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Do technological innovations in working conditions influence consumer preferences for chicken meat?

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ABSTRACT

This study examines how information about the introduction of innovative technologies that improve working conditions influences consumers' perceptions and preferences for chicken breast. The study uses a discrete choice experiment to investigate the preferences and willingness to pay (WTP) of 663 Italian respondents who were presented with an online questionnaire. To assess the impact of innovation on brand equity, the sample was randomly divided into two groups: the treatment group (T), which received information on the impact of the application of the solutions provided in the innovation plan on employee well-being, and the control group (C), which received no information. The results show that consumers perceive the innovation positively, but the effect on brand equity is not significant. In addition, consumers prefer a lower priced product and the organic option is strongly preferred over all other production methods. Finally, information about technological innovation does not influence consumers' purchase intentions.

1. Introduction

In recent years, the poultry meat industry has experienced considerable growth worldwide [1,2], with a focus on reconsidered and automated production systems and processes [3]. However, the intensive nature of modern poultry production brings challenges in terms of animal welfare, environmental impact and economic sustainability. In parallel with the growth of the poultry sector, criticism and public concern about the welfare of farm animals in such systems has increased [1,4,5]. At the same time, the high density of livestock exposes agricultural workers to increasing risks, with injuries often resulting from accidents involving machinery and animals [6,7]. In addition, exposure to pollutants such as hydrogen sulphide, ammonia, volatile organic compounds, particulate matter and endotoxins poses a significant health risk to workers [8]. In this context, technological advances have led to significant automation of agricultural processes through the introduction of the Internet of Things (IoT), sensors, robotics, drones and artificial intelligence [9]. The integration of smart systems has the potential to optimise every stage of the production process and address concerns related to sustainability, animal welfare, worker safety, food safety and labour cost reduction [3].

Previous studies have shown that innovation characteristics have an influence on brand equity [10]. Brand equity is the value attributed to a product brand based on consumer perceptions of its quality, reliability, and ethical behavior, including the adoption of socially responsible practices [11–13]. Brand equity is of fundamental importance in marketing and is defined as the added value that a brand gives to a product [11–13]. This value can influence consumer perception, preference and willingness to pay [11]. Aaker's framework outlines the key elements of brand equity, including brand awareness, perceived quality, brand associations and brand loyalty. These elements are critical to product differentiation, especially in highly competitive markets such as food, where branding strongly influences consumer choice [12,14]. Following the consumer-centric perspective, brand equity is understood as the perceived added value that a brand gives to a product [11,13–16]. Market competition in the food industry has evolved from pure price competition to a more complicated brand competition [17]. Previous research has emphasised the crucial role of branding in differentiating products in a highly competitive market [12,18].

Consumers are increasingly aware of the environmental and social impact of their purchasing decisions and are therefore demanding more transparency and detailed information about their products [19,20]. In response, companies have taken a more proactive approach to improving the environmental and social performance of their products

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in order to strengthen their brand equity [13]. This helps companies to gain a sustainable competitive advantage [21].

Previous research on consumer acceptance of food technologies suggests that technological innovations significantly influence consumer decision making, although the impact of technological advances on the acceptance of all food-related technologies remains uncertain [22,23]. Although much attention has been paid to brand equity, there remains a gap in both the conceptual framework and empirical research examining the specific marketing strategies that promote its development [18,24]. While previous studies have examined the influence of brand equity on purchase intention [24], no study has specifically examined the dimensions of brand equity or quantified its increase when consumers are informed about technology adoption. Therefore, this study aims to investigate whether communicating changes in the adoption of innovative technologies that improve employees' working conditions and well-being can increase brand equity.

Specifically, the study examines the role of information about technological innovations in improving employee well-being and whether it has a positive and significant impact on consumer purchase intentions.

While previous research has looked in depth at consumer preferences in relation to animal welfare, environmental sustainability and food safety in meat production, far less attention has been paid to technological innovations that improve the working conditions of poultry industry workers. Studies have found that ethical concerns influence consumer decision making, but the ethical dimension has predominantly focused on animal welfare [5] rather than human working conditions. Our study fills this gap by investigating whether and to what extent consumers value innovations that improve the welfare of poultry workers, an aspect of ethical production that remains largely unaddressed in the existing literature. In addition, we contribute to the literature on brand equity by examining how information about ethical and technological innovation influences perceptions of brand equity in a competitive marketplace. While brand equity has been associated with sustainability and corporate social responsibility [12,13], there is little empirical evidence linking consumer perceptions of labor-oriented innovations to brand preference and willingness to pay.

The poultry industry represents a particularly interesting context for analyzing technological innovations aimed at improving working conditions. Unlike other food sectors, poultry production is characterized by high-intensity housing systems and repetitive manual work in confined spaces, resulting in increased health and safety risks for workers, including respiratory problems due to exposure to ammonia, ergonomic stress and increased injury rates [6,7]. These risks make the sector a prime target for technological improvements aimed at worker well-being. Despite the increasing focus on consumer-oriented ethical sourcing, worker-centered innovations remain underrepresented in consumer research. From a theoretical perspective, we extend the literature on brand equity by suggesting that corporate investment in ethical labor practices, when communicated transparently, can increase perceived brand equity. Integrating labor-oriented innovations into ethical marketing therefore offers companies a new way to build brand equity.

The study aims to answer the following research questions: (1) What influence does the brand name have on the extent of brand equity? (2) Does information about the introduction of innovative remote animal control techniques that improve working conditions influence brand equity? (3) Which attributes most strongly influence consumer preferences for chicken meat? (4) Are there different consumer groups that differ in their preferences for chicken meat attributes?

To investigate these questions, we conducted an online survey in Italy with 663 participants, which included a questionnaire and a choice experiment (CE). Using the choice experiment, we analyse the influence of brand equity and how the communication of improved working conditions and animal welfare affects consumers' perception of brand equity.

The results of this study can provide companies and marketers with valuable insights into consumer preferences for chicken breast, particularly in relation to brand awareness, production methods and the influence of information about ethical innovations in the poultry industry.

2. Literature review and research hypotheses

Marketing research has dealt extensively with brand equity [25–27]. Brand equity refers to the additional value that a brand adds to a product [12]. This value, also referred to as consumer-based brand equity, reflects how consumers perceive and value a brand [14]. Aaker's [11] conceptualization and Keller's [14] framework emphasise that brand equity is shaped by consumers' associations with the brand. According to Aaker [11], brand equity is based on brand associations, familiarity, perceived quality and loyalty. Keller [14] also emphasised the importance of brand awareness and associations as core components of brand equity. This approach is based on cognitive psychology and focuses on the cognitive processes that consumers use to evaluate brands [25]. Brands act as key indicators of quality and help consumers learn from their experiences [28]. When a brand consistently delivers reliable quality, it becomes associated with a certain standard of excellence, which drives consumer preference and increases brand equity [25,26,29]. Extrinsic cues such as brand name are critical to consumer quality expectations [30,31]. Previous research emphasises the important role of brand names in the marketing of differentiated meat products [32]. Grunert et al. [30] found that consumers are highly receptive to brand cues and use them to form expectations of meat quality. In this context, branding serves to communicate superior quality, reduce consumer uncertainty and persuade them to pay a premium for products perceived to be of higher quality [33]. Since we can assume that the use of extrinsic cues such as brands may vary among consumers, we formulated the following hypothesis.

