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Beef consumption patterns and purchasing preferences among consumers in Calceta, Ecuador

Patrones de consumo y preferencias de compra de carne bovina en Calceta, Ecuador

Autores

Naila Gabriela Rodríguez Delgado
naila.rodriguez.0220@espam.edu.ec

Víctor Alejandro Moreira Moreira
victor.moreiram@espam.edu.ec

****José Jusef Vera Ponce***
jjvera@espam.edu.ec

Escuela Superior Politécnica Agropecuaria de Manabí Manuel Félix López, Carrera de Agroindustria. Calceta, Ecuador.

*Autor de correspondencia.

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Resumen

Beef consumption and purchasing behavior vary across local food systems and consumer groups. This study described self-reported beef consumption and purchasing preferences among adults surveyed in Calceta, Ecuador, and examined selected socio-demographic associations. A cross-sectional quantitative survey was completed by 374 adults recruited through non-probability, voluntary-response digital sampling. Descriptive frequencies and percentages were calculated. Selected associations were examined using Pearson chi-square tests when expected-frequency assumptions were met and Monte Carlo *P*-values (100,000 simulations) when they were not; Cramer's V with 95% bootstrap confidence intervals quantified effect size, and Holm adjustment was applied across four global tests. Among respondents, 57.49% reported consuming beef twice per week, 76.47% reported lunch as the main consumption occasion, and purchases were most frequently reported at local butcher shops (36.36%) and supermarkets (35.83%). The combined 'quality and trust' criterion was the most frequently selected criterion for choosing a purchase location (41.18%). Stated product preferences included fresh odor (58.56%), mild flavor (62.03%), and moderately firm texture (45.45%). Occupation was associated with consumption frequency after sparse frequency categories were combined (χ^2 (8, N= 374)= 40.79, P<0.001, V= 0.234). Education was associated with meal timing (χ^2 (6, N= 374)= 28.51, Monte Carlo P<0.001, V= 0.195) and the most frequently consumed beef cut (χ^2 (15, N= 374)= 37.28, Monte Carlo P= 0.032, V= 0.182). Findings apply to the surveyed participants and should not be generalized to all adults in Calceta because recruitment was non-probabilistic.

Keywords: beef consumption, purchasing behavior, self-reported preferences, socio-demographic factors, Ecuador.

Abstract

El consumo y la compra de carne bovina varían entre sistemas alimentarios locales y grupos de consumidores. Este estudio describió los patrones autoinformados de consumo y las preferencias de compra de carne bovina entre adultos encuestados en Calceta, Ecuador, y examinó asociaciones socio-demográficas seleccionadas. Se realizó una encuesta cuantitativa de corte transversal a 374 adultos reclutados mediante muestreo no probabilístico de respuesta voluntaria por medios digitales. Se calcularon frecuencias y porcentajes. Las asociaciones seleccionadas se analizaron mediante chi-cuadrado de Pearson cuando se cumplieron los supuestos de frecuencias esperadas y mediante valores *P* obtenidos por simulación Monte Carlo (100.000 simulaciones) cuando no se cumplieron; la magnitud de asociación se estimó con V de Cramér e intervalos de confianza del 95% por bootstrap y se aplicó el ajuste de Holm a cuatro pruebas globales. Entre los participantes, el 57,49% informó consumir carne bovina dos veces por semana, el 76,47% señaló el almuerzo como principal momento de consumo y los lugares de compra más reportados fueron las carnicerías locales (36,36%) y los supermercados (35,83%). El criterio combinado 'calidad y confianza' fue el más seleccionado para elegir el lugar de compra (41,18%). Las preferencias declaradas incluyeron olor fresco (58,56%), sabor suave (62,03%) y textura moderadamente firme (45,45%). La ocupación se asoció con la frecuencia de consumo después de reagrupar las categorías de baja frecuencia (χ^2 (8, N= 374)= 40,79; P<0,001; V= 0,234). El nivel educativo se asoció con el momento de consumo (χ^2 (6, N= 374)= 28,51; P Monte Carlo <0,001; V= 0,195) y con el corte de carne bovina consumido con mayor frecuencia (χ^2 (15, N= 374)= 37,28; P Monte Carlo= 0,032; V= 0,182). Los resultados corresponden a los participantes encuestados y no deben generalizarse a toda la población adulta de Calceta debido al reclutamiento no probabilístico.

Palabras clave: consumo de carne bovina, comportamiento de compra, preferencias autoinformadas, factores socio-demográficos, Ecuador.

