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The Link between Food Traceability and Food Labels in the Perception of Young Consumers in Italy

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ABSTRACT

The research analyzed the perception of food traceability among consumers in Italy and the role of food labels in supporting consumer information about food traceability. The components (health, quality, product origin and many others) that are involved in the concept of food traceability were examined and the most important ones were identified. An online survey (n=511 consumers) was carried out in Milan in the north of Italy. Students and employees from the Bocconi University were selected in order to investigate the relevance of food traceability in consumer purchasing decisions. An ordered logit regression was applied.

The findings confirm that consumers are interested in various components of food traceability and look for labels that provide information on the product supply chain. The research confirms that traceability is important in the food market and some types of labels on product features (as product sustainability or origin) are associated with it.

Keywords: *consumers; food labels; food traceability; perception.*

1 Introduction

The food and feed production chain involve many steps, from importing the raw materials to the sale of the final product to the consumer. Food safety events can endanger public health, cause economic losses, and lead to a crisis in confidence (Zhang et al., 2016). The first priority of traceability is thus to protect the consumer through a rapid and precise identification of a product.

To achieve this, food traceability and associated systems are the main tools for reducing the uncertainty of consumers about food safety and for providing quality assurance (Yuan et al., 2020, Hobbs et al., 2005, Liddell and Bailey, 2001, Mattevi and Jones, 2016; van Rijswijk and Frewer, 2008). Food traceability systems have been regulated by many national and international organizations to restore consumer confidence in food producers (Liao et al., 2011). Today's consumers demand food that is fresh, palatable, nutritious as well as safe. Furthermore, an increasing number of consumers want functional foods that offer specific health and nutraceutical benefits (Ingrassia et al., 2017).

Consumers are increasingly aware of the issues related to food and the impacts on the economy and the environment (Chang *et al.*, 2013; van Doorn and Verhoef, 2011). They understand the close relationship between food quality, the environment and the wellbeing of society in general (Bacarella et al., 2015). Consequently, the role of food traceability has evolved from focusing on quality and health to including many other issues (Bollen et al., 2006; Dupuy et al., 2005; Feng et al., 2020; García et al., 2008; Kamann et al., 2019; Opara and Mazaud, 2001; Qian et al., 2020;Schwagele, 2005). Consumers are interested in details about animal welfare standards (Hoogland et al., 2007; Sødring et al., 2020) and environmental protection (Trivedi et al., 2018; Yarimoglu & Binboga, 2019), and are willing to pay a higher price for fair trade products (De Pelsmacker et al., 2005; Kaczorowska et al., 2019; Napolitano, et al., 2010). Consumers thus choose each food product on the basis of its characteristics (Lancaster, 1971). However, in terms of the product features there is often information asymmetry between consumers and producers (Ortega et al., 2011; Zecca and Rastorgueva, 2016). Labelling can therefore provide information for consumers and allows them to make an informed choice (Ingrassia et al., 2017).

Our aim was to analyze the perception that consumers living in Milan have regarding food traceability. Sections 4 analyse the role of food traceability in consumers' purchasing decisions and which aspects of food traceability have the greatest importance for them. Sections 4 analyses the link between the main food labels and the investigated aspects of food traceability in order to understand which aspects have the most positive associations at the time of consumer purchase.

2 Background

2.1 Food traceability definition

The concept of food traceability has evolved since the 1990s and today refers to the origin, supply chain, transport and full life-cycle of products (Bollen et al., 2006; Dupuy *et al.*, 2005; Feng et al., 2020; García et al., 2008; Machado Nardi et al., 2020; Opara and Mazaud, 2001; Qian et al., 2020; Schwagele, 2005). In 1994, the ISO defined traceability as the '*...ability to trace the history, application or location of an entity by means of recorded identifications*' (ISO 8402, 1994).

The EU Common Food Law defines traceability as: '*...the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution*' (EC-178/02, 2002). The EU's General Food Law (EC-178/02, 2002) was implemented in 2002 and makes traceability compulsory for all food and feed businesses.

International food traceability standards are defined through the joint FAO and WHO Food Standards Programme, known as the Codex Alimentarius Commission. The principles of food traceability are laid out in CAC/GL60–2006: *'The traceability/product tracing tool should be able to identify at any specified stage of the food chain (from production to distribution) from where the food came and to where the food went as appropriate to the objectives of the food inspection and certification system'* (CAC, 2006).

Recently, the ISO redefined traceability as the 'ability to follow the movement of a feed or food through specified stage(s) of production, processing and distribution' (ISO 22005, 2007).