H1. Top-of-mind brand influences consumers' preferences and WTP for chicken breast.

According to Sepúlveda et al. [34], consumers evaluate meat quality based on various cues, which are categorised into intrinsic and extrinsic factors. These cues significantly influence consumer behaviour and decision-making. When choosing chicken meat, consumers place great importance on intrinsic factors such as colour and freshness [35]. In Europe, the focus has shifted from price to health, animal welfare and environmental aspects [36]. The influence of extrinsic factors on consumer preferences can vary from country to country [35,37]. To illustrate, consumer preferences refer to the relative value consumers place on different product attributes derived from their choices in a structured experimental setting [1,37,52]. For meat and meat-based products, Brunsø et al. [38] identified four key qualitative attributes: hedonic, health-related, convenience and process-related attributes. Some attributes, such as visual qualities like colour, marbling, and texture, can be perceived before purchase, while others, such as sensory qualities, are experienced during consumption [39]. Certain attributes, such as credibility factors, must be explicitly communicated in order to be perceived by consumers [40]. These attributes, which are often linked to process characteristics — such as organic practises, animal welfare-friendly practises, no genetically modified organisms and environmentally sustainable practises — are becoming increasingly important in food selection [30,41]. In several European countries, consumer concern about food production methods has increased significantly, with growing interest in organic production and animal welfare [30].

Process-related characteristics contribute to the formation of quality expectations as a general quality indicator rather than as isolated attributes. This could be due to the fact that there are few extrinsic cues for evaluating meat quality. Even for branded products, there is evidence that consumers often overestimate the importance of these process-related attributes [30]. Research on consumer preferences for poultry production methods is relatively limited [1]. In this context, Pouta et al. [36] found that production method had a comparatively modest

influence on consumer choice compared to country of origin, while organic production labelling positively influenced preferences for chicken fillets. Van Loo et al. [43] showed in a choice experiment that consumers are willing to pay up to 35 % more for organic chicken meat, especially for organic-labeled chicken breast. Using conjoint analysis, Martínez Michel et al. [43] showed that the chicken production method was an important influencing factor for respondents and that consumers' willingness to pay was negatively influenced by product price. Conversely, Napolitano et al. [44] found that consumer satisfaction was significantly increased by information about the organic production system, emphasising the role of this factor as a differentiator in a competitive market. Despite consumer concerns, a strategy of product differentiation in the food industry can give the poultry production and processing sector a distinct competitive advantage in an increasingly crowded market [36]. Product differentiation is about identifying different consumer segments, with companies trying to stand out within specific segments or across the market [36]. Although preferences may differ between segments, there are usually similarities within each segment. These differences in preferences are often latent, but become apparent when consumers are offered a range of product options [45,46]. Socio-demographic variables are often used to identify these consumer segments [47].

Previous research has shown that consumer preferences vary widely with respect to environmental certification, animal welfare, antibiotic-free production, genetic modification, and health and safety concerns [48,49]. However, willingness to pay (WTP) for chicken meat attributes is not only influenced by socio-demographic factors, but also by consumer behaviour and purchasing habits. Several studies suggest that consumer behaviour is shaped by various demographic characteristics [50]. Therefore, we hypothesise the following based on the literature.

H2. Information about innovative techniques that improve working conditions influences consumer preferences.

H3. The structure of consumer preferences for chicken meat is influenced by the characteristics of the production method.

H4. WTP for chicken meat attributes is influenced by socio-demographic characteristics.

3. Data and method

3.1. Data gathering

To answer our research questions and test our research hypotheses, we conducted an online survey among a sample of Italian consumers via the Qualtrics platform in October 2022. The online survey method allows for easier data collection and processing. In addition, online questionnaires offer a dynamic pool of options for question design. The participants from the Emilia-Romagna region (Italy) were recruited in collaboration with a market research agency. Of the 1935 accesses to the questionnaire link, 655 valid questionnaires were received. Before the questionnaire was launched, consumers were selected on the basis of screening questions. The "*conditio* sine *qua non*" were: (1) being of legal age in Italy (at least 18 years old), (2) knowledge of the brand1, (3) residence in the Emilia-Romagna region, (4) responsibility for food shopping in the household, (5) and consumption of chicken meat at least once a month. Respondents who did not fulfill the five conditions were excluded from participation in the study. In addition, those who always answered "no purchase" in the choice experiment (invalid answers) were excluded. The survey was tested on 20 randomly recruited respondents to determine the clarity of our questions and the quality of responses in the CE. Consumers who responded to the questionnaire were informed of the privacy and anonymity of their responses. The questionnaire contained questions designed to explore: (1) Respondents' purchasing habits regard meat in general and chicken meat specifically; (2) Hypothetical choice experiment based on the same type of product identified before (1 kg chicken breast pack), but associated with variable levels of attributes (price, brand, production method); (3)Perception of the quality of Brand1 was measured with a Likert scale of 5 levels (1: Strongly disagree; 5: Strongly agree); (4) Perception of Brand1 brand equity with a Likert scale of 5 levels (1: Strongly disagree; 5: Strongly agree); (5) Sociodemographic characteristics of the sample.

3.2. Choice experiment

A discrete choice experiment (DCE) was conducted to determine consumers' preferences and willingness to pay (WTP) for 1 kg of chicken breast. DCEs are commonly used in food marketing studies to determine individual preferences and WTP for specific products or services [51–54]. These experiments are consistent with random utility theory [55] and Lancaster's economic theory of consumer behaviour [56] and consider the assumption that alternatives are exhaustive, mutually exclusive and finite. Basic assumptions include that individuals seek to maximize utility within a budget constraint, that decisions include a random utility component, and that the total utility of a good can be divided into partial utilities based on different attributes [55]. The popularity of these experiments lies in their ability to evaluate preferences across different attributes and levels simultaneously. In discrete choice experiments (DCE), participants are tasked with selecting an alternative from a set of product options that typically differ in terms of attributes, including price [57,58]. Another advantage of choice experiments is that they reflect real-life purchase scenarios in which consumers regularly make trade-offs between products with different attributes [59]. In the context of these experiments, the term "design' refers to the strategic planning of observations to optimise data inference [60]. The design process for choice experiments includes: (1) defining the product, identifying significant attributes, (2) defining attribute levels, (3) constructing levels that encourage trade-offs, and (4) creating hypothetical choice sets.

