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Consumers' perceptions and attitudes toward hunted wild game meat in the modern world: a literature review

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Abstract

Hunted wild game meat (HWGM) has a complete nutritional profile, and its environmental impact is lower than farmed meat. However, HWGM derives from hunting, which often relates to consumers' ethical concerns. This review aims to clarify which variables are linked to consumers' perceptions and attitudes toward HWGM. Results highlight that the body of literature about this topic is growing, especially in Europe and U.S. Moreover, gender and residence seem to be good predictors of consumers' perceptions and attitudes toward HWGM. Furthermore, some positive drivers were detected. The positive attitude toward hunting and familiarity with hunting resulted to be linked to HWGM consumption. Conversely, food safety consumers' concerns represent one of the main barriers. Finally, the seasonality of the product and the relative lack of HWGM market supply represent barriers to its consumption. Our findings may assist stakeholders in defining targeted marketing strategies and policies.

Keywords: wild game meat; consumer attitudes; hunting activity; hunters; food choice

1. Introduction

Although hunted wild game meat (HWGM) plays a residual role in developed countries (FAOSTAT, 2020; Farouk et al., 2021), it possesses great social and cultural value and is raising growing interest in modern world (Schulp et al., 2014; Gaviglio et al., 2017; Arnett & Southwick, 2015; Fagarazzi et al., 2021). The link with historical and culinary traditions is one of the positive attributes of this product, which has been described by (Hoffman & Wiklund, 2006) as the '*meat for the modern consumer*', and it has been proven to be an interesting substitute for conventional meats such as beef and pork (Demartini et al., 2018; Marescotti et al., 2020; Demartini et al., 2021). The HWGM, in fact, can respond to the ethical, health, and environmental concerns raised by intensive livestock production. With regard to the ethical dimension, HWGM comes from animals that were born and raised in free conditions until the harvesting moment; thus, the level of animal welfare of hunted wild animals has been considered higher than that of conventional livestock (Olson, 2014; Marescotti et al., 2020). In this sense, a correct hunting procedure can solve the heated public and scientific debate around the respect for animal welfare along conventional meat production supply chains (Carlsson et al., 2007; Shaw et al., 2011; Ramanzin et al., 2010; Hampton et al., 2021). Furthermore, while it is widely known that consumers recognize healthiness as a fundamental attribute of foods, especially relating to meat products (Harguess et al., 2020; Stoll-Kleemann & Schmidt, 2017), the literature shows that HWGM presents valuable nutritional characteristics. Generally, such meats present high-quality protein and low-fat content, with an optimal fatty acid composition (Buriš, 2014; Valencak et al., 2015; Viganò et al., 2019). Finally, even if the evidence is still limited, a study conducted in Italy by Fiala et al. (2020) estimated that the greenhouse gas emissions due to HWGM production are approximately one-third of those emitted in beef farming.

On the other hand, negative attributes of HWGM also must be mentioned. For instance, wild game meat procurement implies hunting, which, in developed countries, is one of the most controversial activities and has been labeled cruel because of the purported violations of the right to life of wild animals (Shaw, D. L., 1973; Dickson et al., 2009; Hutton, Adams, & Dickson, 2009). Moreover, evidence from specialized literature reports that even if HWGM in most cases is safe (Membré et al., 2011; Paulsen & Winkelmayr, 2004), different levels of slaughtering and meat handling skills are present within hunters' communities. This suggests that HWGM may present different levels of microbiological hygiene and commercial quality, especially linked with hunters' training (Gaviglio et al., 2017; Marescotti et al., 2021; Ranucci et al., 2021).

Given its characteristics, comprehending HWGM consumption patterns in developed countries may contribute to assessing the role of this product in human diets and exploring its market

opportunities; however, a systematic review of consumers' perceptions and attitudes toward hunted wild game meat has not been presented thus far. The seminal review by (Hoffman & Wiklund, 2006) first highlighted how South African wild game meat responds to consumers' demand for high-quality foods. A few years later, a second relevant contribution was presented by (Ramanzin et al., 2010), who collected similar evidence with a keen focus on the Italian case study. Finally, a review by Hoffman and Cawthorn (2012) aimed to quantify the relative importance of HWGM in diets compared to that of conventional meats worldwide. While these reviews greatly contributed to the literature, they focused mainly on the strengths and weaknesses of HWGM production methods and their nutritional and microbiological characterizations. This meant that the insights from studies specifically focused on consumers' perception of HWGM and consumption behavior were basically omitted. Furthermore, the literature on HWGM consumption has expanded considerably since those publications.

Given the increasing attention of researchers toward HWGM in recent times, there is an urgent need to collect and review the current scientific knowledge about consumers' perceptions and attitudes toward HWGM in developed countries. With the present systematic review, we thus intend to respond to the following questions. *What do consumers think about HWGM? What are the variables related to consumer perceptions and attitudes toward HWGM?* By answering these questions, the present study aims to offer synthetic and exhaustive information to (i) policy-makers responsible for hunting and HWGM supply chain management; (ii) private companies involved in HWGM commercialization; and (iii) researchers interested in the topic.

2. Methodology

2.1 Study design and search strategy

To retrieve the literature for the present review, a systematic approach was followed. This method was chosen to capture as many records as possible in the literature regarding consumers' stated consumption, perceptions, and attitudes toward HWGM. In fact, according to Hagen-Zanker and Mallett, 2013, *orthodox* reviews tend to start and focus on studies already known by the authors; the unavoidable result may be that some studies are overcited and many relevant papers might be involuntarily omitted. This approach creates a persistent bias in the studies that undermines the trustworthiness of the reviews' outcomes (Mallett et al., 2012; Hagen-Zanker & Mallett, 2013). To avoid the risk of such bias, the PRISMA method (Preferred Reporting Items for Systematic Reviews and Metanalyses), integrated with guidelines given by Hagen-Zanker and Mallett (2013) was used in the present review. PRISMA is a transparent, rigorous, and replicable protocol to identify the relevant papers in the scientific database and synthesize their findings. The search was

carried out from January–February 2021 on four major academic databases selected by the research team: Web of Science Core Collection®, CABI®, Scopus® and Food Technology and Science®. The search strings, reported in Table 1, were adapted to each selected database by using Boolean operators and other variables according to the specific required language. Specifically, the terms ‘game meat’, ‘wild meat’ and ‘wildmeat’ in association with ‘consum*’ (‘consumers’, ‘consumer surveys’, ‘consumer satisfaction’, ‘consumer preferences’, ‘consumer behavior’, ‘consumer attitudes’) were used to find the relevant papers for the present review. It is worth emphasizing that the term ‘bushmeat’ also has been included in the search string, because it is often used as a synonym for HWGM, while the term ‘hunted’ has been excluded, since ‘game meat’ and ‘wild game’ were evaluated sufficiently robustly by the research team as standalone terms to capture all the papers needed for the literature analysis.

The inclusion and exclusion criteria were settled by the research team as reported in Table 2. Considering that, to the best of our knowledge, this is the first systematic review focused on consumers’ perceptions and attitudes toward HWGM, an undefined time span was established (which means that all papers published until February 2021 were considered). Finally, only peer-reviewed articles written in English were included in the analysis, while relevant material located outside of peer-reviewed sources, often referred to as ‘gray literature’, was excluded. Ethical approval is not applicable for this article.

Table 1. Search strings used for selected databases

Database	Search string
Web of Science Core Collection	ts=((game or wild) near/2 meat\$) or wildmeat\$ or bushmeat\$) AND ts=consum*
CABI: CAB Abstract® and Global Health ®	DE=(game meat OR bushmeat OR wild meat OR wildmeat) OR ts=((game OR wild) near/2 meat\$) OR bushmeat\$ OR wildmeat\$ DE=(consumers OR consumer surveys OR consumer satisfaction OR consumer preferences OR consumer behaviour OR consumer attitudes) OR ts=consum*
Scopus	(TITLE-ABS-KEY (consum*)) AND ((TITLE-ABS-KEY (game PRE/1 meat)) OR (TITLE-ABS-KEY (wild PRE/1 meat*)) OR (TITLE-ABS-KEY (wildmeat* OR bushmeat*)))
Food technology and Science	consum\$.ti, ab and (((game or wild) adj1 meat\$)or wildmeat\$ or bushmeat\$) ti, ab.

Table 2. Inclusion and exclusion criteria for papers’ selection

Criteria	Inclusion	Exclusion
Time span,	All	None

Language	English	Other
Focus	Agricultural economics, marketing and consumer science - Consumer and hunted wild game meat	Other
Publication type	Full text paper published in peer-reviewed journal	Non-peer-reviewed sources Dissertation /theses and articles that do not present primary research studies (conference papers and abstracts, opinions)

2.2 Paper selection, eligibility criteria and variable categorization

The search strings retrieved 2,558 records that were exported in EndNote software (Clarivate Analytics, Philadelphia, PA, US). As shown in Figure 1, in the first step, the duplicates were removed by an inbuilt function of the software, which resulted in 1,356 unique papers.

Based on records' titles and abstracts, papers that (i) did not represent peer-reviewed material or analyze secondary data (e.g., reviews); (ii) did not belong to the agricultural economics, marketing, or social science fields; or (iii) focused on communities where wild game meat represents a subsistence resource – i.e., only research conducted in developed countries were considered in the analysis - were excluded during the second and third screenings. Then, three members of the research team independently analyzed the remaining 90 papers on a full-text basis. At the end of a collaborative discussion among the research team members, 25 papers were finally included in the review. Some papers were excluded because the read of the full paper clarified that the research was conducted in developing countries and HWGM was used by local communities as a subsistence resource, or focused on farmed animals (e.g., farmed deer).

