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Unveiling game meat: an analysis of marketing mix and consumer preferences for a forest ecosystem product

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This study explores the dynamics of the game meat market, with a particular focus on venison and wild boar meat, to assess the impact of a nuanced marketing mix and strategy grounded in a comprehensive customer analysis. By conducting three pivotal research studies—namely, the Omnibus Survey (2022) and Consumer Market Analysis Polls (2021 and 2023)—and analysing their data, this research comprehensively analyses buyers' preferences, motivations, and purchasing patterns. This paper is guided by three research questions aimed at examining the relationship between the game meat consumption and engagement in forest ecosystem services, including forest visitation, the sociodemographic characteristics of consumers and the criteria for market segmentation. The analysis focuses on identifying factors influencing the game meat consumption and examines how these factors may influence consumer behavior over time. It also explores the implications for the development of marketing strategies, based on Michael E. Porter's approach, which is discussed in detail. Additionally, the research evaluates the role of game meat within the context of forest ecosystem services, its contribution to forest reforestation initiatives, and its relevance in the formulation of forest policy. This examination highlights the dual nature of game meat as both a market commodity and a critical element in ecosystem management and policy frameworks, seeking to harmonize the economic and ecological objectives.

KEYWORDS

game meat, forest ecosystem services, marketing segmentation, consumer analysis, game management

1 Introduction

1.1 Game meat as a product of forest ecosystem services

Through their multifaceted services, forest ecosystems fulfil a diverse range of societal and individual needs (Berkes and Davidson-Hunt, 2006; Chopra and Kumar, 2004; Jenkins and Schaap, 2018). Among these services, the provision of game meat has emerged as a significant and sustainable source of nutrition and economic value, categorized as a supply-oriented activity within forest ecosystem services (Millennium Ecosystem Assessment, 2005). This categorization has been further refined in recent frameworks. The TEEB (The Economics of Ecosystems and Biodiversity) classifies game meat within a broader food category (Sukhdev et al., 2010), while the CICES (Common International Classification of Ecosystem Services) identifies it as a subcategory of biomass production for nutrition (Haines-Young and Potschin,

2013; Nunes et al., 2019) highlight the socioeconomic value of wild meat extraction to local food security, emphasizing the importance of game meat in rural economies, while (Roila et al., 2021) also emphasize the economic return and cultural promotion associated with game meat, supporting its role in a circular economy. However, the public perception of the role of the forest environment in relation to game meat sometimes does not align with the need to regulate the game density to limit damage to forest stands, suggesting potential conflicts in the forest policy (Němec et al., 2023a,b).

The economic significance of game meat production necessitates thoroughly examining its market dimensions. This includes the analysis of the market size, value, and marketing strategies at both national and international levels, as highlighted in recent studies (Audenaerde, 2022; Mesinger and Ocieczek, 2021; Needham et al., 2023; Pearse, 2022). The increasing scholarly attention towards the game meat value chain reflects various factors, among these, the rising prominence of ecosystem services and the search for alternative forest maintenance funding sources are noteworthy (Štěrbová et al., 2019). The bark beetle calamity has been a significant concern in Central European forests, leading to economic losses and alterations in the forest structure and composition (Biedermann et al., 2019). The impact of events, such as the bark beetle calamity and climate change-induced shifts in forest composition, notably towards more deciduous trees, has led to an increase in game populations in Central Europe (Jacob et al., 2010; Sobek et al., 2009). This rise in the game population necessitates effective game management, potentially augmenting the game meat supply to the market. Thus, the game meat market is emerging as a vital component of forest ecosystem products and services, interlinked with the sustainability of forest management practices (Ezebilo, 2012; Hothorn and Müller, 2010). A related area of hunting, as part of the recreational use of forests, ties into the broader discussion of game meat production as an ecosystem service as described in the study by Dobsinska and Sarvasova (2016).

The interest in game meat consumption is influenced by a combination of subjective and objective factors. Schunko et al. (2019) discuss subjective influences, such as tradition, societal, and cultural preferences, which significantly shape the demand for game meat. On the other hand, objective influences, such as the nutritional content of game meat, particularly its high protein content and composition, also contribute to its appeal. Additionally (Hedman et al., 2020) highlight the importance of considering food safety in relation to the consumption and handling of game meat, emphasizing the presence of zoonotic spillover events and the ubiquity of parasitic, bacterial, and viral pathogens in human and animal populations and their surrounding environment. The perceptions of consumption safety among consumers were detailed by (Niewiadomska et al., 2021), who categorized them into three clusters: Fearful (30%), Selective (28%), and Indifferent (42%).

Nutritionally, game meat is distinguished by its high protein content and composition and its lower fat content, as emphasized in Bureš et al. (2018), Deutz (2012), and Okuskhanova et al. (2017). Substantial levels of minerals, vitamins, trace elements, and unsaturated fatty acids further enhance game meat's nutritional profile. The demand for game meat is intricately tied to traditional, societal, and cultural preferences, as explored in various studies (Schunko et al., 2019).

Contemporary societal trends, including the pursuit of a healthy diet and the preference for locally sourced foods, align well with the potential benefits of systematic game meat production. This could provide additional resources for small forest owners, who face challenges in achieving economies of scale in forest production and are bound by stringent regulatory requirements (Sarvašová et al., 2015). The understanding of the problems of game meat production and marketing constitutes an integral component of the legislative framework (Bekker et al., 2011) underpinning the forestry policy, offering supplementary information resources for decision-making processes within the forestry sector, directly connected to the value production chain prevalent in forestry. It offers an expansion of a comprehensive toolbox for holistic decision-making within the forestry sector.

For the effective market use of these additional resources, the relevant marketing decision-making framework to be established becomes crucial (Halaj and Brodrechtova, 2018).

