



Forest to fork strategy: Examining consumer preferences for wild boar meat

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ARTICLE INFO

Keywords:

Consumer behavior
Food safety
Mixed logit model
Food choice
Ecological management

ABSTRACT

Wild boar population is expanding rapidly across Europe, bringing challenges to wildlife management, agriculture and disease control. Meanwhile, there is an increasing need for wild game meat as it can be a good source of protein, vitamins and minerals. Some European countries, like Italy, still lack of legal and structured supply chains for hunted game meat. This study investigates the acceptability of developing a wild boar meat market in Italy by examining consumer preferences for key product attributes. Data were collected from 1719 Italian consumers through a discrete choice experiment. This study also investigates how wildlife value orientations (WVOs) and food values shape consumer choices. Results highlight that most respondents were reluctant to purchase wild boar meat. However, willingness to pay increased substantially for products with food-health certifications and Italian/regional origin. Three consumer segments were identified through latent class analysis, and their preference heterogeneities were driven by WVOs, ethical concerns, meat quality, sustainability, convenience and economic value. Findings suggest that developing a wild game meat supply chain could be a win-win strategy for consumers, producers, and policymakers as it offers an effective approach to managing wild boar populations, creating new market opportunities, and supporting rural development.

1. Introduction

Since ancient times, game meat has always been part of human diet, playing an important role in human nutrition. Wild game meat is often described as a healthier and more environmentally friendly food choice than meat from domesticated animals (e.g., pork or poultry) (Corradini, Maescotti, Demartini, and Gaviglio, 2022); as they usually have high protein and mineral contents; low fat; and favorable fatty acid (Czarniecka-Skubina, Stasiak, Latoch, Owczarek, and Hamulka, 2022; Needham, Bureš, Černý, and Hoffman, 2023). From an ethical perspective, game hunting is considered controversial: it has importance in food production, ecosystem management, recreation and leisure (Di Minin et al., 2021); but also can be cruel in light of violating the right to life of wild animals (Corradini et al., 2022). Also; game meat raises critical food safety concerns; particularly regarding hygienic handling; traceability; and the risk of pathogen transmission along the game meat supply chain (Needham et al., 2023; Tumelty et al., 2023). Across Europe, wild boar (*Sus scrofa*) is the major large wild game species consumed due to their wide distribution and high abundance (Abrantes and Vieira-Pinto, 2023).

In recent years, the population of wild boars has been growing

markedly across Europe, due to factors including forest regrowth, land abandonment and mild winters (Markov, Pankova, and Morelle, 2019; Vajas, Von Essen, Tickle, and Gamelon, 2023; Vetter, Ruf, Bieber, and Arnold, 2015). This leads to increasing pressure on ecosystem, agriculture, tourism and disease control. The flourishing populations of wild animals can cause significant damages to agricultural crops and ground cover in forests (Acevedo et al., 2019). Some wild animals can transmit diseases and pests to livestock; with the recent cases of African swine fever in Northern Italy (Bellini et al., 2025). Moreover; increasing number of wild boars create problems for tourists; e.g.; hikers getting hurt by wild boars. Among other solutions; implementing ungulate population control through hunting can be effective. However; Italian hunters are not incentivized to do so due to the presence of institutional and logistical barriers. Hunters would be legally allowed to sell their harvest when it is processed through registered slaughterhouses or collection facilities that comply with traceability and hygiene standards. However; in practice; they often face long distances to the few registered facilities; inconvenient opening hours; or limited processing capacities. In addition; the system is constrained by uneven and sometimes restrictive local interpretations of regulations; significant administrative and liability burdens on operators and weak economic incentives; due to

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high processing costs and fragmented seasonal supply. These barriers are likely due to the weak coordination of supply chains and the underdeveloped role of collection centers. As a result, the game meat sold in Italy is predominantly from foreign origin; overlooking the opportunity to create economic value locally and support rural development (Fantechi, Contini, Scozzafava, and Casini, 2022). Therefore, it is important to develop a commercial market for locally sourced wild game markets, which can also be used as a lever for wildlife management.

The expansion of markets for wild game meat is often constrained by weak and poorly organized supply chains (Kempen, Wassenaar, and Tobias-Mamina, 2023). Countries like France and Spain already have well-established markets for game meat; however, this is not the case for Italy (Fantechi et al., 2022; Needham et al., 2023). Taken the Veneto region (in Northeastern Italy) as an example, the market for wild game meat is still fragmented, and at the same time the region is under the pressure of overabundance of wild boars. Underdeveloped supply chains result in unregulated supplies, varying meat quality, fluctuating prices, and inconsistent year-round supply (Kempen et al., 2023). In fact, the profitability of a supply chain depends a lot on consumer willingness to purchase these products (Stoica, 2022), but drivers behind the consumer preferences for wild boar meat are rarely identified, especially for Italy. This study addresses this scientific gap by calculating the consumers' willingness to pay (WTP) and providing some practical insights for producers. Moreover, these findings would also inform broader evaluations of whether game meat markets can serve as a pathway for sustainable rural development in mountainous regions where economic opportunities are limited.

Despite growing interest in game meat consumption, the literature remains largely descriptive. For example, numerous studies have focused on consumers' perceptions and purchase behavior of wild game meat products (Czarniecka-Skubina et al., 2022; Tomasevic et al., 2018). There is limited evidence on consumer preferences and WTP for hunted wild game meat products (Kempen et al., 2023; Marescotti, Caputo, Demartini, and Gaviglio, 2019). Adding to this literature, a discrete choice experiment (DCE) was applied to examine the attributes of game meat that significantly influence consumers' choice to consume it. In DCEs, respondents will face hypothetical choice scenarios with different attribute combinations that simulate realistic decision-making process (Louviere, Hensher, and Swait, 2000). Given that prior work on game meat is mostly focused outside Europe (e.g.; Africa; Australia) (Marescotti et al., 2019), this study also adds European-specific insights.

Building on the literature, several supply-side factors were found to have clear implications on consumers' choices. For example, hunting methods may influence animal welfare perceptions, and even more, meat quality. Hunting with dogs would bring more stress to wild animals than without dogs, which raises animal welfare concerns (Reiche et al., 2019). Meanwhile, increased stress level may cause serious deterioration of meat quality after slaughtering (Kuhnenn, Braun-Münker, and Ecker, 2025). Food safety also plays an important role in consumers' purchasing decisions (Corradini et al., 2022). Like domesticated animals; hunted game species should follow certain hygiene standards before entering the commercial market (Regulation (EC) No 853/2004). Wild game meat could carry foodborne pathogens (e.g.; salmonellosis; yersiniosis) (Fredriksson-Ahomaa, 2019); leading to foodborne illness in some consumers without proper processing treatments. Due to these concerns towards food safety; consumers have more trust in wild game meat with food health certification; which involves inspection by a veterinarian or other qualified inspectors (Needham et al., 2023). Annual harvest level affects consumers' preference as well. Some consumers might have concerns about sustainability and ethics of wild game species. On the one hand; the commercialization of wild game could result in overhunting for profit; therefore threatening the existence of the populations. On the other hand; the global demand for ethical food is increasing (Cembalo et al., 2016); and consumers are likely to question the ethics of meat consumption (e.g.; animal welfare issues) if maintaining a very high annual harvest level. Consumers also

care about meat origins; i.e.; the places where meat products came from (Balcombe, Bradley, Fraser, and Hussein, 2016; Fantechi et al., 2022; Verbeke and Ward, 2006). Origin is found to be an important factor in consumers' choices, and they seem to appreciate wild meat products of local origin or at least raised in their own country (Fantechi et al., 2022). To the authors' best knowledge, there is still scarce research on consumer preferences to these key product attributes.

