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Animal welfare and gender: a nexus in awareness and preference when choosing fresh beef meat?

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ABSTRACT

The modern consumer is now more attentive towards animal welfare practices and this represents an important factor when purchasing meat, whereby ethical, sociological and economic implications are evaluated. In addition, the socio-demographic characteristics of consumers evidence different sensitivities with regard to selection patterns and consumption styles. This study aims to explore the role of Gender in beef meat purchasing preferences, assessing consumer awareness of responsibility towards animal welfare, through the use of cross-tabulation with χ^2 to test the different behaviour of men and women and the use of principal component analysis and cluster analysis to classify attitudes of choice according to gender. Among the research aims, this study examined consumer attitudes towards certain 'ethically incorrect' animal products, as well as their awareness of the institutional responsibility in controlling animal welfare standards during the meat production process. The study conducted in Northwest Italy, involving 512 respondents, shows that women are more sensitive to AW aspects and place trust in those responsible for certification of animal welfare standards, such as veterinarians and consumer associations, and also shows that it is possible to identify an 'animal welfare sensitive' profile of meat consumer.

HIGHLIGHTS

- Modern consumer evaluates ethical, sociological and economic implications in animal friendly meat purchasing process
- Gender affects awareness of the responsibilities of veterinary, public health control bodies and consumer associations to verify animal welfare
- Cluster highlighted consumer differences in perception towards animal welfare

Introduction

The debate over animal welfare (AW) has gained momentum in the last few decades, involving various stakeholder groups, including consumers, institutions, governments and associations (Martelli 2009). The modern consumer is now more attentive to AW practices and this represents an important factor when purchasing meat, whereby ethical, sociological and economic implications are evaluated. For red meat, specifically, the association between AW standards and product safety, ethical aspects, high quality and taste, organic brands, eco-sustainable production and extrinsic cues in quality perception, all emerged as important factors noted in various research in literature (Bertoni 2009). In addition, different targeted consumers expressed their willingness to pay a premium

price for animal-friendly products (Miranda-de la Lama et al. 2017). The communication regarding beef, especially concerning its potential adverse effects on human health, has negatively affected this product consumption trend over the last years (Henchion et al. 2014). However, the beef market in Italy is showing signs of recovery in terms of consumption. This is due to the growing preference for certified products in terms of origin, quality and animal welfare. Voluntary quality certifications involve the application of different and more restrictive standards, during all stages of the meat supply chain, when compared to the mandatory European legislation (Commission Decision 2006/778/EC; European Directive 98/58/EC; Regulation (EC) No 882/2004). These norms concern animal nutrition and breeding practices (housing, pharmacological

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treatment, spaces provided for animals), as well as animal welfare standards (evaluated by direct and indirect measures on animals) to be observed by producers and processors, from breeding to transport and slaughter phases (Barnett and Hemsworth 2009). Apart from voluntary standards, all actors in the meat supply chain must comply with technical production specifications, which are monitored by third-party inspectors. Compliance with specifications that guarantee a quality certification represents an additional cost for the farmer who, consequently, guarantees a certified product of higher quality and that is safer for the consumer, but at a higher sales price. Several studies have shown that consumers have expressed the need to be better informed by producers and institutions on AW issues, including standards for improved welfare conditions of farm animals (de Graaf et al. 2016). With regards to the latter distinction, the difference between mandatory and voluntary animal welfare standards are still confusing for the consumer. In Miranda-De La Lama et al. (2017), most of the involved respondents stated that a properly certified animal welfare-friendly product was more valued due to the higher quality standard of the product and related human health benefits. Additionally, other studies have shown consumer concern regarding the guarantee of production and labelling information authenticity of those products (Nocella et al. 2010; Merlino et al. 2018).

In the European context, attention to animal welfare differs between consumers and governments, especially when based on geographical, cultural and customary contexts (Busch et al. 2017; Merlino et al. 2017). For example, the French government's resistance to the tightening of the European Union animal welfare legislation is in contrast to the greater sensitivity to animal welfare of governments and consumers in other European countries (Buller and Cesar 2007; Nocella et al. 2010). The discussion around AW policies implemented in different countries also involves specialty products for which the convergence between ethics and profit is currently being debated, also referred to as an 'ethically incorrect product' (EIP) (Sullivan and Wolfson 2007; Lomasky 2013). Products such as foie gras, lobsters, and eels are characterised by an inconsistency in breeding or consumption practices, which creates the so-called 'meat paradox' (Loughnan et al. 2010; Kapferer and Michaut-Denizeau 2014). However, foie gras and lobsters, in particular, are high value-added products that also guarantee high profitability for producers. High animal welfare standards can be interpreted as a tool for product

certification that guarantees high quality standards to the consumer. On the contrary, there are also products on the market characterised by a high price and rewarded for their unique characteristics (see foie gras), but their production/slaughtering practices violate some animal welfare rules, in addition to ethical aspects or human values. These aspects can enhance a potential sentiment of mistrust among consumers towards policy decisions, quality guarantees and other rules concerning animal-friendly products. Thus, another aspect to be analysed when discussing AW is the knowledge that consumers have regarding the attribution of responsibilities to those who ensure both animal-friendly procedures during the production process, and the integrity of certifications.