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Introduction

Beef-purchasing and consumption decisions reflect interactions among product attributes, retail context, consumer characteristics, and broader social and economic conditions. Consumers commonly use intrinsic cues such as color, odor, visible fat, and expected eating quality together with extrinsic cues such as price, origin, retail channel, and trust when evaluating meat products (Liu et al., 2022; Cardona et al., 2023). These cues are perceptions and expectations at the point of choice and should be distinguished from measurements obtained in controlled sensory evaluation.

Cross-cultural studies show substantial heterogeneity in beef consumption and purchasing behavior. In a comparison of consumers in Brazil, Spain, and Turkey, the proportion reporting beef consumption at least twice per week differed markedly among countries, illustrating the importance of local context when interpreting consumer surveys (Magalhaes et al., 2023). Research in South America has likewise shown that perceived quality, food-safety concerns, price, and trust may contribute differently to beef-purchasing decisions across consumer groups (Bifaretti et al., 2023).

Consumer responses can also vary with socio-demographic characteristics. Education, age, and occupational context have been associated with differences in food-choice patterns in survey research, although cross-sectional associations do not establish causality (Kmeťková et al., 2025). Major contextual events can further alter meat purchasing and consumption practices, as documented during the COVID-19 pandemic (Żurek and Rudy, 2024).

In Ecuador, previous work has examined demand for beef-quality attributes and consumer willingness to pay (Castillo and Carpio, 2019), while studies in Manabí have described meat consumption in communities outside Calceta (Rodríguez et al., 2021). However, locally specific evidence integrating self-reported consumption frequency, purchase channel, purchase criteria, and stated product preferences among adults surveyed in Calceta remains limited.

Accordingly, this study aimed to describe self-reported beef consumption patterns and purchasing preferences among surveyed adults in Calceta and to examine associations between occupation and consumption frequency, education and meal timing, and education and the most frequently consumed beef cut. The association between age and occupation was examined descriptively.

Materials and methods

This cross-sectional study used a quantitative, descriptive survey design. The analytical population of interest was adults aged 18 years or older residing in Calceta who reported consuming beef. Eligibility was defined by self-reported age, residence in Calceta, and beef consumption. No variables were experimentally manipulated, and the questionnaire measured stated consumption, purchasing behavior, and preferences rather than sensory responses to standardized meat samples.

For the original sample-size planning, 12,507 adult residents of Calceta were used as the reference population based on Instituto Nacional de Estadística y Censos [National Institute of Statistics and Censuses] (INEC, 2022). This value represents the adult resident population used for planning and should not be interpreted as a census count of habitual beef consumers. The finite-population calculation used $n= NZ^2pq/[e^2(N-1)+Z^2pq]$, with N= 12,507, Z= 1.96, P= q= 0.50, and e= 0.05, yielding approximately 373 responses; 374 complete questionnaires were ultimately obtained. Because the questionnaire link was distributed digitally and participation depended on voluntary access to the form, no complete population sampling frame or individual random-selection procedure was used. The final sample was therefore classified as non-probability voluntary-response sampling, and the sample-size calculation is reported only as a recruitment target rather than as evidence of population representativeness.

Data were collected through Google Forms from July 8 to October 30, 2025. The link was distributed digitally to potential adult respondents in Calceta. Because recruitment did not use a closed list of individually invited participants, the number of invitations and a conventional response rate could not be calculated. All 374 submitted questionnaires contained responses to the 20 items. The data set was retrospectively screened for exact duplicate 20-item response profiles; none were identified, although anonymous data do not permit definitive verification that each response came from a unique individual.

The questionnaire contained 20 categorical items covering socio-demographic characteristics, purchasing and consumption behavior, stated product-attribute preferences, packaging, and sustainability/ethical production. Item content was informed by published work on meat-quality attributes and consumer perspectives (Joo et al., 2013; Henchion et al., 2017). A preliminary pilot was used to assess wording clarity and comprehensibility. The retained project records do not document the pilot sample size or item-level modifications; therefore, no claim of formal content validation is made. Because the questionnaire consisted mainly of independent nominal or ordinal items and was not designed as a unidimensional reflective scale, a global Cronbach's alpha was not considered conceptually appropriate and was not used in the reanalysis. An online questionnaire comprising 20 items was administered via Google Forms to examine local consumers' preferences regarding the organoleptic attributes of beef and

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how these attributes influence their purchasing decisions in Calceta, Ecuador. All 374 respondents completed every item; therefore, response frequencies and percentages were calculated using 374 as the denominator for each item. The findings reflect self-reported preferences and purchasing decisions rather than sensory test results.