Apart from supply chain factors, consumers' attitudes towards wildlife and hunting play an important role (Demartini, Vecchiato, Tempesta, Gaviglio, and Viganò, 2018; Tomasevic et al., 2018). Wildlife value orientations (WVOs) are a set of basic beliefs that give direction and meaning to fundamental values in the context of wildlife, and they are upstream beliefs that shape how people interpret wild game meat (Fulton, Manfredo, and Lipscomb, 1996; Manfredo, 2008). Therefore, taking consumer's value orientation towards wildlife into account is essential for policymakers to develop adequate game meat policy and management responses (Grilli, Notaro, and Campbell, 2018). This study is the first exploring the role of WVOs and hunting activities in consumer preferences to wild game meat. Meanwhile; food values (Lusk and Briggeman, 2009) can also play a central role in consumer preferences for wild boar meat. When making food choices, consumers do not solely rely on wildlife-related considerations, but also take into account food-related factors, such as nutrition, taste, perceived naturalness, origin, safety, environmental impact, etc. For example, perceptions of naturalness and environmental sustainability may make wild boar meat more attractive to some consumers, while concerns about unfamiliar taste, handling, or health risks may discourage others.

Against this backdrop, the study investigates the social acceptability of a wild boar meat market as an innovative lever for rural development in mountainous Italy. Specifically, the paper (i) examines consumer acceptance and preferences for key product attributes, including meat origin, food health certification, and price; (ii) understand how Italian consumers respond to broader value-chain information, in the case of wild boar meat, such as hunting method and annual harvest level; (iii) explores the influence of consumers' WVOs and food values on their choice behavior. By integrating supply-side constraints with demand-side evidence, the paper provides actionable insights for policymakers and producer organizations seeking to convert wildlife overabundance into a safe, ethical, and sustainable local resource.

This paper is organized as follows. Section 2 introduces wildlife value orientation theory and Food Values theory. In Section 3, data collection process and methodologies are described in detail. Section 4 reports the CE results and WTP estimates. Section 5 discusses the study's key insights and policy implications. Section 6 concludes with limitations.

2. Theoretical background

2.1. Wildlife value orientation theory

Consumers often face Game Meat Paradox when making food choices. On the one hand, they acknowledge that game meat is an important source of food and has a good nutritional profile (Tomasevic et al., 2018). On the other hand; they tend to have negative attitudes towards hunting activities; or they do not support hunting as a means to providing game meat (Matilainen, Luomala, Lähdesmäki, Viitaharju, and Kurki, 2024). The negative view can also be attributed to the fact that many people consider game species as part of wildlife. For this reason, WVOs can be particularly insightful for understanding consumer responses to wild game meat.

Value orientations are networks of core beliefs that mediate between general values and specific attitudes or norms (Manfredo, 2008). They reflect cultural ideology and give contextual meaning to values within a domain of interest; such as wildlife (Manfredo, Teel, and Henry, 2009; Teel et al., 2010). This theory is often based on the value-attitude-behavior model (Homer and Kahle, 1988); for example; WVOs are good predictors of attitudes to wildlife and in turn predicting

consumers' behavior intentions and choice behavior (Paemelaere et al., 2024). The first classification of attitudes towards wildlife was proposed by Kellert (1985). In recent literature, two main WVOs emerged; namely mutualism and domination (Manfredo, 2008; Manfredo et al., 2009; Teel et al., 2010). Domination represents a relationship where humans are assumed to have power/superiority over animals and the use of wildlife should be prioritized for human benefits, while mutualism represents a relationship where wildlife are assumed to have rights like humans, as part of an extended family, and as deserving of caring and compassion (Manfredo et al., 2009; Manfredo, Berl, Teel, and Bruskotter, 2021). Although Domination vs. Mutualism are often described as opposing VOs; people do not fall into just this two boxes. Instead, individuals can show various levels in each orientation (Teel et al., 2010).

Several studies have already demonstrated WVO's potential as a good predictor of attitudes towards wildlife (Grilli et al., 2018; Notaro, Grilli, and Vaske, 2025). Some studies have also linked WVOs to wild meat (Paemelaere et al., 2024; van Vliet et al., 2021), for example, Paemelaere et al. (2024) examined what drives the difference in WVOs and explored how WVOs can be translated into wild meat consumption behavior. They found that respondents with positive anthropocentric VOs were associated with high consumption frequency of wild meat (Paemelaere et al., 2024). Therefore, consumers with domination ideology might be more likely to consume game meat products, while those scored higher in mutualism might be less likely to purchase wild game meat.

2.2. Food values

Food values refer to a set of enduring beliefs that consumers use to assess food and to determine which food-related outcomes are most important in their choices. Lusk and Briggeman (2009) proposed a list of items; including safety; taste; price; nutrition; naturalness; origin; fairness; convenience; tradition; environment; and appearance. This framework can be particularly insightful for studying wild boar meat; since consumers' willingness to pay for this product are likely to depend on the assessment of food values. On the one hand; wild boar meat might be positively associated with naturalness; sensory quality; local origin; and environmental benefits linked to wildlife management. On the other hand; it may also raise some concerns related to food safety; traceability; and ethical issues linked to hunting activities. Although food values scale have been widely applied in previous literature to explain consumer preferences and willingness to pay (Pappalardo and Lusk, 2016; Sun, Ortega, and Lin, 2023), its direct application to wild game meat products remains limited. Existing studies on game meat addressed only a few food-value dimensions, such as origin, safety, animal welfare, environmental impact, and quality (Demartini et al., 2018; Marescotti et al., 2019).

3. Data and method

3.1. Data collection and survey instrument

Data were collected using questionnaire-based survey, which was administered between November 2024 and January 2025. A professional survey firm sent out the online questionnaire to a sample of Italian consumers who had eaten meat during the previous three months. The survey was administered by a professional survey company that produced a nationally representative sample based on quotas retrieved from official statistics (i.e., gender, geographical regions). In particular, the sample was stratified by age, gender, and place of residence (i.e., macro regions of Italy). The questionnaire consists of three sections. The first section is aimed at identifying respondents' WVOs. The second section covers attitudinal questions about game meat consumption. The third section includes a choice experiment exploring consumers' preferences for wild boar meat. This questionnaire also collected socio-demographic characteristics of respondents, such as gender, income level, education

level, place of residence, etc. 1719 valid answers were obtained from this survey.

3.2. Choice experiment

To further explore consumers' demand for wild boar meat, a DCE was employed to elicit their willingness to pay (Lancaster, 1966; Manski, 1977; McFadden, 1974). Each respondent was presented with 8 choice cards (see Fig. 1), and each card displayed three wild boar meat options defined by five attributes – i.e., hunting method, annual harvest level, food health certificate, meat origin and cost (detailed description see supplementary material). Before completing the choice tasks, respondents were provided with short explanations of each attribute and its levels. Respondents evaluated each set independently, selecting the option they would buy in the supermarket or butcher shop. The third alternative worked as an opt-out, allowing them to choose either of the two products. The choice sets were created using D-efficient design (Bliemer, Rose, and Hess, 2008) with software Ngene (ChoiceMetrics, 2021). The D-efficient design consisted into a single block design of 8 cards and was created in two stages. The design was created using zero priors for the pilot survey, which was administrated to a sample of 300 respondents. The data collected in the pilot were then used to generate priors to create the final design for the main survey.

The levels of each attribute are shown in Table 1. Hunting method was described as the way in which wild boars were harvested (e.g., group hunting with dogs, group hunting without dogs, individual hunting). Annual harvest level (low, medium, or high) was described as the number of wild boars harvested per province per year. Food-health certification indicated whether the meat had undergone health inspection and complied with food safety standards. Origin referred to whether the meat came from the same region in which the meat is sold, from another Italian region, or from another European country. The attributes included in the choice cards were used to capture two dimensions of wild boar meat evaluation. The first dimension refers to product-level information that are available at the point of purchase, such as price per 1 kg wild boar meat, meat origin, and food-health certification. These attributes are widely recognized in the food-choice literature as relevant to consumer decision-making, particularly for meat products (Gracia and De-Magistris, 2013; Verbeke and Ward, 2006). The second dimension refers to additional value-chain-related information, such as hunting method and annual harvest level. These attributes are less common to consumers under the current market condition, therefore are treated as exploratory attributes in this study. Their inclusion can be used to examine whether consumers' choices are sensitive to information about animal-welfare, ethical, and wildlife-management aspects of the supply chain.