Several authors have highlighted consumer socio-demographic characteristics as directly influencing opinions, attitudes and preferences during the purchase decision-making process (Di Pasquale et al. 2016; Merlino et al. 2018), such as the potential differences of consumer perception influenced by gender. In fact, several studies revealed differences between women and men in terms of AW perception and gender specific attitudes towards red meat consumption and attribute evaluation (Kubberød et al. 2002). Thus, this raises the question about how Italian consumers position themselves with regard to the different aspects of the issues highlighted in AW, EIP, purchase patterns relating to the knowledge of AW standards. In particular, due to the difference in perception and attitudes between the two genders, the importance of women as principal purchaser responsible in the Italian households and also due to the positive trends in the last period on beef consumption, this work aims to: i) highlight which attributes consumers consider important during the choice of meat, identifying how the AW attribute is placed in the process of choice with respect to the individual's gender; ii) analyse consumer awareness of animal welfare responsibility and the connection between EIP consumption and AW awareness; iii) identify homogeneous consumer groups based on their attitudes towards beef meat characteristics.

The study area chosen for the survey is Piedmont, a region in Northwest Italy; it is important to underline, that in the geographical area concerned, there is a long history of breeding a specific domestic bovine breed originating in the territory, which produces meat characterised by unique organoleptic characteristics, in addition to a cultural connotation related to the territory and production processes (Brugiapaglia et al. 2014). The latter include practices linked to

higher animal welfare standards, which confer product certification, of which the consumer is aware, and which are usually taken into account during the selection process.

Materials and methods

Data collection

An ad hoc questionnaire was developed and directly submitted through face-to-face interviews (a physical interview) to 512 meat consumers at several points of meat purchase in the Piedmont region (north-west Italy) from October to April 2018. The conceptual questionnaire structure is summarised in Figure 1 and includes four main sections.

The first and the second sections incorporated questions related to the socio-demographic characteristics and explored beef meat purchasing habits and preferences. The level of importance of beef meat attributes considered during purchase was measured using a five-point Likert-type scale (1 = strongly unimportant; 5 = strongly important). In accordance with other authors in this field (Massaglia et al. 2018; Merlino et al. 2018), ten quality attributes describing meat (Figure 1, section 'Materials and methods') were selected and submitted to the respondents who indicated the degree of importance related to each feature during beef meat purchase.

In section 'Results and discussion' of the questionnaire, the interviewees were asked about their awareness of AW responsibility during the production process of animal-friendly products, indicating which of the selected European and Italian certification bodies were accountable for guaranteeing animal welfare (Figure 1, section 'Results and discussion').

In addition, the consumption of animal products related to the AW concept was examined in section 'Conclusions', more specifically as they are characterised by deficiencies or practices inconsistent with AW standards, both during production and consumption (ethically incorrect products) (Mayfield et al. 2007; Napolitano et al. 2010). These latter products have been selected from bibliographic research and are described in Table 1.

Data analysis

First, a cross-tabulation with χ^2 was used to test for statistical differences between groups, based on gender for each individual question and H0 was the distribution frequency of answer was equal for both genders (Kraljević & Filipović 2017; Wang et al. 2017).

Secondly, in accordance with Di Vita et al. (2019a), two non-parametric test were used to determine if there were statistically significant differences between the mean value of preferences expressed by gender (with a Mann-Whitney U Test) and to test the differences between items of Section 'Materials and methods' of the questionnaire (tested with a Kruskal-Wallis H Test).

Then, a two proportion Z test ($\alpha = 0.01$) was performed in order to compare the percentages of men and women that consume ethically incorrect products.