Olsen and Borit (2013) assessed the various definitions of traceability and concluded that it is: 'The ability to access any or all information relating to that which is under consideration, throughout its entire life cycle, by means of recorded identifications'. Karlsen et al. (2013) examined the development of the concept of food traceability from the 1990s to 2010. The food market is developing, and modern consumers demand both quality and safety in their food products. Consumers increasingly look for foods that offer specific health and nutritional

benefits (Grunert, 2005). These trends have been confirmed by studies in Italy (Ingrassia, et al., 2017). Consumers have access to more information and are concerned about food production issues such as environmental protection, animal welfare, and workers conditions throughout the food supply chain (Aung and Chang, 2014; Coderoni and Perito, 2020; Lee K., 2020; Opara and Mazaud, 2001). In fact, the labels of food products both in US and EU markets now indicate that products contain whether they contain natural ingredients or are derived from natural ingredients (Ingredion, 2014).

Food producers not only have to comply with government rules, but also provide information on food attributes, the country of origin, animal welfare, and genetic engineering (Golan et al., 2004; Tsakiridou et al., 2011; Yin et al., 2017). Sustainability issues within the agri-food system are also important for consumers (Hu et al., 2013). However, such perceptions are subject to change (Dangi et al. 2020; Henchion et al., 2017), due to the potential effects of increasing consumer awareness and of health issues regarding food.

According to Canavari (2010), traceability is one facet of information management and can be either a logistic or a strategic issue, and thus the concept includes additional information that can increase the trust between consumers and actors throughout the supply chain. Olsen and Borit (2018) assumed that the concept of a traceability system is generic, and encompasses the principles, practices, and standards needed to achieve traceability of food products, regardless of how these are implemented.

The traditional definition of food traceability by ISO standard is thus considered in this research, and the importance of other strategic information, such as social and environmental protection, fair trade conditions, animal welfare and nutritional facts is assessed (Canavari et al., 2010).

2.2 Food traceability perception and food labels

The traceability of food is very challenging for retailers, resellers and government monitoring authorities, yet the need for more accurate and comprehensive information increases (Creydt and Fischer, 2019). Ensuring a safe supply is difficult as there is information asymmetry in food supply chains (Asioli et al., 2011; Cho and Choi, 2019; Heyder et al., 2010; Smith et al., 2011). Thus, the EU, the US, China and others have adopted traceability systems regulated by national legislation and acts, to mitigate risks in the food supply chain (Bai et al., 2013; Borit and Santos, 2015; Liu et al., 2012).

Food firms can provide information services so that consumers can trace the whole supply chain of a product. This potentially attracts new consumers and thus improves sales. Consumers also want food products of good quality. The studies on consumer perceptions of traceability have focused primarily on issues that relate to food risks and safety (Angulo et al., 2005; Giraud and Amblard, 2003). Thus, food safety and food quality are the two most important elements in consumers' food perceptions and in the decision-making associated with food market choices (Dangi et al., 2020; Hansstein et al., 2017; Szegedyné Fricz et al., 2020).

Research has shown that consumers are particularly interested in traceability, especially when it is linked to these two types of quality assurances (Hobbs et al., 2005; Kher et al., 2010; Otieno and Nyikal, 2017; Verbeke and Ward, 2006). Recent studies confirm that consumer attitudes towards food information focus on health risks, food legislation and production process (Cho and Choi, 2019; Nocella et al., 2014; Van Rijswijk and Frewer, 2012). Van Rijswijk and Frewer investigated yet in 2008 the link between food traceability perception, food safety and quality. They demonstrated that consumers are very interested in (and their choices were guided by) traceability not only in terms of food safety, but also for food quality. However, consumers are not only concerned with quality or health. They prefer foods that are more natural (Hemmerling et al., 2015; Román et al., 2017), organic (Hansmann et al., 2020), less processed and 'free from' some ingredients that are considered negative (Olegario et al., 2020; Priven et al., 2015).

Particularly for consumers in Europe, another important issue linked to food traceability is the product origin (Giraud and Halawany, 2006). Consumers also focus on nutrition, ethics, preparation, quality elements, certification and price (Dimara and Skuras, 2003; Doherty and Campbell, 2014; Kehagia et al., 2017). According to Ingrassia et al. (2017), some details on food could be sufficient to increase the perceived value of the product, such as new technologies for product traceability, which then improve consumer confidence in the food system (Hobbs et al., 2005; Verbeke and Ward, 2006).