The price intervals were selected based on real prices of wild boar meat products on the market. Origin and food certification were selected to take into account product quality and food safety. Consumers were found to value meat origin (Balcombe et al., 2016; Gracia and De-Magistris, 2013; Verbeke and Ward, 2006) and production process a lot when making food choices (Merlino, Borra, Girgenti, Dal Vecchio, and Massaglia, 2018; Orsoni et al., 2020; Schulze, Spiller, and Risius, 2021). Following Fantechi et al. (2022); three levels for meat origin were used: regional; Italy; EU. Sustainability concerns also played an important role in meat consumption (Mirade and Font-I-Furnols, 2023). To enhance acceptability of game meat; a key attribute is the presence of a certification verifying that the product has undergone health inspections and meets defined quality and safety standards. Besides product-related information; hunting method and annual harvest level were chosen for better examining how the value chain of wild boar meat is organized. Some consumers would make their food choices not only based on product characteristics; but also from ethical perspectives. For example; hunting with dogs may be perceived as less acceptable from an animal welfare perspective as it can bring stress to wild animals (Reiche et al., 2019). Annual harvest level was included as a policy-performance

	Option 1	Option 2	Option 3
Hunting method	Group hunting with dogs	Individual hunting	Neither of these two options
Annual harvest level	Low	High	
Food health certification from the meat processing center	NO	Yes	
Meat origin	Italy	EU	
Cost	18	24	

Fig. 1. Example choice card.

Table 1
Description of attributes and levels in the choice cards.

Attribute	Levels
Hunting method	-Group hunting with dogs -Group hunting without dogs -Individual hunting
Annual harvest levels	-Low, if the number of animals killed per province is less than 100 heads -Medium, if the number of animals killed is between 100 and 500 heads -High, if the number of animals killed is greater than 500 heads
Food health certificate	Yes/No
Meat origin	-Regional, origin from the same region in which the meat is sold -Italian, origin from any region within Italy -Other European countries, origin from elsewhere in Europe
Cost per 1 kg wild boar meat	15, 18, 21, 24, 30 euro

attribute, which indicates how many wild boars would be taken each year. Through this, respondents can make a trade-off between consumptive benefits and other outcomes. This attribute also provides some empirical evidence about population control.

3.3. Attitudes towards wildlife, hunting, and game meat

Before choice cards, individual value orientation towards wildlife were measured using fourteen statements (Table S1), which represents a short version of the 19-item scale first proposed by [Teel and Manfredi \(2010\)](#) and each were rated on a 7-point Likert scale (from strongly disagree to strongly agree). To reduce the burden of respondents; 14-item WVO were included in the survey instead of traditional 19-item WVO. These statements were adapted from [Sponarski, Vaske, and Bath \(2015\)](#) and has been extensively tested and proven valid in previous studies ([Notaro et al., 2025](#); [Sponarski et al., 2015](#); [Teel and Manfredi, 2010](#)). Out of fourteen statements, some of them are related to domination, while the other is related to mutualism. An orientation was assigned to each respondent based on their answers to the 14-item statements ([Manfredi, 2008](#)). According to [Teel, Dayer, Manfredi, and Bright \(2005\)](#); the scale midpoint can be used as a cutoff value to identify their orientation. Respondents can be classified into four categories based on their scores on both mutualism and domination items; including mutualist (mutualism >4 and domination ≤4); dominant (domination >4 and mutualism ≤4); pluralist (mutualism >4 and domination >4); and distanced (mutualism ≤4 and domination ≤4). Pluralist respondents tend to have both mutualism and domination orientations; while distanced respondents are considered having neither of them. To incorporate WVOs in choice models; confirmatory factor analysis (CFA) was conducted to test the hypothesized measurement model and validate latent constructs (i.e.; domination and mutualism) derived from survey data ([Hoyle, 2000](#)). The reliability of the latent

constructs was checked using Cronbach's Alpha ([Taber, 2017](#)). Following this, factor scores for two latent constructs were computed and included as covariates in the latent class allocation function.

Food value scales, adapted from the [Lusk and Briggeman \(2009\)](#); were used to measure consumers' attitudes to game meat. These scales were normally used to rank most important features in people's food choice (e.g.; safety; nutrition; price; taste; value for money) and has been extensively applied in food research ([Femi-Oladunni, Ruiz-Palomino, Martínez-Ruiz, and Muro-Rodríguez, 2021](#); [Lusk, 2011](#)). It also has been used to measure attitudes towards large wild ungulates meat, such as in [Demartini et al. \(2018\)](#). Consumers' attitudes towards game meat were examined by asking respondents to what extent they agreed with the statements. The responses were rated on 7-point Likert scale. Explanatory factor analysis (EFA) was first conducted to uncover the latent structure of the survey data (i.e.; respondent attitudes towards game meat) ([Watkins, 2018](#)), followed by a CFA to test the measurement model derived from the EFA results. Scale reliability was assessed using Cronbach's alpha. Factor scores were computed and included as covariates in the latent class allocation function to assess their effects on choices.

3.4. Econometric approach

DCE is underpinned by the utility maximization theory ([Lancaster, 1966](#)); in which individuals are assumed to make choices from a selection of products to maximize their utility. [Lancaster \(1966\)](#) described utility as the sum of products' attributes and levels. Consumer preference for meat product attributes was modelled under the random utility framework ([McFadden, 1974](#)). This framework proposes that individuals select alternatives from unordered choice cards based on a combination of objective characteristics and random factors; underscoring the complexity of decision-making ([McFadden, 1974](#)). Total utility (U_{ij}) that an individual i derives from choosing alternative j can be expressed as:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \quad (1)$$

Total utility (U_{ij}) consists of two components: V_{ij} , the deterministic (observable) component, and ε_{ij} , the stochastic (unobservable) component. The estimation of choice probabilities requires assumptions about the distribution of error terms (ε_{ij}). A standard assumption is that error term is independently and identically distributed (i.i.d.), following Gumbel distribution, suggesting the use of multinomial logit (MNL) model. However, MNL model assumes preference homogeneity across individuals, which is very unlikely.

To relax this assumption, mixed logit (MXL) models were used, allowing coefficients to vary across individuals and providing a more flexible representation of choice behavior. A latent class specification of the MXL model (LCM) was estimated to capture individual's preference heterogeneity. In LCM, consumers are assumed to fall into distinct segments/classes, and each characterized by class-specific utility parameters ([Greene and Hensher, 2003](#)). The optimal number of classes was

selected by comparing models with two and three classes, based on Bayesian Information Criterion (BIC). Models with more than three classes were disregarded due to their complexities. Respondents' WVOs, attitudes towards game meat and socio-demographic variables were included in latent class allocation function to explain the probability of respondents belonging to each latent segment. The probability of respondent i belongs to latent class s and chooses alternative j over the other alternative k can be written as:

$$Pr_{ij} = \sum_{s=1}^S (M_{i,s} \bullet P_{ij|s}) = \sum_{s=1}^S \left(M_{i,s} \bullet \frac{\exp(\beta_s' x_j)}{\sum_{k=1}^K \exp(\beta_s' x_k)} \right) \quad (2)$$

Here, s ($s = 1, 2, 3$) denotes the latent classes, $M_{i,s}$ represents the probability of respondent i affiliated with class s , β_s represents the class-specific preference parameters, x_j is the vector of attribute levels for alternative j , and x_k represents the vector of attribute levels for alternative k .