Integrating game meat into modern food systems presents a unique opportunity for promoting biodiversity conservation within forest ecosystems. In contrast to conventional livestock farming with negative impacts on the land, water, biodiversity, and climate change (Chen et al., 2021), game meat production inherently requires preserving and managing diverse natural habitats. This ecological requirement aligns game meat production with conservation objectives, offering a synergistic approach to both food production and ecosystem health, causing game meat production to be part of circular bioeconomy opportunities (Henchion and Shirsath, 2022).

This complex interplay of ecological, social, economic, and nutritional factors underscores the need for a comprehensive understanding of the game meat market, paving the way for the sustainable utilization and marketing strategies that align with forest ecosystem conservation goals.

1.2 Purpose of the research

The development of the game meat market is intricately linked with the compelling marketing mix employed by game producers and suppliers. In this context, game meat refers to the meat derived from wild ungulates, specifically venison and wild boar meat. A profound comprehension of the customer underpins the creation of an effective marketing mix and strategy.

During the process of a customer analysis, crucial inquiries regarding "Who" – identification and understanding of the target customer, "Where"—the distribution channels, supply chain logistics, and optimal locations for product availability, "When"—questions involve determining the right time to launch a product, run a campaign, or offer promotions, "How"—the methods used to reach and engage the target audience and most notably, "Why"—the motivations and reasons behind consumer behavior, why they make purchases are explored. As emphasized by Kotler, the "Why" question holds particular significance (Kotler, 2012). Although the study focuses primarily on the "Who" and "Where" aspects, the "How" and "Why" questions are considered to provide a well-rounded view of consumer behavior, contributing to the overall market analysis.

The presented article builds upon a previous study conducted in 2021 (Němec et al., 2023a,b), where the main point of the research centered around the Parfitt Collins model, with a primary focus on the subset of meat consumers who actively engage in shopping and frequenting restaurants. The survey was repeated in 2023, where, in addition, the group of analysed respondents was significantly expanded by active buyers as the primary focus aligns with the study's objective

to delineate the marketing aspects of venison effectively (Grunert et al., 2014; Niewiadomska et al., 2020) offering direct implications for market expansion and sustainability strategies within this sector. By analysing the active buyers' preferences, motivations, and purchasing patterns, our study aims to uncover distinct insights into the drivers of the demand for venison. This approach allows for a granular examination of the factors influencing the consumption trends as indicated in various studies (Mondéjar-Jiménez et al., 2022), thereby deriving targeted marketing strategies tailored to this key demographic.

This study broadens the scope of the Parfitt-Collins model by incorporating it into a more comprehensive framework and investigating various marketing aspects which lead to the establishment of the following hypothesis:

> *Based on research and data analysis, it is possible to design a differentiated marketing mix that takes into account the specifics of individual target groups, particularly in relation to game meat, leading to more effective engagement with these groups and improved business outcomes.*

To confirm this hypothesis, three auxiliary research questions were formulated:

> *RQ 1*. Can a relationship be identified between the active engagement in ecosystem services (such as forest visits and the collection of mushrooms and berries) and game consumption, as evidenced by an omnibus survey?
>
> *RQ 2*. Do statistically significant alterations exist within the same target group when comparing research findings between 2021 and 2023? If so, how do these changes influence the formulation of the marketing mix?
>
> *RQ 3*. Do significant differences exist between 'Group A' and 'Group B'? What are the primary outcomes for shaping the marketing mix strategy if confirmed?

The first research question extends a distinct and extensive long-term investigation of utilizing ecosystem products and services linked to forest visitation and collecting forest fruits and mushrooms (Riedl et al., 2020; Sisak et al., 2016). This question aims to determine whether game consumption aligns with the consumption of other ecosystem services and, if so, to explore how this alignment occurs. This investigation can provide insights for developing effective marketing strategies that leverage these connections to enhance the promotion of game products. This entails examining the types of game consumed, the frequency of consumption, and whether any discernible relationships exist between the socio-demographic attributes and the consumption of game, along with utilizing other ecosystem services.

The formulation of the second research question arises from the notable and dynamic changes unfolding across various factors in Central Europe. These changes primarily encompass natural elements related to climate fluctuations, the geopolitical and economic consequences of the conflict in Ukraine, and the effects stemming from the marketing initiatives undertaken by game producers and manufacturers. The question's objective is to assess their effects on the group of respondents previously examined in 2021 and in 2023.

The third research question aims to validate the significance of employing a distinct approach to the market for the marketing strategy and specific marketing mix components. This validation will be accomplished through a comparative analysis of two different segments of customers based on different behavior patterns in relation to game consumption.

The presented RQs highlight the elements we focused on in the Marketing mix, namely:

Product: Data collection included detailed questions about consumer preferences for different types of game meat (e.g., venison, wild boar) and consumption context (organic food, ecologically framed etc.). This helps to understand consumer expectations of the product.

Price: Information about consumer price sensitivity and their willingness to pay was gathered to help assess a targeted pricing strategy. Data on how different groups (e.g., Group A and B) perceive the price barrier for game meat consumption provides insights into appropriate price points for various market segments.

Place: The data from both surveys included information on where consumers typically consume game meat, whether at home or in restaurants. This data helps in identifying optimal distribution channels to reflect this consumption pattern.

Promotion: The survey also investigated the effectiveness of promotional messages (e.g., focusing on health and sustainability). Understanding the impact of these promotional efforts provides insight into how to better communicate with different consumer segments.