Finally, data collected through the questionnaires were analysed using the principal component analysis (PCA), based on the Varimax rotation, in order to determine whether data of individual attitudes can indicate different consumer categories and behaviour schemes. PCA has previously been applied to the quality attributes of red meat and its impact on

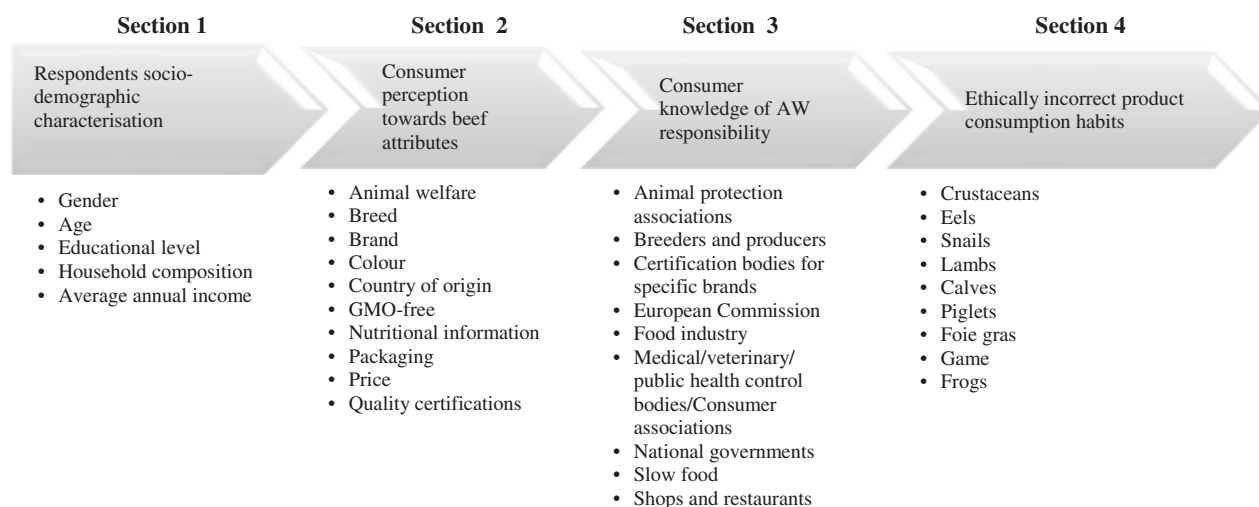| Section 1	Section 2	Section 3	Section 4
Respondents socio-demographic characterisation	Consumer perception towards beef attributes	Consumer knowledge of AW responsibility	Ethically incorrect product consumption habits
• Gender • Age • Educational level • Household composition • Average annual income	• Animal welfare • Breed • Brand • Colour • Country of origin • GMO-free • Nutritional information • Packaging • Price • Quality certifications	• Animal protection associations • Breeders and producers • Certification bodies for specific brands • European Commission • Food industry • Medical/veterinary/public health control bodies/Consumer associations • National governments • Slow food • Shops and restaurants	• Crustaceans • Eels • Snails • Lambs • Calves • Piglets • Foie gras • Game • Frogs

Figure 1. Questionnaire conceptual structure.

Table 1. "Ethically incorrect" animal products selected for the research.

Gap or inconsistent practices with animal welfare standards	Selected "Ethically incorrect" animal products	References ID[a]
Cruelty in meat preparation/eating (live animals)	Crustaceans	[1]; [2]; [3]
	Eels	[3]; [2]; [4]
	Snails	[2]; [3]
Reduced age of animals at the times of slaughter	Lambs	[3]; [5]; [6]; [7]
	Calves	[3]; [6]; [7]; [6]; [8]
	Piglets	[1]; [3] ; [7]
Cruelty during animal breeding	Foie gras	[3]; [9]; [10]
Consumption environmentally unsustainable/hunting practice	Game	[1]; [3]; [11]; [12]; [13]
Consumption environmentally unsustainable	Frogs	[1]; [2]

[a]The full references corresponding to each ID are reported in the Annexe A.