Respondents' WTP values were also calculated to express consumer preference in monetary terms (Rosen, 1974). Confidence intervals of WTP values were calculated using the Krinsky–Robb simulations (Krinsky and Robb, 1986).

4. Results

4.1. Survey responses

A total of 1719 respondents took part in the survey. Table 2 displayed socio-demographic characteristics of respondents under four WVO types. 12.04% of respondents were classified as dominants, while 20.83% of respondents were categorized as mutualists. More than one third of respondents had both mutualism and domination orientations. Among socio-demographic variables, gender, the identity of hunter, and association memberships were statistically related to the four WVO types. Mutualists and dominants were more likely to be male than female. Pluralists were predominantly female (63.72%). Surprisingly, mutualists had the largest share of active hunters (3.91%) and former hunters (8.10%) among three types. Pluralists and mutualists had the largest share in environmentalist and animal-rights associations. Dominants are more likely to be in recreational and/or socio-cultural associations (11.11%).

To further examine the influence of value orientations, CFA was conducted to identify latent factors from WVO (Table S1). The reliability analysis showed high internal consistency across domination items (Cronbach's $\alpha = 0.81$) and mutualism items (Cronbach's $\alpha = 0.91$). Two latent factors (i.e., domination and mutualism) were identified from the survey data, and all the factor loadings in the CFA were higher than the minimum of the recommended level of 0.6 (Chin, Gopal, and Salisbury,

Table 2
Socio-demographic characteristics and WVO types of respondents.

		Wildlife value orientation type*				P-value
		Mutualist N = 358	Dominant N = 207	Pluralist N = 623	Distanced N = 531	
Gender	Male	55.31	56.52	35.96	56.69	<0.001
	Female	44.13	43.00	63.72	42.75	
	Non-binary	0.56	0.48	0.16	0.38	
	Prefer not to say	0.00	0.00	0.16	0.19	
Age	Mean (SD)	48.62(14.14)	46.54(15.49)	48.84(15.07)	48.07(14.34)	0.3
Occupation	Currently employed	62.01	58.45	54.90	62.52	0.3
	Unemployed and seeking work	9.78	9.66	9.63	8.85	
	Unemployed and not seeking work	6.70	4.83	7.87	5.84	
	Retired	15.92	17.39	17.98	16.38	
	Student	5.59	9.66	9.63	6.40	
Are you a hunter?	Yes	3.91	2.42	0.16	1.13	<0.001
	I used to be	8.10	2.90	1.12	5.84	
	NO	87.99	94.69	98.72	93.03	
Are you a member of association?	Environmental	5.59	0.97	3.05	1.13	<0.001
	Animal rights	5.03	3.38	7.87	1.32	
	Recreational and/or socio-cultural	7.82	11.11	9.15	6.21	
	Local development	4.47	1.45	2.73	5.08	
	None of these	77.09	83.09	77.21	86.25	
City size (no of inhabitants)	0–10,000	23.18	16.91	22.31	24.48	0.5
	10,001–30,000	18.72	26.09	21.19	21.28	
	30,001–100,000	24.02	25.60	24.56	22.79	
	100,001–250,000	12.01	7.73	10.59	9.60	
	250,000–5,000,000	22.07	23.67	21.35	21.85	
Area	Northwest	25.14	29.13	27.39	25.14	0.8
	Northeast	18.64	16.50	21.56	19.05	
	Central	22.03	19.90	18.96	20.95	
	South and Islands	34.18	34.47	32.09	34.86	
Education	Elementary school	0.28	0.00	0.00	0.19	0.6
	Middle school	12.01	7.25	9.15	10.92	
	High school	51.68	53.62	51.04	51.60	
	Bachelor's degree or higher	36.03	39.13	39.81	37.29	

*: Shown in the table are percentages unless specified.

1997). Comparative Fit Index (CFI = 0.89) and Standardized Root Mean Square Residual (SRMR = 0.07) both suggested sound goodness of fit of the model.

Table 3 reports survey responses about respondents' attitudes to game meat. Respondents had generally favorable view of wild game meat. Over half of the respondents agreed that it tastes good (69.17%) and offers good nutritional value (65.09%). 67.66% of respondents believed that consuming game meat is part of Italian culinary tradition. 64.28% of respondents agreed that game meat can provide income for mountainous regions. However, respondents were skeptical about the safety and sustainability of game meat: 51.95% of respondents thought it is safe to eat, and 44.84% considered it to be environmentally respectful. Only one third of respondents found game meat easy to find (30.66%) and cook (32.51%). 26.94% of respondents thought game meat was pricey. Through CFA, two latent factors were identified from the survey data, namely *Ethic, quality & sustainability* and *Convenience & economic value*. These two factors described what matters the most when choosing wild boar meat products. The reliability analysis showed high internal consistency across *Ethic, quality & sustainability* items (Cronbach's $\alpha = 0.90$) and *Convenience & economic value* items (Cronbach's $\alpha = 0.80$). The CFI (0.91) and SRMR(0.06) both suggested sound goodness of fit.

4.2. Modelling results

Table 4 reports the results of MNL and LCM models. MNL model presents the average effect of the attributes across all the respondents. The positive and significant coefficient of the opt-out alternative indicates a general tendency among respondents to choose the no-purchase option. This should not be interpreted as evidence of a specific reason for rejection, but rather as reflecting limited preference alignment with the proposed alternatives and/or unobserved heterogeneity in respondents' attitudes towards wild boar meat. In addition, respondents showed a stronger preference for wild boar meat characterized with lower harvest level, regional origin and hunted through individual hunting method. Compared with group hunting with dogs, individual hunting and group hunting without dogs significantly increased the likelihood of wild boar meat being chosen. The coefficient on price was negative and significant, which is aligned with expectation.

LCM with three segments was presented in Table 4. Compared with MNL model (log likelihood = -13,643, BIC = 27,372), LCM has lower log likelihood (-10,307) and better BIC (21023). LC = 3 model was chosen as the best model in this case as AIC and BIC were minimized with 3 classes. LCM revealed substantial heterogeneity about consumers' preferences across three classes, with average class share at 32.79%, 24.88% and 42.33%, respectively. The class share considered respondent-specific characteristics, and it indicated class 2 was the smallest segment. Class 1 showed the strongest preference for wild boar

meat with food health certificates and Italian/regional origin. They were the only group who responded significantly to annual harvest level, with respondents being more likely to choose wild boar meat harvested at low/medium level. Food health certification and Italian/regional origin remained important for class 2, and they particularly preferred wild boar meat hunted by individual hunting method. Class 3, the largest group, had smaller but still positive coefficients for most attributes and they were the least price sensitive. They displayed a favorable attitude towards wild boar meat, with the parameter for the opt out alternative being negative and significant.

Respondents' socio-demographic characteristics, their attitudes towards game meat, and wildlife value orientations had an impact on their choice behavior. Compared with Class 1 (reference group), class 2 membership is more likely among female participants, respondents with more mutualistic and domination-oriented WVOs, and those scoring lower on ethical/quality & sustainability concerns. Class 3 membership was associated with more elderly respondents (positive and significant coefficients for medium age group), lower domination scores than class 1, and higher scores on convenience & economic value.

4.3. Willingness to pay calculations

Table 5 reports the WTP estimates from the LCM simulated from the Krinsky–Robb method (Krinsky and Robb, 1986). Respondents were willing to pay substantial amounts for changes in hunting practices, food safety and meat origin. The food health certificate yielded the highest WTP among all the attributes: respondents were willing to pay 28.15 euro more for certified meat, underlining the central role of food safety in driving acceptance. Meat origin was also highly valued: WTP for meat of Italian origin was 22.12 euro, and for regional origin was 22.63 euro. On average, respondents would pay 16.17 euro more for wild boar meat obtained through group hunting with dogs, and 20.93 euro more for meat obtained through individual hunting. Harvest level was an attribute that was least valued by the respondents. The WTP for a low harvest level was 5.21 euro and for a medium harvest level was 2.89 euro. The very wide confidence interval for WTP of opt out alternative displayed substantial heterogeneity in respondents' decisions in purchasing wild boar meat. In other words, the sample did not reflect a uniform response: while some respondents showed a clear reluctance to enter the market and consistently preferred not to purchase the product, others appeared to be more open to purchasing wild boar meat products.