Food labels describe special features of products, such as their premium quality, designated origin, organic production and fair trade, which are all issues that consumers are concerned about (Gregory, 2000). Research has confirmed that consumers do refer to labels and claims about products (Hall and Osses, 2013). Food labels can help consumers make easier and better choices among a large selection of food products (Amatulli et al. 2019; Cecchini and Warin, 2016; Kaczorowska et al., 2020; Gadema and Oglethorpe, 2011; Gao and Schroeder, 2009; Loureiro and Umberger, 2007).

Labels can include information on production practices (e.g. organic and certified naturally grown labels) (Bangsa and Schlegelmilch; 2020), the presence/absence of ingredients (e.g. non-GMO and gluten-free), and the impact

of food production on the environment, society, and animal welfare (e.g. carbon trust, fair trade, and certified) (Shen et al., 2018). Labelling plays a growing role along the gradient from search attributes to credence attributes (Caswell and Modjuszka, 1996).

Many articles have studied the effects of label information on consumers' willingness to pay for food attributes, such as fair trade (Vlaeminck and Vranken, 2015), sustainability (Grunert et al., 2014), and eco-labels, GM food labels, U.S. state agricultural product labels and protected geographical indication labels in Europe (McCluskey and Loureiro, 2003).

Other research has revealed that health, product quality and environmental protection are the main reasons for buying organic products (Hughner et al., 2007). Abrams, Meyers and Irani (2010) illustrate that consumers associate organic labels with high quality. In contrast, studies by Durham (2007) or Monier-Dilhan and Bergès (2016) indicate that consumers of organic products primarily consider environmental issues.

Another issue considered by consumers in the EU is animal welfare. Blokhuis et al., (2003) established that animal welfare is recognized as an important component of quality assurance for consumers of primary products of animal origin. In fact, labels and the standards on animal welfare can play a significant role in influencing food purchase decisions (McEachern and Warnaby, 2008).

Bandara *et al.* (2016) found that when observing food labels the majority of consumers place the most importance on nutrient status, fiber, fat and calorie content, food safety, environmental protection, origin of the food and brand reputation. Animal welfare, fair trade, sustainable agriculture and traceability were relatively less of a concern in the purchasing food products.

Based on these previous studies, we investigated the link between food traceability and food labels. Our aim was to establish the role of food labels in providing additional information, and thus encouraging the purchase of food products.

3 Methods and sample

3.1 Research method

Our aim was to ascertain the components that Italian consumers consider important in terms of food traceability: health in the supply chain, the control of product quality in the supply chain, correct nutritional facts about food and ingredients, origin of food, transparency in the supply chain, protection of the environment, protection of animals, and fair trade.

We also investigated the link between food traceability and common food labels such as organic and GMO free. The research objective was thus to understand whether Italian consumers that assign high importance to specific items of food traceability also search for labels that support their food purchases with additional information and guarantees. For example, "if consumers give high importance to the food origin, what kind of labels do they search for?"

Thus, the following research questions were considered regarding consumers in Italy:

1. What do they consider important in terms of food traceability? What issues do they consider most important when buying food?
2. Are there links between the issues that constitute the concept of food traceability and the demand for certain food labels?

Starting from these research questions, we investigated feedback from an online survey conducted in Italy during the winter of 2017. The design of our survey included the following steps:

1. identification of the reference population;
2. Choice of sample size;
3. Questionnaire design;
4. Data collection;
5. Statistical approach design;
6. Data processing

The population investigated was consumers located in north Italy: students, researchers, professors, technical and administrative staff of an Italian university - the "Bocconi" (in Milan). The Bocconi has 14,400 students and 1,500 employees, of whom we emailed 1020 potential respondents aged between 18 and 65. A total of 511 individuals completed the questionnaire.

To check the adequacy of the sample size, we applied Cochran's (1977) formula for both continuous and categorical data, and checked the representativeness of the sample against the general characteristics of the Italian population. In reality the sample was not representative of Italian consumers given that a large percentage (63%) were aged between 21 and 30. Despite this, the study shows interesting results on the subject of traceability and describes the opinions of young consumers.

The questionnaire had two sections: i) socio-demographic questions (age, gender), ii) ten items concerning the attitude of respondents on food traceability. We designed the questionnaire by considering the potential problems of common method variance, which can affect behavioral research. Several procedural remedies were used to reduce biases such as avoiding vague concepts, complicated syntax and unfamiliar terms, keeping questions simple, specific and concise, and guaranteeing respondent anonymity (King and Bruner, 2000). Four students tested the questionnaire before it was sent to the sample. The questionnaire was then submitted via email. The Bocconi collected the questionnaires from consumers and Sant'Anna University processed the data.

