Discovering market segments for hunted wild game meat

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Abstract:

Recent years have seen a notable increase in the popularity of hunted wild game meat (HWGM) among consumers. This has led to a growing number of emerging markets for HWGM in many developed countries, including Europe. However, expansion of these markets is often hampered by the lack of a professional supply chain. The profitability of a supply chain would depend on consumer willingness to purchase HWGM products. This paper aims to (1) segment consumers based on their general attitudes towards HWGM, their perceptions of its safety, animal welfare, orientation concerning wildlife-related values, hunting activities, objective knowledge and socio-demographic factors and (2) assess whether these general attitudes affect consumer intentions to purchase HWGM products. To achieve our objective, a random sample of Italian consumers was recruited. Three different consumer segments were identified: pro-animal consumers, disoriented consumers, and hunted wild game meat eaters. Our findings highlighted an important lack of knowledge amongst consumers.

Keywords: Hunted wild game meat; hunting; cluster analysis; Italian consumer; consumer segmentation

1. Introduction

In recent years, there has been a notable increase in the popularity of hunted wild game meat[1] (HWGM) among consumers (Hoffman & Wilkund, 2006; Atanassova *et al.*, 2008; FAO, 2007; Goguen *et al.*, 2018). This has led to a growing number of emerging markets for HWGM in many developed countries, including Europe. To illustrate this, although there are no data available concerning the HWGM sector in Europe, the last European Commission study on minor meats (EC, 2014) reported that, in some member states, there is a well-established market for this type of product. For example, in France, about half of the game meat processors promote a "Game from French Hunters" brand (*Gibier de Chasse – Chasseurs de France*[2]). Similarly, in Spain, the Interprofessional Association for Hunted Game "Asiccaza" (*Asociación Interprofesional de la Carne de Caza*[3]) promotes wild game products that mainly come from hunting. However, the expansion of HWGM markets is often hampered by the lack of a structured food supply chain. This is especially the case in Italy where, despite flourishing populations of wild animals (Ramanzin *et al.*, 2010), there is still a limited market for HWGM products (Gaviglio *et al.*, 2017; Giacomelli & Gibbert, 2018).

Nonetheless, the creation of an Italian food supply chain for HWGM would generate market incentives that are expected to improve hunting practices and the management of wildlife overpopulation at no cost to the public. In addition, it would also generate new sources of income for populations living in marginal and rural mountain areas (Gaviglio *et al.*, 2018). However, whether a supply chain for HWGM is economically sustainable depends on whether there is a demand for these products, which in turn depends on how consumers perceive them. In this regard, if obtained under strict and regulated hunting practices, HWGM embeds a number of quality features that may appeal to modern consumers when purchasing meat products (Hoffman & Wiklund, 2006; Ljung *et al.*, 2012;

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[1] In this paper the term "hunted wild game meat" refers to meat from large wild ungulates (e.g. wild boar – *Sus scrofa*, red deer – *Cervus elaphus*, roe deer – *Capreolus capreolus*, chamois – *Rupicapra rupicapra*, mouflon – *Ovis orientalis*) obtained through hunting activities.
[2] http://chasseurdefrance.com/charte-gibier-de-chasse-chasseurs-de-france/
[3] http://www.asiccaza.org/

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Hoffman, 2013; AC Nielsen, 2016). For instance, HWGM may be considered organic and grass-fed meat because wild animals are, by definition, free roaming (Hoffman & Wiklund, 2006). In relation to free roaming, HWGM production may be considered an environmentally friendly livestock system (Thogmartin, 2006; Wiklund et al., 2014), representing a sustainable alternative to intensive livestock production for beef, pork or poultry (Ahl et al., 2002; Bureš et al., 2014; Thulin et al., 2015). Additionally, as wild animals follow their natural grazing behaviour, hunting guarantees the maximum level of animal welfare. Moreover, HWGM retains high nutritional values, with a low fat and cholesterol content, favourable n3:n6 fatty acid ratios and a high mineral content (Higgs, 2000; Rule, 2002; Webb, 2003; Hoffman & Wiklund, 2006; Bureš et al., 2014). Finally, if consumed in the area within which it has been hunted, HWGM embeds quality features associated with local food products (e.g., produced and consumed "from forest to fork") (Cerulli, 2012). However, despite these benefits, consumer valuation of HWGM can be hampered by other factors, such as environmental and ethical concerns regarding hunting practices (Ljung et al., 2012; Byrd et al., 2017). For instance, certain consumers with pro-environmental and pro-animal attitudes may perceive hunting practices as risky for the maintenance of wild animal species, or as a cruel activity committed against vulnerable living creatures (Kellert & Berry, 1987). Hence, consumers' perceptions of HWGM products may also be affected by concerns arising from individual attitudes towards hunting, animal welfare, and wildlife value.

To date, several studies have focused on the determinants for the consumption of meat from different animal species (Verbeke & Viaene, 1999; Grunert et al., 2004; Verbeke & Vackier, 2004; Angulo & Gill, 2007; Bonne et al., 2007; Pieniak et al., 2008; Verbeke et al., 2010; Pieniak et al., 2010b; Van Loo et al., 2010; Sepúlveda et al., 2011; Font-i-Furnols & Guerrero, 2014; Lusk & Tonsor, 2016, among others). However, the economics and marketing literature on HWGM is still limited. This study aims to (1) segment consumers based on their general attitudes towards HWGM, their perceptions of its safety, animal welfare, orientation concerning wildlife-related values, hunting

65 activities, objective knowledge and socio-demographic factors and (2) assess whether these general

66 attitudes affect consumer consumption of HWGM products.

67   Our study addresses the need to broaden knowledge of consumers' attitudes towards HWGM

68 and explores whether consumers would support a professional supply chain for HWGM, offering

69 more information to stakeholders (i.e., hunters, processors, and retailers) to develop products and

70 marketing strategies that effectively target individual consumer needs. Findings from this study can

71 help policy makers to design new strategic interventions for the management of wild ungulate

72 populations and the organization of professional supply chains for local HWGM products.

73   The remainder of the text is organized into four sections. Section 2 presents a literature review

74 focused on consumers' attitudes towards HWGM. Section 3 presents the method and procedures

75 adopted, including the survey framework (3.1), data collection and survey instrument (3.2) and

76 statistical analysis (3.3.). Section 4 provides and discusses the results, while section 5 provides a

77 summary of the research and some conclusions.

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2. Consumers' attitudes towards hunted wild game meat: background

80 Most of the existing literature devoted to wild game meat consumption is primarily descriptive and

81 focuses on non-European countries, such as Africa and Australia. With regard to the African context,

82 a number of studies have focused on African consumers' perceptions and purchase behaviour for

83 products derived from local species, such as springbok (*Antidorcas marsupialis*), blesbok

84 (*Damaliscus pygargus phillipsi*), kudu (*Tragelaphus strepsiceros*), zebra (*Equus burchelli*), blue

85 wildebeest (*Connochaetes taurinus*), impala (*Aepyceros melampus*) and gemsbok (*Oryx gazelle*)

86 (Hoffman *et al.*, 2003; Hoffman *et al.*, 2004; Hoffman *et al.*, 2005; Hoffman & Wiklund, 2006;

87 Swanepoel *et al.*, 2016). The results from these studies generally indicate that, despite the potential

88 of wild game meat, African consumers and tourists are ill-informed regarding the positive attributes

89 of game meat. This may be because producers and marketers are not doing enough to promote this

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90   meat. In Australia, Hutchinson *et al.* (2010) performed a sensory analysis to investigate consumers'

91   evaluation of farmed red deer (*Cervus elaphus*) and fallow deer (*Dama dama*). The results from this

92   study suggest that Australian consumers prefer red deer meat compared to fallow deer meat and that

93   their perception of venison quality is mainly influenced by the method of carcass suspension, which

94   can enhance the meat's tenderness and succulence. However, due to the characteristics of HWGM

95   products, the results from these international studies cannot be extended to other geographical

96   contexts, such as Europe (Tomasevic *et al.*, 2018), for a number of reasons. First, game meat

97   consumption is strictly related to the local available species and to their population size. Unlike Africa

98   and Australia, in Europe the most representative large wild ungulate species are wild boar (*Sus scrofa*)

99   and red deer (*Cervus elaphus*) (Hoffman & Wiklund, 2006; Hofbauer *et al.*, 2010; Tomasevic *et al.*,

100   2018). Second, some cultural differences across countries must also be considered. The acceptance

101   of hunting practices, in fact, is strictly connected to socio-cultural heritage, and depending on this

102   factor, harvesting and culling wild animals may or may not be ethically accepted (Mayfield *et al.*,

103   2007; Willebrand, 2009; Ljung *et al.*, 2012; Byrd *et al.*, 2017; Gamborg & Jensen, 2017; Goguen *et*

104   *al.*, 2018).