5. Discussion

This study investigates Italian consumers' preferences and WTP for wild boar meat, paying particular attention to the role of WVOs and food values. Several insightful findings can be highlighted. First, results suggest that overall acceptance of wild boar meat among Italian

Table 3
Survey responses of respondents' attitudes to game meat.

I believe that wild game meat...	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
It is safe to eat	3.78	5.58	9.77	28.91	19.78	22.16	10.01
It offers good nutritional value	1.98	1.69	2.97	28.27	25.07	26.7	13.32
It tastes good	4.01	2.27	4.83	19.72	22.34	27.46	19.37
It is good value for money	5.24	6.81	14.89	37.17	16.99	13.5	5.41
It comes from natural, non-intensive production	4.25	3.43	6.34	31.12	21.82	19.26	13.79
It is easy to find	6.17	12.97	24.78	25.42	16.06	10.41	4.19
It is easy to cook	8.03	13.9	20.42	25.13	14.54	12.97	5.00
It is appealing	6.40	4.54	8.55	26.82	21.00	20.65	12.04
It is environmentally respectful	5.24	5.18	9.83	34.9	18.38	16.11	10.35
It provides income for mountain regions	3.49	2.44	5.12	24.67	30.31	22.92	11.05
It is part of Italian culinary tradition	3.20	2.73	5.06	21.35	25.25	25.54	16.87
It mainly comes from Italy	4.89	5.12	8.96	32.00	18.44	16.35	14.25

*Percentages are shown in the table.

Table 4

Results of multinomial logit and latent class logit models.

	MNL model		Latent class logit model					
			Class 1		Class 2		Class 3	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Group hunting w/o dog	0.31***	0.03	0.45***	0.11	1.44***	0.18	0.22***	0.04
Individual hunting	0.36***	0.04	0.77***	0.13	1.82***	0.18	0.25***	0.06
Harvest level: medium	0.10***	0.03	0.37***	0.09	0.11	0.14	0.03	0.04
Harvest level: low	0.15***	0.03	0.34**	0.11	0.32	0.17	0.07	0.05
Food health certificate	1.00***	0.03	3.06***	0.14	1.34***	0.14	0.33***	0.05
Origin: Italy	0.72***	0.03	1.51***	0.10	0.62***	0.15	0.60***	0.04
Origin: regional	0.75***	0.03	1.68***	0.12	0.53**	0.17	0.62***	0.05
Opt out alternative	0.57***	0.08	1.48***	0.29	4.24***	0.35	−1.87***	0.16
Price	−0.04***	0.003	−0.08***	0.01	−0.04**	0.01	−0.02***	0.005
Class membership								
Constant					−0.68***	0.17	0.05	0.14
Female					0.33*	0.16	−0.20	0.14
Age_low					−0.34	0.22	0.42*	0.18
Age_medium					−0.02	0.18	0.51***	0.15
Mutualism					0.40***	0.09	0.06	0.08
Domination					0.66***	0.10	−0.21*	0.09
Ethic, quality & sustainability					−0.89***	0.10	−0.28**	0.09
Convenience & economic value					0.15	0.10	0.56***	0.09
Class share			32.79%		24.88%		42.33%	
Log likelihood	−13,643		−10,307					
N	1719		1711					
AIC	27,304		20,700					
BIC	27,372		21,023					

*** $p < 0.01$; ** $p < 0.01$; * $p < 0.05$.**Table 5**

Willingness-to-pay values and confidence intervals for LCM model.

Attribute	Mean	Median	Lower bound*	Upper bound
Group hunting w/ dog	16.17	14.29	7.98	33.32
Individual hunting	20.93	18.40	10.26	43.53
Harvest level: medium	2.89	2.71	−1.31	7.94
Harvest level: low	5.21	4.59	0.03	12.79
Food health certificate	28.15	26.07	17.60	48.94
Origin: Italy	22.12	20.68	14.07	37.36
Origin: regional	22.63	21.13	13.48	39.06
Opt out alternative	1.75	−3.36	−34.65	60.60

*: Lower and upper bound for 95% confidence interval.

consumers is low. However, this reluctance is not uniform across the sample. Using choice experiment, three segments are identified from our respondents, and their preferences for the most important wild boar meat attributes differ by segments of consumers. Second, this study finds out the attribute that matters the most for consumers is food health certification, followed by meat origin with Italian/regional origin being preferred. Third, respondents' WVOs and attitudes towards wild game meat influence their choice behavior. For example, individuals with stronger ethical and sustainability concerns are more likely to choose meat products with food health certificates and local origin, while those with domination-oriented views were more attracted to hunting-practice attribute. Overall, these findings suggest that acceptance of wild boar meat depends not only on product characteristics, but also on broader value-based orientations towards wildlife and food. To the authors' best knowledge, this is the first study that integrates WVOs into a choice experiment framework to quantify consumers' preferences and willingness to pay for wild boar meat, thereby providing a novel behavioral and value-based perspective on game meat consumption.

The finding about food health certification is aligned with previous research that most consumers are concerned about game meat safety and view it as the most important attribute (Bekker, Hoffman, and Jooste, 2011; Wassenaar, Kempen, and van Eeden, 2019). As for meat origin, Italian/regional origin are preferred, which is consistent with previous findings (Balcombe et al., 2016; Bekker et al., 2011; Fantechi et al., 2022). Respondents are willing to pay more for wild game meat of

national or local origin than for products imported from another European country (Fantechi et al., 2022). Consumers have almost the same preference for meat from Italy and from the region; which further confirms the finding by Demartini et al. (2018). Compared with previous research; this study is also innovative in introducing two new variables to the literature: hunting method and annual harvest level. These attributes allow the analysis to move beyond product characteristics and incorporate attributes directly linked to wildlife management practices; although these attributes are less common to consumers under the current market condition. Results indicate that individual hunting is the preferred harvesting method; and this preference also suggests that consumers may associate individual hunting with lower levels of stress in wild animals compared with hunting with dogs (Kuhnenn et al., 2025). Moreover, results also reveal a clear preference for a lower annual harvest level, reflecting consumers' concerns about over-exploitation of wild animals. However, the results should not be interpreted as a direct recommendation for wildlife management targets, and this needs to be made context specific. However, if information about hunting method and harvest level could somehow be communicated to consumers through labels or traceability systems, this might influence their willingness to pay. Increased WTP could create economic incentives for stakeholders to develop a more structured supply chain for wild boar meat. Therefore, policymakers aiming to establish and maintain such a supply chain should consider not only food safety, certification, and origin, but also the governance and communication of hunting practices and annual harvest levels.

Another finding is that there are multiple segments of consumers of wild boar meat, with different preference patterns, which is aligned with previous findings (Czarniecka-Skubina et al., 2022; Fantechi et al., 2022). Consumers' attitudes towards wild game meat (i.e., food value scale) and their WVOs both have an effect on choice behavior (Demartini et al., 2018); further confirming the finding by Demartini et al. (2018). Although WVOs contributes to explaining some heterogeneity in class membership; LCM results suggest that food values play a far more central role than WVOs in driving purchase decisions. The first segment show strong preferences for wild boar meat with food safety certification and regional origin. Class 1 score significantly higher on Ethic; quality & sustainability items and lower on mutualism and

domination orientations compared to the other segments. In other words; respondents in this segment perceive wild game meat as a safe; ethical; nutritious; and sustainable option. They are willing to pay a premium for wild boar meat that is certified and locally sourced. Class 1 match the profile of “ethical consumers” (Kushwah, Dhir, and Sagar, 2019; Oke, Ladas, and Bailey, 2020), whose food choice are not only guided by personal preferences, but also by moral, environmental, and social considerations.