Statistical analyses were conducted in R (version 4.6.1) using all 374 records. Categorical variables were summarized as frequencies and percentages. Four global associations were examined: age × occupation, occupation × consumption frequency, education × meal timing, and education × most frequently consumed beef cut. For occupation × frequency, the original categories 'three times per week' and 'more than three times per week' were combined as 'three or more times per week' because of sparse expected counts, as recommended during peer review. Pearson's chi-square test was used when no expected count was <1 and no more than 20% of expected counts were <5. When those criteria were not met, the Pearson chi-square statistic was retained but the global p-value was estimated by Monte Carlo simulation with 100,000 replicates. Effect size was reported as Cramer's V with 95% bootstrap confidence intervals (5,000 resamples). Adjusted Pearson residuals were examined to identify cells contributing to significant associations, with Holm correction for cell-wise comparisons; Holm adjustment was also applied across the four global tests. Statistical significance was set at $\alpha = 0.05$.

Ethics statement

Under Article 87 of the institutional bioethics provisions of the Escuela Superior Politécnica Agropecuaria de Manabí Manuel Félix López (ESPAM MFL), this anonymous, minimal-risk survey was exempt from prior review by the institutional Bioethics Committee; consequently, no approval code was issued. Before participation, respondents were informed of the purpose of the study and that participation was voluntary. Voluntary completion and submission of the anonymous questionnaire after presentation of this information was used as consent to participate. No direct personal identifiers were collected.

Results and discussion

Socio-demographic characteristics

The analytical sample comprised 374 respondents: 209 women (55.88%) and 165 men (44.12%). Most respondents were aged 50 years or younger (n= 326; 87.17%). The largest age group was 26-35 years (n= 128; 34.22%), followed by 36-50 years (n= 119; 31.82%). Secondary (n= 167; 44.65%) and university education (n= 155; 41.44%) were the most frequent educational categories. Merchants were the largest occupational group (n= 128; 34.22%), followed by other occupations (n= 86; 22.99%) (table 1).

Table 1. Socio-demographic characteristics of the surveyed sample.

Variable	Category	Percentage (%)	n
Sex	Female	55.88	209
	Male	44.12	165
Age (years)	18-25	21.12	79
	26-35	34.22	128
	36-50	31.82	119
	>50	12.83	48
Education level	None	2.94	11
	Primary	10.96	41
	Secondary	44.65	167
	University education	41.44	155
Occupation	Public employee	16.84	63
	Private employee	13.90	52
	Merchant	34.22	128
	Farmer	12.03	45
	Other occupation	22.99	86

Age and occupation were associated (χ^2 (12, N= 374)= 101.56, $P<0.001$; Holm-adjusted $P<0.001$; Cramer's V= 0.301, 95% CI 0.257-0.372). All expected counts were ≥5 (minimum expected count= 5.78), supporting the asymptotic chi-square approximation. Adjusted residuals indicated that respondents aged 18-25 years were more frequently classified in 'other occupation' than expected under independence, whereas respondents older than 50 years were more frequently represented among farmers (table 2).

Table 2. Distribution of occupation according to age group (n= 374).

Age group (years)	Farmer	Merchant	Private employee	Public employee	Other	Total
18-25	2 (2.5%)	23 (29.1%)	5 (6.3%)	3 (3.8%)	46 (58.2%)	79
26-35	9 (7.0%)	48 (37.5%)	24 (18.8%)	24 (18.8%)	23 (18.0%)	128
36-50	20 (16.8%)	44 (37.0%)	20 (16.8%)	22 (18.5%)	13 (10.9%)	119
>50	14 (29.2%)	13 (27.1%)	3 (6.3%)	14 (29.2%)	4 (8.3%)	48

Values are presented as frequency (n) and row percentage (%).

Beef consumption frequency and timing

Among respondents, 215 (57.49%) reported consuming beef twice per week, 96 (25.67%) once per week, 55 (14.71%) three times per week, and 8 (2.14%) more than three times per week (table 3). The combined proportion reporting beef consumption at least twice weekly was 74.33%, indicating that consumption was a recurring practice for most respondents.

Table 3. Beef consumption patterns among surveyed respondents (n= 374).