105   Therefore the question arises, what do we know about European consumers' perceptions of

106   HWGM? To date, there are only five studies assessing European consumer attitudes and purchase

107   behaviour towards HWGM products. Tomasevic *et al.* (2018) have recently published the most

108   exhaustive study on European consumers of hunted game meat. By using a cluster analysis, the

109   authors investigated consumers' perceptions, attitudes and perceived quality of game meat in ten

110   European countries (e.g., Czech Republic, Poland, Slovakia, Croatia, Albania, Bosnia and

111   Herzegovina, Bulgaria, Former Yugoslav Republic of Macedonia, Montenegro and Serbia). The

112   results from this study indicate that the consumption rate for game meat in the ten European countries

113   is influenced by a number of factors, such as location, age, and gender. For example, the authors

114   found that the consumption of HWGM is higher in South East European countries, and more popular

115   among men and older consumers.

116   Within the remaining literature, studies have just focused on consumers from one country.

117 Ljung *et al.* (2012) investigated the association between frequency of game meat consumption and

118 attitudes towards hunting through an online survey sent to a random sample of Swedish residents.

119 Their findings suggest that game meat consumption and social relationships (i.e., having friends or

120 parents who hunt) were the key factors associated with positive attitudes towards hunting. Bodnar *et*

121 *al.* (2010) researched Hungarian consumers' demand for meat from game animals (red deer, fallow

122 deer, roe deer, wild boar, hare, pheasant and mallard duck) and found differences between a sample

123 of respondents living in cities and those living in rural areas. Moreover, authors report that people

124 with negative attitudes towards game meat are vegetarian or refuse its consumption for emotional

125 reasons. With reference to the Polish context, Kwiecinska *et al.* (2017), using a model based on a

126 logistic regression for predicting the consumption of wild game, demonstrated that purchase intention

127 increases with greater availability and the provision of higher quality. The results also showed a

128 higher propensity to change eating habits towards the consumption of game in men, city dwellers and

129 those who evaluated their own knowledge on nutrition and diet higher than others. Finally, the most

130 recent literature on European consumers' attitudes and purchase behavior for HWGM analyzes

131 consumer preferences for different types of preparation of red deer meat and beef in a northern Italian

132 population sample (Demartini *et al.*, 2018). The authors conclude that considering consumers'

133 attitudes towards wild game meat and hunting in their model significantly improved the interpretation

134 of their results and allowed them to identify a niche market for red deer carpaccio (i.e. sliced fresh

135 raw meat). Although Demartini *et al.* (2018) found interesting results in relation to consumer

136 attitudes, the authors only included two of the multiple attitudinal dimensions relating to meat

137 consumption and were restricted in generalizing their results to the entire Italian population due to a

138 limited, non-representative sample. Thus, collectively, these prior studies suggest that consumer

139 attitudes impact on consumption of HWGM, yet there is more to be learned from a comprehensive

140 study specifically designed to assess the relationship between an array of consumer attitudes and

141 HWGM purchase behavior.

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3. Method and procedures

3.1 Survey framework

To segment consumers of HWGM, we identified the attitudes and perceived risks that may influence

consumer consumption of this type of meat and divided these attitudinal constructs into two groups.

The first attitude group directly relates to the HWGM product and explores (1) consumers' general

attitudes towards the product and (2) perceptions of HWGM safety. On the other hand, the second

group gathers consumers' attitudes towards the supply chain for HWGM, such as (3) animal welfare,

(4) attitudes towards hunting and (5) consumer wildlife-related values. Furthermore, to describe the

segments, socio-demographic characteristics and consumers' objective knowledge about HWGM are

considered in the analysis. Figure 1 shows a schematic representation of the variables under study.

Figure 1: Schematic representation of the variables investigated
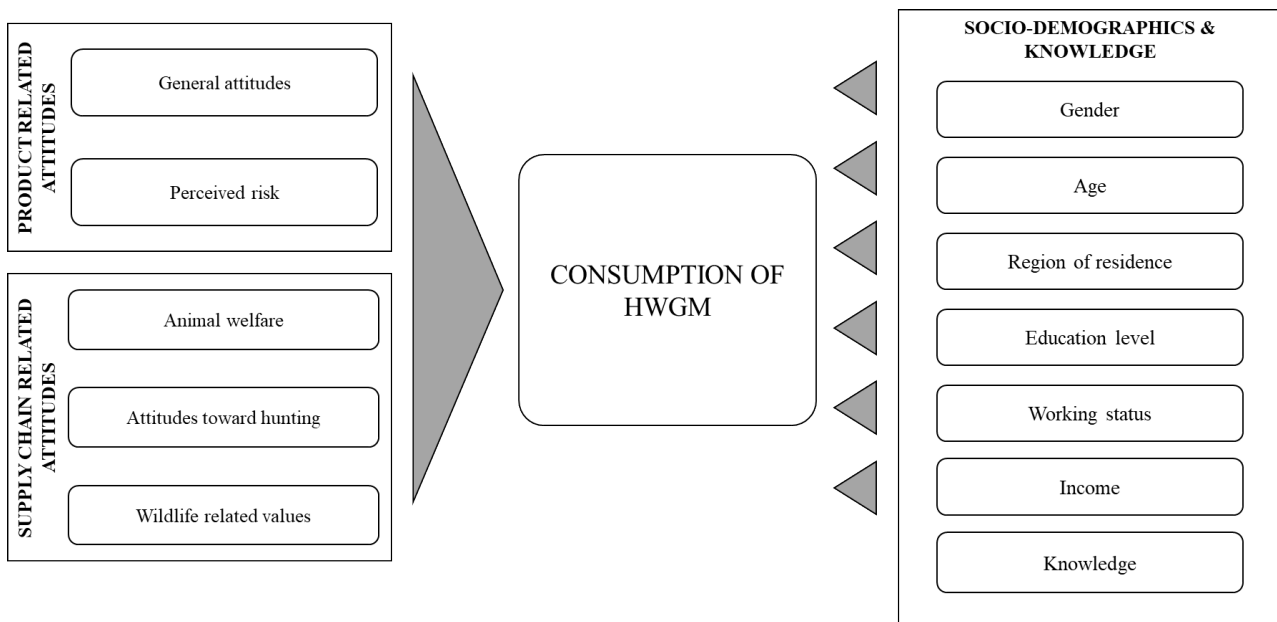
3.2 Data collection and survey instrument

Data were collected using an online survey (Appendix A) sent to a random sample of Italian

consumers during February and March 2018. The data collection was carried out using the Qualtrics®

159   online survey platform. Qualtrics is a leading world provider of survey samples[4]. Consumers were

160   excluded from the survey if they did not buy meat during the three months preceding the survey and

161   if they were aged under 18. The total sample comprised 1,029 respondents.

162   The survey consisted of a questionnaire containing closed-ended questions organized into four

163   sections following the framework presented in Figure 1. The first section aimed at detecting

164   consumption habits and objective knowledge about HWGM. To detect consumption habits,

165   respondents were asked whether they had consumed wild game meat in the last year (yes/no). To

166   measure objective knowledge, we developed a series of true/false questions based on the literature on

167   the various empirical applications mentioned above. The following three items, out of the five, were

168   correct: "In Italy, populations of wild ungulates (red deer, wild boar, roe deer, chamois) are growing

169   rapidly"; "Consuming game meat (red deer, wild boar, roe deer, chamois) is an ethical choice,

170   sustainable and with a very low environmental impact"; "Currently in Italy, hunting is 'controlled',

171   in fact it is subject to well defined rules concerning culling, species, times and places". The remaining

172   two were false, and they were as follows: "Hunters are not considered producers by Italian law;

173   therefore they cannot sell the meat they hunt" and "Game meat (red deer, wild boar, roe deer, and

174   chamois) has a lower protein content and higher fat and cholesterol content than beef".

175   The second section of the questionnaire included questions aimed at capturing the consumers'

176   general attitudes towards HWGM products and their perceptions of HWGM safety. Consumers'

177   general attitudes towards game meat (**ATT**) were assessed by asking respondents to describe their

178   overall feelings when thinking about the consumption of HWGM products. More specifically, we

179   adapted the version of the "general attitudes scale" proposed by Olsen *et al.* (2007) (scored on five-

180   point semantic differential scales), which has been widely used in the literature to assess consumers'

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[4] Qualtrics is a world leading provider of survey samples. The sampling procedures are certified for the transparency of the online process by the Qualtrics Esomar28 and through a variety of quality systems certifications, such as ISO 20252 management systems standards, Media Ratings Council, among others. Although online surveys are increasingly used in consumer food choice studies, they may be subject to selection bias issues (Canavari *et al.*, 2005; Windle & Rolfe, 2011; Guimarães *et al.*, 2015; Ripoll *et al.*, 2015) due to the exclusion of individuals who do not use the internet. This might induce slight differences between the general population and the sampled population.

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attitudes towards food in general (Olsen, 2001, Honkanen *et al.*, 2006; Pieniak *et al.*, 2010b; Pérez-Cueto *et al.*, 2011; Van Loo *et al.*, 2013), and meat in particular (Berndsen & Van der Pligt, 2004; Almli *et al.*, 2013). To capture consumers' perceptions towards wild game meat safety (**SAF**), we used the five-point semantic differential scale proposed by Almli *et al.* (2013) and considered six bipolar adjectives.