For consumers in class 2, hunting-related attributes significantly increase the likelihood of wild boar meat products being chosen. This class consists of consumers who are more domination-oriented (e.g., those who use wildlife for human benefits) (Manfredo, 2008). For this group, hunting is perceived as a legitimate method to harvesting wild boar meat and appropriate means of managing wild boar populations. Class 3 is the only segment that shows a generally favorable attitude towards wild boar meat, and they have moderate but positive preferences for most attributes. Respondents who belong to this group are more likely to be in middle age group, and their WVOs have little influence on choice behavior. For Class 3, ethical, quality and sustainability aspects of meat products play a marginal role in their choices. Instead, their choice is primarily driven by convenience and good value for money. Our results reveal the underlying motivations of this type of consumers purchasing wild boar meat.

Several practical implications emerge from this study. First, it is important for wild boar meat retailers to formulate marketing strategies based on consumers' profiles. For example, providing “ethical consumers” with certified and traceable wild boar meat products can significantly increase their WTP, while for consumers who care about the convenience of meat products, retailers can provide them with already-cleaned or ready-to-cook wild boar steak. Promoting meat as coming from “population control projects” can attract consumers who value the context of hunting practices. Second, wild boar meat products have the potential for territorial branding. Consumers prefer to choose meat with local/Italian origin, which reflects a trend known as “consumer ethnocentrism” (Sabina del Castillo, Díaz Armas, and Gutiérrez Taño, 2024); where individuals favor products from their own country or region as a way to express their local identity and cultural heritage. Meanwhile; this preference may also arise from more practical considerations; such as greater trust in local production systems; easier traceability; and stronger confidence in quality controls and supply-chain transparency. To that end; territorial branding could be used to differentiate wild boar meat from imported products. Short supply chain can not only meet consumers' expectations about place identity and sustainability but also support rural economies by creating new market opportunities for small producers and job opportunities for local communities (De Fazio, 2016). Third, this study proves that there is demand for wild game meat products, with food health certifications and meat origin being the most important. In light of this, policymakers should extend current food certification framework also to wild game meat and develop transparent traceability systems aligned with EU food safety standards. By legalizing the market, consumers would have more trust in wild game meat products and placing more orders, which in turn generating more income for mountainous regions. Thus, developing wild game meat supply chain could be a win-win strategy for consumers, producers, retailers, and policymakers.

6. Conclusion

This study examined Italian consumers' preferences for wild boar meat products and explored the social acceptability of developing a national supply chain for this product. Using DCE, results suggest that most respondents were unwilling to buy wild boar meat. To increase consumers' WTP, food-health certifications and meat of regional/Italian origin were the attributes that they valued the most. When speaking about game meat, people usually come across this common paradox: I like wild animals, but I eat their meat. To further understand how people

perceive the Game Meat Paradox, the respondents' WVOs and their attitudes towards wild game meat were examined. The findings support the initial hypothesis that WVOs and food values contribute to explaining heterogeneity in consumer preferences.

There are still some limitations that should be taken into account in future research. First, the CE may not capture all the attributes that could affect respondents' purchasing decisions, such as sensory characteristics (e.g., color, smell, tenderness), processing method (e.g., fresh, frozen, ready-to-cook). Future studies could be improved by including more attributes in the CE, but they need to pay attention to the number of attributes included as respondents might find choice tasks too demanding. Second, this study only examined consumers' preferences for wild boar meat, and future research could also be conducted on other types of wild game meat, e.g., deer, rabbit, mouflon. Third, although midpoint-based classification is commonly used in the WVO literature, it inevitably simplifies continuous belief structures and may reduce nuance for respondents located near the threshold, resulting in potential misclassification. Lastly, as the choice experiment is hypothetical, it remains uncertain whether actual purchasing decisions would mirror stated preferences, thereby introducing hypothetical bias. Besides, this study introduced some attributes that are not usually available to consumers at the point of purchase; therefore, the results should be interpreted and generalized to real world example with caution. Future studies could validate these findings using revealed preference data or evidence from real purchase behavior.

Consent form

The authors declare that informed consent was obtained for experimentation with human subjects.

CRediT authorship contribution statement

Xinran Shen: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Gianluca Grilli:** Writing – review & editing, Methodology, Formal analysis, Conceptualization. **Paola Gatto:** Writing – review & editing, Supervision. **Francesco Pagliacci:** Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of competing interest

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

Acknowledgements

This work was supported by the Agritech National Research Center and received funding from the European Union Next-GenerationEU (Piano Nazionale Ripresa Resilienza (PNRR) – Missione 4 Componente 2, Investimento 1.4– D.D. 1032 17/06/2022, CN00000022).

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.meatsci.2026.110119>.

Data availability

Data will be made available on request.