2 Materials and methods

2.1 Data collection

This study's methodology is designed to address the research questions presented in the previous chapter, focusing on the effective implementation of marketing strategies for game meat. Answering the research questions also involves examining how consumers engage with game meat (e.g., through different purchasing channels) and why they choose it (e.g., for health, environmental, or cultural reasons). These insights complement the broader analysis of the market and contribute to the formulation of effective marketing strategies. The selected data sources: Omnibus Survey (2022), Consumer Market Analysis Polls (2021 and, 2023)—are integral to this endeavor. The scope of this study encompasses the entirety of the Czech Republic (CZ), a country in central Europe. The CZ occupies a landmass spanning 78,863 km2. Within this expanse, the forested land accounts for 26,717 km2, equivalent to 33.9% of the total CZ area.

2.2 Omnibus survey (2022)

This survey focused on forest visits and non-timber forest products, has been carried out regularly every year since 1994. For all the survey details, including the basic set of questions, see (Sisak et al., 2016). The questioning was conducted using a Computer Aided Personal Interview (CAPI) on a representative group of respondents. The respondents were selected based on their gender, age, education, municipality size and county of residence (the so-called quota

TABLE 1 Structure of the research sample.

Category	Sub-category	Group A, 2021	Group A, 2023	Group B, 2023
Gender	Male	266	285	200
	Female	257	245	310
Age category	20–29 years old	84	81	51
	30–39 years old	137	142	105
	40–49 years old	136	141	128
	50 or more years	166	166	226
Highest completed education	Elementary school/secondary school without high school diploma	95	121	216
	Secondary school with high school diploma	261	231	197
	University/Higher vocational school	167	178	97
Region of the Czech Republic	Prague and the Central Bohemian Region	169	172	130
	Bohemia	162	174	212
	Moravia	192	184	168
Place of residence	Village	153	150	213
	Small and medium-sized cities	199	205	202
	Big cities	171	175	95
Total		523	530	510

sample). In 2022, this survey was expanded to include questions about game consumption. The data collection and processing of the results took place in the period: 30.11.–8.12.2022. The total number of conducted interviews and completed questionnaires reached 1,000 respondents.

2.3 Consumer market analysis poll (2021)

A consumer market survey was undertaken in 2021 using the online data collection method, "Computer-Assisted Web Interviewing" (CAWI), facilitated by the Nielsen agency. Field data acquisition occurred within the temporal span from August 24th to August 30th, 2021. After the data collection, analysis procedures were applied to a representative subset of the populace comprising 523 participants. This assemblage encompassed individuals aged 20 and above who share the joint responsibility for procurement activities and dining at a restaurant at least twice per month while maintaining a preference for meat consumption (hereinafter referred to as Group A, 2021). The data incorporated various parameters, including gender, age, education, geographical region, and the scale of their respective residential localities, for all the survey details and questionnaire, see Němec et al. (2023a,b).

2.4 Consumer market analysis poll (2023)

Two parallel consumer market surveys were undertaken in 2023 utilizing the same questionnaire and CAWI method as in 2021. The selection criteria incorporated include gender, age, education, income, geographical region, and the scale of their respective residential localities. Field data acquisition took place from July 25 to August 2, 2023. After data acquisition, a meticulous examination was conducted of two diverse subsets:

Group A, 2023: This assemblage comprises 530 respondents fulfilling the same criteria as in the survey in 2021 (Group A, 2021): i.e., aged 20 and above who share the joint responsibility for procurement activities and dining at a restaurant at least twice per month consuming meat.

Group B, 2023: This assemblage comprises 510 respondents aged 20 and above who share the joint responsibility for procurement activities and go to a restaurant, at most, once a month or do not consume meat. The structure of the samples is shown in Table 1.

Table 1 presents the demographic structure of the research sample, comparing Group A (2021), Group A (2023), and Group B (2023). The table includes details on gender, age categories, highest completed education, region of the Czech Republic, and place of residence for each group. Gender: The distribution between male and female respondents is shown for each group, with Group B (2023) having a notably higher proportion of female respondents compared to Group A. Age Category: Respondents are grouped into four age categories. The 50 or more years category is the largest in Group B (2023), indicating an older population compared to Group A. Highest Completed Education: Educational levels are divided into three categories. Group B (2023) has the highest percentage of respondents without a high school diploma, while Group A (2023) maintains a higher proportion of those with a university or higher vocational school education. Region of the Czech Republic: Respondents are categorized by three major regions: Prague and the Central Bohemian Region, Bohemia, and Moravia. Group B (2023) has a higher

representation from the Bohemia region. Place of Residence: Respondents are grouped based on whether they live in a village, small/medium-sized cities, or big cities. Group B (2023) has a higher proportion of respondents from villages compared to Group A.

STEMMARK (n.d.) and Nielsen (n.d.) research agencies guarantee the data representativeness of research studies (Omnibus survey, Consumer Market Analysis Poll) following the European Society for Opinion and Marketing Research (ESOMAR, n.d.) standards and meet its strict criteria regarding the ethics and professional approach to market research. All the surveys were carried out in a way that kept everyone's identity anonymous, following the rules of the Helsinki Declaration. Consequently, alongside ensuring respondent anonymity, the study also meticulously addressed ethical norms and the rights of the participants, among other considerations (World Medical Association, 2013).

2.5 Methods

The integration of these data sources provides a solid foundation for answering research questions and conducting a scientific investigation into game meat marketing strategies. The push marketing strategies (Keller and Lehmann, 2006; Schultz et al., 2014), designed to influence consumer purchasing decisions actively through direct engagement, can draw information on the segmentation and behavioral insights derived from the Omnibus Survey. The pull marketing strategies (Aaker, 1996; Kapferer, 2012), aimed at building a brand identity and consumer demand, are shaped by insights into consumer perceptions and trends gained from the Consumer Market Analysis Poll. Qualitative data from stakeholder interviews complement these strategies by ensuring that they are grounded in the realities of the game meat supply chain (Corbin and Strauss, 2008; Miles and Huberman, 1994).