The third section of the questionnaire sought to highlight the typical factors that are expected to influence attitudes towards meat, in general, and HWGM in particular. To illustrate, previous studies have shown that attitude towards animal welfare (**AW**) is an important factor affecting consumer purchase intention for meat in general (Wong & Aini, 2017; Van Wezemael *et al.*, 2010). Accordingly, we included the eight-item scale proposed by Kendall *et al.* (2006), which takes into account the general ethical issues linked to animal production, as well as questions relating to the different uses of animals. For each item, a 5-point interval scale ranging from "*strongly disagree*" to "*strongly agree*" was used. Additionally, we captured consumers' attitudes towards hunting (**AH**) by using the Likert scale proposed by Ljung *et al.* (2012). This scale is based on 9 items concerning hunting activity and hunters' behaviour. For each item, respondents were asked to express their agreement using a scale ranging from 1= *strongly disagree* to 5= *strongly agree*. Finally, since HWGM is obtained from wild animals, consumers' attitudes to this type of meat can be influenced by their attitudes towards wildlife. Accordingly, the 8-item Likert scale proposed by Hrubes *et al.* (2001) was used to measure consumer wildlife-related values (**WV**). For each item, a 5-point scale ranging from 1= *strongly disagree* to 5= *strongly agree* was used.

Finally, the fourth section of the questionnaire collected the socio-demographic characteristics of the sample, including gender, age, region of residence, education level and income. Table 1 provides an overview of the socio-demographic characteristics of the sampled population and the actual Italian population (Italian National Institute of Statistics data, 2018).

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206   **Table 1. Socio demographic characteristics of the sample (Sample size *n*= 1,029)**

	Total sample (%)	Italian population* (%)
Gender		
Male	49.08	49.82
Female	50.92	50.18
Age group		
18-22 yrs	7.58	7.81
23-35 yrs	25.27	22.75
36-55 yrs	51.31	48.59
56-65 yrs	15.84	20.84
Geographical region of residence		
Northeast Italy	26.34	19.05
Northwest Italy	18.46	26.22
Southern Italy and Islands	37.50	34.48
Central Italy	17.69	19.85
Education Level completed		
Elementary School	0.10	5.74
Middle School	8.07	31.95
High School	55.00	44.48
University and Postgraduate	36.05	17.83
Other	0.78	
Average household income		
Low	51.99	n/a
Medium	43.63	n/a
High	4.37	n/a

207   * Source: Italian National Institute of Statistics data (ISTAT 2018). Percentages are calculated for the population
208   aged between 18 and 65 years.

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210   Of the 1,029 respondents in the study, according to the national population, females were slightly

211   over-represented (50.9%). In the sample, 51.3% were aged between 36 and 55; 44.8% of the

212   interviewed sample live in the northern part of Italy, while 37.5% of the respondents were from

213   southern Italy (islands included), and 17.7% were from the central part of Italy. Concerning education

214   level, the sample was slightly biased towards better-educated participants, which may be due to the

215   use of the online survey method. In fact, 55.0% of the respondents had completed college and 36.0%

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had obtained a degree or a master's degree. Finally, most interviewees (51.99%) had self-reported low financial status.

3.3 Statistical Analysis

The data were analysed using IBM SPSS Statistics (SPSS Inc., Chicago, IL). Survey data were first subjected to a descriptive analysis to provide a synthetic description of the main characteristics of the sample interviewed.

In addition, following the previous literature concerning consumer attitude studies (Roininen *et al.*, 1999; Verbeke & Vackier, 2004; Vanhonacker *et al.*, 2007; Van Wezemael *et al.*, 2010; Vanhonacker *et al.*, 2013; De Graaf *et al.*, 2016), we also explored the internal reliability of the five multi-item attitudinal scales used in our survey instrument (e.g. ATT, SAF, AW, AH, WV). We did so by using the Cronbach's α (Cronbach, 1951; Peterson, 1994) and considering 0.6 as the threshold value for a satisfactory scale (Verbeke & Vackier, 2004). Further, we expanded our analysis on the relationship underlying the set of variables for the five multi-item attitudinal scales through the execution of a principal component analysis (PCA) with varimax rotation (Malhotra, 1999).

Next, we performed a cluster analysis (CA) to identify groups of consumers with similar attitudes towards HWGM. Two steps were followed. In the first step, we applied the Hierarchical Clustering (Verbeke & Vackier, 2004; Dimech *et al.*, 2011; Aprile *et al.*, 2015) and the TwoStep Cluster procedure (Bacher *et al.*, 2004) to determine the optimal number of clusters. In the second step, we used the optimal number of clusters derived from the first step to perform a non-hierarchical *k*-means cluster analysis (CA). Moreover, bivariate analyses were performed to explore whether the identified clusters differ in terms of socio-demographics, consumption habits and knowledge about HWGM. These analyses were performed using the one-way ANOVA with Dunnett's T3 post hoc comparison of means, and cross-tabulation with χ^2 and Kruskal-Wallis statistics. Finally, we adopted the approach suggested by Dimech *et al.* (2011) and estimated a probit model to explore whether

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belonging to a particular consumer segment identified by the CA relates to different HWGM consumption patterns.

4. Results and Discussion

4.1 Descriptive analysis

4.1.1 Consumption of wild game meat

The results of the analysis revealed that the majority (61.1%) of the respondents had consumed wild game meat at least once in the last year (termed "wild game meat eaters"). In contrast, 38.9% of the interviewees claimed that they had not consumed it in the last year (termed "wild game meat non-eaters").

4.1.2 Consumers' objective knowledge about HWGM

Descriptive statistics for the objective knowledge variables are shown in Table 2. The table reports the total score for objective knowledge, which was created by summing the number of correct answers to the five true/false questions. The average number of correct answers was 2.66 on a five-point scale, indicating that, on average, respondents answered about half of the questions correctly. Of the sample, only 5% of the respondents answered all five true/false questions correctly, whereas 30% and 27% answered three and two correctly, respectively. More specifically, the majority of the sample interviewed (74%) answered correctly to the false statement "Game meat (red deer, wild boar, roe deer, chamois) has a lower protein content and higher fat and cholesterol content than beef", whereas most of the respondents (73.3%) failed to provide a correct answer to the false statement "Hunters are not considered producers by the Italian law; therefore they cannot sell the meat they hunt". These results highlight the need to increase consumers' awareness about HWGM. Overall, about 53% of the answers to all the implied statements were correct.

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265 **Table 2. Objective knowledge related to HWGM: number of correct answers to 5 statements**

Statements	Correct (%)
Statement 1	55.49
Statement 2	26.72
Statement 3	74.05
Statement 4	60.64
Statement 5	70.26
Total number of correct answers	**53.18**
Respondents' number of correct answers to 5 statements	
0	2.92
1	14.29
2	27.11
3	30.42
4	20.21
5	5.05

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267 *4.1.3 Consumers' general attitudes and perceptions of HWGM safety*

268 The general attitudes construct (**ATT**) was calculated as the average score across the six items.

269 Respondents showed a general positive tendency towards the consumption of HWGM products

270 (mean value= 3.18 on a 5-point scale; SD= 1.03). The results of the general attitudes scale are reported

271 in Figure 2.

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273 **Figure 2. Consumers' general attitudes (ATT)**

Unfavorable	13.70	14.09	33.33	23.13	15.74	Favorable
Unsatisfied	11.18	11.27	37.32	28.38	11.86	Satisfied
Negative	11.56	13.41	35.57	28.09	11.37	Positive
Dislike	11.08	11.95	34.60	29.74	12.63	Like
Bad	10.98	11.86	39.46	25.27	12.44	Good
Terrible	12.15	8.55	38.19	27.31	13.80	Delightful