References

- Abrantes, A. C., & Vieira-Pinto, M. (2023). 15 years overview of European zoonotic surveys in wild boar and red deer: A systematic review. *One Health*, 16. <https://doi.org/10.1016/j.onehlt.2023.100519>
- Acevedo, P., Croft, S., Smith, G. C., Blanco-Aguilar, J. A., Fernandez-Lopez, J., Scandura, M., ... Vicente, J. (2019). ENETwild modelling of wild boar distribution and abundance: Update of occurrence and hunting data-based models. In 16(8). *EFSA Supporting Publications*. <https://doi.org/10.2903/SP.EFSA.2019.EN-1674>
- Balcombe, K., Bradley, D., Fraser, L., & Hussein, M. (2016). Consumer preferences regarding country of origin for multiple meat products. *Food Policy*, 64, 49–62. <https://doi.org/10.1016/J.FOODPOL.2016.09.008>
- Bekker, J. L., Hoffman, L. C., & Jooste, P. J. (2011). Knowledge of stakeholders in the game meat industry and its effect on compliance with food safety standards. *International Journal of Environmental Health Research*, 21(5), 341–363. <https://doi.org/10.1080/09603123.2011.552715>
- Bellini, S., Salvato, S., Bernardis, M., Chiari, M., Martinello, F., Galimberti, L., ... Alborali, G. L. (2025). Epidemiological characteristics of the African swine fever genotype II epidemic in domestic pigs in Lombardy (Northern Italy) in 2023 and 2024. *Viruses*, 17(3), 327. <https://doi.org/10.3390/V17030327/S1>
- Bliemer, M. C. J., Rose, J. M., & Hess, S. (2008). Approximation of Bayesian efficiency in experimental choice designs. *Journal of Choice Modelling*, 1(1), 98–126. [https://doi.org/10.1016/S1755-5345\(13\)70024-1](https://doi.org/10.1016/S1755-5345(13)70024-1)
- Cembalo, L., Caracciolo, F., Lombardi, A., Del Giudice, T., Grunert, K. G., & Cicia, G. (2016). Determinants of individual attitudes toward animal welfare-friendly food products. *Journal of Agricultural and Environmental Ethics*, 29(2), 237–254. <https://doi.org/10.1007/S10806-015-9598-Z>
- Chin, W. W., Gopal, A., & Salisbury, W. D. (1997). Advancing the theory of adaptive structuration: The development of a scale to measure faithfulness of appropriation. *Information Systems Research*, 8(4), 342–367. <https://doi.org/10.1287/ISRE.8.4.342>
- ChoiceMetrics. (2021). *Ngene 1.3 User Manual & Reference Guide*. ChoiceMetrics. www.choice-metrics.com
- Corradini, A., Marescotti, M. E., Demartini, E., & Gaviglio, A. (2022). Consumers' perceptions and attitudes toward hunted wild game meat in the modern world: A literature review. *Meat Science*, 194, Article 108955. <https://doi.org/10.1016/J.MEATSCI.2022.108955>
- Czarniecka-Skubina, E., Stasiak, D. M., Latoch, A., Owczarek, T., & Hamulka, J. (2022). Consumers' perception and preference for the consumption of wild game meat among adults in Poland. *Foods*, 11(6), 830. <https://doi.org/10.3390/FOODS11060830/S1>
- De Fazio, M. (2016). Agriculture and sustainability of the welfare: The role of the short supply chain. *Agriculture and Agricultural Science Procedia*, 8, 461–466. <https://doi.org/10.1016/J.AASPRO.2016.02.044>
- Demartini, E., Vecchiato, D., Tempesta, T., Gaviglio, A., & Viganò, R. (2018). Consumer preferences for red deer meat: A discrete choice analysis considering attitudes towards wild game meat and hunting. *Meat Science*, 146, 168–179. <https://doi.org/10.1016/J.MEATSCI.2018.07.031>
- Di Minin, E., Clements, H. S., Correia, R. A., Cortés-Capano, G., Fink, C., Haukka, A., ... Bradshaw, C. J. A. (2021). Consequences of recreational hunting for biodiversity conservation and livelihoods. *One Earth*, 4(2), 238–253. <https://doi.org/10.1016/J.ONEAR.2021.01.014>
- Fantechi, T., Contini, C., Scozzafava, G., & Casini, L. (2022). Consumer preferences for wild game meat: Evidence from a hybrid choice model on wild boar meat in Italy. *Agricultural and Food Economics*, 10(1), 10–23. <https://doi.org/10.1186/S40100-022-00231-W>
- Femi-Oladunni, O. A., Ruiz-Palomino, P., Martínez-Ruiz, M. P., & Muro-Rodríguez, A. I. (2021). A review of the literature on food values and their potential implications for consumers' food decision processes. *Sustainability*, 14(1), 271. <https://doi.org/10.3390/SU14010271>
- Fredriksson-Ahomaa, M. (2019). Wild boar: A reservoir of foodborne zoonoses. *Foodborne Pathogens and Disease*, 16(3), 153–165. <https://doi.org/10.1089/FPD.2018.2512>
- Fulton, D. C., Manfredi, M. J., & Lipscomb, J. (1996). Wildlife value orientations: A conceptual and measurement approach. *Human Dimensions of Wildlife*, 1(2), 24–47. <https://doi.org/10.1080/10871209609359060>
- Gracia, A., & De-Magistris, T. (2013). Preferences for lamb meat: A choice experiment for Spanish consumers. *Meat Science*, 95(2), 396–402. <https://doi.org/10.1016/J.MEATSCI.2013.05.006>
- Greene, W. H., & Hensher, D. A. (2003). A latent class model for discrete choice analysis: Contrasts with mixed logit. *Transportation Research Part B: Methodological*, 37(8), 681–698. [https://doi.org/10.1016/S0191-2615\(02\)00046-2](https://doi.org/10.1016/S0191-2615(02)00046-2)
- Grilli, G., Notaro, S., & Campbell, D. (2018). Including value orientations in choice models to estimate benefits of wildlife management policies. *Ecological Economics*, 151, 70–81. <https://doi.org/10.1016/J.ECOLECON.2018.04.035>
- Homer, P. M., & Kahle, L. R. (1988). A structural equation test of the value-attitude-behavior hierarchy. *Journal of Personality and Social Psychology*, 54(4), 638–646. <https://doi.org/10.1037/0022-3514.54.4.638>
- Hoyle, R. H. (2000). Confirmatory factor analysis. In *Handbook of Applied Multivariate Statistics and Mathematical Modeling* (pp. 465–497). <https://doi.org/10.1016/B978-012691360-6/50017-3>
- Kellert, S. R. (1985). American attitudes toward and knowledge of animals: An update. In *Advances in Animal Welfare Science* (pp. 177–213). https://doi.org/10.1007/978-94-009-4998-0_11
- Kempen, E., Wassenaar, A., & Tobias-Mamina, R. (2023). South African consumer attitudes underlying the choice to consume game meat. *Meat Science*, 201, Article 109175. <https://doi.org/10.1016/J.MEATSCI.2023.109175>
- Krinsky, I., & Robb, A. L. (1986). On approximating the statistical properties of elasticities. *The Review of Economics and Statistics*, 68(4), 715. <https://doi.org/10.2307/1924536>
- Kuhnhen, S., Braun-Münker, M., & Ecker, F. (2025). Influence of driven hunts on selected game meat quality parameters in central Germany. *European Journal of Wildlife Research*, 71(4), 71–82. <https://doi.org/10.1007/S10344-025-01959-8>
- Kushwah, S., Dhir, A., & Sagar, M. (2019). Understanding consumer resistance to the consumption of organic food: A study of ethical consumption, purchasing, and choice behaviour. *Food Quality and Preference*, 77, 1–14. <https://doi.org/10.1016/J.FOODQUAL.2019.04.003>
- Lancaster, K. J. (1966). A new approach to consumer theory. *Journal of Political Economy*, 74(2), 132–157. <https://doi.org/10.1086/259131>
- Louviere, J. J., Hensher, D. A., & Swait, J. D. (2000). *Stated Choice Methods: Analysis and Applications*. Cambridge University Press. <https://merrimack.noblenet.org/merebc/EBC144724>
- Lusk, J. L. (2011). External validity of the food values scale. *Food Quality and Preference*, 22(5), 452–462. <https://doi.org/10.1016/J.FOODQUAL.2011.02.009>
- Lusk, J. L., & Briggeman, B. C. (2009). Food values. *American Journal of Agricultural Economics*, 91(1), 184–196. <https://doi.org/10.1111/J.1467-8276.2008.01175.X>
- Manfredo, M. J. (2008). Who cares about wildlife?: Social science concepts for exploring human-wildlife relationships and conservation issues. In *Who Cares About Wildlife?: Social Science Concepts for Exploring Human-Wildlife Relationships and Conservation Issues* (pp. 1–228). <https://doi.org/10.1007/978-0-387-77040-6/COVER>
- Manfredo, M. J., Berl, R. E. W., Teel, T. L., & Bruskotter, J. T. (2021). Bringing social values to wildlife conservation decisions. *Frontiers in Ecology and the Environment*, 19(6), 355–362. <https://doi.org/10.1002/FEE.2356;JOURNAL:JOURNAL:15409309;PAGE:STRING:ARTICLE/CHAPTER>
- Manfredo, M. J., Teel, T. L., & Henry, K. L. (2009). Linking society and environment: A multilevel model of shifting wildlife value orientations in the western United States. *Social Science Quarterly*, 90(2), 407–427. <https://doi.org/10.1111/J.1540-6237.2009.00624.X;WGROU:STRING:PUBLICATION>
- Manski, C. F. (1977). The structure of random utility models. *Theory and Decision*, 8(3), 229–254. <https://doi.org/10.1007/BF00133443/METRICS>
- Marescotti, M. E., Caputo, V., Demartini, E., & Gaviglio, A. (2019). Discovering market segments for hunted wild game meat. *Meat Science*, 149, 163–176. <https://doi.org/10.1016/J.MEATSCI.2018.11.019>
- Markov, N., Pankova, N., & Morelle, K. (2019). Where winter rules: Modeling wild boar distribution in its north-eastern range. *Science of the Total Environment*, 687, 1055–1064. <https://doi.org/10.1016/J.SCITOTENV.2019.06.157>
- Matilainen, A., Luomala, H., Lähdesmäki, M., Viitaharju, L., & Kurki, S. (2024). Resenting hunters but appreciating the prey? - Identifying moose meat consumer segments. *Human Dimensions of Wildlife*, 29(1), 30–47. <https://doi.org/10.1080/10871209.2023.2177778;PAGE:STRING:ARTICLE/CHAPTER>
- McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in Econometrics* (pp. 105–142). Academic Press.
- Merlino, V. M., Borra, D., Girgenti, V., Dal Vecchio, A., & Massaglia, S. (2018). Beef meat preferences of consumers from Northwest Italy: Analysis of choice attributes. *Meat Science*, 143, 119–128. <https://doi.org/10.1016/j.meatsci.2018.04.023>
- Mirade, S., & Font-I-Furnols, M. (2023). Meat consumption, sustainability and alternatives: An overview of motives and barriers. *Foods*, 12(11), 2144. <https://doi.org/10.3390/FOODS12112144>
- Needham, T., Bureš, D., Černý, J., & Hoffman, L. C. (2023). Overview of game meat utilisation challenges and opportunities: A European perspective. *Meat Science*, 204, Article 109284. <https://doi.org/10.1016/J.MEATSCI.2023.109284>
- Notaro, S., Grilli, G., & Vaske, J. J. (2025). Demographics and wildlife value orientations: Insights for managing wildlife in the Alps. *Human Dimensions of Wildlife*, 30(5), 574–585. <https://doi.org/10.1080/10871209.2024.2393824;CTYPE:STRING:JOURNAL>
- Oke, A., Ladas, J., & Bailey, M. (2020). Ethical consumers: An exploratory investigation of the ethical food consumption behaviour of young adults in the North East of Scotland. *British Food Journal*, 122(11), 3623–3638. <https://doi.org/10.1108/BFJ-10-2019-0801>
- Orsoni, F., Romeo, C., Ferrari, N., Bardasi, L., Meriardi, G., & Barbani, R. (2020). Factors affecting the microbiological load of Italian hunted wild boar meat (*Sus scrofa*). *Meat Science*, 160, Article 107967. <https://doi.org/10.1016/j.meatsci.2019.107967>
- Paemelaere, E. A. D., Puran, A., Williams, T., Agard, G., Pierre, M. A., Yang, H., ... van Vliet, N. (2024). Value orientations toward wild meat in Guyana are determined by gender, ethnicity, and location. *Frontiers in Conservation Science*, 5, Article 1277599. <https://doi.org/10.3389/FCOSC.2024.1277599/BIBTEX>
- Pappalardo, G., & Lusk, J. L. (2016). The role of beliefs in purchasing process of functional foods. *Food Quality and Preference*, 53(1), 151–158. <https://doi.org/10.1016/j.foodqual.2016.06.009>
- Reiche, A. M., Oberson, J. L., Silacci, P., Messadène-Chelali, J., Hess, H. D., Dohme-Meier, F., ... Terlouw, E. M. C. (2019). Pre-slaughter stress and horn status influence physiology and meat quality of young bulls. *Meat Science*, 158, Article 107892. <https://doi.org/10.1016/J.MEATSCI.2019.107892>
- Rosen, S. (1974). Hedonic prices and implicit markets: Product differentiation in pure competition. *Journal of Political Economy*, 82, 5–26. <https://doi.org/10.1086/260169>
- Sabina del Castillo, E. J., Díaz Armas, R. J., & Gutiérrez Taño, D. (2024). Ethnocentrism and place identity in the consumption of local products. *Heliyon*, 10(10), Article e31602. <https://doi.org/10.1016/J.HELIYON.2024.E31602>
- Schulze, M., Spiller, A., & Risius, A. (2021). Do consumers prefer pasture-raised dual-purpose cattle when considering meat products? A hypothetical discrete choice experiment for the case of minced beef. *Meat Science*, 177, Article 108494. <https://doi.org/10.1016/J.MEATSCI.2021.108494>