3.2.1. Selection of product and attributes

In the present study, chicken breast was selected as the object of investigation as it appeared suitable for answering the research questions. In today's chicken production systems, high-density rearing systems are used to meet the increasing market demand, a practise that has been confirmed in studies by Mitloehner et al. [6] and Simsek et al. [7]. This more intensive rearing leads to increased concentrations of pollutants and emissions from chicken farms. The increased concentrations of ammonia (NH3) in these facilities have a negative impact on the well-being of workers and animals [6,7].

The DCE has three attributes: Brand, production method and price (Table 1). The first attribute, brand, was selected because the main objective of this study is to understand how information about improved working conditions on chicken farms can influence consumer preferences and WTP for chicken breast. The brand attribute included nationally recognized brands to ensure familiarity and relevance to consumers. Therefore, four brands were considered: 'Brand1'

Table 1
Attributes and level used in the choice experiment.

Attributes	Attribute levels
Brand	- Brand1 - Brand2 - Brand3 - Retailer's brand
Production method	- Organic - Free range - Cage-free - Standard
Price	- €8.90 - €13.90 - €18.90 - €23.90

headquartered in Emilia-Romagna and a well-known brand in Italy for chicken production; 'Brand2′ an Italian brand specialised in meat and egg production; 'Brand3′ an Italian brand specialised only in meat production; and 'Retailer's brand'.

The second attribute is the production method, as studies have shown that this is an important feature for consumers when buying meat, especially chicken [61]. The demand for more sustainable production methods for chicken meat has increased significantly over the last decade, providing new opportunities for producers to differentiate their products [42,51,62]. These labels are also often perceived as an indication of healthier alternatives [42]. Specifically, four levels of production methods were distinguished. These levels differ in terms of the type of feed, the use of antibiotics and the environment in which the chicken is reared to capture different aspects of sustainability. The levels selected were: "organic' for its emphasis on natural farming methods, environmental sustainability and higher animal welfare standards; "free-range' for improving animal welfare through access to the outdoors in line with consumers' ethical expectations; "cage-free" as a balance between animal welfare and economic efficiency, as animals remain indoors but are not kept in cages, meeting retailers' and consumers' demands for humane treatment without the logistical complexity of free-range; and "standard' because of its efficiency, scalability and low cost, allowing for mass production and affordable prices, making it suitable for broad market demand, even though it may raise concerns about animal welfare and sustainability.

Finally, four price levels were established, based in part on current market prices for chicken breast fillets from different production methods in retail outlets in Bologna (Conad and COOP), (Italy), and adjusted to cover a realistic but differentiated range to provide a meaningful estimate of willingness to pay. The use of four price levels is a common practice in the choice experiment literature, as shown by studies such as Barreiro-Hurle et al., [63]. Indeed, the use of four price levels increases the efficiency of the estimation of willingness to pay (WTP) as it ensures a balanced experimental design [62].

3.2.2. Design

In order to obtain the choice sets, Ngene 1.1.1 was used to design an optimal orthogonal design (OOD). The OOD maximizes differences in attribute levels across alternatives, thus improving the information collected from respondents in SC surveys by requiring them to trade off all attributes in the experiment [64]. While OOD are orthogonal within each alternative, they often show correlations, frequently perfect negative ones, across alternatives [64]. The utility function for the design was:

$$U = f\{\text{Price, Brand, Production method, } \varepsilon\}$$

Ngene generated 8 choice tasks. Each choice task was composed of 4 product alternatives each and the fifth alternative was the "opt-out" option. The opt-out alternative (no buy option) was included to enhance the comparability to real-world shopping scenarios. This mirrors consumer choices in actual shopping experiences, where individuals may opt not to make any purchases [59,65]. Choice sets and alternatives within each choice set, except the opt-out option, were randomized to avoid any ordering effect (Fig. 1).

Before completing the DCE task, participants were presented with a clear explanation and description of the attributes and levels. They were also instructed to imagine that they were shopping in a grocery shop, and it was explained to them how to complete the CE. To mitigate hypothetical bias, a cheap talk (CT) script was used [66]. To find out whether the information about the new production methods introduced by Brand1 influenced consumers' preferences regarding the brand in question, participants were randomly presented with the following information before the discrete choice experiment task: "*Brand1 has integrated 'smart farming' into its meat production. This term refers to the use of technology to monitor and facilitate production processes on the farms.*

Fig. 1. Example of choice scenario.

Environmental sensors have been installed to record the temperature of the boxes, the weight and the temperature of the chickens in the pilot farms. This technology makes it possible to improve the well-being of both the animals and the workers. Analysing the data recorded by the sensors for precision monitoring makes it possible to assess the health and growth of the animals and prevent stress or disease. The ability to monitor herds remotely increases the quality and safety of work for farmers, who can limit visits to the barns and better manage labour time".

3.3. Data analysis

The data in this study were analyzed using R 4.1.0. In the beginning, descriptive analysis was applied to depict participants' consumption and purchase habits of chicken meat. In addition, perceptions of brand equity for Brand 1 were described. In addition, a two-step cluster analysis was conducted to identify consumer segments based on purchase habits, attitudes toward Brand 1, and socio-demographic characteristics. Concerning the DCE, the models were estimated based on the choices made by participants, each of whom completed 8 choice tasks. All attributes and levels are included in the specific utility function. Therefore, the utility function is:

$$V_{njt} = \alpha + \beta_{n1}Price_{njt} + \beta_{n2}Brand_{njt} + \beta_{n3}Production_{njt} + \varepsilon_{njt} \quad (1)$$

Where.

- V_{njt} is the individual utility for each participant, alternatives, and choice task; - n = 1, …, N represents the participant,
- t the choice task,
- j the alternatives A, B, C, D and E where E is the no-buy option;
- α is the constant for estimating the utility of participants at the no-buy option;
- β_{n1}, β_{n2}, β_{n3} are the coefficients of the estimated mWTP values for brand and production method, respectively;
- $Price_{njt}$ is the price for 1 kg of chicken breast of alternative j with 4 levels;
- $Brand_{njt}$ is the brand attribute with 4 levels: Brand1, Brand2, Brand3 and Retailers' brand;
- Production is the production method used for producing chicken breasts with 4 levels: Organic, Cage-free, Free range and standard.
- ε_{njt} is the error term, not observable by the researcher.