0.00   0.20   0.40   0.60   0.80   1.00

Cronbach's α = 0.946

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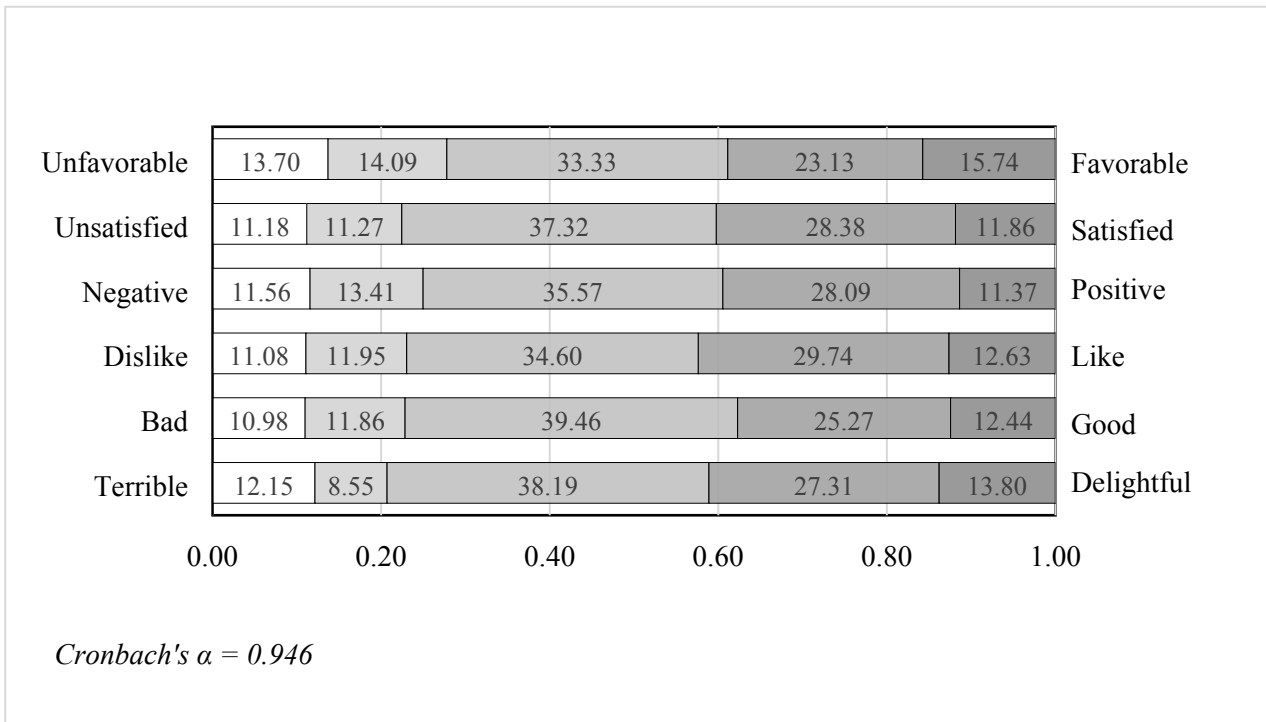
275 As shown in Figure 2, the semantic differential item unfavourable/favourable showed the highest

276 percentage of strongly positive and strongly negative feelings, with 15.7% of respondents favourable

277 and 13.7% unfavourable. The analysis of the results shows that the group of consumers with the

278 lowest attitudes towards HWGM, who indicated a dislike of the product, consider it terrible and feel

279 bad when thinking about it; and the consumer group with the highest attitudes, who like HWGM and

280 consider it good and delightful, have a similar sample size.

281   The perception of the HWGM safety (**SAF**) construct was computed as the average across the

282 six items in the scale. As seen in Figure 3, respondents generally showed slightly positive feelings

283 towards HWGM safety (mean value= 3.13, SD= 0.91). Across all the semantic items on the scale,

284 between 35.7% and 44.7% of the respondents identified as uncertain; this result can be expected

285 considering respondents' low level of objective knowledge. Similar to the general attitudes towards

286 HWGM, the analysis of safety perceptions revealed the presence of two groups of respondents who

287 have strongly negative ("suspicious", "uncomfortable", "unconfident") and/or strongly positive

288 feelings ("satisfied", "optimistic", "confident") towards HWGM.

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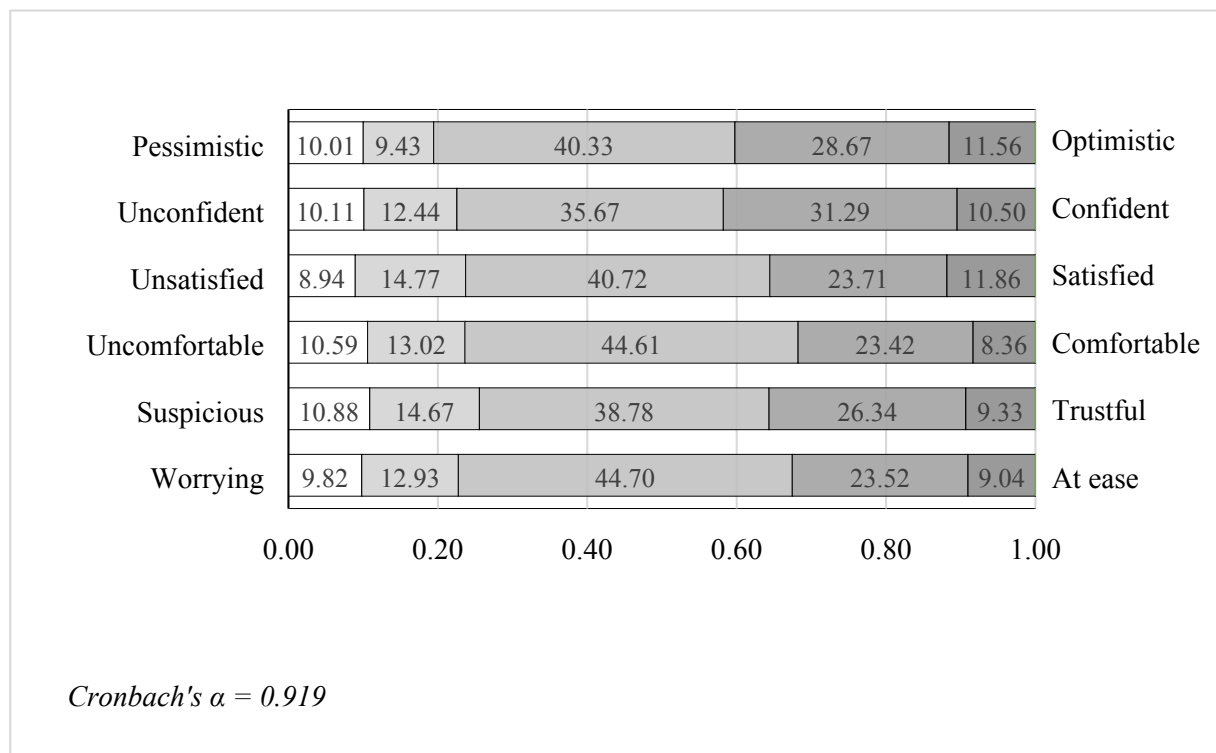859
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289   Considering the limited body of literature concerning HWGM, consumers' general attitudes

290 and perceptions of HWGM safety are not strictly comparable with other previous studies on this topic.

291 However, the sample mean values relating to consumers' general attitudes and perceptions of HWGM

292 safety are similar to the mean values reported by Van Wezemael *et al.* (2010) and by Almli *et al.*

293 (2013) in a study concerning beef consumers in different European countries (respectively, Germany,

294 Spain, France, and the UK in the first study, and Belgium and Norway in the second).

295 **Figure 3. Consumers' perceptions of HWGM safety (SAF)**

Pessimistic	10.01	9.43	40.33	28.67	11.56	Optimistic
Unconfident	10.11	12.44	35.67	31.29	10.50	Confident
Unsatisfied	8.94	14.77	40.72	23.71	11.86	Satisfied
Uncomfortable	10.59	13.02	44.61	23.42	8.36	Comfortable
Suspicious	10.88	14.67	38.78	26.34	9.33	Trustful
Worrying	9.82	12.93	44.70	23.52	9.04	At ease

0.00   0.20   0.40   0.60   0.80   1.00

Cronbach's α = 0.919

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4.1.4 Consumers' Attitudes towards animal welfare, hunting activity and wildlife-related values

299 The third section of the questionnaire relates to factors that show a reasonable direct correlation with

300 HWGM consumption, such as attitudes towards animal welfare, attitudes towards hunting and the

301 perceived importance of wildlife.

302   Concerning attitudes towards animal welfare (**AW**), the construct was calculated as the

303 average of the answers to the eight statements. Table 3 shows an overview of the results of the AW

304 Likert scale.

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305 **Table 3. Consumers' attitudes towards animal welfare (AW)**

Items	Strongly disagree (%)	Disagree (%)	Neither disagree nor agree (%)	Agree (%)	Strongly agree (%)	Mean	SD
It is important that the food I normally eat has been produced in a way that animals have not experienced pain.	1.94	4.66	25.85	39.84	27.70	3.87	0.94
It is important that the food I normally eat has been produced in a way that animals' rights have been respected.	0.87	4.57	21.48	42.47	30.61	3.97	0.88
In general, humans have too little respect for the quality of life of animals.	1.55	5.05	23.62	40.33	29.45	3.91	0.93
Increased regulation of the treatment of animals in farming is needed.	1.75	3.50	22.25	39.26	33.24	3.99	0.92
Animal agriculture raises serious ethical questions about the treatment of animals.	2.14	4.66	25.17	41.01	27.02	3.86	0.94
As long as animals suffer pain, humans should not be able to use them for any purpose (R).	12.34	18.56	37.51	24.78	6.80	3.05	1.09
It is acceptable to use animals to test consumer products such as soaps, cosmetics and household cleaners (R).	35.47	22.06	25.56	14.19	2.72	3.73	1.16
Hunting animals for sport is an acceptable form of recreation (R).	42.08	18.85	23.13	13.41	2.53	3.85	1.18

Cronbach's α = 0.696

306 Note: R indicates items that have been reversely scaled in the analysis of the results; SD= Standard Deviation

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308 Sample results were quite high (mean value= 3.73, SD= 0.70), indicating that respondents have strong

309 attitudes towards animal welfare. Of the sample, 73.08% declared that it is important that the food

310 they normally eat has been produced in a way that respects animals' rights (mean value= 3.97), while

311 72.5% agreed that increased regulation of the treatment of animals in farming is needed (mean value=

312 3.99). This finding is consistent with several consumer studies reporting consumers' concerns about

313 animal welfare (Frewer *et al.*, 2005; Mayfield *et al.*, 2007, Vanhonacker *et al.*, 2007; Vecchio &

314 Annunziata, 2012; Cembalo *et al.*, 2016). Moreover, a substantial proportion of respondents (42.1%,

315 mean value= 3.85) believe that hunting animals for sport is unacceptable, while only 15.9% of them

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believe that recreational hunting is acceptable. These results are in line with previous studies on Italian consumers in relation to animal welfare issues (Harper & Henson, 2001; Mayfield *et al.*, 2007; Vecchio & Annunziata, 2012).