consumption decisions, to help better characterise beef (Topcu et al. 2015). Two tests were used to assess the reliability of the results: the Kaiser-Meyer-Olkin index (KMO) and the Bartlett's sphericity test. The KMO test provides a value from 0 to 1, which indicates the sample suitability by examining the relationship between the correlation coefficients. Low values of the index (near value 0) suggest the inadequacy of the analysis, while values of KMO above 0.7 can be considered satisfactory, and below 0.5 are unacceptable for this methodology (Kaiser and Rice 1974). A higher correlation determines a better analysis of the sample. The Bartlett's sphericity test analyses the sample based on the zero hypothesis (H0: the data is arranged in a rectangular shape). If the initial hypothesis is rejected, it means that the attributes are not related to each other in the sample (Verbeke and Viaene 1999). This methodology is widely accepted in various sectors (human resources management, psychology, market research) and is used to make critical decisions for the future (Di Vita et al. 2019a). PCA has also been widely used to describe consumer behaviour or product characteristics in the agri-food sector (Pourová and Stehlik 2012). PCA is a method used to analyse large data sets and helps to find a new reference system in order to maximise the variance of the variables represented along the axes. This procedure simplifies and eliminates information about the original sample to form different subgroups (components). The total variance of the variables is subdivided into a number of variables equal to the starting point, but the number of which can be reduced. From this analysis, factors emerge described by a participation ratio that indicates how much a set of data influences the factor that has been formed. If this ratio is less than 0.35, it is rejected because it has little or no effect on the considered factor; if instead the values of the participation ratio are between 0.5 and 0.7, it is considered satisfactory, while the factor is well supported with values above 0.7 (Vlontzos et al. 2018). Data were further explored to identify clusters of homogeneous consumers. Using factor scores, a hierarchical analysis

was performed by grouping all cases into clusters. Firstly, the different clusters are formed, then the non-hierarchical k-means (k-means cluster analysis) is applied, allowing the definition of clusters and minimising the distances between the component averages of each group. The analysis was performed using the IBM SPSS Statistics software for Windows, Version 25.0, IBM Corp., Armonk, NY, USA.

Results and discussion

Socio-demographic characteristics of the consumer sample

517 compiled questionnaires were collected (237 men and 275 women). The sample of consumers involved in the study appears to be balanced among the various age groups taken into account, with a prevalence of individuals between 18 and 50 years old (77% of the sample). The prevailing level of education is the high school diploma for both genders (66% of the sample). The size of the families is balanced (about 30% for each level: single, couples and 3 members' families). Singles (20% of sample) and families with a child (16.2% of sample) stand out when the respondent to questionnaire is a man, while the women interviewed mainly represent couples (24%).

The 44% of women interviewed in this research belonged to the lower-medium range of average annual household income (<50.000€/years), while the men were equally distributed in the different range of income, accounting also a 18% of individuals with an average income over the 50.000 €/years.

Gender relating to beef purchasing preferences

The level of importance given by consumers towards the considered attributes to describe beef is reported in Table 2. In general, there is a different distribution of data between men and women compared to the 5 levels of scores. Especially for the animal welfare attribute, which is considered 'very important' for 55% of women against 27% of men ($p < .001$). Also for the

Table 2. Gender differences towards beef meat attribute perception (1 = strongly unimportant, 2 = unimportant, 3 = less important, 4 = important, 5 = very important).

	Men (values in %)					Women (values in %)					Test	
	#1	#2	#3	#4	#5	#1	#2	#3	#4	#5	χ^2	p
Animal welfare	6.5	10.0	22.6	33.5	27.4	2.3	3.4	11.3	27.9	55.1	46.664	***
Breed	5.2	6.1	21.7	33.5	33.5	4.1	9.0	37.2	32.7	16.9	25.313	***
Brand	12.2	8.7	34.9	26.6	17.5	8.3	13.3	33.7	25.0	19.7	4.561	
Colour	5.2	6.0	29.3	28.4	31.0	4.9	6.0	19.5	30.3	39.3	7.572	
Country of origin	3.5	3.5	11.7	27.4	53.9	0.8	4.5	9.8	22.2	62.8	8.335	
GMOs free	16.2	12.7	18.9	22.8	29.4	4.1	9.8	22.2	24.8	39.1	23.640	***
Nutritional characteristics	6.4	7.7	23.2	34.8	27.9	2.7	3.0	14.8	40.2	39.4	19.660	**
Packaging	17.0	22.3	28.8	19.7	12.2	14.6	18.5	34.2	20.8	11.9	2.532	
Price	6.9	7.3	28.9	34.9	22.0	3.0	12.7	31.8	39.7	12.7	14.825	**
Quality certifications	3.5	4.8	24.1	28.1	39.5	0.4	2.6	12.1	27.5	57.4	26.260	***

	Men		Women		Test	
	Mean	Std. Dev.	Mean	Std. Dev.	Mann-Whitney U	p
Animal welfare	3.65	1.17	4.30	0.96	20065	***
Breed	3.84	1.12	3.49	1.01	23890	***
Brand	3.28	1.21	3.34	1.18	29478	
Colour	3.74	1.12	3.93	1.13	27361	*
Country of origin	4.25	1.03	4.42	0.90	27627	*
GMOs free	3.36	1.43	3.85	1.17	24591	***
Nutritional characteristics	3.70	1.15	4.11	0.95	24526	***
Packaging	2.88	1.26	2.97	1.21	28322	
Price	3.58	1.12	3.46	0.97	28281	
Quality certifications	3.95	1.07	4.39	0.83	23256	***

$*p < .05, **p < .01, ***p < .001.$
GMOs: genetically modified organisms.