Variable	Category	Percentage (%)	n
Weekly consumption frequency	Once	25.67	96
	Twice	57.49	215
	Three times	14.71	55
	More than three times	2.14	8
Meal time	Breakfast	10.70	40
	Lunch	76.47	286
	Merienda (snack/light meal)	12.83	48

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Twice-weekly consumption was the most frequent response (57.49%), whereas consumption more than three times weekly was uncommon (2.14%). Magalhaes et al. (2023) documented variation in beef-consumption frequency across Brazil, Spain, and Turkey. Here, the predominance of the twice-weekly category indicates a concentrated reported pattern, rather than an even distribution across frequency categories. This local result complements the differences described in that cross-cultural comparison and provides useful information for describing respondents' weekly consumption habits.

Reported meal timing

Lunch was the most frequently reported consumption occasion (n= 286; 76.47%), followed by merienda (a snack/light meal; n= 48; 12.83%) and breakfast (n= 40; 10.70%) (table 3). The concentration of responses at lunch suggests that this meal provides the clearest point of reference for understanding how participants incorporate beef into their reported eating routines.

Education and most frequently consumed beef cut

Education level was associated with the most frequently consumed beef cut (χ^2 (15, N= 374)= 37.28; Monte Carlo *P*= 0.032; Holm-adjusted *P*= 0.032; Cramer's V= 0.182, 95% CI 0.142-0.271). Because 13 of 24 expected counts (54.17%) were <5 and the minimum expected count was 0.03, the asymptotic p-value was not used. Holm-adjusted cell-wise residuals identified university education × tenderloin ('lomo fino') as the clearest contributing cell. This modest association highlights variation across educational groups in the reported cuts consumed most frequently (figure 1).

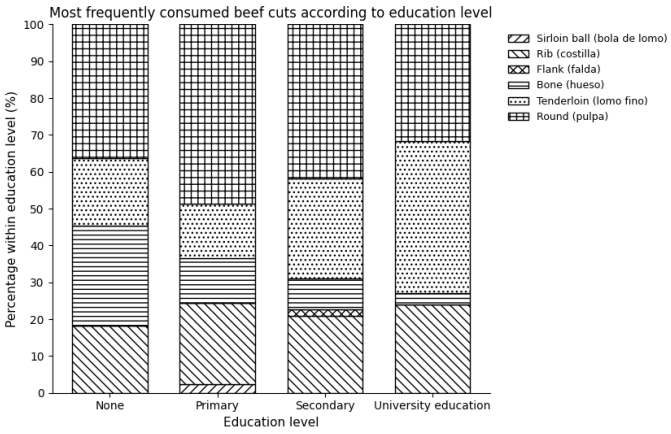


Figure 1. Distribution of the most frequently consumed beef cuts by education level among surveyed respondents (n= 374).

Because educational groups differed in size, figure 1 should be read using within-group percentages rather than raw totals. In the text, round ('pulpa') is used as a provisional commercial translation of the original survey category, not as a verified anatomical equivalence.

The observed distribution indicates differences in reported cut choices across educational groups. Castillo and Carpio (2019) investigated consumer valuation of beef-quality attributes in Ecuador, whereas the present study examined the cuts reported as most frequently consumed. These approaches address different aspects of beef-choice behavior: valuation of quality attributes and stated cut selection. The association magnitude (V= 0.182) indicates that the education-related association was modest in magnitude.

Reported criteria for selecting a purchase location

The most frequently selected criterion for choosing a purchase location was 'quality and trust' (n= 154; 41.18%), followed by hygiene (n= 58; 15.51%), price (n= 57; 15.24%), and better service (n= 54; 14.44%). Local butcher shops (n= 136; 36.36%) and supermarkets (n= 134; 35.83%) were the most frequently reported purchase locations. These purchase-location responses are also displayed in figure 2A.

The combined response category "quality and trust" was selected more often than price (41.18% versus 15.24%). This places perceived quality-related considerations ahead of price as the single most frequently selected criterion for choosing a purchase location (figure 2B). The similar shares of local butcher shops (36.36%) and supermarkets (35.83%) show that the surveyed consumers used different retail channels. Bifaretti et al. (2023) also discuss the relevance of quality, trust, and price in South American beef purchasing; the present results add a local perspective based on the questionnaire's combined "quality and trust" option. Convenience (n= 157; 41.98%) and personal liking (n= 140; 37.43%) were the most frequently reported reasons for beef consumption, suggesting that both practical considerations and enjoyment were relevant to these respondents.