Once the paper selection was done, the research team discussed the codification of the variables related to the consumers' perceptions and attitudes toward HWGM found in the selected studies. Thus, the variables were categorized into three main groups: *sociodemographic variables*, *supply chain-related variables* and *product-related variables*. A further in-depth discussion led to a more precise codification of the variables. The result of the codification process is reported in Figure 2, where a summary of the variables treated by each paper also is provided, including the following:

- six *sociodemographic variables*, including gender, residence, age, income, ethnicity and education;
- nine *supply chain-related variables*, divided into the three subcategories of *hunting*, which includes familiarity with hunting, beliefs and attitudes toward hunting and production method knowledge; *ethics*, which includes animal welfare and environmental concerns and wildlife value; and *purchase*, which includes point of purchase, seasonality, market availability, and occasion of consumption; and

- six *product-related variables*, divided into the three subcategories of *safety and healthiness*, which includes perceived safety and perceived healthiness; *experience attributes*, which includes sensory characteristics and ease of cooking; and *extrinsic attributes*, which includes origin and price.

Figure 1 – Paper selection using PRISMA method: flow diagram

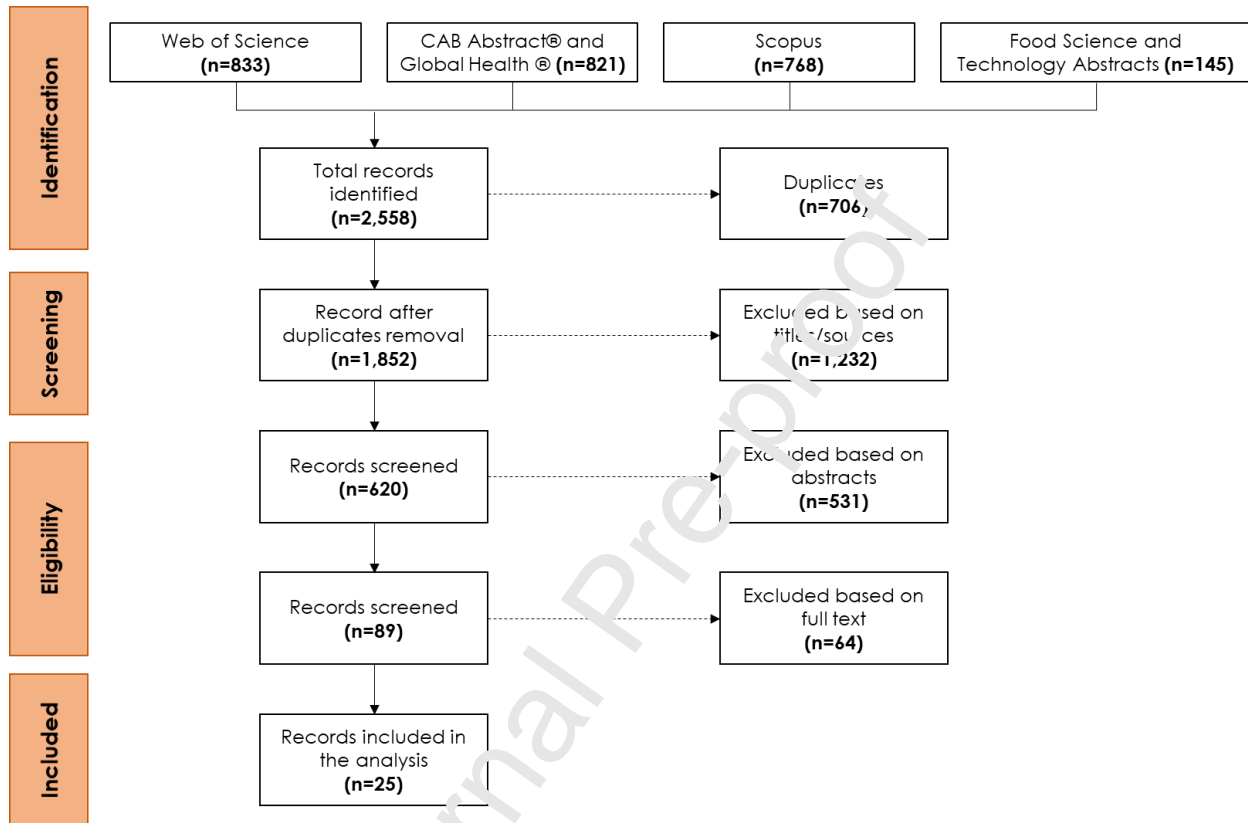
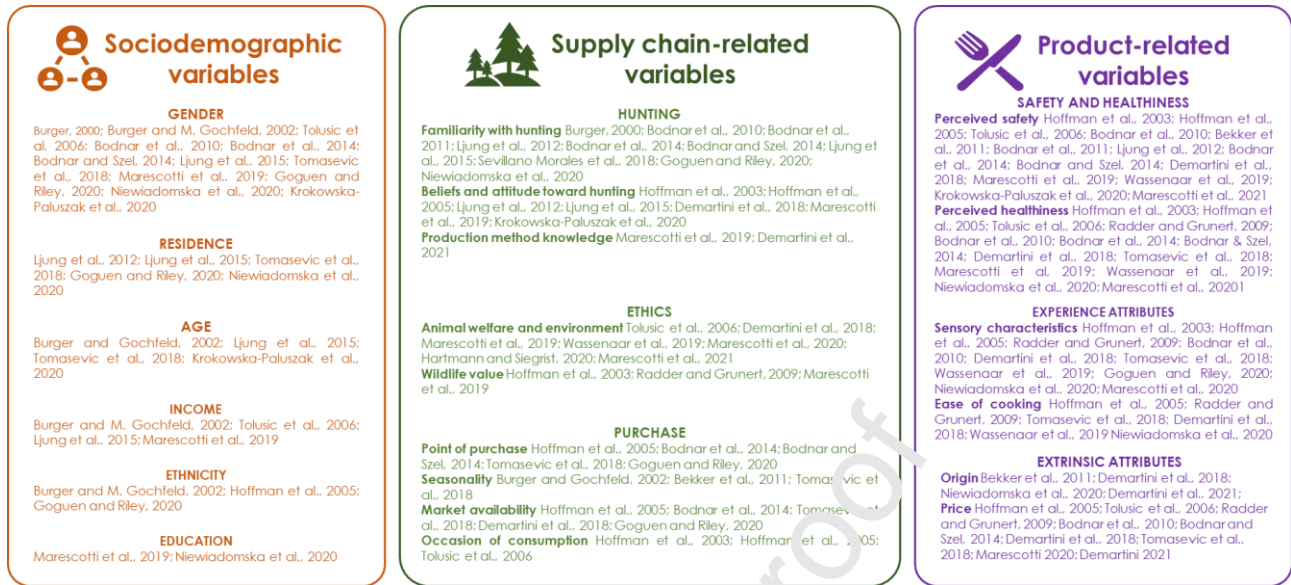


Figure 2 - Categories of variables identified in the examined literature and related papers



3. Results

3.1 General overview of the included studies

The final pool of papers is composed of 25 papers whose content is summarized in Appendix A. Although the time span was undefined, only recent papers appear in the literature. The publication period, in fact, goes from 2000 to 2021, while most of the articles are dated after 2010 (72.0%), which seems to confirm the growth of interest around this topic from the academic community. The papers analyzed are distributed across three continents: North America (12.0%), Africa (20.0%) and Europe (68.0%). The sample size of the investigations varies across publications; the smallest sample consists of 40 participants, while the largest sample consists of 5,807 participants. Most of the studies include regular adult consumers (40.0%), meaning those with peculiar features, while other papers consider specific categories of consumers, such as attendants to outdoor activity fairs (Burger, 2000; Burger & Gochfeld, 2002), tourists (Hoffman et al., 2003), heads of household (Hoffman et al., 2005), attendants to scientific events (Krokowska-Paluszak et al., 2020), experts (Bodnar & Szel, 2014) or unexpert students or supply chain stakeholders (Bekker et al., 2011). Next, a noteworthy element is that in studies from Sevillano Morales et al. (2018) and Marescotti et al. (2021), samples are composed totally or partially of hunters, whereas Ljung et al. (2012, 2015) and Krokowska-Paluszak et al. (2020) exclusively involve adult consumers who had not hunted in the previous 12 months preceding the survey. Moreover, other authors, such as Tomasevic et al. (2018) and Niewiadomska et al. (2020), prefer to consider only those who declared to consume