Considering that this study also aims to understand how information on improved working and farm conditions affect consumers' preferences, brand was interacted with the individual receiving the information or not. Hence, equation (1) is transformed as:

$$V_{njt} = \alpha + \beta_{n1}Price_{njt} + \beta_{n2}Brand_{njt} + \beta_{n3}Brand_{njt} * Info + \beta_{n4}Production_{njt} + \beta_{n5}Production_{njt} * Info + \varepsilon_{njt} \quad (2)$$

Finally, in order to respond to H3, brand's and production method levels were interacted in order to understand how preferences and willingness to pay differ between consumers' segments. Therefore, equation (1) is transformed as follows:

$$V_{njt} = \alpha + \beta_{n1}Price_{njt} + \beta_{n2}Brand_{njt} + \beta_{n3}Brand_{njt} * Cluster + \beta_{n4}Production_{njt} + \beta_{n5}Production_{njt} * Cluster + \varepsilon_{njt} \quad (3)$$

The utility function parameters were estimated using the Multinomial Logit (MNL) model, which assumes homogeneous preferences. While this provides a useful benchmark, its limitations make it less suitable for our study, which involves repeated choice observations per respondent and likely heterogeneity in consumer preferences regarding ethical and production-related attributes. Therefore, to account for potential preference heterogeneity, we also employed the Mixed Logit (MXL) model, allowing for some coefficients to vary randomly. In addition, the MXL is particularly appropriate in our context because consumer preferences for brand, production method, and price are expected to vary due to personal values, familiarity, and sensitivity to ethical attributes such as working conditions or animal welfare. This model relaxes the necessity of treating irrelevant alternatives as independent and allows for the consideration of correlations among unobserved factors over time [55]. Based on this model some assumptions should be made. Firstly, the coefficients in equation (1) are assumed to be stochastic, following statistically reasonable empirical distributions. Secondly, alternative specific constants are modelled as random variables, following a normal distribution. This choice is made to account for the expectation that individuals may exhibit preferences with both positive and negative inclinations towards the chicken breast under examination in this study. Thirdly, the price coefficient is assumed to adhere to a constrained (one-side) triangular distribution.

Consequently, in the MXL framework, the probability of individual n choosing alternative j is expressed as follows:

$$\{P_{nj}\} = \int_{\beta_n}\int_{\alpha_n}\prod_{t=1}^{T}\frac{V_{njt}}{\sum_j e^{V_{njt}}} f(\beta_n, \alpha_n|\mu,\Omega)d\beta_n d\alpha_n \quad (4)$$

where f (β_n,α_n| μ, Ω) is the probability density function of the vector of J random coefficients < β_n,α_n>; μ is the vector of the price coefficient and the alternative-specific constants; Ω is the variance-covariance matrix of the vector of random parameters, for which the off-diagonals were assumed zero. The model was estimated using gmnl packaging with 1000 draws.

Based on the coefficients from MXL, marginal willingness-to-pay (mWTP) for each attribute level country was calculated as follows:

$$WTP(Attribute) = -(\beta_n - \beta_{level})/\beta_1 \quad (5)$$

Where β_1 is the parameter of price, β_{level} is the parameter for each level of the attributes, brand and production method, and β_n is the parameter for reference attribute level.

4. Results

4.1. The sample

The socio-demographic characteristics of the sample show a diverse group of consumers from the Emilia-Romagna region in Italy (Table 2). The sample consists of 59 % female and 41 % male respondents, with the majority (47 %) between 35 and 54 years old. The level of education is relatively high, with more than half of the participants having a high school diploma (53 %) and 37 % having a university degree or higher. The income level of respondents varies, with most reporting a middle-income level. 62 % of respondents say they can afford small luxuries occasionally, while 20 % have to be careful with their spending. Geographically, the majority of respondents live in central urban areas (40 %) or in Bologna and its surroundings (33 %), which may influence their familiarity with local brands and their access to different foods. These socio-demographic factors provide a valuable context for understanding the consumer preferences and behaviours analyzed in the study.

4.2. Purchasing habits

As can be seen in Fig. 2, most of the study participants consume chicken meat several times a week, mainly twice a week. Only 2 % of respondents consume chicken meat once a month.

As far as the brand is concerned, "Brand 1" is in first place. 61.5 % of participants stated that this is the first brand that comes to mind and 42 % buy it most often.

For 25.3 % of participants, "Brand 2" is the second most frequently mentioned brand and 15 % buy it more. Regarding supermarket brand, 3.9 % of participants mentioned it as the first brand coming to their mind, however, 38 % purchase chicken with supermarket brand (See

Table 2
Socio-Demo graphic characteristics.

	Definitions	Sample characteristics (%) (n = 655 participants)
Gender	Male	41
	Female	59
Age (years old)	18–24	8
	25–34	18
	35–44	23
	45–54	24
	55–64	17
	64 +	10
Education	Elementary school	9
	High school	53
	University and/or above	37
	Prefer not to respond	1
Income (qualitative scale)	I should be careful with what I spent	20
	Sometimes I can afford some small luxuries	62
	I can afford everything	17
	Prefer not to respond	1
Income	Less than € 1.500	12
	€1.501 – €2.499	27
	€2.500 - €3.499	26
	€3.500 – €4.499	13
	€4.500 – €5.499	4
	€5.500 +	4
	Prefer not to respond	13
Location	Bologna and nearby areas	33
	Center of the provinces	40
	Other municipalities	27

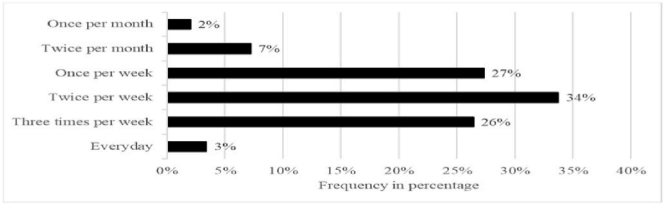

Fig. 2. Frequency consumption of chicken.

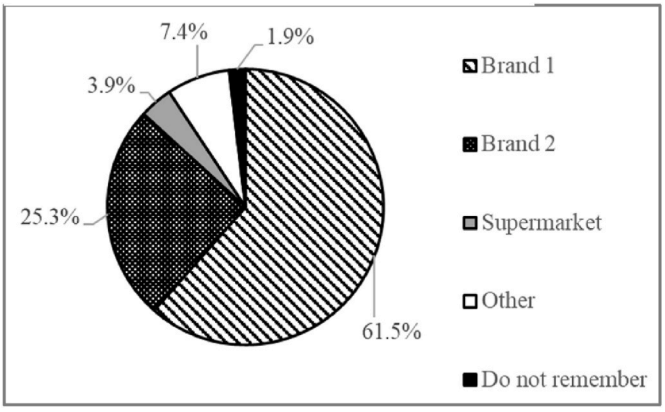

Fig. 3. Top of mind brand.

Fig. 3) (see Fig. 4).

The Cronbach alphas for perceived quality and brand equity were 0.87 and 0.86 respectively, which is considered high. As Fig. 5 shows, perception of quality and brand equity vary widely, indicating that consumer trust the brand which plays a key role in purchase decisions.