Preparation preferences were dominated by the "asada" (roasted/grilled) option (n= 174; 46.52%), followed by 'seco' (n= 76; 20.32%), 'hornado' (n= 64; 17.11%), and soups or broths (n= 60; 16.04%) (figure 2C). This distribution indicates a clear preference for the asada category among survey respondents. Because the original questionnaire used broad local preparation names, the result should not be interpreted as a measurement of specific cooking temperatures, equipment, or techniques.

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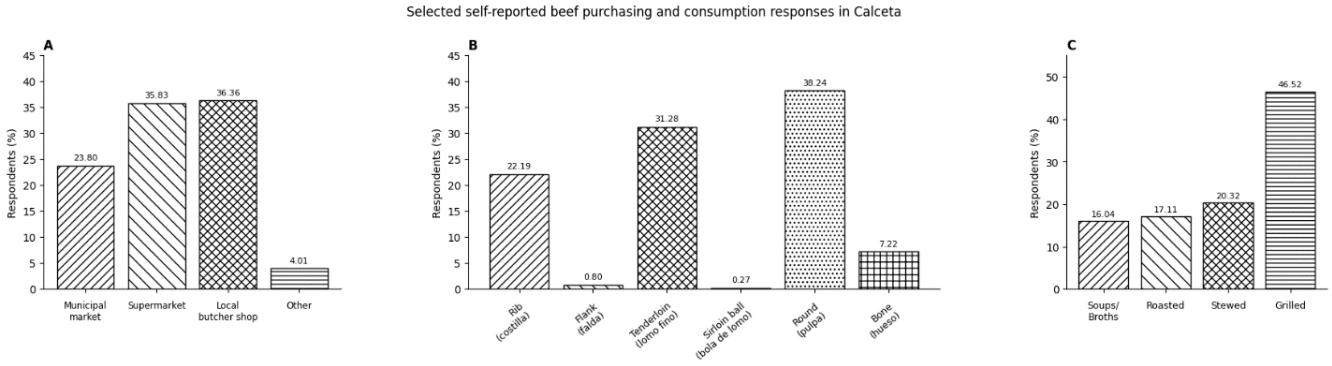


Figure 2. Selected self-reported beef purchasing and consumption responses: (A) usual purchase location, (B) most frequently consumed beef cuts, and (C) preparation methods.

Stated preferences for product attributes

The questionnaire elicited stated preferences rather than conducting a controlled sensory evaluation. Fresh odor was selected by 219 respondents (58.56%), mild flavor by 232 (62.03%), and moderately firm texture by 170 (45.45%). Low visible fat was preferred by 203 respondents (54.28%), while 130 (34.76%) preferred beef with intramuscular marbling. Regarding the color of raw beef, 146 (39.04%) selected the "less reddish" category, 138 (36.90%) "very red", 81 (21.66%) reported not focusing on color, 7 (1.87%) selected "bright red", and 2 (0.53%) selected "pink".

These choices indicate which verbal descriptors participants associated with desirable beef. Fresh odor and mild flavor were the most frequently selected responses for their respective items, while the less reddish and very red options attracted relatively similar proportions for raw-meat color. Such variation underscores the importance of distinguishing consumers' expressed expectations from objective meat-quality attributes. Previous research distinguishes intrinsic and extrinsic choice cues (Cardona et al., 2023) and consumer expectations from measured eating quality (Liu et al., 2022).

Occupation and beef-consumption frequency

After combining 'three times per week' with 'more than three times per week', occupation was associated with reported beef-consumption frequency (χ^2 (8, N= 374)= 40.79, P<0.001; Holm-adjusted P<0.001; Cramer's V= 0.234, 95% CI 0.190-0.315). No expected counts were <5 (minimum expected count= 7.58). Holm-adjusted residuals showed that merchants reported twice-weekly consumption more often and once-weekly consumption less often than expected under independence, while respondents in 'other occupation' showed the opposite pattern (table 4).

Table 4. Weekly beef consumption frequency according to occupation after consolidation of sparse categories (n= 374).

Occupation	Once	Twice	Three or more times	Total
Farmer	4 (8.9%)	31 (68.9%)	10 (22.2%)	45
Merchant	16 (12.5%)	92 (71.9%)	20 (15.6%)	128
Private employee	18 (34.6%)	25 (48.1%)	9 (17.3%)	52
Public employee	20 (31.7%)	34 (54.0%)	9 (14.3%)	63
Other	38 (44.2%)	33 (38.4%)	15 (17.4%)	86
Total	96	215	63	374

Values are presented as frequency (n) and row percentage (%). The two sparse upper-frequency categories were combined before inference.