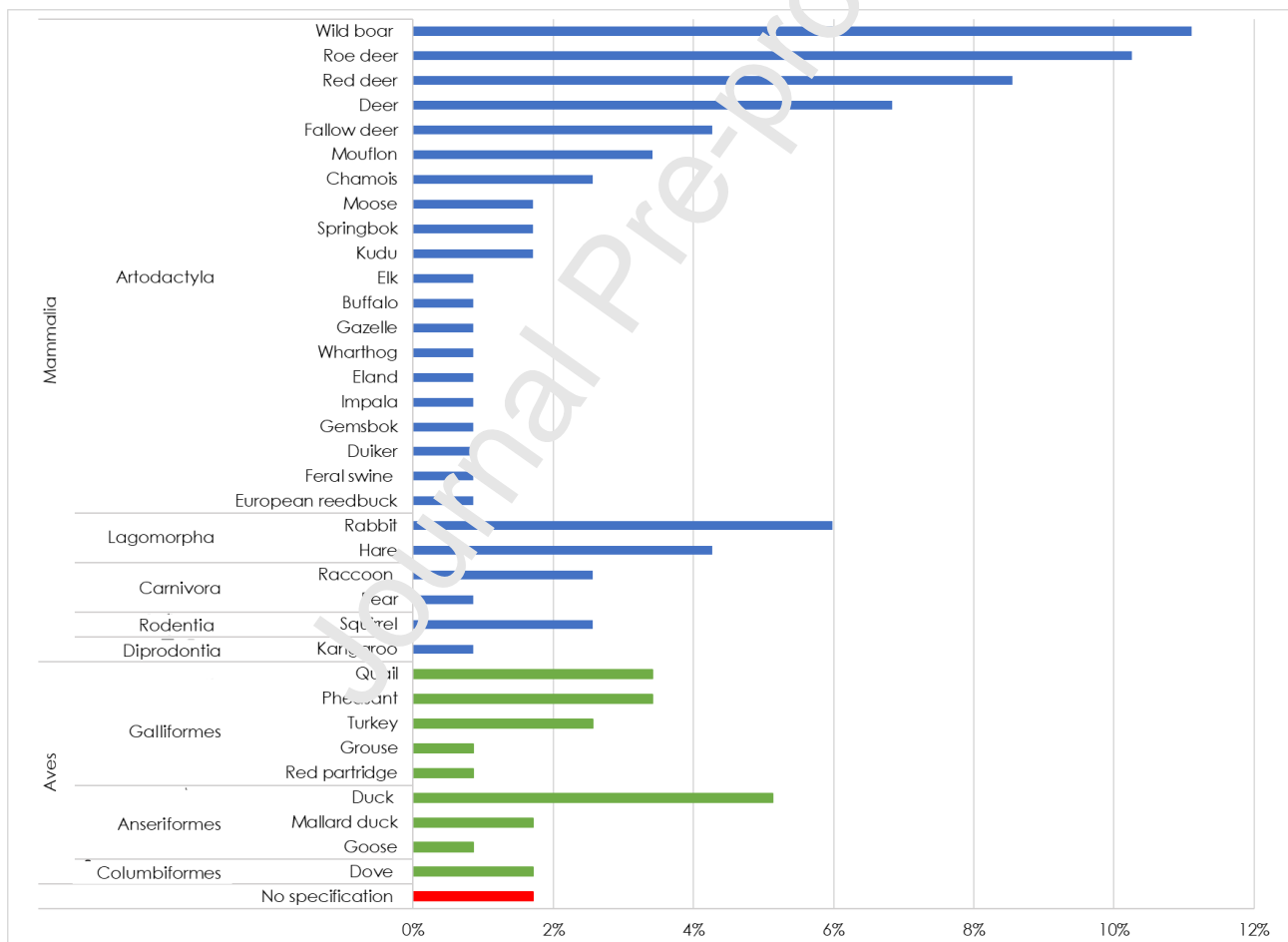
HWGM, whereas Marescotti et al. (2020) consider those who declared to have eaten HWGM in the previous three months before the questionnaire administration.

Finally, the review of the methodological approaches used in the papers shows that most of the papers (92.0%) apply quantitative methods, whereas one of them uses qualitative text analysis (Radder & Grunert, 2009) and another applies a mixed methodology, using a qualitative in-depth interview followed by a quantitative survey (Bekker et al., 2011).

3.1.1 Consumer-stated consumption and preferences for hunted wild game meat

The review shows that different types of animals are defined as hunted wild game meat in the pool of papers selected (Figure 3).

Figure 3 - Percentage of papers mentioning each wild species



Most papers consider *wild game* species only those that belong to the class of mammals (60.0%), while ten papers consider both mammals and birds. It is worth emphasizing that the species are not specified in two papers where general descriptions such as ‘*African wildlife meat*’ and ‘*wildlife meat*’ or ‘*various species*’ are provided (Radder & Grunert, 2009; Bekker et al., 2011). Where declared, the species belong to eight orders. Five orders of mammals are examined, namely,

Artiodactyl (60.7%), *Lagomorpha* (10.3%), *Carnivora* (3.4%), *Rodentia* and *Diprotodonts* (2.6% and 0.8%, respectively), whereas only three orders of birds are represented, namely, *Anseriformes* (7.7%), *Galliformes* (11.1%) and *Columbiformes* (1.71%). The most frequently mentioned species are wild boar (11.1%), roe deer (10.3%) and red deer (8.6%). However, the term ‘deer’ is frequently used (6.8%) to refer to species belonging to the Cervidae family (Burger, 2000; Burger & Gochfeld, 2002; Hoffman et al., 2003; Tomasevic et al., 2018; Niewiadomska et al., 2020; Goguen & Riley, 2020; Hartmann & Siegrist, 2020). Considering small game, ‘rabbit’ (5.9%) (Burger, 2000; Burger & Gochfeld, 2002; Tolušić et al., 2006; Sevillano Morales et al., 2018; Tomasevic et al., 2018; Goguen & Riley, 2020; Niewiadomska et al., 2020) and ‘duck’ (5.1%) (Burger, 2000; Burger & Gochfeld, 2002; Hartmann & Siegrist, 2020; Goguen & Riley, 2020) are the two most frequently mentioned species. Here, too, the authors use the terms ‘rabbit’ and ‘duck’ as common names to refer to an animal belonging to the *Lagomorpha* and *Anatida* family, respectively. Obviously, the geographical and cultural contexts in which the studies have been carried out justifies the heterogeneity of the species that are considered in the studies. In this connection, Figure 3 shows that the least mentioned species are distinctly African ungulates, e.g., gemsbok or impala (Hoffman et al., 2003). In this sense, it also can be observed that studies that have been conducted in North America included species that are traditionally hunted in specific areas, such as raccoon (which is traditionally hunted in the Midwest), squirrel (traditionally hunted in Mississippi) or bear (northern states).

Among the studies reviewed, 56.0% investigate the frequency of consumption of HWGM. It is relevant to highlight that some studies reported the presence of consumers who had never tasted HWGM in their lives in the sample (Bodnar & Szel, 2014; Hoffman et al., 2003; Bodnar et al., 2014; Ljung et al., 2015; Krokowska-Paluszak et al., 2020; Goguen & Riley, 2020), whereas all the studies reported frequencies of consumption of at least once a year for the majority of consumers surveyed. Considering the countries in which investigations have been carried out, the most consumed species in the US (Burger, 2000; Burger & Gochfeld, 2002; Goguen & Riley, 2020) and Spain (Sevillano Morales et al., 2018) were deer and red deer, respectively. Moreover, differences in species consumption subsist among European countries. Italian consumers declared that they consume mostly wild boar (Demartini et al., 2021; Marescotti et al., 2021), whereas Hungarian consumers declared that they eat mostly roe deer (Bodnar et al., 2011). Finally, two studies collected data on consumers’ preferences for game meat (Bodnar et al., 2014; Bodnar & Szel, 2014) and suggested that European consumers prefer wild boar among the species considered.

3.2 Consumers’ perceptions and attitudes toward hunted wild game meat

3.2.1 Sociodemographic variables

According to the review, consumers' *gender* is the most investigated sociodemographic variable for which significant results are reported (44.0% of the studies), followed by *age* (20.0%), *residence* (20.0%), *income* (16.0%), *ethnicity* (12.0%), and *education* (8.0%).

Studies that investigated *gender* found differences between male and female participants in terms of stated HWGM consumption (Tomasevic et al., 2018; Goguen & Riley, 2020; Niewiadomska et al., 2020), consumption frequency (Tolušić et al., 2006; Ljung et al., 2015; Tomasevic et al., 2018), declared consumed species (Burger & Gochfeld, 2002), consumption preferences (Bodnar et al., 2010) and attitudes toward HWGM (Bodnar et al., 2014; Marescotti et al., 2019) and hunting (Krokowska-Paluszak et al., 2020). Overall, the results suggest that male consumers show a more positive attitude toward HWGM and hunting than female consumers and eat this product more frequently. Furthermore, in Goguen and Riley (2020), Ljung et al. (2012, 2015); Niewiadomska et al. (2020); and Tomasevic et al. (2018), the residence variable is explored. In these papers, the stated consumption of HWGM between respondents living in rural or urban areas is compared: the results suggest that a lower level of urbanization may positively influence HWGM consumption. Moreover, Tomasevic et al. (2018) present a cross-cultural investigation conducted in ten Eastern European countries (i.e., Albania, Bulgaria, Bosnia-Herzegovina, Czech Republic, Croatia, Macedonia, Montenegro, Serbia, Slovakia and Poland) that reports that the frequency of HWGM consumption is higher in Southeastern Europe than in Central Europe (especially in Bulgaria, where HWGM is reported to be consumed at least once a month by almost 80.0% of respondents). Considering consumers' *age*, the results reveal that younger consumers consume less HWGM than older consumers (Burger & Gochfeld, 2002; Bodnar et al., 2014; Ljung et al., 2015; Tomasevic et al., 2018; Krokowska-Paluszak et al., 2020). In this respect, it may be notable to look at the results reported by Burger and Gochfeld (2002) where in contrast to the other classes of participants, middle-aged consumers (35-45 years) declare that they eat less common wild species such as doves, raccoon, and squirrel. However, it also is interesting to see the results of Krokowska-Paluszak et al., (2020) in which the attitude toward hunting is studied and where a more positive attitude is revealed in young male participants (<40 years).