Table 4 reports the results for attitudes towards hunting using a Likert scale (**AH**).

Table 4: Consumers' attitudes towards hunting (AH)

Items	Strongly disagree (%)	Disagree (%)	Neither disagree nor agree (%)	Agree (%)	Strongly agree (%)	Mean	SD
Hunting helps keep nature in balance.	15.06	23.52	39.94	18.85	2.62	2.70	1.02
Most hunters are well-prepared when they go hunting.	16.03	26.63	32.26	21.87	3.21	2.70	1.08
I see little wrong with harvesting animals for their meat, as long as the animal is not endangered.	12.73	14.48	31.58	33.92	7.29	3.09	1.13
Hunters are properly trained and follow hunting regulations.	19.53	25.75	36.83	15.26	2.62	2.56	1.05
Hunting is an important rural tradition.	14.19	16.72	36.73	27.31	5.05	2.92	1.10
I regard any kind of sport and recreational hunting as cruel to animals. (R)	4.37	8.16	25.66	30.81	31.00	2.24	1.11
Hunters often ignore safety rules. (R)	2.92	6.61	26.63	38.39	25.46	2.23	1.00
Hunters often harm animals, which then die a slow and painful death. (R)	2.53	5.25	32.94	33.82	25.46	2.26	0.98
I do not like people who hunt. (R)	6.03	10.98	38.87	22.16	21.96	2.57	1.13
Cronbach's α = 0.866							

Note: R indicates items that have been reversely scaled in the analysis of the results; SD= Standard Deviation

Attitudes towards hunting were notably quite low, with a mean value of 2.56 (SD= 0.74). Overall, 61.8% of respondents regarded sport or recreational hunting as cruel to animals (mean value= 2.24), corroborating the results of the AW scale item regarding hunting animals for sport. On the other hand, 41.2% of them (mean value= 3.09) agreed with the acceptability of hunting game animals for food, as long they are not endangered, revealing that hunting is more acceptable to the public if it has some kind of utility (Gamborg & Jensen, 2017). Respondents generally expressed negative feelings and concern towards hunters, stating that hunters often ignore safety rules (63.8%; mean value= 2.23),

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often harm animals (59.3%; mean value= 2.26), are not properly trained and do not follow hunting

regulations (45.3%; mean value= 2.56). Finally, approximately 44% of the respondents report

disliking people who hunt (mean value= 2.57). Our findings are consistent with the findings of a

previous study on Italian consumers' behaviour (Mayfield *et al.*, 2007) and differ from the results for

other European countries, such as Sweden (Mayfield *et al.*, 2007; Ljung *et al.*, 2012), where

consumers were shown to be strongly in favour of hunting. This result may be because, in Sweden,

hunting is not only a sport but also essential for food acquisition purposes (Mayfield *et al.*, 2007),

highlighting that consumers' attitudes towards hunting are strongly influenced by the socio-cultural

context and, in particular, the final purpose of the hunting activities (hunting for sport, hunting for

meat, hunting for wildlife population control, hunting for a trophy).

Table 5 shows consumers' wildlife-related value orientations (**WV**).

Table 5: Consumers' attitudes towards wildlife

Items	Strongly disagree (%)	Disagree (%)	Neither disagree nor agree (%)	Agree (%)	Strongly agree (%)	Mean	SD
It is important to manage populations of wildlife for the benefit of humans. (R)	5.73	12.24	34.01	35.37	12.63	2.63	1.04
I enjoy watching wildlife when I take a trip.	1.17	4.18	19.53	47.81	27.31	3.96	0.86
It is important to protect wildlife for future generations.	0.68	2.04	14.38	42.76	40.14	4.20	0.81
Hunting and fishing are cruel and inhumane to the animals.	7.39	16.13	42.27	22.06	12.15	3.15	1.07
I notice birds and wildlife around me every day.	3.89	11.47	31.97	38.19	14.48	3.48	1.00
People should not cause pain and suffering to wildlife, regardless of how much we may benefit.	3.21	7.58	27.31	31.88	30.03	3.78	1.06
It is important that we learn all we can about wildlife.	0.68	3.98	23.91	43.93	27.50	3.94	0.86
Animals should have rights similar to the rights of humans.	0.25	12.54	36.93	28.86	16.42	3.39	1.06

Cronbach's α = 0.830

Note: R indicates items that have been reversely scaled in the analysis of the results; SD= Standard Deviation

Reported wildlife-related value orientations, computed as the average score across the items, were generally positive (mean value= 3.16; SD= 0.60), indicating that wildlife enjoyment and animal rights/management are important for the interviewees (Fulton *et al.*, 1996). The majority of the respondents stated that they enjoy watching wildlife (75.1%; mean value= 3.96) and that it is important to learn all we can from wildlife (71.4%; mean value= 3.94). Moreover, almost 40.1% of the interviewees strongly agreed and 42.8% agreed that it is important to protect wildlife for future generations (mean value= 4.20). On the other hand, approximately half of the sample stated that it is important to manage populations of wildlife for the benefit of humans. From these results, a relevant proportion of respondents have a "mutualist value orientation", believing that humans and wildlife are meant to coexist or live in harmony and, thus, that wild animals deserve rights similar to the rights

of humans (Charles M. Russell National Wildlife Refuge & UL Bend National Wildlife Refuge, 2010; Gamborg & Jensen, 2016). In contrast, only a limited part of the sample had a "utilitarian value orientation" and thus believed that wild animals should be used for the benefit of humans and that hunting is acceptable (Gamborg & Jensen, 2016).

4.2 Reliability analysis and principal component analysis

The internal reliability consistency of the AW, ATT, SAF, AH, and WV scales was analyzed using the Cronbach's α test. The results were all higher than the 0.6 threshold value for a satisfactory scale, indicating that all the adopted scales are valid instruments to measure the proposed constructs. The lowest values were obtained for the animal welfare scale (AWα= 0.696), while the other scales had Cronbach's α-values higher than 0.8 (ATTα= 0.946; SAFα= 0.919; AHα= 0.866; WVα= 0.830).

To further investigate the structure and relevance of these scales in explaining consumer attitudes towards HWGM, we also performed a principal component analysis (PCA) using the varimax rotation (see Appendix B, Table B1). The PCA revealed eight components, whose internal reliability values (measured using the Cronbach's α test) are lower than the values calculated on the original attitudinal scales. This suggests that the constructs from the PCA are less consistent than the original scales, and indicates that techniques applied to factor scores (as, for example, CA) may perform worse than on original variables (Fiedler & McDonald, 1993). Moreover, removing the items that loaded on different factors, as suggested by De Graaf *et al.* (2016) and Verbeke & Vackier (2004), has not improved the internal reliability values of the constructs (see Appendix B, Table B2).

4.3 K-means cluster analysis

The cluster analysis was performed using the *k*-means method and the index of the items/constructs from the five original scales (e.g., ATT scale, SAF scale, AW scale, AH scale, WV scale). Prior to

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381 applying the k-means method, we determined the optimal number of classes using the Hierarchical

382 Clustering and Two-Step Cluster procedures. A total of three optimal clusters were identified[5].

383   To verify the existence of significant differences between clusters, one-way analysis of

384 variance (ANOVA) was performed to compare factor means. Considering their respective reported

385 factor mean scores, clusters have been classified as pro-animal, disoriented, and HWGM eaters. The

386 results of the cluster and of the one-way ANOVA analyses are summarized in Table 6.

387 **Table 6. Final cluster average scores**

	Cluster 1 (n= 168; 16.33%)	Cluster 2 (n= 574; 55.78%)	Cluster 3 (n= 287; 27.89%)	F statistics (F-test)
General attitudes	1.532a	3.116b	4.257c	1348.02 ***
Perception of HWGM safety	1.793a	3.075b	4.035c	855.54 ***
Animal welfare	4.253a	3.753b	3.382c	98.75 ***
Attitudes towards hunting	1.861a	2.489b	3.107c	223.81 ***
Wildlife related value	3.605a	3.197b	2.842c	105.64 ***
Cluster classification	*Pro-animals*	*Disoriented*	*HWGM eaters*	

Significance Levels ***$p < 0.001$; **$p < 0.010$; *$p < 0.050$
a,b,c indicate significantly different means using one-way ANOVA and post hoc Dunnet T3 multiple comparison test (equal variances not assumed)

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389 The ANOVA proved that all segments significantly differ for all the factors under study ($p < 0.001$).

390 The highest differences among consumer groups were related to the factor "general attitudes". Figure

391 4 reports a graphical representation of the profiles for each cluster, while Figure 5 graphically reports

392 the results for each construct.