GMOs free and quality certification attributes women express a higher interest than men ($p < .001$).

On the other hand, with regard to the country of origin, both genders consider it the most important of the attributes analysed and no statistically significant differences between the two genders emerge.

Testing the differences between items itself the Kruskal-Wallis H test showed that there was a statistically significant difference ($p < .001$) in country of origin score between all other items except quality of certification ($p < .05$).

The country of origin, especially for fresh meat, is linked to product safety, freshness, but also sustainability, according to consumer meat assessment studies (Balcombe et al. 2016). Additionally, animal welfare conditions are of great importance for all the interviewed and represent an approach in assessing meat safety and quality (Tonsor and Wolf 2011). Several studies show that the modern consumer is willing to pay a higher price for animal-friendly meat, as it is linked to the breeding and lifestyle of an animal (Lagerkvist 2013; Miranda-de la Lama et al. 2017).

In addition, quality certification also emerged as a driver for meat choice, as it not only guarantees a higher quality standard of product, but is also a guarantee of sustainable practices, such as environmental oriented production (Di Vita et al. 2019b) or animal welfare during beef meat production. This latter result implies that there is an increasing consumer awareness about meat production processes, as well as an increase in sensitivity and acceptance towards certified production, despite the probable but acceptable premium price on the market (Sahelices et al. 2017; Merlino et al. 2018).

On the contrary, packaging and brand, together with price, did not emerge as discriminant factors for beef meat purchase. The meat brand is often perceived as synonymous with being a traceable, guaranteed and authentic product (Grunert 2005), however, in our research, this attribute was considered of little relevance by the consumer, probably due to the geographical area where the survey was carried out, where only a few types of meat were purchased and where traceability and origin are guaranteed as a prerequisite.

Analysing the mean value expressed by men and women, it is possible to confirm what has been said above with respect to the distribution of data for the animal welfare, GMOs free, quality certification attributes, but also a statistically significant difference emerges for the nutritional characteristics, which women consider more important than men ($p < .001$). While it should be noted that men give more importance during the experience of choosing the product to breed ($p < .001$) highlighting a significant difference compared to women.

These results are in line with other studies confirming animal welfare as a discriminatory attribute for

consumers when choosing meat, in particular for women (Thøgersen et al. 2017). These findings confirm that nutritional aspects are often included in meat consumer choice, as stated by other authors (Resurreccion 2004) and women perceive this attribute more strongly indicative of meat quality. Moreover, they also consider attributes related to the risk assessment of meat consumption, such as quality and certification for products as not containing GMOs, during the decision-making process (Resano et al. 2018).

Consumer awareness of animal welfare responsibility

The results from the consumer awareness analysis on the attribute regarding AW responsibility along the meat supply chain are reported in Table 3. Most of the consumers declared that veterinarians and certification bodies should be responsible for managing and guaranteeing animal welfare standards at farms. Consumers identify breed and producers as the third most important category in terms of the issues examined. Our results indicated that consumers were informed regarding the responsibility and the identity of specific independent bodies responsible for animal welfare standards guaranteed by certified specifications and this result confirms the awareness that consumers have regarding compliance to minimum welfare standards during animal breeding, transport and slaughter. However, consumers are still poorly informed about the role of European Commission and of the food industry, still showing a rather approximate knowledge of the aspects of AW (Grunert 2005).

Considering gender, it can be said that women are better informed regarding the responsibilities of institutions and national governments ($p < .05$), and animal protection associations ($p < .05$) in charge of checking AW standards, and the importance of these variables is statistically significant. On the contrary, men place trust

in shops and restaurants ($p < .01$) to guarantee animal welfare standard in the meat production process. Women are also better informed about the role of medical/veterinary and public health control bodies, in addition to consumer associations than men ($p < .05$). This result can be justified by the fact that, traditionally, women are the ones responsible for purchasing groceries in Italian families and, they are aware that in recent years, in Italy, veterinarians are in charge of controlling the minimum conditions of animal welfare established by law, during all phases of the production process. In addition, they recognise the role of consumer associations in defending animal rights and their role as guarantors, in addition to the role of private, independent certification bodies that are in charge of the compliance assessment of the most restrictive standards necessary for the accreditation of voluntary certifications on animal-friendly certified products.

