

## 3. Conclusions

In order to generate a beef marketing strategy in Argentina, it was possible to group the population into three market groups, named "health-conscious", "hedonic" and "appearance". The first group chooses lean beef because it is healthier. In turn, the second group prefers fattier beef, associating it with a tender, tasty and juicy steak, looking for palatability. Consumers in the third group make their choice based on how beef looks like and how it relates to freshness, color, health and the lower production of waste (less waste). On the other hand, the decision tree grouped the Argentine population into two market groups based on beef fat content. The first group includes the "health-conscious" and "appearance" groups, and it contains consumers interested in their health (lean meat) and in a given beef color. The other group contains the "hedonic" group, which consists of consumers who search for a palatable product. Fat and color in beef are the main attributes that all groups have in common and consumer's beliefs and purchase habits are influenced by them. As beliefs and purchase habits appear to be influenced by socio-demographic characteristics, it's considered that the consumer perception of color and marbling depends on these.

## References

1. FAOSTAT. Food and Agriculture Organization of the United Nation (FAO). 2018. Available online: (accessed on 26 March 2021).
2. Biffaretti, A. Oportunidades de marketing en la comercialización minorista de carnes. In IPCVA; Boletin, Ed.; Instituto de promoción de la carne vacuna Argentina: Buenos Aires, Argentina, 2008; pp. 12–17.

3. Bifaretti, A. Implicancias de la calidad de carne en estratégisas de marketing y el comportamiento de los mercados. In Proceedings of the Jornadas Internacionales de Veterinaria Práctica, Buenos Aires, Argentina, 25 August 2017.
4. National Dietary Guidelines, NDG. Available online: (accessed on 26 March 2021).
5. Ministry of Health. 2016. Available online: (accessed on 26 March 2021).
6. Pighin, D.; Pazos, A.; Chamorro, V.; Paschetta, F.; Cunzolo, S.; Godoy, F.; Messina, V.; Pordomingo, A.; Grigioni, G. A Contribution of Beef to Human Health: A Review of the Role of the Animal Production Systems. Sci. World J. 2016, 2016, 1–10.
7. Aguirre, A.; Borneo, M.; El Khori, S.; Borneo, R. Exploring the understanding of the term “ultra-processed foods” by young consumers. Food Res. Int. 2019, 115, 535–540.
8. Arrieta, E.; González, A. Impact of current, National Dietary Guidelines and alternative diets on greenhouse gas emissions in Argentina. Food Policy 2018, 79, 58–66.
9. López Osornio, M.M.; Hough, G.; Salvador, A.; Chambers IV, E.; McGraw, S.; Fiszman, S. Beef’s optimum internal cooking temperature as seen by consumers from different countries using survival analysis statistics. Food Qual. Prefer. 2008, 19, 12–20.
10. Vazquez-Araujo, L.; Chambers IV, E.; Adhikari, K.; Hough, G.; Carbonell-Barrachina, A.A. Influence of various traditional seasonings on beef flavor: United States, Spanish, and Argentinian practices. Meat Sci. 2013, 93, 61–66.
11. Zapata, M.E.; Rovirosa, A.; Carmuega, E. Urbano y Rural: Diferencias en la alimentación de los hogares argentines según nivel de ingreso y área de residencia. Salud Colectiva. 2019, 15, 1–13.
12. Rodriguez, E.; Berges, M.; Casellas, K.; Di Paola, R.; Lupín, B.; Garrido, L.; Gentile, N. Consumer Behaviors and Supermarrkets in Argentina. Dev. Policy Rev. 2002, 20, 429–439.
13. Smith, G.C.; Carpenter, Z.L. Eating quality of animal products and their fat content. In Proceedings of the Symposium on Changing the Fat Content and Composition of Animal Products; National Academy of Sciences: Washington, DC, USA, 1974.
14. Lusk, J.L.; Fox, J.A.; Schroeder, T.C.; Mintert, J.; Koohmaraie, M. In-Store Valuation of Steak Tenderness. Am. J. Agric. Econ. 2001, 83, 539–550.
15. WHO. Diet, Nutrition and the Prevention of Chronic Diseases. Report of joint WHO/FAO Technical Report Series N° 916. 2003. Available online: (accessed on 1 December 2013).
16. Verbeke, W.; De Smet, S.; Vackier, I.; Van Oeckel, M.J.; Warnants, N.; Van Kenhove, P. Role of intrinsic search cues in the formation of consumer preferences and choice for pork chops. Meat Sci. 2005, 69, 343–354.

17. Banović, M.; Fontes, M.A.; Barreira, M.M.; Grunert, K.G. Impact of Product Familiarity on Beef Quality Perception. Agribusiness 2012, 28, 157–172.
18. Deliza, R.; MacFie, H.; Feria-Morales, A.; Hedderely, D. The effect of consumer expectation on the evaluation of instant coffee. Braz. J. Food Technol. 2000, 3, 97–105.
19. Grunert, K.G.; Bredahl, L.; Brunsø, K. Consumer perception of meat quality and implications for product development in the meat sector—A review. Meat Sci. 2004, 66, 259–272.