HWGM consumption also is related to consumers' *income*. On average, the review suggests that income is positively related to consumption and attitudes toward HWGM. For instance, the results from Tolušić et al. (2006) reveal that HWGM is perceived as expensive by Croatian consumers, who declare that they can afford HWGM only once a month. Moreover, Marescotti et al. (2019) found income differences among identified clusters of HWGM Italian consumers, highlighting that higher household income consumers show more positive attitudes toward HWGM. This evidence

also is confirmed in the Swedish context by Ljung et al. (2015) where the analysis highlights that income is the sociodemographic variable that has the greatest effect on HWGM consumption frequency, especially in urban contexts where higher-income households tend to consume more HWGM than lower-income households. In contrast, the survey conducted by (Burger & Gochfeld, 2002) in the United States suggests that the consumption of squirrel and racoon is related to lower income, which suggests that hunting activity still represents a feasible way to procure meat for underprivileged people.

Furthermore, considering *ethnicity*, the results show that in the United States (Burger & Gochfeld, 2002; Goguen & Riley, 2020) and South Africa (Hoffman et al., 2005), Caucasian people seem to consume more HWGM than other ethnic groups. Finally, concerning *education*, consumers with higher education tend to consume more HWGM (Niewiadomska et al., 2020) and to have a positive attitude toward it (Marescotti et al., 2019).

3.2.2 Supply chain-related variables

According to the review, two of the most studied variables fall in the category labeled ‘hunting’. More specifically, the most explored variable is *familiarity with hunting* (36.0% of the studies) and *beliefs and attitude toward hunting* (28.0%). These are followed by *animal welfare and environment* (28.0%), which falls in the ‘ethics’ category, and *point of purchase* (16.0%), *market availability* (16.0%), *occasion of consumption* (16.0%) and *seasonality* (12.0%), which fall in the ‘purchase’ category. The less explored variables are *wildlife value* (12.0%) and *production method knowledge* (8.0%), which fall into the ‘ethics’ and ‘hunting’ categories, respectively.

3.2.2.1 Hunting

The variable *familiarity with hunting* includes all the studies that explored consumers’ hunting-related experiences, both in terms of direct (e.g., consumer is a hunter) and indirect experiences (e.g., consumer has relatives or friends who hunt). Considering the direct experience with hunting, four studies based on the Hungarian context report that a considerable number of the consumers interviewed also declared that they hunt (Bodnar et al., 2010; Bodnar et al., 2011; Bodnar et al., 2014; Bodnar and Szel, 2014). In these studies, the authors note that hunters are overrepresented in the samples compared to the number of hunters in the Hungarian population and declare that they consume a wider variety of species of HWGM and more frequently than nonhunters. This correlation is confirmed by Sevillano Morales et al. (2018) who statistically verify that being a hunter is a factor positively correlated with HWGM consumption in Spanish consumers. Furthermore, considering consumers’ indirect experience with hunting, Burger et al. (2000) report that in their study, respondents who declare that they have never hunted nevertheless mention

having the occasion to consume HWGM as a '*courtesy of their friends and family*'. More recent surveys confirm the role of indirect experience with hunting in association with HWGM consumption (Ljung et al., 2012, 2015; Sevillano Morales et al., 2018; Niewiadomska et al., 2020; Goguen & Riley, 2020). Specifically, Ljung et al. (2012, 2015) and Goguen and Riley, 2020 found that HWGM consumption is positively correlated with having a previous experience with hunting or having a social interaction with hunters (e.g., having a hunter in the household, having a friend or a parent who hunts) in Sweden and the United States, respectively.

The papers published by Hoffman et al. (2003) and Hoffman et al. (2005) first emphasized the importance of considering consumers' *beliefs and attitude toward hunting* in the studies related to HWGM. Specifically, the results from the first study reveal that most of the sample of tourists interviewed had a positive opinion about wild game culling, whereas the results from the second study show that South African consumers had more conflicted opinions on this topic. Regardless of the differences found in the answers obtained by the two different samples, the authors suggested that consumption and attitudes toward HWGM might correlate with consumers' beliefs or attitudes toward hunting. Unfortunately, no statistical analysis was provided to test this relationship. Other authors addressed the issue later. In this sense, the study of Ljung et al. (2012) proposes a psychometric scale of nine items referring to hunting activity and hunters' behavior, revealing that, overall, Swedish nonhunters have a positive attitude toward hunting and that HWGM consumption is the best explanatory variable linked to this attitude. The latter findings also are confirmed in Ljung et al. (2015), where attitudes toward hunting appear to be overall positive and positively affected by familiarity with hunting and game meat consumption, especially when hunting is practiced for food purposes. This evidence is in line with what was observed later in the Italian context by Demartini et al. (2013), where more than half of the surveyed consumers declare that they are positively disposed toward hunting and that this positive disposition increases their willingness to pay (WTP) for HWGM. Similarly, Krokowska-Paluszak et al. (2020) find that Polish consumers have positive attitudes toward hunting, determined first by familiarity with hunting and second by their frequency of HWGM consumption. In direct contrast, Marescotti et al. (2019) found an overall negative disposition toward hunting in Italian consumers. It is interesting to note that this value seems to increase only for those consumers who recognized in this activity some kind of utility, i.e., meat procurement.

Finally, two studies have analyzed consumer *production method knowledge* (Demartini et al., 2021; Marescotti et al., 2019). Interestingly, in Marescotti et al. (2019) objective knowledge about hunting and HWGM was tested combined with other variables. Findings from this study suggest that a lower level of consumer objective knowledge about hunting may act as a barrier to consumption. In

light of these findings, Demartini et al. (2021) deepened this issue, focusing their research on the roles of both objective and subjective knowledge about hunting and farming in determining consumers' preferences for both hunted wild boar meat and pork. The results of the research show that the more consumers objectively know about hunting, the more they like HWGM, while the more they know about livestock farming, the less they like conventional farmed meat. However, at the same time, the results reveal that subjective knowledge seems not to be a reliable predictor of preferences for HWGM.

3.2.2.2 Ethics

Some relevant variables able to explain consumer perception and attitudes toward HWGM relate to the 'ethics' dimension in terms of *animal welfare and environment* and *wildlife value*; nonetheless, few studies have explored these topics. With regard to *animal welfare and environment*, Tolušić et al. (2006) report that most Hungarian consumers consider HWGM to be produced in an 'environmentally friendly' and sustainable way. Similar results are discussed in Marescotti et al. (2021), who found that Italian hunters perceive HWGM as more 'environmentally friendly' and 'ethical' than farmed meat. On the other hand, Demartini et al. (2018) and Wassenaar et al. (2019) suggest that the perception of HWGM is heterogeneous among consumers and show that Italians and South Africans dislike HWGM because they perceive hunting activity as negative for the environment.

Consumers' concerns about *animal welfare* issues related to HWGM consumption are explored in three papers. Findings from Marescotti et al. (2019, 2020) highlight that Italian consumers are generally sensitive to animal welfare, highlighting that the more consumers care about this issue, the more they show a negative disposition toward HWGM consumption. The relationships between animal welfare perception and consumption of HWGM are not confirmed by the survey conducted by Wassenaar et al. (2019), who report that both South African consumers and nonconsumers of HWGM believe that game meat possesses the 'animal welfare attribute'. Finally, considering consumers' ethical concerns related to HWGM production method ethics, Hartmann and Siegrist, 2020 reveal that German consumers consider HWGM procurement to be more morally justifiable than intensive animal and fish farming.

Finally, consumers' orientations toward *wildlife value* are explored in three papers. Specifically, Hoffman et al. (2003) and Radder & Grunert (2009) first report that some consumers feel uncomfortable eating wild animals culled from their environment. These results are confirmed in Marescotti et al. (2019), where a cluster analysis revealed that a strong wildlife value orientation can be identified in consumers who do not consume HWGM.

3.2.2.3 Purchase

The literature review related to the *purchase* variables allowed us to collect information about the *point of purchase*, *seasonality*, *market availability*, and *occasions of consumption* of HWGM.

Regarding the *point of purchase*, the analysis of the literature shows that in Europe (Bodnar et al., 2014; Bodnar & Szel, 2014; Tomasevic et al., 2018) and North America (Goguen & Riley, 2020), HWGM is normally purchased or donated by hunters, while in South Africa, consumers report buying it at the butchery (Hoffman et al., 2005).

Furthermore, our analysis shows that the results from Burger and Gochfeld (2002) highlight that some types of HWGM follow a seasonal pattern, since North American consumers involved in this survey declare that they eat more deer in winter months. Similar results can be found in Bekker et al. (2011) and Tomasevic et al. (2018), who report that HWGM is available only during winter in South Africa and is perceived as a seasonal product in Eastern Europe, respectively. Looking at *market availability*, the analysis shows that HWGM is generally perceived as hard to find in the market (Hoffman et al., 2005; Bodnar et al., 2014; Tomasevic et al., 2018; Demartini et al., 2018; Goguen & Riley, 2020). However, the relationship between perceived market availability and HWGM consumption is not clear. For instance, Bodnar et al. (2014) described the lack of availability as one of the causes of HWGM rejection, while Demartini et al. (2018) found that the lack of market availability was not important for consumers who showed positive attitudes toward HWGM.

Finally, with reference to the *occasions of consumption*, an investigation of tourists in South Africa carried out by Hoffman et al. (2003) reported that most of the sample used to eat wild game at their friends' houses. The same results were found in surveys conducted on a South African sample (Hoffman et al., 2005) and in Croatia (Tolušić et al., 2006), where consumers stated that they eat HWGM at the restaurant or their friends' homes rather than in their own homes.