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[5] The results of the Hierarchical Clustering and Two-Step Cluster procedures are available upon request.

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395 **Figure 4. Final cluster profiles**
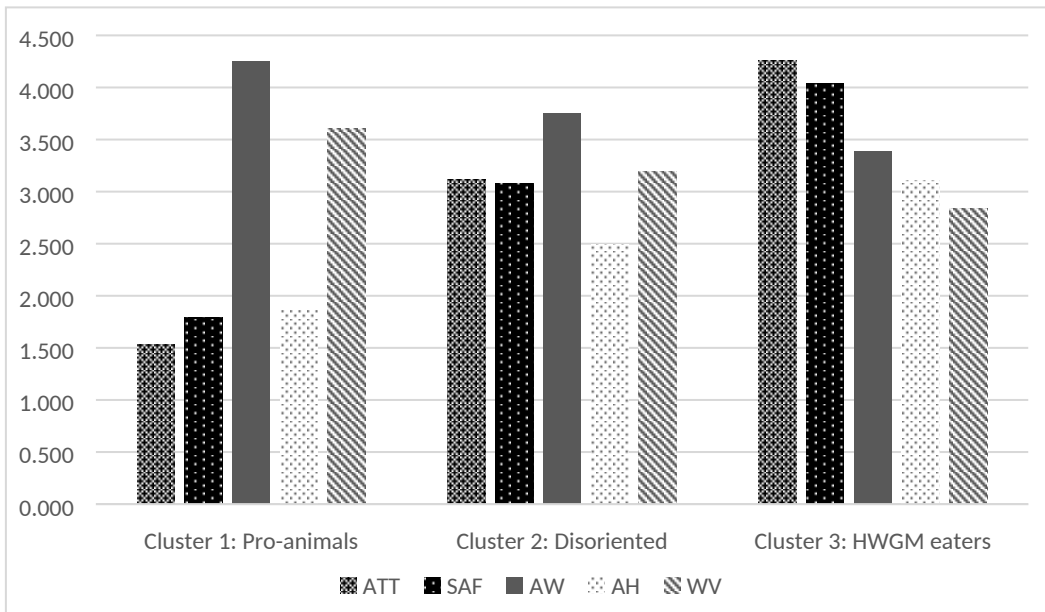
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Figure 5. Construct results differences between clusters
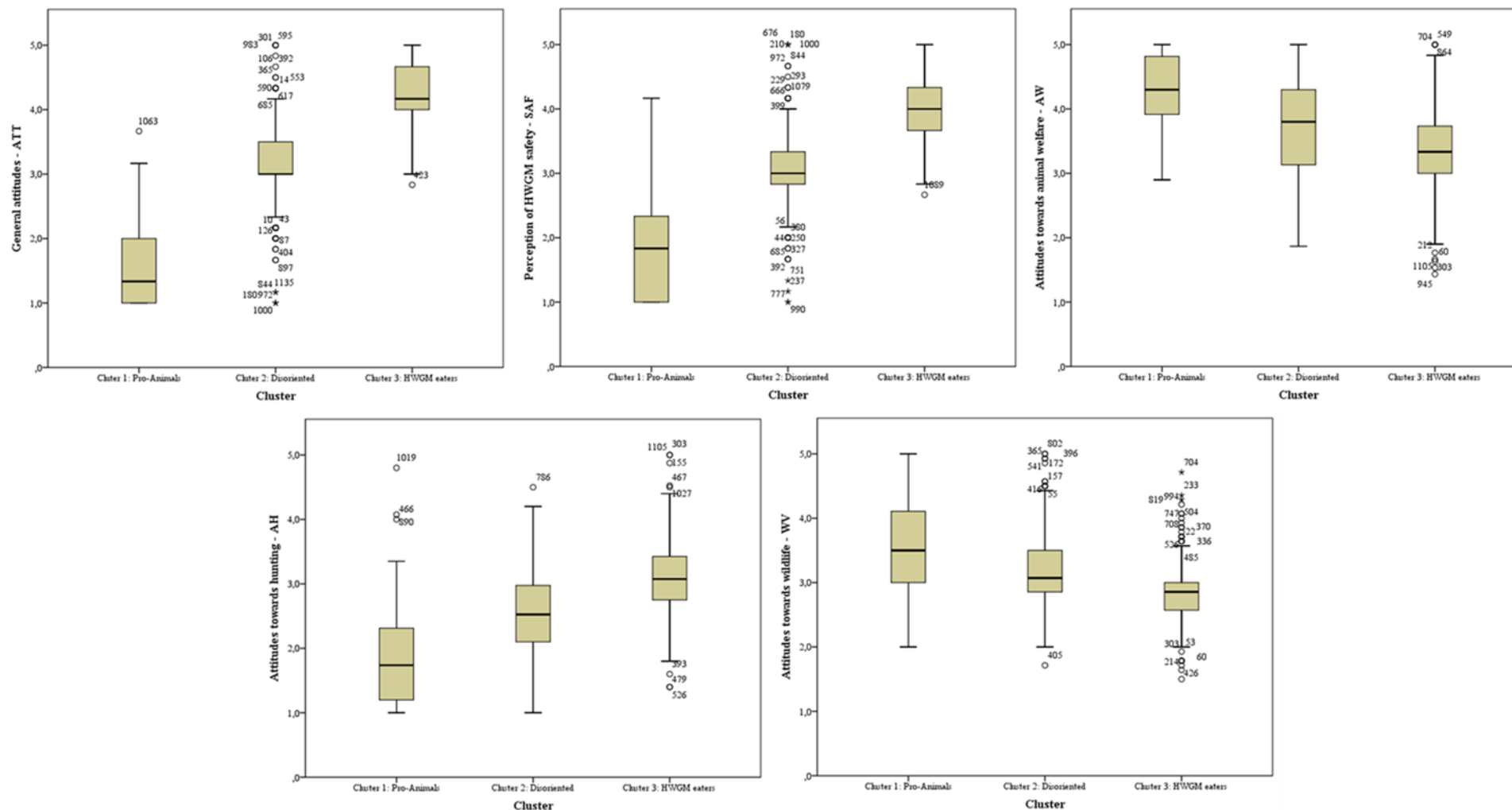
To better describe the characteristics of the individuals in each class, we also designed post-clustering profiles in relation to the most meaningful variables used in the survey, such as demographic characteristics, consumption habits, and consumer knowledge.

To profile each of the segments identified in terms of socio-demographic characteristics, we performed a cross-tabulation analysis. Table 7 summarizes the socio-demographic profile of the three identified clusters, as well as the statistically significant differences found between groups. Differences across segments were measured using the chi-square test or Kruskal-Wallis test, depending on the characteristics of the variables.

Table 7. Socio-demographic profiles of the three identified clusters

Item	Cluster 1 Pro-animal (%; n= 168)	Cluster 2 Disoriented (%; n= 574)	Cluster 3 HWGM eaters (%; n= 287)	p-value (χ2-test)	p-value (Kruskal-Wallis test)
Gender					
Male	28.57	47.74	63.76	0.000 ***	
Female	71.43	52.26	36.24		
Age group					
18-22 yrs	8.33	9.41	3.48		0.106
23-35 yrs	22.02	26.66	24.39		
36-55 yrs	55.36	47.74	56.10		
56-65 yrs	14.29	16.20	16.03		
Geographical region of residence					
Northeast Italy	14.88	17.77	21.95	0.090	
Northwest Italy	21.43	26.83	28.22		
Southern Italy and Islands	45.83	37.98	31.71		
Central Italy	17.86	17.42	18.12		
Education Level completed					
Elementary School	0.00	0.17	0.00		0.029 *
Middle School	10.71	8.01	6.62		
High School	57.14	56.62	50.52		
University and Postgraduate	31.55	34.15	42.51		
Other	0.60	1.05	0.35		
Average household income					
Low	62.50	54.18	41.46		0.000 ***
Medium	33.93	41.99	52.61		
High	3.57	3.83	5.92		

Significance Levels: ***p< 0.001; **p< 0.010; *p< 0.050

Chi-square and Kruskal-Wallis statistics results showed statistically significant differences between the three consumer groups in terms of gender ($p= 0.000$), education level completed ($p= 0.029$) and average household income ($p= 0.000$).

The first cluster included 16.3% of the respondents ($n= 168$). These consumers were particularly concerned about animal welfare and gave a high value to wildlife (Table 7 and Figure 4). Moreover, they had very low attitudes towards HWGM, as well as towards hunting, and revealed strongly negative feelings regarding HWGM safety. Thus, this group was classified as *pro-animal consumers*. The results reported in Table 8 revealed that the members of this group were more likely to be female (71.4% of the total sample), with a middle school or high school diploma (67.85%), and with a low income (62.5%). Furthermore, there was a tendency ($p= 0.090$) for the respondents in this cluster to come from southern Italy and the Islands (45.8%).