Research data encompassing respondent characteristics underwent categorical data analysis using contingency tables (Agresti, 2012). Contingency tables were presented graphically using mosaic displays. The mosaic displays visually represented the cell counts in the contingency tables; each tile is proportional to the frequencies of the cell configurations. The tile size served as an indicator of the data deviation from the hypothesized model, where larger tiles denote larger observed frequencies, and smaller tiles denote smaller observed frequencies. The relationships between the different reasons why respondents do not consume venison were illustrated using Venn diagrams.

To explore and confirm the relationships between key variables, statistical analysis was employed alongside the descriptive data. Specifically, the chi-square test of independence was used to assess the significance of observed differences in categorical data, such as shifts in game meat consumption patterns, gender differences in consumption, and changes in consumer perceptions between 2021 and 2023. The chi-square test compares the expected frequencies with the observed frequencies, allowing us to determine whether differences between groups (e.g., gender, consumption settings, or changing attitudes) are statistically significant, meaning they are unlikely to have occurred by chance. In this study, chi-square tests were performed with a significance level set at 0.05. When the p-value obtained was below this threshold, the results were considered statistically significant, indicating a meaningful relationship between the variables. The p-value, a random variable derived from the Chi-squared distribution of test statistics, assesses the null hypothesis of independence (Hung et al., 1997). All the statistical analyses were carried out using R software (The R Foundation, n.d.).

3 Results

3.1 Omnibus data analysis 2022

Based on the data collected by the omnibus research study, an analysis of visitation frequencies to forests revealed that the respondents most frequently reported visiting forests once per month (26.5%), followed closely by weekly visits (24.3%). This trend aligns with the data from 2018 and 2019. Notable deviations were observed during 2020 and 2021, affected by the COVID-19 pandemic see also (Jarský et al., 2022). Additionally, the 2022 survey incorporated questions pertaining to the consumption of game meat, specifically focusing on the frequency of consumption and factors contributing to its limited preference among the respondents.

The findings, detailed in Tables 2, 3, indicate that wild boar and red deer meat, derived from cloven-hoofed animals, are the most consumed types of game meat. Despite this, the overall consumption rates of game meat remain low, suggesting a substantial potential for growth in this area.

Table 2 shows the frequency of consumption for different species of game meat among the respondents, with a total sample size of n = 1,000. The table categorizes consumption frequency into three levels: [1] Not at all, [2] 1x to 2x a year, and [3] repeatedly. It provides a comprehensive overview of game meat consumption from cloven-hoofed animals, notably wild boar and red deer, which emerge as the most frequently consumed types. The survey indicates that only a small part of respondents reported the repeated consumption of game meat, with wild boar being the preferred choice for 8% of the respondents. Overall, game meat consumption is identified as relatively low, indicating a significant potential for its increase among the population. The Total column provides the overall percentage for each frequency category across all game species, showing that 59.7% of respondents do not consume game meat at all, while 28.5% consume it 1x to 2x a year, and 11.8% consume it repeatedly.

The results suggest that wild boar and red deer are the most commonly consumed types of game meat. However, the overall low consumption levels point to substantial untapped potential in the market. To further understand *why* consumers are hesitant to consume game meat regularly, several factors were analyzed.

3.2 Reasons for limited game meat consumption

Table 3 presents the reasons why respondents either consume game meat infrequently or do not buy and eat it at all, expressed as percentages. The reasons listed include Festive food, Taste issue, Preparation complexity, High price, Unknown source, and Health concerns. Key reasons include that 67.6% consider game meat a festive food, 33.6% cite taste issues, 31.2% mention preparation complexity, 30.3% note high price, 29.5% express concern about the unknown

TABLE 2 The frequency of consuming game meat (number of respondents $n = 1{,}000$).

Frequency	Species					
	Wild boar (*Sus scrofa*)	Red deer (*Cervus elaphus*)	Roe deer (*Capreolus capreolus*)	Fallow deer (*Dama dama*)	European mouflon (*Ovis musimon*)	Total
[1] Not at all	69.6%	79.9%	74.3%	83.7%	96.2%	59.7%
[2] 1x to 2x a year	22.4%	16%	21.2%	13.1%	3%	28.5%
[3] Repeatedly	8%	4.1%	4.5%	3.2%	0.8%	11.8%

TABLE 3 If you eat a little game, or do not buy and eat it, it is because... (number of respondents $n = 1{,}000$).

	Festive food	Taste issue	Preparation complexity	High price	Unknown source	Health concerns
Yes	67.6%	33.6%	31.2%	30.3%	29.5%	14.1%
No	32.4%	66.4%	67.8%	69.7%	70.5%	85.9%

source, and 14.1% have health concerns. The remaining respondents for each reason do not see these factors as barriers to game meat consumption. As mentioned above, the main finding is that two-thirds of the respondents regard games as primarily holiday food. Other reasons, such as "you do not like it" and "you could not prepare it," can be closely related; poor preparation is often cited as a cause for unfavorable taste experiences. Additionally, the high price and lack of availability were among the most common reasons for limited game meat consumption.

This analysis reveals important insights into how consumers perceive game meat and why they choose not to consume it more frequently. The high association of game meat with festive occasions may limit its consumption to special events, while issues such as preparation complexity and high price further reduce regular usage.

3.3 Relationship between forest visits and game meat consumption

The frequency of game meat consumption was further analysed in relation to the forest visitation rates. Details are shown in Figure 1, which illustrates the close relationship between these two variables. There is a significant correlation between *how* often respondents visit forests and *how* frequently they consume game meat. This suggests that consumers who are more engaged with forest ecosystem services are also more likely to engage with game meat products.

The analysed contingency table and corresponding mosaic display were constructed by using the categorical variable of the respondent's frequency of forest visits (1: not at all, 2: once or twice a year, 3: once a month, 4: once a week, 5: more often) and the categorical variable of the frequency of game meat consumption (1: not at all, 2: 1x to 2x a year, 3: repeatedly). A chi-square test was conducted to confirm the relationship between these variables, yielding a highly significant p-value of 2.10^{-15}. This robust statistical confirmation validates the descriptive trends observed and demonstrates the reliability and construct validity of the results.