The perception of quality for Brand1 is strongly positive, especially in relation to expectations, where the level of agreement is higher

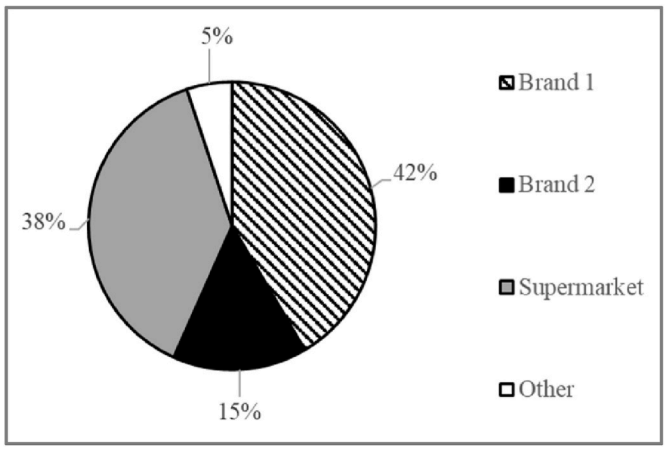

Fig. 4. Brand purchased more frequently.

compared to the other two statements about the quality and reliability of the brand. The level of agreement with the statements about the value of Brand1 is not as strong as for quality. The level of agreement has shifted from undecided to partial agreement, particularly for statements 1 and 2.

4.3. *Consumers' segments*

The cluster analysis conducted to segment participants based on their consumption, purchasing habits and attitudes towards brand1 resulted in three consumer groups, as shown in Fig. 6. Cluster 1 (n = 224) consists primarily of middle-income males (~46 years old) who consume chicken once a week, purchasing refrigerated chicken breasts from supermarkets. Brand 1 is familiar to them and they show loyalty towards it. Cluster 2 (n = 258) includes mostly middle-income females (~44 years old) who also consume chicken once a week and purchase refrigerated versions from supermarkets to cook at home. This group shows the highest preference and perceived quality for Brand 1, reflecting strong brand loyalty. As brand-loyal loyalty programs and regional branding could also enhance retention. Cluster 3 (n = 173) is composed mainly of higher-educated females (~44 years old) in middle-income households, consuming chicken twice a week but preferring frozen products. Unlike the other two groups, they show low brand equity for Brand 1 and associate higher quality with Brand 2. This group values convenience and frequency over brand or ethics. Marketing should emphasise ease of preparation, bulk-buy offers, and availability in frozen sections.As the results show, clusters 1 and 2 are similar in terms of consumption habits, but there are some differences in terms of socio-demographic characteristics. On the other hand, clusters 2 and 3 are similar in terms of socio-demographic characteristics but differ greatly in terms of consumption and purchasing habits. Finally, cluster 3 shows considerable differences in terms of perceived quality and brand value, with cluster 2 having the highest mean and cluster 3 the lowest.

The first cluster consists of consumers who are similar to the second cluster in their consumption habits but differ in their socio-demographic characteristics. This group shows a lower preference for brand 1, with a significant but negative coefficient for brand 1, and is orientated towards other brands, with brand 2 being the preferred one. This means that this consumer group favours other brands over Brand 1, with Brand 2 being the most preferred, as it has the highest coefficient. In terms of production methods, this cluster favors standard production methods over organic options, showing a negative and high coefficient for organic options but a positive coefficient for the remaining production methods, favouring the standard production method. The second cluster, on the other hand, shows a strong preference for Brand 1 with significant and positive coefficients for Brand 1 and Brand 2, reflecting both loyalty and regional familiarity. In terms of production method, this

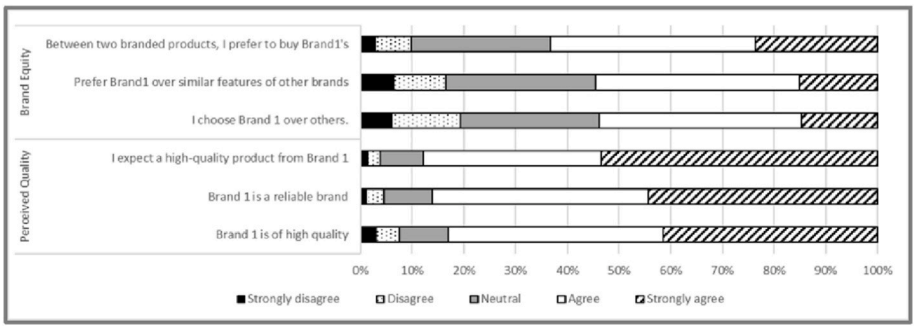

Fig. 5. Perceived quality and brand equity agreement level.

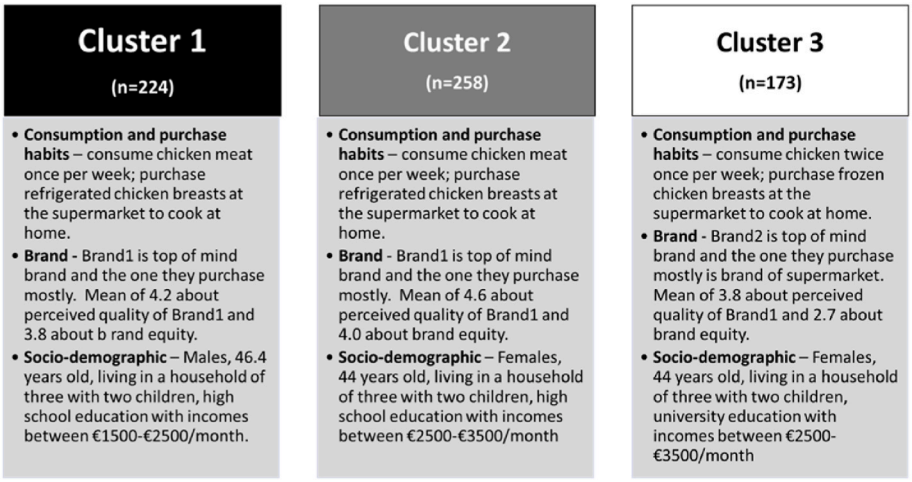

Fig. 6. Clusters' description.

group places high value on organic production methods, which is in line with the general trend of consumer demand for sustainable and ethically produced food.

4.4. Consumer preferences

To answer the hypotheses regarding the preference structure, we use data from the choice experiment. The CE data can be estimated using discrete choice models that are consistent with long-standing theories of consumer choice behaviour, namely random utility theory and Lancaster theory [56]. Table 3 shows the results of the multinomial logit (MNL) and mixed logit (MXL) models, which emphasise the influence of different attributes on consumer preferences for chicken breast. According to the results, respondents appreciate the value of the product and prefer to buy one of the alternatives offered rather than none of them. The results show that the coefficient of price is significant and negative in both models, confirming that consumers generally prefer cheaper options. This shows that the participants made their decisions rationally.