The second cluster, classified as *disoriented consumers*, was the largest, accounting for 55.8% of the sample ($n= 574$). Respondents in this group, even if they revealed concerns about animal welfare and placed importance on wildlife enjoyment and animal rights, had positive attitudes towards HWGM and its safety. On the other hand, they had relatively low attitudes towards hunting (Table 7 and Figure 4). From a socio-demographic viewpoint, as shown in Table 6, consumers belonging to this cluster had a better financial status (54.2% had low and 42.0% medium financial status), and they mainly came from southern Italy and the Islands (38.0%). In contrast to the first cluster, this group contained better-educated participants (34.15% of them had obtained a degree or a master's degree). With a proportion of 47.7% males and 52.3% females, this cluster was the most balanced of the three. Finally, the third cluster (27.9% of the sample, $n= 287$) contained consumers with strongly positive attitudes towards the consumption of HWGM products and strongly positive feelings concerning its safety. Thus, this cluster was defined as *HWGM eaters*. These consumers reported the highest attitudes towards hunting and the lowest score related to animal welfare issues and wildlife value orientation. In contrast with the other groups, HWGM eaters were mainly males

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435 (63.7%) with a medium or high financial status (58.5%). This cluster had the highest percentage of

436 consumers with the highest education level; in fact, 42.5% of them reported having a university or

437 postgraduate degree. Moreover, although not statistically significantly different, consumers in this

438 group seemed to be more likely to come from northern (50.2%) and central Italy (18.1%) and to be

439 aged over 36 years (72.0%).

440 In relation to consumer objective knowledge concerning hunted wild game meat (Table 8),

441 statistically significant differences were found between the three consumer clusters ($p= 0.000$). Pro-

442 animal consumers showed the lowest degree of knowledge (mean value= 1.90 correct answers out of

443 the five statements), followed by disoriented consumers (mean value= 2.59). HWGM eaters

444 demonstrated the highest degree of knowledge about HWGM (mean value= 3.24). These findings

445 suggest that a poor level of consumer knowledge regarding HWGM could act as a barrier to its

446 consumption. Consumers, in fact, are often not aware that hunting can be practised ethically and that

447 it is subject to strict and well-defined regulations. Our results are consistent with previous studies

448 (Pieniak *et al.*, 2010a; Van Loo *et al.*, 2013) reporting that higher consumer knowledge about certain

449 food products has a positive influence on their consumption.

450 **Table 8. Objective knowledge related to hunted wild game meat among different clusters**

Item	Total sample	Cluster 1 Pro-animals	Cluster 2 Disoriented	Cluster 3 HWGM eaters	F statistics
	(n= 1.029)	(n= 168)	(n= 574)	(n= 287)	(F-test)
Objective Knowledge (no. of correct answers to 5 statements)	2.66	1.90 [a]	2.59 [b]	3.24 [c]	0.000 ***

a-b-c Indicate significantly different means using Scheffé post hoc test (equal variances assumed)

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452 Finally, we followed Dimech et al., (2011) to explore whether consumers belonging to a

453 specific segment or cluster, and with certain socio-demographic characteristics, are more or less likely

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to consume HWGM. More specifically, we estimated a probit model using the self-reported consumption of HWGM in the last year as a dependent variable, and the consumers' socio-demographic characteristics as covariates. The variables are defined in table 9, while the probit estimates are reported in table 10.

Table 9. Probit model variables

Variable	Description
Dependent variable	
HWGM Cons	Equals 1 if the respondent has consumed HWGM in the last year; 0 otherwise
Categorical Covariates (factors)	
Cluster	
Cluster 1	Equals 1 if the respondent belongs to the *Pro-animal* cluster, 0 otherwise (baseline)
Cluster 2	Equals 1 if the respondent belongs to the *Disoriented* cluster, 0 otherwise
Cluster 3	Equals 1 if the respondent belongs to the *HWGM eaters* cluster, 0 otherwise
Gender	
Male	Equals 1 if the respondent is a male, 0 otherwise (baseline)
Female	Equals 1 if the respondent is a female, 0 otherwise
Area	
NEItaly	Equals 1 if the respondent lives in Northeast Italy, 0 otherwise (baseline)
NWItaly	Equals 1 if the respondent lives in Northwest Italy, 0 otherwise
SItaly	Equals 1 if the respondent lives in Southern Italy and Islands, 0 otherwise
CItaly	Equals 1 if the respondent lives in Central Italy, 0 otherwise
Covariates	
Age	Respondent age. Equals 1 if the respondent is aged between 18 and 22 yrs, 2 if between 23-35 yrs, 3 if 36-55 yrs, 4 if 56-65 yrs.
Edu	Respondent education level. Equals 1 if completed middle school, 2 high school, 3 University/Postgraduate, 4 other kind of school.
Inc	Respondent average household income. Equals 1 if low, 2 if medium, 3 if high.

Table 10. Probit estimates results

Variables	Coeff.	Std. Error	Significance		
			z	P>|z|	
Cluster 2 - Disoriented	0.846	0.120	7.059	0.000	***
Cluster 3 - HWGM eaters	1.506	0.142	10.604	0.000	***
Female	0.041	0.088	0.469	0.639	
Northwest Italy	0.194	0.131	1.479	0.139	
Southern Italy and Islands	-0.022	0.110	0.205	0.838	
Central Italy	0.136	0.133	1.025	0.305	
Age	-0.127	0.053	2.423	0.015	*
Edu	0.246	0.072	3.414	0.001	***
Income	0.374	0.080	4.687	0.000	***
Constant	-1.539	0.355	4.336	0.000	***
Log Likelihood	-306.135				
Pseudo R-squared	0.48				

Note: Significance Levels: ***$p< 0.001$; **$p< 0.010$; *$p< 0.050$; for the categorical covariates baselines refer to the Table 8

As expected, probit estimates show that the proportion of wild game meat eaters increases across consumer segments ($p< 0.001$) from Cluster 1 (*pro-animal*) to Cluster 3 (*HWGM eaters*), and that individuals are more likely to consume HWGM if they are younger ($p< 0.050$). Moreover, the probability of HWGM consumption increases with the individual's education level and household income ($p< 0.001$). Gender and geographical region of residence seem to have no effect on HWGM consumption. Finally, the statistical significance of the coefficients for clusters 2 and 3 indicate differences in consumption patterns for HWGM across the three clusters or segments. According to the Wald Chi-Squared Test (reported in table 10) the null hypothesis of equality between classes can be rejected, indicating that the probability of consuming HWGM varies across consumer segments.

Table 10. Wald Tests across clusters

Hypothesis	Wald Chi-square	p-value	
Ho: Cluster 1 = Cluster 2	49,834	0.000	***
Ho: Cluster 1 = Cluster 3	112,443	0.000	***
Ho: Cluster 2 = Cluster 3	38,883	0.000	***

Significance Levels: ***$p< 0.001$; **$p< 0.010$; *$p< 0.050$

5. Conclusions

This study profiles Italian consumers according to their attitudes and perceptions towards HWGM, socio-demographic characteristics and objective knowledge, and it assesses whether these factors affect consumer consumption of HWGM products. Through a cluster analysis, three different consumer groups were identified and classified as *pro-animal consumers*, *disoriented consumers* and *HWGM eaters*. The three groups (clusters) showed significant differences with respect to their socio-demographic characteristics (gender, education level and average household income), consumption of HWGM and their level of objective knowledge. Cluster one, termed *pro-animal consumers*, was the smallest (16.3%) and included significantly more females, those who are less educated, and those with a low income who are particularly concerned about animal welfare and give high value to wildlife. This cluster showed very low attitudes towards HWGM, hunting, and HWGM safety, as well as the lowest degree of knowledge about HWGM. This group seemed the least interesting for future marketing strategies. The second and largest cluster (55.8%) was the intermediate group of *disoriented consumers* that mainly comprised consumers who were more educated, with a good financial status, who revealed concern about animal welfare and gave importance to wildlife enjoyment and animal rights, but had positive attitudes towards HWGM and its safety. On the other hand, these consumers had relatively low attitudes towards hunting. Moreover, the majority of the disoriented consumers (60.1%) reported having eaten HWGM in the last year, but showed a low degree of knowledge about HWGM. Considering all these factors, this consumer group is the most interesting for future targeted marketing strategies aimed at increasing HWGM consumption. Finally, the cluster of *HWGM eaters* (27.9% of the sample) contained mainly male consumers, consumers with the highest education level, and those with a medium or high financial status, with strong positive attitudes towards the consumption of HWGM products and strong positive feelings concerning its safety. These consumers reported the highest attitudes towards hunting and the lowest scores related to animal welfare issues and wildlife value orientation. Moreover, the majority of them (83.0)

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reported having eaten wild game meat in the last year, and they had the highest degree of knowledge about HWGM.

Our findings provide new insight for the development of a new market for Italian HWGM, highlighting the existence of an important lack of consumer knowledge that could act as a barrier to consumption. Several studies, in fact, have reported that higher consumer knowledge about certain food products has a positive influence on purchase and consumption (Brucks, 1985; Pieniak *et al.*, 2010a; Van Loo *et al.*, 2013; Prestamburgo & Sgroi, 2018). There is a need to better inform and educate citizens about the hunted wild game meat sector, as well as about HWGM. Consumers need to be informed about European hunting regulations, the role of hunting activities in the management of large wild animal overpopulation, and the impact of the high densities of these animals on ecosystems and human activities. On the other hand, consumers need to be aware of all the positive intrinsic features of HWGM. Only by improving consumers' knowledge about HWGM is it possible to increase the likelihood of its consumption. Further research is needed to provide new insights into the existence of consumer segmentation towards HWGM in different geographical areas and cultural contexts. Future studies on this topic should focus on the analysis of consumer preferences and willingness to pay for Italian hunted wild game meat products by adopting the discrete choice experiment (DCE) method.