3.2.3 Product-related variables

According to the review, the most mentioned variables fall into the 'safety and healthiness' category, namely, *perceived safety* (60.0%) and *perceived healthiness* (56.0%), followed by *sensory characteristics* (48.0%) belonging to the 'experience attributes' category, and *price* (40.0%) categorized in the 'extrinsic attributes' category. Finally, *ease in cooking* (20.0%) and *origin* (8.0%) are the less reported experience and extrinsic attributes, respectively.

3.2.3.1 Safety and healthiness

Considering the variable *perceived safety*, the review reveals contradictory findings. On the one hand, some studies indicate that most consumers are concerned about HWGM safety (Hoffman et al., 2005; Tolušić et al., 2006; Bodnar et al., 2010; Bekker et al., 2011; Bodnar et al., 2011, 2014; Krokowska-Paluszak et al., 2020; Marescotti et al., 2021). Some of these studies report that consumers fear the presence of pathogens such as the nematode *Trichinella* spp., especially in wild boar meat (Tolušić et al., 2006) (Bodnar et al., 2010), and parasites and *Salmonella* spp. in HWGM (Bekker et al., 2011). It is worth emphasizing that consumers' perception of HWGM safety is sometimes investigated in connection with consumers' trust and beliefs about hunters' compliance with food safety standards and hygienic meat handling practices. In this sense, the results from Bekker et al. (2011) suggest that even if most South African consumers were concerned about HWGM safety, they trusted the HWGM production method and knew that processing plants must comply with basic hygienic regulations. On the other hand, Krokowska-Paluszak et al. (2020) argue that consumers criticize those hunters not following the minimum principles of food safety. In this connection, Marescotti et al. (2021) directly surveyed a sample of Italian hunters who declared that they perceive hunted wild boar meat as less safe to eat than farmed pork.

On the other hand, the review reveals that several papers mention consumers' positive opinions regarding the *perceived safety* of HWGMs. For instance, Hoffman et al. (2003) report that most of the consumers surveyed believe that HWGM is a BSE-free meat. Furthermore, Ljung et al. (2012) illustrate that Swedish consumers feel that hunters are well trained and adequately follow hunting and food safety rules. Additionally, Bodnar et al. (2014) and Bodnar and Szel (2014) show that few consumers perceive hygienic risk as deriving from HWGM consumption. Similar results are presented in Demartini et al. (2018) and Marescotti et al. (2019), who reveal that Italian consumers generally think that HWGM is safe to eat. Finally, the results from Wassenaar et al. (2019) report that South African HWGM consumers are completely confident about its safety, while nonconsumers have no opinion about this characteristic.

Regarding safety, the *perceived healthiness* of HWGM has been widely explored in the last two decades. Overall, the studies analyzed show that consumers appear to recognize that HWGM possesses positive nutritional proprieties (Hoffman et al., 2003; Hoffman et al., 2005; Tolušić et al., 2006; Radder & Grunert, 2009; Bodnar et al., 2010, 2014; Bodnar & Szel, 2014; Demartini et al., 2018; Marescotti et al., 2019; Wassenaar et al., 2019; Niewiadomska et al., 2020; Marescotti et al., 2021), with a low content of fat (Hoffman et al., 2003; Hoffman et al., 2005; Tomasevic et al., 2018; Marescotti et al., 2019) and cholesterol (Tomasevic et al., 2018; Marescotti et al., 2019) but a

high content of protein and minerals (Bodnar et al., 2010, 2014; Bodnar & Szel, 2014; Tomasevic et al., 2018).

3.2.3.2 Experience attributes

Given the review process, the *sensory characteristics* of HWGM emerged as very important attributes for both consumers and nonconsumers. The results from Hoffman et al. (2003) reveal that most of the sample declared that they liked the taste of HWGM. Moreover, Demartini et al. (2018) shows that the cluster of consumers who are disposed to pay more for HWGM recognize a good taste in red deer meat. Similarly, Tomasevic et al. (2018) found that taste and smell are the most valued attributes of HWGM by European consumers. Finally, Marascotti et al. (2020) reports that hunters consider hunted wild boar meat tastier than farmed pork. On the other hand, other studies emphasize the negative role of the typical flavor of HWGM, which is reported as one of the most negative attributes related to HWGM consumption (Hoffman et al., 2005). Furthermore, Radder & Grunert (2009) reported that both groups of surveyed consumers perceive HWGM as 'dry' meat. In line with this, Bodnar et al. (2010) found that Hungarian consumers rate taste as the first reason for rejecting HWGM. Similar findings are reported in other studies (Goguen & Riley, 2020; Niewiadomska et al., 2020; Wassenaar et al., 2019), where nonconsumers rate the sensory characteristics of HWGM as the crucial cause for not eating this product. These findings are confirmed by Niewiadomska et al. (2020) where taste is indicated as the attribute with the greatest impact on the frequency of HWGM consumption.

The *ease of cooking* of HWGM is one of the less explored variables linked to HWGM consumption. Hoffman et al. (2005) report that most consumers state that they are knowledgeable about how to prepare HWGM; conversely, Radder & Grunert (2009) reported that HWGM is perceived as a product that needs special preparations, suggesting that some consumers avoid purchasing HWGM to prevent culinary disappointment and a decrease in self-esteem. It is worth comparing these results with the cluster analysis presented in Demartini et al. (2018), where the attitudes toward HWGM are negatively related, among other factors, to the perceived difficulties in cooking. Finally, Niewiadomska et al. (2020) find the perceived easiness in cooking to be negatively correlated with the HWGM consumption frequency.

3.2.3.2 Extrinsic attributes

The *origin* variable of HWGM appears to be marginally explored in the literature. For instance, Bekker et al. (2011) and Niewiadomska et al. (2020) found that South African and Polish consumers would prefer to buy local HWGM. Similar results were provided by Demartini et al.

(2018, 2021), who estimate a consistently increasing willingness to pay for Italian HWGM when compared to a product imported from another European country.

The *price* of HWGM seems to play a prominent role in research that explores consumers' perceptions and attitudes toward HWGM. In fact, the results from Radder & Grunert (2009) reveal that price is considered an important attribute for those who decide to consume game meat, and Bodnar & Szel, (2014), Hoffman et al. (2005), Tolušić et al. (2006), Tomasevic et al. (2018) show that consumers perceive HWGM as an expensive meat compared to conventional ones. In a different context, Demartini et al. (2018) found that even if Italian consumers are willing to pay more for beef than for hunted red deer meat, there is a niche of consumers who are positively disposed toward HWGM and would recognize a higher price for red deer meat than for beef. These findings are corroborated by Marescotti et al. (2020), who found heterogeneous preferences and willingness to pay for cured meat products made with different animal species (hunted red deer, bovine and horse). Finally, the results from Demartini et al. (2021) suggest that higher levels of objective knowledge of hunting have a positive impact on willingness to pay for HWGM.

4. Discussion

Studies on consumers' perceptions and attitudes toward hunted wild game meat confirmed the increasing interest in the product and its positive characteristics that meet consumers' needs for ethical, healthy, and environmental foods. However, the research also highlighted relevant limitations for the development of its market, especially in terms of availability and motives of rejection, such as taste, wildlife value, and perceived safety risks within certain segments of consumers.

Despite the studies' heterogeneity in the literature and the differences among countries, the review process identified clear and established trends in HWGM consumption and consumers' attitudes toward the product. These topics will be discussed in this section, extending the debate to relevant literature on hunting and meat consumption and proposing some policy and managerial implications for the future of HWGM consumption.

4.1 The roles of gender and residence in HWGM consumption

Gender was a good predictor of HWGM consumption. The results show that among different Western contexts (Europe and the USA), men eat more HWGM than women and have more positive attitudes toward it and hunting. These results seem consistent with what has been found by Kubberød et al. (2002), Rothgerber (2013), Love & Sulikowski (2018), Rosenfeld & Tomiyama (2021), who demonstrated that males eat more meat than their counterparts and display more positive attitudes, especially toward red meat in different contexts (Europe, Australia, and the

USA); in contrast, female participants are more open to becoming vegetarian and display more negative attitudes toward meat. A plausible interpretation for this phenomenon proposed by the literature is that eating meat makes men feel like “*real men*”, suggesting the personal adherence of the majority to one of the hegemonic standards of traditional masculinity (Rosenfeld & Tomiyama, 2021). In this connection, given that HWGM is obtained from hunting and that historically the hunting arena belongs to men (Sumpter, 2015), it may be conceivable to assume an even stronger connection between HWGM consumption and masculinity traits than with conventional meats, especially for certain consumer groups such as hunters themselves. Interestingly, as suggested by Rosenfeld & Tomiyama (2021), gender differences in meat consumption attitudes are more likely to be driven by men's relationships with masculinity rather than women's relationships with femininity. In this regard, the authors propose an interpretation of the phenomenon in line with the theory of precarious manhood (Vandello et al., 2008), whereby in Western cultures, threatened masculinity (and not femininity) needs to be behaviorally affirmed. In this respect, it could be speculated that consuming HWGM and having more positive attitudes toward hunting or being a hunter could be included in such behaviors. Future research should empirically demonstrate the possible connection between masculinity and hunting and HWGM consumption.