To answer hypothesis 1 "Top-of-mind brand influence consumers' preferences and WTP for chicken breast.", the results in Table 3 support this hypothesis. Brand 1, which is probably the most remembered brand due to its regional recognition, has a positive and significant coefficient, indicating that it is preferred by consumers. In contrast, Brand 2, Brand 3 and the retailer's brand all have negative coefficients, indicating lower consumer preference. This suggests that brand familiarity has a strong influence on consumer preference and willingness to pay (WTP), with consumers willing to pay a premium for a well-known and trusted brand. In terms of production methods, the organic option is widely preferred, as shown by its very positive coefficient, which makes it the most attractive choice for consumers. Other production methods (free-range, cage-free and standard) are less preferred as they all have negative coefficients. These results underline the importance of brand awareness and production methods, especially organic labelling, for consumer choice in the chicken breast market.

Table 3
Multinomial and Mixed Logit model.

Attributes	Levels	Coefficients MNL	Coefficients MXL
Alternative	Alternative 1	4.28***(0.17)	4.47***(0.12)
	Alternative 2	4.49***(0.17)	4.66***(0.12)
	Alternative 3	4.26***(0.16)	4.44***(0.12)
	Alternative 4	4.25***(0.16)	4.37***(0.11)
Price	Price	−0.14***(0.01)	−0.15***(0.01)
Brand	Brand 1	0.92***	0.96***
	Brand 2	−0.56***(0.06)	−0.53***(0.06)
	Brand 3	−0.49***(0.06)	−0.49***(0.07)
	Retailer's brand	−0.87***(0.07)	−0.94***(0.07)
Production method	Organic	1.74***	2.44***
	Free range	−0.52***(0.04)	−0.52***(0.04)
	Cage-free	−0.95***(0.07)	−0.93***(0.07)
	Standard	−1.27***(0.08)	−1.99***(0.21)
Standard deviation	Brand 2	–	−0.00 (1.20)
	Brand 3	–	−0.24 (0.54)
	Retailer's brand	–	0.18 (0.52)
	Free range	–	0.10 (0.49)
	Cage-free	–	−0.10 (0.43)
	Standard	–	−1.62***(0.26)
AIC		11944.57	11953
BIC		12016.78	12051.66

The estimation of the interaction effect model (Table 4) aims to test hypothesis 2 "Information about innovative techniques that improve

Table 4
Mixed Logit model coefficients for information treatment and cluster.

Attribute	Level	Information	Cluster
Alternative	Alternative 1	4.47***	3.43***
		(0.12)	(0.14)
	Alternative 2	4.66***	3.54***
		(0.12)	(0.12)
	Alternative 3	4.45***	3.30***
		(0.12)	(0.12)
	Alternative 4	4.38***	3.47***
		(0.11)	(0.17)
Price	Price	−0.15***	−0.18***
		(0.01)	(0.01)
Brand	Brand1	0.88***	0.57***
	Brand2	−0.48***	−0.00
		(0.08)	(0.08)
	Brand3	−0.42***	−0.13
		(0.08)	(0.10)
	Retailer's brand	−0.98***	−0.44***
		(0.08)	(0.07)
Effect of information	Brand1x Information	−0.81	0.00#
	Brand2 x Information	−0.11 (0.10)	−0.04 (0.08)
	Brand3 x Information	−0.15 (0.09)	−0.10 (0.08)
	Retailer brand x Information	0.07 (0.09)	0.14# (0.07)
Production method	Organic	2.44***	0.87***
	Free range	−0.52***	0.32***
		(0.04)	(0.06)
	Cage-free	−0.93***	−0.07
		(0.07)	(0.09)
	Standard	−1.99***	−1.12***
		(0.21)	(0.15)
Effect of purchase habits and socio-demographic characteristics	Brand1x Cluster1	–	−0.05***
	Brand1x Cluster2	–	0.50*
	Brand1x Cluster3	–	−0.45***
	Brand2x Cluster1	–	0.50*
	Brand2x Cluster2	–	0.25* (011)
	Brand2 x Cluster3	–	0.25° (0.13)
	Brand3 x Cluster1	–	0.30***
	Brand3 x Cluster2	–	0.19° (0.11)
	Brand3 x Cluster3	–	0.51*** (0.13)
	Retailer's brand x Cluster1	–	0.25***
	Retailer's brand x Cluster2	–	0.06 (0.10)
	Retailer's brand x Cluster3	–	0.69*** (0.12)
	Organic x Cluster1	–	−4.71***
	Organic x Cluster2	–	1.56**
	Organic x Cluster3	–	3.15***
	Free range x Cluster1	–	1.61***
	Free range x Cluster2	–	−0.09 (0.09)
	Free range x Cluster3	–	−0.52*** (0.11)
	Cage-Free x Cluster1	–	1.85***
	Cage-Free x Cluster2	–	−0.04 (0.12)
	Cage-Free x Cluster3	–	−0.81*** (0.15)
	Standard x Cluster1	–	2.25***
	Standard x Cluster2	–	−0.43** (0.16)
	Standard x Cluster3	–	−0.82*** (0.19)
Standard deviation	Brand 2	−0.00 (1.21)	0.02 (1.13)
	Brand 3	−0.23 (0.55)	−0.45 (0.36)
	Retailer's brand	0.18 (0.52)	0.20 (0.50)
	Free range	0.10 (0.49)	0.09 (0.49)
	Cage-free	−0.11 (0.43)	−0.13 (0.45)
	Standard	−1.62*** (0.26)	−1.68*** (0.27)
Log-Likelihood		−5950.2	−5890.8
McFadden R2		0.2507	0.25817
Chisq		3981.6***	4100.2***

working conditions influences consumer preferences". Table 4 examines the influence of information and consumer segments on preferences for chicken breast by presenting the results of the mixed logit model. The results show that consumers' information about improved working conditions on farms has no significant influence on their preferences for any of the brands, as indicated by the non-significant coefficients for the interaction between information and brand attributes. This suggests that although ethical considerations are becoming increasingly important, they do not significantly change consumers' brand preferences in this context. Therefore, this hypothesis is rejected.

To answer hypothesis 3, "The structure of consumer preferences for chicken meat is influenced by the characteristics of the production method", the results support this hypothesis by showing that the characteristics of the production method significantly influence consumer preferences. In particular, the organic production method has a strong positive coefficient, indicating a high consumer preference for organic chicken meat. In contrast, other methods such as free-range, caged and standard rearing have negative coefficients, indicating that consumers are less willing to pay for these characteristics. The cluster analysis in Table 4 also shows that different consumer segments have different preferences for production methods, underlining the importance of production attributes for consumer behaviour.

The table also illustrates the differences in preferences between the three consumer groups. Cluster 1 shows a negative preference for Brand1 but prefers Brand2, while Cluster 2 has a strong preference for Brand1 and organic production methods. Cluster 3, on the other hand, prefers retail brands and organic production methods and shows a distinct pattern of brand and production method preferences. These results underline the variability of consumer behaviour and show that different segments prioritise different attributes in their purchasing decisions.