- Sponarski, C. C., Vaske, J. J., & Bath, A. J. (2015). The role of cognitions and emotions in human-coyote interactions. *Human Dimensions of Wildlife*, 20(3), 238–254. <https://doi.org/10.1080/10871209.2015.1010756>
- Stoica, G.-D. (2022). *Analysis of Game Meat Production* (pp. 155–161). <https://www.econstor.eu/handle/10419/301719>.
- Sun, J., Ortega, D. L., & Lin, W. (2023). Food values drive Chinese consumers' demand for meat and milk substitutes. *Appetite*, 181. <https://doi.org/10.1016/j.appet.2022.106392>
- Taber, K. S. (2017). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273–1296. <https://doi.org/10.1007/S11165-016-9602-2>
- Teel, T. L., Dayer, A. A., Manfredo, M. J., & Bright, A. D. (2005). Regional Results from the Research Project Entitled "Wildlife Values in the West." https://www.researchgate.net/publication/287997441_Regional_Results_from_the_Research_Project_Entitled_Wildlife_Values_in_the_West.
- Teel, T. L., & Manfredo, M. J. (2010). Understanding the diversity of public interests in wildlife conservation. *Conservation Biology*, 24(1), 128–139. <https://doi.org/10.1111/J.1523-1739.2009.01374.X>
- Teel, T. L., Manfredo, M. J., Jensen, F. S., Buijs, A. E., Fischer, A., Riepe, C., ... Jacobs, M. H. (2010). Understanding the cognitive basis for human-wildlife relationships as a key to successful protected-area management. *International Journal of Sociology*, 40(3), 104–123. <https://doi.org/10.2753/IJS0020-7659400306>
- Tomasevic, I., Novakovic, S., Solowiej, B., Zdolec, N., Skunca, D., Krocko, M., ... Djekic, I. (2018). Consumers' perceptions, attitudes and perceived quality of game meat in ten European countries. *Meat Science*, 142, 5–13. <https://doi.org/10.1016/J.MEATSCI.2018.03.016>
- Tumelty, L., Fa, J. E., Coad, L., Friant, S., Mbane, J., Kamogne, C. T., ... Ickowitz, A. (2023). A systematic mapping review of links between handling wild meat and zoonotic diseases. *One Health*, 17(6609), Article 100637. <https://doi.org/10.1016/j.onehlt.2023.100637>
- Vajas, P., Von Essen, E., Tickle, L., & Gamelon, M. (2023). Meeting the challenges of wild boar hunting in a modern society: The case of France. *Ambio*, 52(8), 1359–1372. <https://doi.org/10.1007/S13280-023-01852-1>
- Verbeke, W., & Ward, R. W. (2006). Consumer interest in information cues denoting quality, traceability and origin: An application of ordered probit models to beef labels. *Food Quality and Preference*, 17(6), 453–467. <https://doi.org/10.1016/J.FOODQUAL.2005.05.010>
- Vetter, S. G., Ruf, T., Bieber, C., & Arnold, W. (2015). What is a mild winter? Regional differences in within-species responses to climate change. *PLoS One*, 10(7), Article e0132178. <https://doi.org/10.1371/JOURNAL.PONE.0132178>
- van Vliet, N., Nyumu, J. K., Nziavake, S., Muhindo, J., Paemelaere, E. A. D., & Nasi, R. (2021). How do local folks value wild meat, and why it matters? A study in the Democratic Republic of Congo. *Human Ecology*, 50(1), 195–203. <https://doi.org/10.1007/S10745-021-00275-4>
- Wassenaar, A., Kempen, E., & van Eeden, T. (2019). Exploring south African consumers' attitudes towards game meat—Utilizing a multi-attribute attitude model. *International Journal of Consumer Studies*, 43(5), 437–445. <https://doi.org/10.1111/IJCS.12523;ISSUE:ISSUE:DOI>
- Watkins, M. W. (2018). Exploratory factor analysis: A guide to best practice. *Journal of Black Psychology*, 44(3), 219–246. https://doi.org/10.1177/0095798418771807/ASSET/IMAGES/LARGE/10.1177_0095798418771807-FIG_1.JPEG