Moreover, residence, both in terms of country and urbanization, is a second clear influencing factor of HWGM consumption. The availability of different species in different areas of the world influences the type of HWGM consumed; however, hunting acceptance is a context-dependent variable, and hunting public perception varies among countries and is related to hunting motivation. Most of the literature has explored public perception toward hunting, especially in the USA, whereas European context-based analyses that have been carried out focus more on Northern Europe rather than Mediterranean countries. For example, a recent survey on US samples shows the public positive perception of hunting and that most respondents consider hunting acceptable when it is related to food provision (Byrd et al., 2017). Similarly, empirical European context-based analyses conducted in Denmark (Gamborg & Jensen, 2017) and Sweden (Ljung, 2014) reveal a public positive perception of hunting when related to food provision.

With regard to urbanization, even if hunting does not represent a subsistence resource for rural communities in developed countries (Peterson et al., 2011), this activity continues to be perceived more positively in such a context compared to urbanities (Mankin et al., 1999; Peterson et al., 2011), and being a resident in rural areas is positively associated with HWGM consumption. Two explanations seem conceivable for this relationship. First, in rural contexts, it may be easier to participate in rural activities such as hunting or farming, as previous research has shown. For instance, the results from Heberlein et al. (2002) indicate that rurality is the strongest predictor of

participation in hunting. Moreover, the results from (Stedman & Heberlein, 2009) show that rurality is strongly related to hunting participation, but they also suggest that “rurality” is particularly contingent on the effects of other variables, such as another sociodemographic variable (e.g., being male) or socialization (e.g., having fathers who hunt). Second, living in rural areas increases the probability of having experienced negative interactions with wild animals and thus supports hunting as a feasible way to solve this issue (Valente et al., 2020).

4.2 The positive drivers of HWGM consumption

Ethical issues stemming from meat production methods are increasingly worrisome to Western consumers, who are increasingly opting for products from supply chains that claim to ensure standards of environmental sustainability and animal welfare. In this respect, our review shows that HWGM satisfies consumers’ expectations regarding these attributes. Specifically, the findings reported here reveal that consumers generally recognize that HWGM production is more environmentally sustainable than farmed meat. This is in line with the contribution of Fiala et al. (2020), who evaluated the environmental impact of red deer hunted meat through the LCA approach and found that HWGM appears to be more environmentally sustainable than conventional meat.

Furthermore, European consumers positively valued animal welfare as an attribute related to HWGM. Thus, it seems plausible that the animal welfare attribute will be evaluated in a positive manner related to HWGM since wild animals, by definition, live free, according to their nature. In this connection, it may be interesting to mention findings from Boaitay & Minegishi (2020) that provide insight into the characteristics of consumers who are concerned with animal welfare. Their review reports the existence of differences in animal welfare perception across countries (USA, Australia, Canada), emphasizing that consumers' interests in animal welfare are generally higher in Europe than in the USA. Boaitay & Minegishi (2020) suggest that such evidence may be due to the lack of studies that focus on other parts of the world, where there might be a lower level of interest in animal welfare.

Moreover, the findings suggest that a positive attitude toward hunting (and familiarity with hunting) seems to correlate with HWGM consumption. Considering this, it is interesting to report findings from other studies that have addressed the issue thus far, exploring public attitude toward hunting in different contexts (Byrd et al., 2017; Gamborg & Jensen, 2017). In the European context, Gamborg and Jensen (2017) have shown that Danish participants involved in their study seem to have a generally positive attitude toward recreational hunting. This study confirms that a positive attitude toward hunting is explained by certain sociodemographic characteristics of the participants (older public and rural residents have more positive attitudes) and by having social interactions with

hunters. Interestingly, Gamborg & Jensen (2017) do not consider HWGM consumption as a variable linked to attitude toward hunting, although their results highlight a link between such attitude and childhood area of residence. To explain these results, the interpretation given by the authors is that consumption habits established in consumers' early years, or ties to family members or friends, persist among participants who moved to urban areas, where they grow older. Furthermore, similar findings also have been reported by Byrd et al. (2017). In their study, positive attitudes toward hunting have been expressed by the majority of the US sample involved. In contrast to the aforementioned study, here, the authors took the consumption of HWGM into account when assessing attitude toward hunting. Although this study was not retrieved with our research, it is still worth mentioning that in this sample, people who consider hunting cruel also have never eaten HWGM. Future studies should shed light on the direction of the interaction between HWGM consumption, attitude toward hunting and familiarity with hunting, also considering the role of participants' social interactions with hunters. Such studies also may be useful to design wildlife conservation interventions. In fact, through surveys exploring consumer perceptions and attitudes toward HWGM, information can be gathered on the general public's perception of hunting. This can be relevant since hunting is one of the tools through which wildlife populations are managed: understanding the public perception of this activity is essential to designing new policies, since the public is one of the main stakeholders involved in wildlife conservation.

4.3 The motives for HWGM rejection

Food safety was one of the most challenging issues related to the HWGM supply chain. Among product-related variables, consumers' perception of HWGM safety and healthiness has been found to be largely studied in the literature. The review highlighted contradictory opinions regarding HWGM safety among consumers, even in the same cultural context. Some consumers, both from Europe and South Africa, showed major concerns about well-known foodborne diseases associated with HWGM consumption. In some cases, the perceived inadequate safety levels are associated with poor hunter training, which results in bad handling practices. At the same time, other studies revealed that most surveyed consumers from Europe (Sweden, Hungary, and Italy) and South Africa are generally positive about HWGM safety and hunters' handling abilities. As part of consumers' perceptions, HWGM consumption objectively exposes consumers to some hazards, since bacterial pathogens, parasites, and chemical and foreign objects may contaminate these products (Coburn et al., 2005). Thus, recently, a review published on HWGM safety and hygiene

claimed the need for improvement in specific hygienic practices and standards related especially to deer and wild boar (Gomes-Neves et al., 2021).

Moreover, it is worth mentioning that sensory characteristics may act as a barrier to HWGM consumption. However, studies that explored this attribute do not distinguish whether the sensory characteristics are evaluated on raw or cooked meat even if it is known that different preparations lead to different sensory profiles (Moran et al., 2022). Therefore, further studies dealing with precise sensory analyses on HWGM would be appreciated to extend the knowledge about this issue. Since HWGM derives from wild animals, wildlife value orientation in consumers has been explored. Generally, the literature suggests an erosion of traditional orientation toward wildlife (Manfredo et al., 2003), describing a public shift from a utilitarian focus (i.e., use of wildlife for human benefits) to a more protectionist orientation, both in Europe and North America (Zinn et al., 2002; Gamborg & Jensen, 2017). This evidence suggests that where wildlife value orientation is strongest in consumers, it might act as a barrier to HWGM consumption. However, we can speculate that the use of HWGM derived from containment plans may be considered more acceptable than the use of HWGM obtained by recreational hunting.

4.4 The seasonality of HWGM and the provision issue

The findings from the review highlight how the lack of market availability and seasonality are the main constraints related to HWGM market development. In fact, HWGM is a limited-supply product, available only during the hunting season, in every region considered in this study. In this respect, even if the attribute 'seasonality' is mostly conceptually linked to vegetables and fruits, some considerations also can be drawn also for HWGM. As a result of technological evolution and globalization, almost all foods are available year-round (at least in Westernized countries), although historically, food availability is determined by the seasonality (season of harvesting) of the product itself (Westerterp-Plantenga, 1999). However, as pointed out by Macdiarmid (2014) and Spence (2021) the consumption of seasonal products might contribute to moving toward more environmentally sustainable and healthy consumption patterns, at least when the food is produced locally. With that said, what if the right promotion strategy transformed the seasonality from a barrier into an advantage? As suggested by Resare Sahlin et al. (2020), a new Western model of meat consumption is currently pursuing the 'less but better' principle, essentially for sustainability purposes (social, economic, and environmental). Thus, the scientific community has the duty to communicate to consumers what is 'less' and 'better'. From this perspective, it is interesting to note that HWGM may meet both challenges, as it is a 'healthy' product that is available in limited quantities and sustainable in terms of environmental impact. Because of its

limited availability and due to its characteristics, HWGMs could meet the needs of the niches of more conscious meat consumers, as endorsed by Hoffman & Wiklund, (2006). In this sense, improving the performance of HWGM supply chains may help foster its market at the local level. Moreover, the findings suggest that considering the modality of purchase of HWGM, other regional differences emerged. This means that different territories correspond to different HWGM supply chain organizations, with implications for consumers' perception of HWGM.

4.5 Policy and managerial implications for HWGM market development

Going into detail and describing the level of development and efficiency of HWGM supply chains in each of the sociocultural contexts considered in this review, is beyond the scope of this paper. However, looking at the results, it is still possible to draw some general conclusions. HWGM objectively possesses positive attributes, but hunting is not always accepted by consumers as a method to produce meat in high-income countries. However, what does the consumer know about hunting? Generally, the literature recognizes a link between knowledge and consumer purchasing behavior (Pieniak et al., 2010). Thus, further research to explore consumer knowledge about hunting related to HWGM perception in different cultural contexts is suggested. In fact, revealing mechanisms that guide individual choices (especially when studying meat consumption behavior) is essential for policy-makers and marketers to improve hunted product communication strategies. In this sense, since hunting plays a key role in wildlife management, improving consumers' positive perception about hunting can be useful not only for the promotion of HWGM but also for raising awareness and informing the public about the role of this activity.

At the same time, as we expected, the results show that a lack of clear food safety standards and trust in hunters' ability in HWGM handling may have effects on consumers' perception of HWGM safety. Improving procedures to guarantee food safety may benefit supply chain stakeholders transversally in all examined cultural contexts. At the same time, policy-makers should foster the enhancement of safe supply chains and ensure proper hunter behavior through protocols that must be implemented.