3.4 Gender differences in game meat consumption

Figure 2 presents a mosaic display of the relationship between gender and game meat consumption. The data reveal a substantial gender disparity, with men consuming significantly more game meat than women. The analysed contingency table was constructed by using the categorical variable of the respondent's gender (F females, M men) and the categorical variable of frequency of game meat consumption (1: not at all, 2: 1x to 2x a year, 3: repeatedly). Here, the significant difference is especially seen in category 2 (consumption 1–2 times a year). The relationship between gender and game meat consumption was statistically significant, as confirmed by the chi-square test (p-value = 0.0025, DoF = 3).

This finding highlights *why* gender may play a role in game meat consumption, possibly due to cultural associations or preferences related to meat consumption, as seen in previous studies (Kwiecińska et al., 2017). These findings add further support to the validity of the construct by statistically verifying the observed gender differences.

3.5 Consumer market analysis poll (CMAP): differences between group A, 2021 and 2023

The reasons connected with the consumption of games were compared on the sample of respondents in Group A, 2021, and Group A, 2023. The responses were divided into three categories, with ratings ranging from "strongly agree" to "strongly disagree." Details are given in Table 4. It compares consumer attitudes toward game meat between 2021 and 2023, focusing on the perceptions of its health benefits, environmental impact, and support for forests in the Czech Republic. Respondents' levels of agreement are divided into four scales: I definitely agree, I rather agree, I rather disagree, and I definitely disagree.

3.5.1 Healthy organic food

Examining Table 5 reveals a nuanced shift in the respondent perceptions concerning the statement 'It is a healthy food in organic

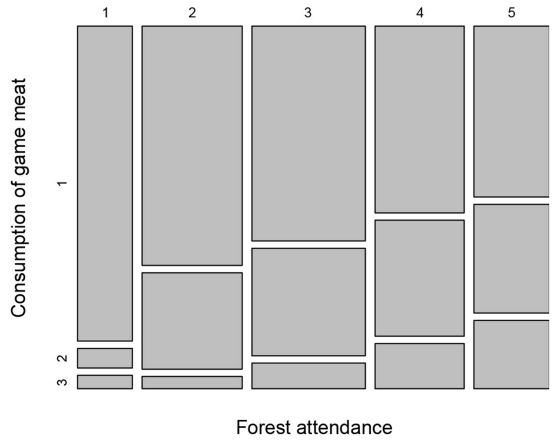

FIGURE 1
The mosaic display of the relationship between the frequency of forest visits and the consumption of game meat.

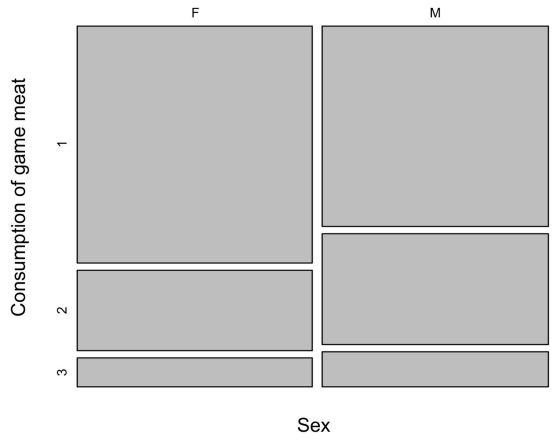

FIGURE 2
The relationship between the gender and consumption of game meat.

quality.' The percentage of those 'definitely agreeing' or 'rather agreeing' experienced a slight decrease from 84.0% in 2021 to 80.6% in 2023; though statistically inconclusive ($p = 0{,}1799$, DoF =3).

3.5.2 Environmentally friendly food

Notably, there has been a substantial decline in the percentage of respondents expressing agreement with the statement 'It is an environmentally friendly food.' This percentage dropped from 58.7% in 2021 to 49.3% in 2023, or from 75.3 to 67.9% when combining the 'definitely agree' and 'rather agree' responses ($p = 0.0001$, DoF =3). This signals a noteworthy shift in perceptions about the environmentally friendliness of venison.

3.5.3 Helping Czech forests

The percentage of respondents who "definitely agree" that consuming game meat helps Czech forests increased by 2.2%, while those who "rather agree" saw a decline of 3.3%.

Table 4 tracks shifts in consumer perceptions between 2021 and 2023, highlighting modest changes in agreement levels across these key statements.

The place of game meat consumption is described in Table 5. It indicates an 8.3 percentage point decrease in individuals consuming game meat both at home and in restaurants. Conversely, there is a 4.7 percentage point increase in those exclusively consuming game meat at home. This shift in consumption patterns was found to be statistically significant, as confirmed by a chi-square test ($p = 0.0010$, DoF = 3). The chi-square test is commonly used to assess whether observed differences in categorical data, such as changes in consumption habits, are statistically meaningful or could have occurred by chance. In this case, the *p*-value indicates strong evidence that the shift in consumption behavior between 2021 and 2023 is unlikely to be due to random variation. These results indicate that *how* consumers choose to consume game meat is shifting towards more at-home preparation, which could influence future marketing strategies that focus on making game meat more accessible for home use.

3.6 Consumer market analysis poll: differences between group A, 2023 and group B, 2023

The defined groups within the CMAP 2023 methodology were compared through the method and place of consumption for game consumers (see Table 5) and the four basic reasons why they do not consume game for the respondents who do not consume game. The results are visualized in Figure 3.