Table 5 shows the marginal willingness to pay (mWTP) for different attributes of chicken breast, both overall and within specific consumer groups. The table shows that consumers generally have a negative mWTP for the attributes of Brand2, Brand3 and the retailer's brand, meaning that they would prefer to pay less for these brands compared to the reference brand (Brand1). The standard production method has the highest negative mWTP, indicating that consumers are least willing to pay for chicken produced using this method. However, when analysing the cluster-specific effects, clear differences emerge. Cluster 1, for example, shows a strong positive mWTP for standard and cage-free production methods, indicating a particular preference compared to other groups. Cluster 3, on the other hand, is willing to pay more for retail brands and organic production, highlighting the different priorities of each consumer segment. These findings highlight the importance of understanding the heterogeneity of consumers in the market, as different groups place different value on brand and production characteristics, which can lead to more targeted marketing strategies.

To answer hypothesis 4 "WTP for chicken meat attributes is influenced by socio-demographic characteristics", the cluster analyses

Table 5
MWTP for attribute effects and interaction with Clusters.

	mWTP attribute effects	mWTP clusters effects
Brand 2	−3.58	–
Brand 2 *x* Cluster 1	–	3.10
Brand 2 *x* Cluster 2	–	−1.39
Brand 2 *x* Cluster 3	–	3.90
Brand 3	−3.30	–
Brand3 x Cluster1	–	1.94
Brand3 x Cluster2	–	−1.72
Brand3 x Cluster3	–	0.05
Retailer's brand	−6.37	–
Retailer's brand x Cluster1	–	1.67
Retailer's brand x Cluster2	–	−2.44
Retailer's brand x Cluster3	–	6.33
Free range	−3.51	–
Free range x Cluster1	–	35.11
Free range x Cluster2	–	−9.17
Free range x Cluster3	–	−20.39
Cage-free	−6.26	–
Cage-Free x Cluster1	–	36.44
Cage-Free x Cluster2	–	−8.89
Cage-Free x Cluster3	–	−22.00
Standard	−13.5	–
Standard x Cluster1	–	38.67
Standard x Cluster2	–	−11.10
Standard x Cluster3	–	−22.10

(Tables 4 and 5) show that the WTP for chicken meat attributes varies considerably across consumer segments, which are often defined by socio-demographic characteristics. For example, some groups show higher WTP for organic and retail brands, while others prefer standard or cage-free. These differences suggest that socio-demographic factors such as regional familiarity with brands or different levels of income and education play a crucial role in determining WTP, supporting this hypothesis.

5. Discussion

This study provides insights into the factors influencing consumer preferences for chicken breast in Italy, particularly in relation to technological innovations that improve working conditions on farms. The results confirm that familiarity with the brand plays a crucial role in consumer choice, as shown by the strong preference for brand1, likely due to its regional familiarity and reputation. This is in line with previous literature on the importance of brand equity in consumer decision-making, according to which well-known brands are often more trusted by consumers and are willing to pay a higher price [33,67]. Incidentally, this result is to be expected as the sample studied is located in Emilia Romagna, the region where Brand1 is based, and is therefore a brand known to consumers. Furthermore, the regional loyalty observed for Brand1, especially in Emilia-Romagna, underlines the importance of geographical and cultural factors in brand preference. These findings are consistent with the notion that consumer behaviour is influenced by a combination of intrinsic product attributes such as price and production method and extrinsic factors such as brand awareness and regional loyalty [68]. In addition, the results of the study show that consumers generally appreciate the value of the product and prefer to buy one of the alternatives offered rather than none at all. According to our results, consumers prefer a low-priced product; this is in line with expectations and indicates that participants made their choice rationally. In terms of production method, the organic option is largely preferred over all other methods. The negative coefficients for other production methods such as free-range, caged and standard rearing suggest that these methods are less valued by consumers, highlighting the competitive advantage that organic labelling can provide. This preference is in line with general trends in the food industry, where demand for organic and sustainably produced products continues to rise [69].

Existing literature shows that consumers have a strong preference for organic products due to the positive brand associations associated with organic labelling. Organic products are perceived as healthier, more environmentally friendly and ethically produced, which increases the brand equity of organic products [30,62]. Studies have shown that the perceived health and environmental benefits of organic products promote a stronger emotional connection between consumers and the brand, thereby increasing brand equity [15]. The results support these findings by showing a significant willingness to pay for organic chicken breast. This suggests that the organic label is a strong trust signal and increases consumer preference. In the poultry market, organic production remains a strong differentiator, attracting consumers who value health, sustainability and safety, and helping brands to add value [34,43].

The results of the study on the influence of information about better working conditions paint a more complex picture. Although previous research shows that consumers are aware of the ethical dimensions of production, which include environmental sustainability, animal welfare and fair working conditions [70], information about worker welfare did not have a significant impact on consumer preferences or willingness to pay in this study. Ethical brand practises have the potential to increase brand equity by associating the brand with positive social and environmental impacts, thus improving perceived quality and brand loyalty [13]. However, our results show that information about technological advances to improve working conditions on chicken farms did not have a significant impact on consumer preferences or brand equity. The finding that information about technological innovations to improve employee well-being does not significantly influence consumer preferences may be explained by the value-action gap. Although consumers often express support for ethical practices in surveys, these values are not always reflected in actual purchasing behavior, especially when the ethical dimension has no direct impact on product quality or personal benefit. Furthermore, consumers in the food sector tend to favor attributes that are perceived as more personally relevant, such as health and safety, over less visible social aspects such as working conditions. This suggests that while consumers conceptually value ethical labor practices, such factors may not have the immediacy or importance required to influence purchasing decisions in competitive food markets. Another possible explanation for the limited impact of the technological information treatment is that consumers may have a lower awareness of working conditions in the poultry industry than of animal welfare or environmental issues. Worker welfare tends to be less visible to consumers and has less emotional resonance, making it more difficult to translate this into purchasing behavior. Furthermore, innovations that are labeled as "technological' may not have the emotional or moral appeal that attributes such as "organic' or "free-range' have, which have become ingrained in consumers' minds over a longer period of time. There may also be some skepticism about whether such innovations really benefit workers or are primarily marketing driven. These factors suggest that while consumers are generally supportive of ethical practices, not all ethical cues are equally persuasive when making purchasing decisions. In addition, while participants were told that Brand1 had introduced technologies to improve animal and worker welfare, the description may not have been detailed and specific enough to significantly influence perceptions. It is possible that a more detailed explanation highlighting specific technologies and tangible benefits could have had more significant effects. Future studies should test different formats and levels of communication to increase the perceived relevance and credibility of ethical and technological innovations in food production.