4.6 Limitations

Some limitations of the study are worth mentioning. First, given the implied heterogeneous methods and the different definitions provided for HWGMs, the results are difficult to compare. In addition, the findings cannot be generalized, since the context in which the survey/study has been carried out influences consumers' perceptions and attitudes. In fact, as highlighted by Korzen & Lassen, 2009, context impacts consumers' perceptions of meat. Therefore, future research should include cross-cultural investigations providing a more accurate i) definition of HWGMs, ii) description of the

supply chain of HWGM in the context of research, iii) insights into consumers' perceptions of hunting and their relationship with wildlife, and iv) insights into hunting knowledge.

5. Conclusions

The aim of this study was to review the current literature, synthesize and provide the reader critical insights about the state of the art regarding the variables and factors related to consumers' perceptions and attitudes toward HWGM in different developed socioeconomic contexts. Our study shows first that the interest around this issue is growing, as demonstrated by the rapidly increasing number of scientific publications devoted to this topic in recent years. Moreover, key variables and factors related to consumer perceptions and attitudes toward HWGM are strictly connected to the geographical context for different reasons (i.e., available species, cultural differences, acceptance of hunting). Nevertheless, the literature analysis reveals that HWGM possess specific characteristics that make it interesting for modern consumers. However, the main barriers related to this product resulted in a lack of market availability and a low level of perceived food safety.

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Declaration of interest

None.

Authors' contribution statement

Corradini Annafrancesca: conceptualization, methodology, investigation, software, data curation, formal analysis, writing-original draft, visualization. Marescotti Maria Elena; conceptualization, methodology, investigation, writing-review & editing, visualization, writing, review & editing.

Demartini Eugenio: conceptualization, methodology, data curation, formal analysis, writing-review & editing, validation, visualization, supervision.

Gaviglio Anna: conceptualization, methodology, writing-review & editing, validation, supervision.

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Appendix A - – Overview of the papers selected for the review (n= 25)

Year	Authors	Title	Research methodology		Sample		Species considered			Key finding(s)	
			Type	Statistical analysis	Type	Continent	Country	Size	Wild game species		Domesticated species
2000	Burger, J.	Gender differences in meal patterns: Role of self-caught fish and wild game in meat and fish diets	Quantitative	Descriptive statistics and cross tabulation	Attendants to outdoor activities fair	North America	USA; South Carolina	457	Deer, rabbit, squirrel, raccoon, duck, dove, wild-caught quail, wild turkey	Beef, pork, chicken, wild-caught fish, store-bought fish, restaurant fish, restaurant quail	Women were less likely to eat most types of wild game meat than men although there were no gender differences in the percentage eating beef, chicken, pork. Similarly, women consumed significantly fewer meals of wild game than did men.
2002	Burger, J. and Gochfeld, M.	Role of wild game in the diet of recreationists in South Carolina	Quantitative	Multiple regression analysis	Attendants to outdoor activities fair	North America	USA; South Carolina	457	Deer, rabbit, squirrel, raccoon, duck, dove, wild-caught quail, wild turkey	Beef, pork, chicken, wild-caught fish, store-bought fish, restaurant fish, restaurant quail	In the black participants diet wild game represents up to 50% of the total meat consumed and 32% in the white participants diet. Game species seem generally eaten more by low-income black respondents, while more deer are consumed by higher-income black respondents.
2003	Hoffman, L.C.; Crafford, K.; Muller, N.; Schutte, D.W.	Perceptions and consumption of game meat by a group of tourists visiting South Africa	Quantitative	Descriptive statistics and cross tabulation	Tourists	Africa	South Africa	60	Duiker, gemsbok, impala, kudu, springbok, eland, warthog, kangaroo, deer, European reedbuck, wild pig	Beef, pork, chicken, lamb, ostrich	Tourist visiting South Africa enjoy game meat, know the product and are aware of health benefits deriving from game meat consumption. The respondents further indicated game meat as the meat type they most favoured to order in restaurants in South Africa. The culling of game animals did not concern most of them.
2005	Hoffman, L.C.; Muller, M.; Schutte De W.; Calitz, F.J.; Crafford, K.	Consumer expectations, perceptions and purchasing of South African game meat	Quantitative	Descriptive statistics and cross tabulation	Heads of household	Africa	South Africa	300	Springbok, kudu, hare	Beef, pork, chicken, lamb, ostrich	Consumers do not purchase game meat regularly and consider it as an exotic, seasonal product. They have negative perceptions towards its price and poor availability. Furthermore, they are not willing to pay more for game meat than other types of meat. Fat content of meat is the most important attributes in meat purchase. Consumers were generally indecisive about hunting.
2006	Tolušić, Z.; Florijančić, T.; Kralik, I.; Sesar, M.; Tolušić, M.	Game meat market in Eastern Croatia	Quantitative	Descriptive statistics and cross tabulation	Adult consumers	Europe	Croatia; Slavonia and Baranja	101	Roe deer, rabbit	None	Consumption of game meat is relatively low because of high price and safety motives. Consumers prefer meat of domestic animals, because it is cheaper, not paying attention to specific nutritive advantages of game meat. A significant number of examinees considers game meat as healthy food, being also convinced that game was healthier to consume if hunted in their natural environment, than if reared on specialized farms.
2009	Radder, L. and Grunert, K.J.	Consumers' perceptions of African wildlife meat: a laddering study	Qualitative	Textual analysis	Adult consumers and non-consumers	Africa	South Africa	40	Referred by authors as "african wildlife meat"	Beef, lamb	The most important product's attributes are low levels of fat, dryness, novelty, and special preparation requirements. Significant values included security, self-esteem, hedonism, tradition, and stimulation. Consumers were particularly interested in the health benefits, while barriers to consumption are related to the difficult and time-

consuming to prepare.

2010	Bodnar, K.; Benak, A.; Bodname Skobrak, E.	Analyses of consumer preferences and attitudes on Hungarian game meat market (preliminary report)	Quantitative	Descriptive statistics and cross tabulation	Adult consumers	Europe	Hungary	200	Red deer, roe deer, fallow deer, mouflon, wild boar, hare, pheasant, mallard duck	None	Game species, quality, freshness and price have been considered by consumers as the most important attributes related to wild game meat preferences. Differences were found between respondents living in cities and in the rural areas. Consumers who have a negative attitude to game meat are vegetarian or refuse consumption due to emotional reasons.
2011	Bekker, J.B.; Hoffman, L.C.; Jooste, P.J.	Knowledge of stakeholders in the game meat industry and its effect on compliance with food safety standards	Quantitative and Qualitative	Descriptive statistics and cross tabulation	Stakeholders and students	Africa	South Africa	673	Referenced by authors as "wild game meat", "various species"	None	70% of the respondents prefer the game meat to be of local origin. Consumers have a high level of concern regarding the presence of health hazards in meat. Only few respondents related game meat to negative factors such as the meat being dark in colour, tough and originating from canned hunting; however the majority of the respondents perceive game meat of inferior quality compared to other types of meat. Findings revealed a general low level of knowledge of the stakeholders.
2011	Bodnar, K.; Bodnarne Skobrak, E.; Tanacs, L.; Pinyey, S.Z.	Consumers' opinion about the hygienic risks of the meat of wild ungulates	Quantitative	Descriptive statistics and cross tabulation	Adult consumers	Europe	Hungary	250	Red deer, roe deer, fallow deer, mouflon, wild boar	None	Consumers are afraid of disease and hygienic risk related to game meat consumption. Differences were found between respondents living in cities and in the rural areas. Consumers who have a negative attitude to game meat are vegetarian or refuse consumption due to emotional reasons. Information given to consumers by producers about game meat safety need to be improved.
2012	Ljung, P.E.; Riley, S.J.; Heberlein, T.A.; Ericsson, G.	Eat prey and love: game-meat consumption and attitudes toward hunting	Quantitative	Path analysis	Adult consumers that have not hunted in the last 12 months	Europe	Sweden	457	Moose, roe deer	None	Game meat consumption and social relationships are the key factors associated with positive attitudes towards hunters and hunting. Results suggest that increased distribution and availability of game meat can be expected to strengthen links between non-hunters and hunters, and promote favorable attitudes towards hunting.
2014	Bodnar K.; Szel Hodi, M.; Skobrak Bodnar, E.	Acceptance of the meat of wild ungulates among the Hungarian consumers	Quantitative	Descriptive statistics and cross tabulation	Adult consumers	Europe	Hungary	500	Red deer, roe deer, fallow deer, mouflon, wild boar	None	About 90% of the consumers considered game meat as healthy and almost organic food. Respondents who have a negative attitude to game meat are vegetarian or refuse consumption due to fear from zoonotic diseases or emotional reasons. Respondents consider game meat expensive. Differences were found between the answers of the asked sample population living in urban and in the rural areas.
2014	Bodnar, K. and Szel, M.H.	Factors affecting game meat consumption among Hungarian University students	Quantitative	Descriptive statistics and cross tabulation	Expert students	Europe	Hungary	227	Red deer, roe deer, fallow deer, mouflon, wild boar, hare, pheasant, mallard duck	None	Most of the respondents ate game meat occasionally. The most frequently consumed game meat is the wild boar meat. The most popular species are wild boar, roe deer and pheasant. Respondents consider game meat expensive. Only few people reject game meat, and the main causes are: emotional reasons, never tasted it, vegetarian lifestyle, fear of zoonotic diseases.