Analysis of the connection between EIP consumption and AW awareness

Male consumers, when compared to women, were especially inclined towards consumption of the selected 'ethically incorrect' meat products linked to the AW topic except for crustaceans and calves (Table 4). However, considering both genders, lambs and shellfish were the most consumed products, followed by veal. Among the other proposed food products, a minority of men consume snails and foie gras.

Despite the difference in EIP consumption between the two genders, neither men (χ^2 0.001, $p = .970$) nor women (χ^2 0.850, $p = .357$) demonstrate a statistically significant difference in AW awareness between those who consume EIP and those who do not. Therefore, this analysis reveals how men seem to be more inclined to consume 'ethically incorrect' products but at the same time they do not have a sensitivity towards AW aspects different from that expressed by

Table 3. Awareness of consumers regarding the designated guarantor of animal welfare standards in the meat production process.

Item	Men (values in %)		Women (values in %)		Test	
	Yes	No	Yes	No	χ^2	p
Associations for animal protection	50.6	49.4	54.2	45.8	5.450	*
Breeders and producers	31.2	68.8	30.2	69.8	0.065	
Certification bodies for specific brands	6.8	93.2	1.5	98.5	0.643	
European Commission	18.1	81.9	10.9	89.1	0.056	
Food industry	17.7	82.3	11.3	88.7	0.980	
Medical/veterinary/public health control bodies/Consumer associations	9.3	90.7	12.0	88.0	6.082	*
National governments	54.0	46.0	64.7	35.3	4.330	*
Slow food	16.0	84.0	15.3	84.7	0.328	
Shops and restaurants	15.6	84.4	13.8	86.2	9.513	**

*$p < .05$, **$p < .01$, ***$p < .001$.

women. These results are in accordance with other studies, in which women tend to consume less game (Burger 2002), driven by a feeling of disgust created by the perception of animality (Kubberød et al. 2006), in addition to their perception regarding un-ethical hunting production methods and AW conflict (Hoffman and Wiklund 2006), and the cultural conceptual overview defines the hunting practice as a traditionally male hobby/sport (Ljung et al. 2012). It has been observed that the consumption of this type of meat is linked to masculinity; both of the act of this meat consumption itself, together with the hunting practice (Chan and Zlatevska 2019). Moreover, in addition to the AW evaluation regarding game, the unique and strong taste and flavour of this product are more appreciated by men when compared to female subjects (Barr and Chapman 2002; McEachern and Schróder 2002).

Consumer behaviour analysis and clustering

The principal components analysis (PCA) was used to identify the main fresh beef consumption attitudes of the sample surveyed. In the elaboration, we included the gender variable, which is represented by a

dichotomous variable that assumes value 1 in the case in which the interviewee is a woman, and the education variable, understood as the number of years of study. The application of this method helped to reduce the amount of information contained in the 17 variables previously identified, reducing these to 4 components that represent 40.2% of the explained variance, as reported in Table 5. The first component extracted, with 16.3% of the explained variance, identified consumption models mostly of women who considered animal welfare as an important attribute during the process of beef selection. This component was positively correlated with the following variables: 'animal welfare' (+0.698), 'GMO-free' (+0.627), 'certification' (+0.560), 'nutritional characteristics' (+0.484) and 'origin' (+0.364). The search for animal-friendly products by consumers means they are looking for certified quality characteristics deriving from guaranteed production systems (GMO-free) and empirically evaluated standards, both during the production phase, and in the final product (Vecchione et al. 2015). This attitude of consumption is also confirmed by the positive evaluation of 'nutritional characteristics' and meat 'origin' that reinforces the animal-friendly image for meat consumers, also linked to product sustainability and higher nutritional value for human health. This latter result can be assumed to explain the most recent styles of beef consumption, which, in the last two years, has shown signs of recovery in the European context from a quantitative to a qualitative consumption style (ISMEA 2019). However, this trend has seen consumers making increasingly conscious choices towards certified, environmentally and socially sustainable products (Payen et al. 2020), perhaps linked to the short supply chain and therefore

Table 4. Ethically incorrect product consumption.

EIP	Men (values in %)	Women (values in %)	Z test	p Value
Crustaceans	70.9	64.7	2.20	
Eels	25.3	8.7	25.54	***
Snails	21.9	9.8	14.34	***
Lambs	79.7	62.9	17.42	***
Calves	60.8	52.7	3.34	
Piglets	45.6	29.5	14.20	***
Foie gras	22.8	10.9	13.09	***
Game	58.6	34.9	28.89	***
Frogs	25.7	8.7	26.61	***

$*p < .05$, $**p < .01$, $***p < .001$.

Table 5. Component pattern and component load values of the considered factors.