Results show the differences in game meat consumption between Group A and Group B. Group A has a higher percentage of respondents who consume game meat both at home and in restaurants (41.2%) compared to Group B (21.9%). Conversely, Group B has a greater percentage of respondents who only consume it at home (33.1%) and a higher proportion who do not consume it at all (39.4%) compared to Group A (22.9%). The percentage of respondents consuming game meat only in restaurants is higher in Group A (13.8%) than in Group B (5.7%). This difference between A and B is statistically significant (DOF = 3, $p < 0.0001$). The non-consumption of game meat between males and females in Group A and Group B was also analysed. Non-consumption rates are higher in Group B for both genders: 31.1% of males and 44.7% of females do not consume game meat, compared to 16.4% of males and 30.1% of females in Group A. This indicates that non-consumption is more prevalent in Group B for both men and women.

Figure 3 uses Venn diagram methods to graphically express the frequency of the reasons why they do not consume game (in the questionnaire, it was possible to list several reasons). If we analyse the statistical significance, they come out as a significantly high price (*p*-value 0.0289), it does not taste good (*p*-value 0.00007), ethics (*p*-value 0.0003). (The Group B respondents may also include those who do not consume meat). Differences in other factors, such as unhealthy, complexity of preparation, and not knowing where to buy, were not statistically significant.

When comparing Group A (frequent consumers) and Group B (less frequent consumers), the analysis identified significant differences in *why* game meat is consumed or avoided. Group A

TABLE 4 Tracking the consumer dynamics by comparing the survey from 2021 (n = 523) to 2023 (n = 530).

Statement	Scale	2021	2023	Diff abs.
It is a healthy food of organic quality	I definitely agree	24.0%	23.4%	−0.7%
	I rather agree	59.9%	57.2%	−2.7%
	I rather disagree	11.9%	14.0%	2.2%
	I definitely disagree	4.2%	5.4%	1.3%
It is an environmentally friendly food	I definitely agree	16.6%	18.6%	2.0%
	I rather agree	58.7%	49.3%	−9.4%
	I rather disagree	18.8%	24.2%	5.4%
	I definitely disagree	5.9%	7.9%	2.0%
By consuming game meat, I am helping Czech forests	I definitely agree	9.9%	12.1%	2.2%
	I rather agree	48.2%	44.8%	−3.3%
	I rather disagree	30.5%	32.3%	1.9%
	I definitely disagree	11.4%	10.7%	−0.7%

TABLE 5 Do you consume game meat dishes (including pâtés, smoked products, etc.)?

	2021	2023	Diff abs.
Yes, I consume both at home and in restaurants	49.5%	41.2%	−8.3%
Yes, I only consume it at home	17.4%	22.1%	4.7%
Yes, I only consume it in restaurants	12.3%	13.8%	15%
I do not consume it	20.8%	22.9%	2.1%

respondents, who tend to have higher incomes, cited health and taste as primary motivations, while Group B respondents were more likely to cite price as a limiting factor.

4 Discussion

The previous section shows that game meat consumption, particularly in the context of forest-related activities, presents an intriguing intersection of environmental awareness, cultural practices, dietary preferences, in-store availability, and many other factors. The presented results facilitate an analysis of the marketing aspects associated with game meat consumption, highlighting market opportunities and barriers, while also formulating initial principles for their application in crafting a marketing strategy and addressing the research questions in the conclusion.

Figure 1 and its related statistical analysis demonstrate a correlation between the frequency of forest visits and higher consumption of game meat. This relationship can be attributed to several factors. Firstly, the visitors' awareness of the quality of the forest environment and their understanding of the need to regulate the game's condition. These people may also have hunters in their circle of acquaintances more often and the increased possibility of the direct delivery of the game. This direct supply plays an important role; e.g., 40% of those interviewed in Group A in 2021 indicated direct deliveries from hunters (Němec et al., 2023a) as their distribution channel for game meat. This indicates *how* the availability of direct delivery channels influences the consumption patterns of frequent consumers.

Figure 2 and the corresponding data analysis revealed a significant gender disparity in game meat consumption, with men consuming substantially more than women. This observation aligns with previous research suggesting that red meat consumption, including game meat, may be associated with expressions of male identity and power (Kwiecińska et al., 2017). Understanding *why* this gender disparity exists can help in designing targeted marketing strategies that address gender-specific preferences and behaviors.

Table 2 indicates a notably low frequency of consumption of wild ungulate meat, aligning with official data reflecting the modest consumption of game meat *per capita* in the Czech Republic. This consumption rate stands at approximately 1 kg per year, equivalent to only 1.2% of the total annual meat consumption (Němec et al., 2023b). This relatively low figure underscores the untapped potential for elevating the domestic consumer demand (Agrarian Chamber of the Czech Republic, 2021). The study by Guenther et al. (2005) shows that consumers' nutritional knowledge is an important factor in their decision-making, with consumers obtaining this knowledge from a variety of sources, as reported by McCarthy et al. (2003). The need for consumer education on the benefits of venison consumption also follows from the study by Mesinger and Ocieczek (2021), which concludes that game meat in Poland is slowly increasing through the gradual promotion of game meat products. This highlights *why* consumers may not be fully aware of the nutritional benefits of game meat, suggesting a need for improved education and promotional efforts.