2015	Ljung, P.E.; Riley, S.J.; Ericsson, G.	Game meat consumption feeds urban support of traditional use of natural resources	Quantitative	Path analysis	Adult consumers that had not hunted in the last 12 months	Europe	Sweden; Stockholm and Northern Sweden	5807	Moose, roe deer	None	Urban and rural residents' have different attitudes toward hunting. Path analyses suggest that experiences with hunting or hunters, and especially consumption of game meat, are associated with positive attitudes. Results suggest that finding ways to increase the distribution of game meat and associated social interactions to urban nonhunters will help maintain or increase support for hunting and enhance wildlife management.
2018	Demartini, E.; Vecchiato, D.; Tempesta, T.; Gaviglio, A.; Viganò, R.	Consumer preferences for red deer meat: a discrete choice analysis considering attitudes towards wild game meat and hunting	Quantitative	Cluster analysis; Discrete Choice Modelling	Adult consumers	Europe	Italy; Northern Italy	721	Red deer	Beef	On average, consumers show a good appreciation for red deer meat and are willing to pay 12% more for this type of meat than for beef ceteris paribus. Positive attitude towards wild game meat has an effect on the willingness to pay for red deer meat that is more than 3 times greater than being in favour of hunting. An analysis of the heterogeneity of consumer preferences has allowed to identify the presence of an important niche market for red deer meat served as carpaccio.
2018	Sevillano Morales, J.; Moreno-Ortega, A.; Amaro Lopez, M.A.; Arenas Casas, A.; Cámara-Martos, F.; Moreno-Rojas, R.	Game meat consumption by hunters and their relatives: a probabilistic approach	Quantitative	Risk analysis	Hunter and relatives	Europe	Spain; Andalusia	137	Red deer, wild boar, rabbit, red partridge	None	Hunters generally registered a larger intake of game meat. The total mean game meat consumption, per capita in the sample, is 6.87 kg/person/year of meat and 8.57 kg/person/year if the processed meat products (salami-type sausage) are also considered.
2018	Tomasevic, I.; Novakovic, S.; Solowiej, B.; Zdolec, N.; Skunca, D.; Krocko, M.; Nedomova, S.; Kolaj, R.; Aleksiev, G.; Djekic, I.	Consumers' perceptions, attitudes and perceived quality of game meat in ten European countries	Quantitative	Principal component analysis; Cluster analysis	Adult consumers consuming game meat	Europe	Albania, Bulgaria, Bosnia-Herzegovina, Czech Republic, Croatia, Macedonia, Montenegro, Serbia, Slovakia, Poland	3445	Deer, wild boar, rabbit, hare, pheasant, quail, partridge, other	None	Variables that affect mostly consumption of game meat are: geographical location, age and gender. In terms of perceived quality of game meat, consumers favor its health benefits and nutritional properties. Central European consumers, especially the younger generation, are more concerned with its price and sensory characteristics (in particular taste, overall quality, and odor).
2019	Marescotti, M.E.; Caputo, V.; Demartini, E.; Gaviglio, A.	Discovering market segments for hunted wild game meat	Quantitative	Principal component analysis; Cluster analysis; Probit model	Adult consumers	Europe	Italy	1029	Red deer, roe deer, wild boar, chamois	None	Three different segments have been identified: pro-animal consumers, disoriented consumers, and hunted wild game meat eaters. The three segments showed significant differences with respect to their socio-demographic characteristics (gender, education level and average household income), consumption of hunted wild game meat and their level of objective knowledge. A general lack of knowledge is reported among consumers.
2019	Wassenaar, A.; Kempen, E.; van Eeden, T.	Exploring South African consumers attitudes towards game meat. Utilizing a multi-attribute attitude model	Quantitative	Descriptive statistics and cross tabulation	Adult consumers and non-consumers	Africa	South Africa	1406	Gazelle, buffalo	None	Differences between game meat consumers and nonconsumers have been founded. Respondent groups differed most in their attitudes regarding the health benefits, sensory characteristics, availability, and ethics. Although nonconsumer respondents were relatively neutral regarding the importance of different attributes, food safety was rated as an important consideration, indicating that these respondents are particularly concerned about it.

2020	Hartmann, C. and Siegrist, M.	Our daily meat: Justification, moral evaluation and willingness to substitute	Quantitative	Principal component analysis; Logistic regression analysis; Two-step hierarchical regression analysis	Adult consumers	Europe	Germany	973	Deer, wild boar, duck	Beef, veal, pork, poultry, rabbit, lamb, cold cuts, sausages, exotic meat, fish, shellfish, meat substitutes	Hunted wild game meat is considered one of the most morally justifiable meat, similar to free-range chicken and organic beef. Meat-eating justification strategies correlated positively with meat consumption and negatively with willingness to substitute meat. Even though participants evaluated most of the conventional animal production systems to be morally not justifiable, they seemed not to behave accordingly with regard to meat consumption or willingness to substitute meat.
2020	Goguen, A.D. and Riley, S.J.	Consumption of Wild-Harvested Meat in Society	Quantitative	Logistic regression analysis; Linear regression	Adult consumers	North America	USA; Michigan	983	Deer, rabbit or hare, squirrel, raccoon, duck, quail, turkey, pheasant, bear, grouse, grouse, elk, raccoon	None	Hunting experience, social network, and race have been identified as the only influential predictors of wild-harvested meat consumption. Hunting experience, social network, and level of urbanization of residence have been identified as the only influential predictors of frequency of venison consumption.
2020	Niewiadomska, K.; Kosicka-Gębska, M.; Gębski, J.; Gutkowska, K.; Jeżewska-Zychowicz, M.; Sulek, M.	Game Meat Consumption - Conscious Choice or Just a Game?	Quantitative	Logistic regression analysis	Adult consumers consuming game meat	Europe	Poland	450	Deer, roe deer, fallow deer, wild boar, wild rabbit, wild birds	None	Rational motives have a greater impact on game meat choice than emotional reasons. The possibility of increasing the frequency of eating game is greater for the people who pay attention to the rational aspects related to the taste, low fat content, nutritional value and local origin of the meat.
2020	Krokowska-Paluszak, M.; Lukowski, A.; Wierzbicka, A.; Gruchala, A.; Sagan, J.; Skorupski, M.	Attitudes towards hunting in Polish society and the related impacts of hunting experience, socialisation and social networks	Quantitative	Principal component analysis; Descriptive statistics and cross tabulation;	Attendant to University Scientific event not hunting in the last year	Europe	Poland	486	Red deer, roe deer, wild boar	None	Respondents who included game meat in their diet on a regular basis had a more positive attitude towards hunting, as did respondents who participate in hunting. Having parents or friends who hunt were key positive influences on attitude towards hunting. Conversely, the inability to visit a forest due to ongoing hunting had a significant negative impact on attitude towards hunting.
2020	Marescotti, M.E.; Caputo, V.; Demartini, E.; Gaviglio, A.	Consumer preferences for wild game cured meat label: do attitudes towards animal welfare matter?	Quantitative	Principal Component Analysis; Cluster analysis; Discrete Choice Modelling	Adult consumers	Europe	Italy	168	Red deer	Bovine, horse	Preferences for the hunted wild game meat label were heterogeneous across the sample. Although the presence of the label "hunted wild game meat" does not provide any added value to consumers who are more concerned for animal rights and more price conscious, more than half of the sample (56.6%) gain a significant level of utility from choosing red deer product carrying the hunted wild game meat label.
2021	Marescotti, M.E.; Demartini, E.; Gibbert, M.; Viganò, R.; Gaviglio, A.	Disentangling Individual Phases in the Hunted vs. Farmed Meat Supply Chain: Exploring Hunters' Perceptions in Italy	Quantitative	Descriptive statistics and cross tabulation	Hunters	Europe	Italy	104	Red deer, roe deer, wild boar, chamois	Pig	Hunters' preferences are oriented towards the consumption of hunted products, which are preferred over farmed products. Hunted wild boar meat is considered healthier, tastier and more ethical and environmentally friendly than conventional farmed meat. On the other hand, hunted wild game meat is perceived by hunters themselves as less safe to eat.
2021	Demartini, E.; Vecchiato, D.; Marescotti, M.E.; Gibbert, M.; Viganò, R.; Giacomelli, S.; Gaviglio, A.	The more you know the equivocal effects of prior knowledge on preferences for hunted vs. farmed wild boar meat	Quantitative	Discrete choice modelling; Scenario analysis	Adult consumers	Europe	Italy	510	Wild boar, red deer, roe deer, chamois	Beef, pork	Participant on average preferred farmed meat to hunted meat. Objective knowledge has a mixed effect on consumer preferences: the more consumers (objectively) know about hunting, the more they like hunted meat; in contrast, the more they know about farming, the less they like farmed meat.

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Highlights

- Hunted wild game meat (HWGM) has recently gained attention as an alternative animal protein
- A literature review aimed to synthesize current findings on variables related to consumers' perceptions and attitudes towards HWGM is presented
- Results show that consumers from different contexts perceive HWGM as a healthy product, with a low environmental impact
- Ethical issues related to hunting, lack of market availability, and the perceived low level of food safety have been identified as the main barriers to HWGM consumption

Highlights

- Hunted wild game meat (HWGM) is gaining attention as an alternative animal protein
- Variables related to consumers' perceptions and attitudes towards HWGM are explored
- HWGM is positively perceived as a healthy and environmentally friendly
- The barriers of consumption are low availability and perception of low food safety