	Components			
Item	C1 Animal-friendly and certified meat	C2 Traditional and local production	C3 Consumption based on experience and credence	C4 Visual attributes and price sensitive
Gender (W = 1)	**0.712**	−0.200	−0.116	0.002
Animal welfare	**0.698**	0.100	0.119	0.054
GMO-free	**0.627**	−0.030	0.171	0.040
Quality certifications	**0.560**	**0.460**	0.031	−0.143
Nutritional characteristics	**0.484**	0.328	0.192	0.287
Brand	0.058	**0.678**	0.317	−0.023
Breed	−0.152	**0.658**	0.016	0.243
Country of origin	**0.364**	**0.544**	−0.001	−0.167
Educational level	−0.062	−0.075	**−0.750**	0.034
Age	0.076	0.178	**0.739**	−0.028
Price	−0.092	−0.056	−0.049	**0.660**
Colour	0.238	0.333	−0.087	**0.608**
Awareness of certification bodies	−0.038	0.263	**−0.387**	**−0.418**

Kaiser-Meyer-Olkin index = 0.68.
Bartlett's sphericity test: Chi square 816.748, p value .000.
Each component was named in accordance to the consumption models described by the significance of values.
The value bolded are the major loadings for each item.
GMO: genetically modified organism.

characterised by a high territoriality, also synonymous of quality (Telligman et al. 2017). This last profile seems to correspond to the consumption behaviour just detected in our research (C1: Animal-friendly and certified meat).

The second component (9.3% of the explained variance) identifies consumer awareness of traditional products linked to a specific production process and to the country or region of origin. Variables such as 'certification' (+0.460), 'brand' (+0.678), 'breed' (+0.658), 'country of origin' (+0.544) are probably the result of the selection criteria linked to the regional tradition of breeding in the area of the survey, which is widespread and well-known by consumers of the Piedmont region, where the meat is characterised by specific and univocal organoleptic characteristics (Brugiapaglia et al. 2014).

The third component explains 7.5% of the variance and identifies older consumers with a low educational level who based their meat choice on personal experience gained over the years, which has given them different awareness and knowledge of the product (Ellies-Oury et al. 2019). This attitude is therefore in contrast with the guarantees normally provided by the supervisory bodies that control and guarantee animal-friendly product quality and safety. In fact, a negative correlation emerged with the 'awareness of certification bodies' (−0.387). The fourth factor (7.2% of the total variance) showed a positive correlation with 'price' (+0.660) and 'colour' (+0.608), both variables defining a consumer attitude oriented towards a visual perception of meat quality and price sensitive. On the contrary, this component is also characterised by a low consideration of guarantee of meat quality aspects (−0.418) related to certification and meat origin.

Factor scores derived from PCA were used in the cluster analysis to identify homogeneous groups of consumers. The cluster analysis identified 3 consumer groups, each one characterised by a similar attitude and perception towards beef characteristics (Table 6).

The first group, called 'traditionalist consumer', represented 38% of the total sample and identified consumers loyal to a specific brand of a certified product

and attentive to meat origin, in addition to the animal breed. These consumers did not assign an importance to price during meat purchase, together with other qualitative attributes (colour, nutritional characteristics, animal welfare), because these are probably considered intrinsic aspects of the product itself and guaranteed by quality certification. For this type of consumer, for which the production process and the sustainability take second place of importance, the gender does not appear to be a discriminating factor in the definition of these attitudes of meat choice (59% of women vs. 41% of men). The 'traditionalist consumer' would be aligned with the choice of meat derived from the Piedmontese bovine breed (domestic cattle that originates from the Piedmont region, producing a top-quality, tender and lean meat). This last result also emerges in a recent study by Merlino et al. (2018), carried out on meat consumers in Piedmont, which revealed a positive attitude towards the choice of a meat product derived from local farms, traditionally oriented towards the breeding of the Piedmontese bovine breed (Scozzafava et al. 2016).

The second group (23% of the total sample), called 'distracted consumer', identified individuals whose choice of meat was made randomly on the basis of criteria evaluated only at the time of purchase, such as price, promotions and packaging. This group of consumers counted only the 21% of women highlighting, probably, a greater carelessness and superficiality of men during the choice of meat, probably also associated with the occasionally of the act of food expenditure by these individuals. This category of consumer probably bought meat in mass distribution chains rather than in small, trusted shops or butchers. The third group, called 'animal welfare and price sensitive consumer' (39% of the total sample), was represented by price sensitive consumers, also attentive to animal welfare. In this case, animal-friendly meat was perceived as a product of superior quality and greater ethical value, recognised on the market by certification (Di Pasquale et al. 2016). This consumer group was represented by an important presence of women (73%), confirming once again a greater sensitivity to the issue of animal welfare on the part of the women

Table 6. Associations between consumer perception and preference related to meat consumption models.