Our finding contrasts with some previous studies suggesting that ethical practises can have a positive impact on brand perceptions when communicated to consumers [20]. This discrepancy could be due to a possible mismatch between consumers' values and their purchasing behaviour, where ethical considerations are acknowledged but do not always translate into purchasing decisions unless there is a direct personal benefit, such as improved health or quality, as postulated by

Frewer [22]. While studies such as that of Nørskov et al. [10] suggest that innovation attributes can increase brand equity, especially when they lead to higher product quality or environmental benefits, our findings suggest that consumers may not perceive improvements in employee well-being as a direct benefit to themselves, limiting their influence on their purchasing behaviour. This is consistent with the concept of the 'value-action gap', where there is a discrepancy between what consumers value and the price they are willing to pay [12]. Conversely, the positive impact of organic labelling on brand equity highlighted in our study is consistent with previous research suggesting that consumers are willing to pay more for products that are perceived to be more natural, safe and ethically produced [30,71]. Previous research has shown the importance of considering consumer heterogeneity when analysing food choices, as preferences can vary considerably due to demographic, psychographic and behavioural factors [30,43]. There is evidence that consumers have different preferences based on attributes such as price, production methods, brand awareness and ethical considerations [36]. The results of this study support these findings. Indeed, the cluster analysis shows the heterogeneity of consumer preferences, with different segments having different levels of brand loyalty and different prioritisation of production methods. This is consistent with the findings of previous studies such as Pouta et al. [36] and Nilsson et al. [48], which emphasise the importance of identifying latent preferences that emerge when consumers are offered different product options. These differences highlight the need for targeted marketing strategies that cater to the specific preferences and values of different consumer groups.

In addition, the cluster analysis revealed three different consumer segments that differ in terms of brand loyalty, preferences for production methods and socio-demographic characteristics. Cluster 1, for example, is more price-sensitive and less receptive to ethical claims, suggesting a segment motivated by economic constraints or pragmatic priorities. In contrast, Cluster 2 showed strong loyalty to Brand 1 and a clear preference for organic production methods, suggesting consumers with greater ethical awareness and brand trust, characteristics typically associated with education, income and regional familiarity. Cluster 3, which showed an openness to retail brands and organic products, may reflect a 'value-conscious' group interested in ethical options but constrained by cost. These differences highlight the importance of tailoring communications and product offerings to segment-specific motivations, such as emphasising quality and authenticity for ethically-minded segments versus convenience and transparency for price-sensitive consumers.

6. Conclusion

The results of this study aim to improve understanding of the ethical dimensions of food marketing and brand equity, particularly in the poultry sector. The findings have implications for marketers, producers and policy makers in the poultry industry.

First, our results show that there is a willingness to pay a higher price for the organic production method. This result suggests that organic certification leads to a premium in the market and reflects a concrete preference to which food producers can respond. From a commercial perspective, this premium can justify the additional costs associated with organic certification and production. In contrast, the willingness to pay for standard production is clearly negative, indicating a strong consumer aversion. This has clear implications for product positioning: offerings that are perceived as 'standard' or unethical may not only face price resistance, but also damage the brand if they are not accompanied by credible improvements in sustainability or animal welfare standards.

Moreover, the limited impact of information on improved working conditions on consumer purchase intentions suggests that ethical innovation alone may not be sufficient to drive significant changes in consumer behaviour. Even though our results show that information about improved working conditions did not significantly influence consumers' purchasing decisions, this does not mean that work-related innovations are unimportant, but rather that their communication needs to be refined. It is possible that consumers do not yet recognize the benefits of improved working conditions in the same way that they do with claims about organic farming or animal welfare, nor do they make an emotional connection to them. This finding could be of interest to food marketers looking to incorporate ethical claims into their brand strategy. Future campaigns could consider reframing such messages to emphasise tangible benefits to consumers, such as increased food safety or confidence in responsible sourcing, to increase their awareness. In addition, the segmentation analysis revealed that there are different consumer groups, each with different preferences in terms of production methods and brands.

The results of this study provide a basis for developing more targeted marketing strategies and facilitate the adaptation of brands' communication and branding efforts to the specific priorities of different consumer segments. For example, emphasising organic certification and regional connectedness could increase a brand's appeal to health-conscious consumers, while emphasising low-cost production methods could be an effective strategy to appeal to those who prefer low-cost products. For policy makers, the findings highlight the importance of supporting initiatives that raise consumer awareness of the wider implications of their purchasing decisions, perhaps through education campaigns or labelling schemes that better communicate the value of ethical practises. Finally, for producers, the findings suggest that while investment in worker welfare and sustainable practises is important, these efforts need to be complemented by strong branding and marketing strategies that align with consumer priorities in order to gain a competitive advantage.

Specific field studies are needed as demand for and attitudes towards more responsible products are likely to be inconsistent across market segments and cultures and vary according to national regulations [20]. In addition, consumer attitudes towards brand equity vary due to cultural differences.

These findings have several practical implications for marketers, food producers, and policy makers seeking to influence consumer behavior in ethically sensitive markets. First, the strong consumer preference for organic production underscores that organic certification remains a reliable tool for product differentiation. This suggests that producers wishing to market ethical innovations should consider associating labor-related improvements with more familiar labels such as organic or animal welfare. Second, the limited influence of information about worker welfare suggests that while such attributes are ethically significant, they are only meaningful to consumers when framed in terms of personal relevance. Marketing strategies could benefit from narratives, visual cues or third-party verification to make work-related innovations more emotionally appealing and credible. Third, because investments in worker wellbeing technologies can increase production costs without direct consumer payoffs, companies should consider whether such innovations can be leveraged for operational efficiency, employee loyalty or long-term brand reputation, especially if they are not directly rewarded by consumers. Fourth, regional brand familiarity played a clear role in preference formation. Marketing strategies should consider geographic loyalty patterns, with localized campaigns reinforcing trust in established brands, while national or international brands may need to invest more in building awareness and credibility in unfamiliar markets. As our data comes from a regional sample in Italy, we caution against generalizing these findings. Consumer perceptions of ethical innovation and brand equity may vary according to culture, socio-economic context and market maturity.

The results of this study are based on a sample from the Italian region of Emilia-Romagna, a region with relatively high-income levels and a strong cultural interest in food quality and ethics. While this makes the region a meaningful case study of early adoption of ethical innovations, it may also limit the generalizability of our findings. Consumer attitudes towards work-related technological innovations may differ in regions

with different socioeconomic profiles, different levels of trust in food labeling, or different cultural values related to food and work.

Future research should replicate this study in different geographic and cultural contexts to refine marketing policies and strategies for broader application. In addition, extending the study to non-hypothetical methods, such as experimental auctions, and to different countries could further validate these findings and provide a deeper understanding of consumers' decision-making processes in different market segments and cultural contexts.

CRediT authorship contribution statement

Giulia Maesano: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Methodology, Investigation, Data curation, Conceptualization. **Vilma Xhakollari:** Writing – original draft, Software, Methodology, Formal analysis, Data curation. **Maurizio Canavari:** Supervision, Project administration, Conceptualization.

Declaration of competing interest

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

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Data availability

Data will be made available on request.

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