Another important aspect is that the Czech public does not readily connect game production, forest timber production, and forest management with sufficient wildlife management and the extraction of sustainable maximum benefits from this forest product resource. The insight derived from our research also suggests the importance of communicating the necessity for adequate game regulation to the public. This communication should address potential ecological harm to the forest ecosystem and acknowledge the role of the forest ecosystem as a source of wood production and

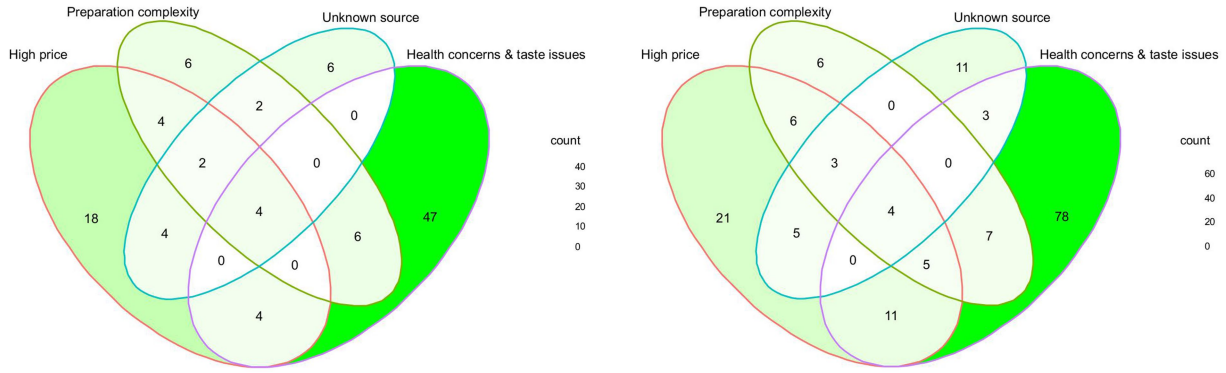

FIGURE 3
The reason I do not consume: differences between Group A and Group B, 2023.

many other products and services. *"Deer management has great benefits for the welfare of the wild deer herd. It improves the habitat, creating shelter and a good quality food source for the deer. As a by-product, a healthy, organic, sustainably sourced food in the form of venison is produced."* [Coigach and Assynt Living Landscape Partnership (CALLP) 2021]. The necessity of communicating those aspects also flows from Table 4, showing the decline in the perception of game meat as an "environmentally friendly food" in Group A over 2 years. These findings explain *why* the perception of game meat's environmental impact influences purchasing decisions and overall consumption.

Addressing these barriers requires comprehensive communication campaigns and consumer education initiatives aimed at promoting the quality and sustainability of game meat products. These campaigns should be accompanied by many other sales promotion activities, as establishing specialised salesrooms or market stalls at organic and farmers' markets will also allow you to meet consumers personally and specific culinary methods, which will strengthen the link between customers and local suppliers. Cooking shows presented by chefs could also emphasize the health benefits of venison and teach customers *how* to prepare tasty venison dishes. Concerning the consumer, the factors of the specific taste, smell and preparation associated with the consumption of game must be considered (see Figure 3: The reason I do not consume or Table 3). It corresponds with the findings (Radder and Le Roux, 2005) or (Proskina et al., 2013) regarding the quality and taste aspects of venison as the most important criteria for purchasing venison.

The importance of this type of sales promotion activity is also evidenced by Table 5, which shows that among the more active customers from Group A, during just 2 years, there was a significant shift in the consumption of venison to consumption only at home, i.e., home preparation and, unfortunately, a slight increase in customers who do not consume game at all. This suggests a change in *how* consumers prefer to consume game meat, with an increasing emphasis on home-prepared meals.

As can be seen from Table 3, the majority of the respondents, almost 68%, understand venison as a food for a special occasion. Czech households are very conservative, which is also evidenced by the consumption of domestic freshwater fish, which most Czech households consume at Christmas, some at Easter, and outside of these holidays, the domestic demand for freshwater fish is practically zero. This reflects *how* cultural traditions strongly influence the consumption of certain types of food, including game meat.

Given the substantial communication expenses within the consumer market, a pragmatic approach would involve a collaborative advertising effort encompassing all the stakeholders within the forestry sector to promote game consumption with government support.

When comparing the consumption of game in Groups A and B, we see that almost 40% of the customers in Group B do not consume game at all, and 1/3 of the customers from Group B only consume it at home. As most customers belonging to Group B tend to have a lower income, there is a greater opportunity to offer more affordable types of venison in discount-type stores, which requires large-capacity meat-cutting and packing plants and an extensive retail network. It corresponds to the approach of Game, (n.d.), which offers its products in a wide network of stores such as UK Aldi, Sainsbury's, Tesco, and Lidl, as well as a range of semi-finished products that can be prepared even by men or young people who do not know how to cook or do not want to spend much time preparing meals (see Highland Game).

For customer segments belonging mainly to Group A, differentiation based on the communication of territoriality, tradition or exclusivity can be used. This approach is successfully applied, e.g., by the national park Gesäuse (Steiermärkische Landesforste in Austria) (Stadtforst Fürstenwalde, n.d.) promoting the regional brand Xeis Edelwild (Fleischerei Pfeiler, n.d.), the Municipal Forest Stadtforst Fürstenwalde in Bavaria (communication of the city name, see Fürstenwalde) or the exclusivity associated with reference to the name of a well-known nobleman's family (see the von Hohenzollern, n.d.). The growing appreciation among customers for natural products with a known regional origin can also enhance local gastronomy. For tourists visiting the area, the local provenance of goods, particularly venison products, plays a significant role in their purchasing decisions and in the demand observed at restaurants and hotels.

The two approaches mentioned above, commoditization and differentiation, are consistent with Michael Porter's methodology for devising sustainable, generic marketing strategies, which include low cost, uniqueness, and focus (Islami et al., 2020; Porter, 1998).

Concerning the above, it is possible to recommend a marketing strategy based on different approaches to different customer segments.

In a "Commodity" approach, game meat is considered a substitute for other types of meat, which requires standardizing the output of processing, offering popular recipes for easy preparation, and extending the offer of pre-processed semi-finished products. This approach is more suitable for segments corresponding to Group B or part of Group A with a lower income. The uniqueness or differentiation can be built on a brand connected with exclusive quality or a certificate of origin. Activities of a similar type exist in the Czech Republic, e.g., (see Šmidrkal, n.d.; LČR, n.d.; VLS, n.d.). Still, they do not reach either the necessary level of low prices connected with a low-cost strategy or the required level of exclusivity associated with premium prices.