Components	Clusters		
	1 "Traditionalist consumers"	2 "Distracted consumers"	3 "Animal welfare and price sensitive consumer"
C1: Animal-friendly and certified meat	−2.231	−2.585	+1.038
C2: Traditional and local production	+2.334	−4.022	−0.103
C3: Consumption based on experience and credence	−0.160	+0.834	+3.850
C4: Visual attributes and price sensitive	−1.855	−0.201	+1.132

The results above indicate the mean score of individuals, for the coordinates on axes C1 to C4 in each clusters.

considered in this research, who make this aspect a criterion of choice for higher quality meat.

Therefore, this consumer probably chooses a product by visually evaluating and choosing meat that is ethically and qualitatively superior. These individuals, usually tending to be women, may be more likely to buy from trusted butchers, justifying the importance of the third component and excluding packaged meat from large retailers.

Conclusions

This study examined several aspects of the relationship between AW and the consumer. In particular, this research aimed to analyse how and if an individual's perception towards AW can be influenced by the gender variable (male/female). The importance of the animal welfare attribute emerges as a discriminating factor in the choice of meat, associated with both the territory of origin, the short supply chain, the traditional product and quality certification. From the first part of the analysis, women emerged as being more sensitive and attentive to the AW component during beef purchase and consumption. The choice of animal-friendly meat by women also emerges from the analysis using the PCA methodology. This technique has enabled the identification of meat choice models linked both to the tradition of the animal breed, but also to purchasing processes based on the meat attributes and animal welfare, in addition to visual judgement of quality and price. The importance of animal welfare was also highlighted by the identification of the cluster called 'animal welfare and price sensitive consumer', characterised by a majority of women. Our study has shown that the group of 'traditionalist consumers' has distinguished itself by the preference for a traditional product, with a superior quality recognised by the certification. In this case, the importance of the traditional aspect emerges from the positive evaluation of the organoleptic characteristics as univocal aspects of distinction and recognition of a certified product, with a branding that identifies a specific territory (origin) and race. However, other quality aspects, including animal welfare, are probably considered intrinsic to this product.

In addition, this study also revealed the consumer's awareness of the responsibilities of veterinary, public health control bodies and consumer associations to verify animal welfare standards and animal conditions during the production process. However, a lack of awareness emerged among the sampled individuals about the role of institutions, food industries and shops and restaurants for the certification of animal-friendly products. Although quality certifications are recognised by the consumer as an added value of the product the consumer is probably not aware of the voluntary nature of these procedures, which entail additional costs for the farmer. Therefore, the beef and veal sector should have the maximum possibility to certify farms by associating more widespread market communication initiatives.

This research provides a contribution to the scientific literature as it allowed defining consumer perception of animal welfare and beef by identifying different attitudes and degrees of awareness according to gender. The paper results afford, in addition, some possible implication in the real world, especially in a context of extreme change in the food styles increasingly oriented towards the choice of ethics production process and product, as well as social, economic and, especially for red meat, environmental sustainable. The differentiation of the purchasing-process dynamics according to gender also widens the usefulness of the research even more since it turned out to be the woman most sensitive to the topic addressed and being also, in parallel, the main responsible for purchase in Italy. This latter result, therefore, could be used in the first place in order to identify a gap in the context of consumer awareness that, through focussed information campaigns, could be bridged; secondly, the same results could be used as marketing tools in order to enhance the more sustainable, ethical product linked to a higher standard of animal welfare and therefore of higher quality. On the contrary, the limit of this research has been the area of investigation that is circumscribed to Northwest Italy, in the Piedmont region, involving the awareness of the target of consumers of the characteristics of Piedmontese beef and of the characteristics of the production process, but at the same time identifying the strong link of the consumer with the local breed. However, this aspect is manageable and easily substitutable with other breeds typical of different regions or countries in view of future studies and for a comparative analysis of the different areas. It would be interesting to expand the area of investigation to compare the different categories of consumers, considering other potentially discriminant aspects in the formation of attitudes, such as the influence of social values, including religious and cultural aspects.

Ethical approval

The research reported in this paper has been conducted in an ethical and responsible manner.

Disclosure statement

All authors declare no conflicts of interest in this paper.

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Annexe A

Full Reference and Corresponding ID Number of the study on the "Ethically incorrect" animal products

ID	Full reference
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