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Appendix A: Overview of the Questionnaire

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1.   Have you consumed wild game meat in the last year?

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731   ○ Yes

732   ○ No

733 **2.   Please indicate whether the following statements are true or false:**

734   - "In Italy the populations of wild ungulates (red deer, wild boar, roe deer, chamois) are rapidly

735   growing" (*True*)

736   - "Hunters are not considered producers by the Italian law; therefore they cannot sell the meat

737   they hunt" (*False*)

738   - "Game meat (red deer, wild boar, roe deer, chamois) if compared with beef meat has a lower

739   protein content and higher fat and cholesterol content" (*False*)

740   - "Consuming game meat (red deer, wild boar, roe deer, chamois) is an ethical choice,

741   sustainable and with a very low environmental impact" (*True*)

742   - "Currently in Italy hunting is 'controlled', in fact it is subject to well defined rules concerning

743   culling, species, times and places" (*True*)

744 **3.   For each statements please indicate which adjectives better describe your feelings**

745   **towards the consumption of HWGM products.**

Unfavourable	○	○	○	○	○	Favourable
Unsatisfied	○	○	○	○	○	Satisfied
Dislike	○	○	○	○	○	Like
Negative	○	○	○	○	○	Positive
Bad	○	○	○	○	○	Good
Terrible	○	○	○	○	○	Delightful

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3.   For each statements please indicate which adjective better describe your feelings when thinking about wild game meat safety.

Pessimistic	O	O	O	O	O	Optimistic
Unconfident	O	O	O	O	O	Confident
Unsatisfied	O	O	O	O	O	Satisfied
Uncomfortable	O	O	O	O	O	Comfortable
Suspicious	O	O	O	O	O	Trustful
Worrying	O	O	O	O	O	At ease

4.   Would you agree or disagree with the following statements? (Those statements where not categorized and appeared in mixed order)

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
ANIMAL WELFARE (**AW**)					
It is important that the food I normally eat has been produced in a way that animals have not experienced pain	O	O	O	O	O
It is important that the food I normally eat has been produced in a way that animals' rights have been respected	O	O	O	O	O
In general humans have too little respect for the quality of life of animals	O	O	O	O	O
Increased regulation of the treatment of animals in farming is needed	O	O	O	O	O
Animal agriculture raises serious ethical questions about the treatment of animals	O	O	O	O	O
As long as animals do not suffer pain, humans should be able to use them for any purpose	O	O	O	O	O
It is acceptable to use animals to test consumer products such as soaps, cosmetics and household cleaners	O	O	O	O	O

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Statement					
Hunting animals for sport is an acceptable form of recreation	O	O	O	O	O

ATTITUDES TOWARDS HUNTING (**AH**)

Statement					
Hunting helps keep nature in balance	O	O	O	O	O
Most hunters are well-prepared when they go hunting	O	O	O	O	O
I see little wrong with harvesting animals for their meat as long as the animal is not endangered	O	O	O	O	O
Hunters are properly trained and follow hunting regulations	O	O	O	O	O
Hunting is an important rural tradition	O	O	O	O	O
I regard any kind of sport and recreational hunting as cruel to animals	O	O	O	O	O
Hunters often ignore safety rules	O	O	O	O	O
Hunters often harm animals, which then dies a slow and painful death	O	O	O	O	O
I do not like people who hunt	O	O	O	O	O

WILDLIFE-RELATED VALUES (**WV**)

Statement					
It is important to manage the populations of wildlife for benefit of humans	O	O	O	O	O
I enjoy watching wildlife when I take a trip	O	O	O	O	O
It is important to protect wildlife for future generations	O	O	O	O	O
Hunting and fishing are cruel and inhumane to the animals	O	O	O	O	O
I notice birds and wildlife around me every day	O	O	O	O	O
People should not cause pain and suffering to wildlife, regardless of how much we may benefit	O	O	O	O	O
It is important that we learn all we can about wildlife	O	O	O	O	O
Animals should have rights similar to the rights of humans	O	O	O	O	O

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755 **Appendix B:**

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757 **Table B1. Results of the Factor analysis of the 37-items: rotated component matrix results**

	Component							
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
GENERAL ATTITUDES (**ATT**)								
Favorable/Unfavorable (R)	0.690							
Unsatisfied/Satisfied	0.770							
Dislike/Like	0.838							
Negative/Positive	0.841							
Bad/Good	0.828							
Terrible/Delightful	0.837							
PERCEPTION OF SAFETY (**SAF**)								
Pessimistic/Ottimistic			0.773					
Unconfident/Confident			0.789					
Satisfied/Unsatisfied (R)			0.508					
Uncomfortable/ Comfortable			0.777					
Suspicious/Trustful			0.809					
Worrying/At ease			0.830					
ANIMAL WELFARE (**AW**)								
It is important that the food I normally eat has been produced in a way that animals have not experienced pain		0.796						
It is important that the food I normally eat has been produced in a way that animals' rights have been respected		0.781						
In general humans have too little respect for the quality of life of animals		0.705						
Increased regulation of the treatment of animals in farming is needed		0.774						
Animal agriculture raises serious ethical questions about the treatment of animals		0.729						
As long as animals suffer pain, humans should not be able to use them for any purpose (R)								0.800
It is acceptable to use animals to test consumer products such as soaps, cosmetics and household cleaners (R)								0.645
Hunting animals for sport is an acceptable form of recreation (R)								0.475
ATTITUDES TOWARDS HUNTING (**AH**)								

Item					
Hunting helps keep nature in balance		0.606			
Most hunters are well-prepared when they go hunting		0.784			
I see little wrong with harvesting animals for their meat as long as the animal is not endangered		0.548			
Hunters are properly trained and follow hunting regulations		0.758			
Hunting is an important rural tradition		0.663			
I regard any kind of sport of recreational hunting as cruel to animals (R)			0.722		
Hunters often ignore safety rules (R)			0.819		
Hunters often harm animals, which then dies a slow and painful death (R)			0.761		
I do not like people who hunt (R)			0.502		
WILDLIFE-RELATED VALUES (WV)					
It is important to manage the populations of wildlife for benefit of humans (R)				-0.516	
I enjoy watching wildlife when I take a trip				0.714	
It is important to protect wildlife for future generations				0.605	
Hunting and fishing are cruel and inhumane to the animals					0.708
I notice birds and wildlife around me every day				0.614	
People should not cause pain and suffering to wildlife, regardless of how much we may benefit	0.588				
It is important that we learn all we can about wildlife				0.609	
Animals should have rights similar to the rights of humans					0.622

Table B2. PCA components internal reliability consistency

Scale	Cronbach's α-values			
	Original scale	PCA Subscale 1	PCA Subscale 2	Reduced scale
GENERAL ATTITUDES (**ATT**)	0.946	-	-	
PERCEPTION OF SAFETY (**SAF**)	0.919	-	-	
ANIMAL WELFARE (**AW**)	0.696	0.863 (Factor 2)	0.550 (Factor 8)	
ATTITUDES TOWARD HUNTING (**AH**)	0.866	0.835 (Factor 4)	0.816 (Factor 5)	
WILDLIFE RELATED VALUES (**VW**)	0.830	0.515 (Factor 6)	0.686 (Factor 7)	0.654[*]

[*]Reduced scale obtained by removing the single item that loaded on the factor 2.

PRODUCT RELATED ATTITUDES	
General attitudes	
Perceived risk	

SUPPLY CHAIN RELATED ATTITUDES	
Animal welfare	
Attitudes toward hunting	
Wildlife related values	

CONSUMPTION OF HWGM

SOCIO-DEMOGRAPHICS & KNOWLEDGE

Gender
Age
Region of residence
Education level
Working status
Income
Knowledge

Unfavorable	13.70	14.09	33.33	23.13	15.74	Favorable
Unsatisfied	11.18	11.27	37.32	28.38	11.86	Satisfied
Negative	11.56	13.41	35.57	28.09	11.37	Positive
Dislike	11.08	11.95	34.60	29.74	12.63	Like
Bad	10.98	11.86	39.46	25.27	12.44	Good
Terrible	12.15	8.55	38.19	27.31	13.80	Delightful

0%   20%   40%   60%   80%   100%

Cronbach's α = 0.946

Pessimistic	10.01	9.43	40.33	28.67	11.56	Optimistic
Unconfident	10.11	12.44	35.67	31.29	10.50	Confident
Unsatisfied	8.94	14.77	40.72	23.71	11.86	Satisfied
Uncomfortable	10.59	13.02	44.61	23.42	8.36	Comfortable
Suspicious	10.88	14.67	38.78	26.34	9.33	Trustful
Worrying	9.82	12.93	44.70	23.52	9.04	At ease

0%   20%   40%   60%   80%   100%

Cronbach's α = 0.919