The respondents rated the level of importance of each item in terms of traceability information using a 5-point importance scale: 1 very low importance, 5 very high importance (see Table 1). The items investigated were:

1. importance of food traceability in purchase decision;
2. preferences on different components of traceability when buying food;
3. safety issues regarding health in the supply chain;
4. the control of product quality in the supply chain;
5. correct nutritional facts about food and ingredients;
6. origin of food;
7. transparency in supply chain;
8. protection of the environment;
9. protection of animals;
10. fair trade.

The questionnaire included a question about the different types of food labels that consumers are influenced by when they buy food:

- GMO free, i.e. the absence of genetically modified organisms;
- Organic certification, a label that confirms that the product come from organic production, which means a sustainable agricultural system respecting the environment and animal welfare, but also includes all other stages of the food supply chain;
- Short Food Supply Chain, i.e. a production chain characterized by a limited number of production steps, also known as from-farm-to-fork;
- Fair trade label, which is a product certification within the market-based movement of fair trade;
- POD: Protected Designation of Origin.

The data were processed by:

- A qualitative analysis that described the importance of food traceability information and what traceability consists of. The nine items considered were those commonly associated with the concept of traceability in the scientific literature. The qualitative analysis identified the items of most importance for Italian consumers.
- For each item and for the importance of food traceability information, cross tabulation was used to show the common distribution of these variables and the age range and gender. The Pearson chi square (X^2) test of significance and measures of association was applied using STATA 15. This method enables the verification of the relationship between food traceability items and sociodemographic variables (gender and age).
- The last phase of research matches the food traceability items with the food labels searched for by consumers when buying food, and their sociodemographic variables. An ordered logit regression was applied to verify whether consumers in Italy that assign high importance to specific items of food traceability search for food labels that support the information on the respective item.

3.2 The sample population

Our sample was not statistically representative of the Italian population as younger people were over-represented, which limits the generalization of the findings to the broader population. Around 63% of the sample were between 21 and 30 years old, with 18% under 20. Of the remainder, 10% were between 31 and 40 and 9% were between 41 and 65. In terms of gender composition, 35.33% were men and 63.55% women.

4 Results and discussion

The analysis shows that in general the sample think that food traceability is important in their purchasing decisions. Consumers assigned very high importance to food traceability information, with 56% and 24% giving it high importance (see Table 1). In terms of gender, male and female consumers showed similar percentages, with 23% of women (25% men) declaring the level of food traceability importance as high, and 57% (53% men) as very high. All the age ranges assigned mainly *high* or *very high* to food traceability information. The "oldest" assigned *high* (46%) or *very high* (44%), and only 5% to *"unconcerned"* and "*very low*". The 31-40 years old ranked traceability as *high* (61%), *very high (24%), unconcerned (12%) and only 3% low.* On the other hand, 22% of "under 20s" were "unconcerned" and 12% gave it low importance. There were similar percentages for the 21 30-year olds (15% "*unconcerned*" and 4% *low relevance.* This range is aligned with the overall evaluation of the sample, while the other ranges show different opinions.

Table 1.
Importance food traceability information in purchase decisions.

Relevance of food traceability in purchase decisions	**Consumer sample**		**Men**		**Women**	
	No.	%	No.	%	No.	%
very low	3	1%	3	2%	-	-
low	27	5%	11	6%	16	5%
unconcerned	73	14%	25	14%	48	15%
high	286	56%	95	53%	188	57%
very high	122	24%	45	25%	75	23%
Total	511	100%	179	100%	327	100%

The data in Table 1 confirmed the key role of information on food traceability for both men and woman.

In terms of the individual components of food traceability, the consumers gave most importance to origin and health (63% and 50%, respectively), confirming the findings of many other studies. Table 2 shows the percentages for each component of food traceability. The control of product quality and transparency in the supply chain were also considered important. The interviewees also regarded nutritional facts, environmental protection and fair trade criteria being of high and very high importance, respectively.

Table 2.
Level of importance of each item of the food traceability.