As ecosystems sustain healthy game populations, they simultaneously provide various other ecosystem services, such as carbon sequestration and habitat for other wildlife species. This multifunctionality positions game meat not just as a product of the forest, but as a catalyst for broader ecological benefits. Recognizing this interconnectedness, future research and market strategies should not only focus on the economic and nutritional aspects of game meat but also on its potential role in fostering a more sustainable and ecologically integrated food system. Moreover, new approaches, such as sharing economy concepts in forestry, might show their viability for local economies in venison production (Palátová et al., 2023). Additionally, understanding the dynamics of innovation in the forestry sector related to venison marketing is vital, as it highlights the importance of different ownership structures and their historical context in fostering innovation (Šálka et al., 2006).

Currently, there is very little focus on how game is considered in our national policies. The only place we really see it mentioned is in forestry discussions, particularly in the "Concept of State Forestry Policy until 2035." This document points out the problems caused by wild animals, especially the need to control the population of deer and similar animals to keep our forests healthy. It says we need to "… Limit the influence of ungulates on the forest through hunting and other suitable methods, ensuring the forest fulfils all its functions, without the game becoming a barrier to the successful restoration of forest stands" (The Czech Republic, 2020). However, the concern around game management transcends forest conservation, impacting broader areas such as food production and environmental preservation. This indicates a need for greater consideration of this issue and to figure out how to include it in our broader national strategies."

5 Conclusion

The investigation and research studies into the game market in the Czech Republic, conducted from 2021 to 2023, provide clear findings and address the research questions outlined at the beginning of the paper.

> *RQ 1*: Can a relationship be identified between the active engagement in ecosystem services (such as forest visits and the collection of mushrooms and berries) and game consumption, as evidenced by an omnibus survey?

Yes, Figure 1 shows a close relationship between the frequency of forest visits and the intensity of game meat consumption, which was also confirmed by a statistical test. in addition, there is also a close relationship between the gender and game consumption, which is illustrated by Figure 2.

> *RQ 2*: Do statistically significant alterations exist within the target group denoted 'Group A' when comparing research findings between 2021 and 2023? If so, how do these changes influence the formulation of the marketing mix?

For Group A, as can be seen from the description of the result in Table 4, there was a statistically significant decrease in the perception of venison as an environmentally friendly food in 2023. Due to this change, it is advisable to communicate more intensively, emphasizing the quality of game meat and the contribution of its consumption to forest restoration. Other changes were not statistically significant.

Our hypothesis posits that, of the 8.3% of consumers who claimed to no longer consume game meat at both home and in restaurants, 4.7% transitioned to exclusive home consumption. The remaining segment either ceased venison consumption altogether or sporadically indulged in eating it in restaurants.

Furthermore, our hypothesis implies a decrease in the percentage of individuals preferring to consume venison at a restaurant, declining from 32.1% in 2021 to 27.1% in 2023, primarily attributable to cost concerns.

> *RQ 3*: Do significant differences exist between 'Group A' and 'Group B'? What are the primary outcomes for shaping the marketing mix strategy if confirmed?

There are obvious differences between Groups A and B due to the different structures in terms of education, gender, and age distribution, as seen in Table 1. These differences are also reflected in the different reasons for not consuming the game, as can also be seen in Figure 3. From the result of the chi-square test, these differences are statistically significant. For both groups, the high price is an important factor in not consuming game meat. In this context, it is necessary to communicate more about the high quality that is related to this price. The respondents from Group A can afford to pay for this high quality more than those from Group B. In Group B, far more of the respondents stated that they do not like venison as a reason for not consuming it. If beyond this answer is not vegetarianism, which the marketing mix tools cannot normally influence, it is necessary to educate people more about preparing venison and organizing various tasting events to support sales.

The answers to the mentioned research questions helped to confirm the established hypothesis. A differentiated marketing mix is an appropriate strategy, as consumer preferences and behaviors differ significantly across various target groups. Group A (higher-income consumers) values the health and exclusivity of game meat, while Group B (price-sensitive consumers) requires more affordable and accessible options.

As the result of our research, we can suggest the following highlight points:

- **Improve Accessibility**: Either establish specialized sales points, such as market stalls or partnerships with supermarkets and discount chains or leverage local retail outlets and farmers' markets to increase the availability of game meat.
- **Consumer Education Initiatives**: Either develop educational campaigns to promote the nutritional and environmental benefits of game meat, emphasizing its organic quality or introduce initiatives such as cooking tutorials and simple recipes to mitigate the perceived complexity of preparation.

- **Simplify Preparation Methods**: Either provide easy-to-follow recipes and cooking instructions through various media or implement cooking tutorials to reduce complexity and encourage the consumption of game meat.
- **Promotional Focus**: Either emphasize the premium quality, health benefits, and sustainability of game meat in promotional materials targeting higher-income consumers or market game meat as an everyday option through semi-prepared or pre-packaged products to shift its perception.
- **Address Price Sensitivity**: Either develop budget-friendly game meat options through smaller packages or bundled offers for price-sensitive consumers or offer affordable, processed products in discount chains and encourage bulk purchases.
- **Activation Campaigns**: Either promote tasting events to reduce consumer aversion and unfamiliarity with game meat or market its distinctiveness by highlighting benefits such as sustainability and nutritional value.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the [patients/ participants OR patients/participants legal guardian/next of kin] was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

MR: Conceptualization, Resources, Writing – original draft, Writing – review & editing. MN: Conceptualization, Data curation, Investigation, Visualization, Writing – original draft, Writing – review & editing. VJ: Supervision, Validation, Writing – original draft, Writing – review & editing. DZ: Data curation, Software, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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