Merchants most frequently reported twice-weekly consumption (71.9%), whereas respondents in the "other occupation" category reported it less often (38.4%) and selected once-weekly consumption more frequently (44.2%; table 4). These contrasting response patterns account for part of the occupation–frequency association and show that the most common consumption schedule differed across occupational categories. Kmeťková et al. (2025) likewise examined sociodemographic variation in meat-consumption behavior, providing a broader reference for interpreting the local occupational pattern identified in this survey.

Education and reported meal timing

Education level was associated with reported meal timing (χ^2 (6, N= 374)= 28.51; Monte Carlo P= 0.00022; Holm-adjusted P= 0.00044; Cramer's V= 0.195, 95% CI 0.146-0.277). Three of 12 expected counts (25.0%) were <5 (minimum expected count= 1.18), so a Monte Carlo P-value was used. Holm-adjusted residuals indicated more breakfast responses than expected among respondents with secondary education, fewer breakfast responses and more lunch responses than expected among those with university education, and more merienda responses than expected among those with primary education. The distribution of reported meal timing by education level is presented in table 5.

LA TÉCNICA
Revista de las Agrociencias
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Table 5. Reported meal occasion according to education level among surveyed participants (n= 374).

Education level	Breakfast	Lunch	Merienda	Total
None	0 (0.0%)	9 (81.8%)	2 (18.2%)	11
Primary	5 (12.2%)	25 (61.0%)	11 (26.8%)	41
Secondary	30 (18.0%)	121 (72.5%)	16 (9.6%)	167
University education	5 (3.2%)	131 (84.5%)	19 (12.3%)	155
Total	40	286	48	374

Values are presented as frequency (n) and row percentage (%) except for the total row. 'Merienda' is retained as the original questionnaire response label.

The meal-time distribution differed among educational categories: lunch was reported by 84.5% of respondents with university education, compared with 61.0% of those with primary education (table 5). Breakfast and merienda also showed differing response profiles across educational categories. Kmeťková et al. (2025) explored socio-demographic differences in meat and fish consumption across five European countries; the present analysis adds an Ecuadorian perspective focused specifically on reported beef-consumption occasions.

Study limitations

Several limitations constrain interpretation. First, digital voluntary-response recruitment was non-probabilistic; consequently, selection and digital-access bias are possible and the results cannot be generalized statistically to all adult consumers in Calceta. Second, all outcomes were self-reported and may be affected by recall or response bias. Third, the cross-sectional design supports association, not causal inference or temporal stability. Fourth, household income, market access, certification awareness, nutritional knowledge, and behavioral inertia were not measured and therefore cannot explain the observed associations. Fifth, several beef-cut categories were rare, requiring Monte Carlo inference and limiting detailed subgroup interpretation. Finally, although a clarity pilot was conducted, the available study records do not preserve the pilot sample size or a formal content-validation procedure; the questionnaire should therefore be interpreted as a descriptive survey instrument rather than a validated psychometric scale.

Conclusion

Among the 374 surveyed adults, the most frequently reported consumption pattern was twice per week, lunch was the most common consumption occasion, and local butcher shops and supermarkets were the most frequently reported purchase channels. The combined 'quality and trust' criterion was the most frequently selected criterion for choosing where to buy beef. The questionnaire also identified stated preferences for fresh odor, mild flavor, moderately firm texture, and low visible fat.

Occupation was associated with reported consumption frequency, and education was associated with meal timing and the most frequently consumed beef cut, with small-to-moderate Cramer's V values. These findings describe associations among respondents and do not establish causal effects of occupation or education. Because recruitment was non-probabilistic and digitally mediated, the results should be treated as context-specific evidence from the surveyed sample rather than as population estimates for all adults in Calceta.

Conflict of interest

The authors declare that they have no conflicts of interest related to this publication.

Use of language-editing tools

Grammarly was used solely for grammar, clarity, and language editing. It was not used to generate data, perform statistical analyses, or determine the scientific interpretation of the results.

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Author contributions (CRediT Statement)

Naila Gabriela Rodríguez Delgado: Methodology, Investigation, Formal analysis, Writing – original draft, Writing – review & editing. **Víctor Alejandro Moreira Moreira:** Formal analysis, Writing – original draft, Writing – review & editing. **José Jusef Vera Ponce:** Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Writing – review & editing.