Level of importance	**Items of food traceability**							
	health in the supply chain	control of products' quality in the supply chain	nutritional facts	origin of food	transparency in supply chain	protection of the environment	animal protection	fair-trade
very low	2%	2%	5%	2%	4%	5%	8%	8%
low	6%	6%	15%	3%	9%	13%	14%	13%
unconcerned	7%	10%	17%	7%	17%	19%	19%	17%
high	35%	33%	26%	25%	23%	27%	26%	23%
very high	50%	49%	37%	63%	47%	35%	33%	39%
Total	100%	100%	100%	100%	100%	100%	100%	100%

In addition, the study compared the relevance of food traceability items in purchases in terms of the gender and age of the consumers in the sample. The Pearson chi square (X^2) test results demonstrated that both men and woman consider traceability important when making their purchases. Table 3 reports the percentages of

assigned relevance for gender, the X^2 test results, including the degrees of freedom (4) and the P value. The X^2 square test result in the table No.3 has 4 degrees of freedom (4). Based on the P value the significance level of each item was: 10%, 5% and 1%.

Gender was only significant in terms of the nutritional facts, transparency in supply chain and fair trade issues, demonstrating that woman and men assign different relevance to these components of food traceability. Nutritional facts are mainly important for women, while men assigned a higher importance than woman to transparency in the supply chain and fair trade.

Table 4 shows the percentages by age range, the X2 test results, including the degrees of freedom (12) and the P value. The significance is defined based on the P value. The results confirmed that age is significant in terms of: relevance of food traceability in purchase decision, health in the supply chain, control of product quality in the supply chain, nutritional facts, transparency in supply chain, protection of the environment, and fair trade issues.

The result of the X2 square test thus showed that consumers of different ages assign different levels of importance to various items of food traceability. Consumers across all age groups only regarded product origin similarly, as they all considered it very relevant (high and very high).

Health is particularly important for 21-30 year-olds, representing the majority of sample (63%), while 76% of the same group considered quality control as important (high and very high). The percentage of the importance level for the control of product quality decreases with increasing age: only 69% of those aged from 41 to 65 consumers considered this item important (high and very high).

With regard to nutritional facts, those aged 31-40 considered this item as important, followed by the 41-65 year olds. The majority of the sample (aged between 21 and 30) judged nutritional facts as less important, with a high percentage unconcerned (26%). Transparency in the supply chain was considered important by consumers over 31 years old. The results regarding environmental protection showed that a high percentage did not consider this important in the 21-30 range, 36.5% of 41-65 year olds scored it low or very low importance. Only consumers between 31-40 years old considered the environmental protection factor of food traceability as important. The same result was also true for fair trade, which was mainly of interest to the 31-40 year-olds.

Table 3.
Differences by gender on the assigned importance to food traceability components.

Items	Level of importance	Male (%)	Female (%)	Pearson X^2 (4)	P value	significance level
Importance of food traceability in purchase decisions	Very low	2	-	6.5021	0.16	-
	low	6	5			
	unconcerned	14	15			
	high	53	57			
	very high	25	23			
Health in the supply chain	Very low	3	1	1.9731	0.74	-
	low	8	8			
	unconcerned	10	10			
	high	46	46			
	very high	32	33			
Control of product quality in the supply chain	Very low	4,5	2	4.8702	0.30	
	low	11	9			
	unconcerned	12	15			
	high	43,5	42			
	very high	29	32			
Nutritional facts	Very low	7	4	10.5491	0.03	**
	low	15	16			
	unconcerned	29	22			
	high	31	30			
	very high	17	28			
Origin of food	Very low	2	3	4.9453	0.29	-
	low	3	3			
	unconcerned	8	10			
	high	25	32			
	very high	61	51			
Transparency in the supply chain	Very low	7	4	9.7610	0.04	**
	low	9	15			
	unconcerned	23	23			
	high	23	27			
	very high	37	30			
Protection of the environment	Very low	9	6	3.1917	0.52	-
	low	19	24			
	unconcerned	27	26			
	high	27	25			
	very high	16	18			
Animal protection	Very low	9	12	7.1955	0.12	-
	low	20	22			
	unconcerned	33	24			
	high	27	25			
	very high	10	17			
Fair trade criteria issues	Very low	13	11	13.2680	0.01	*
	low	15	23			
	unconcerned	29	20			
	high	15	23			
	very high	27	22			

*** 10% significance level, ** 5% significance level,*1% significance level

Table 4.
Differences by age ranges on the assigned importance to food traceability components.

Items	Level of importance	Less 20 (%) n=93	21-30 (%) n=327	31-40 (%) n=51	41-65 (%) n=40	Pearson $X^2(12)$	P value	significance level
Importance of food traceability in purchase decisions	Very low	1	-	-	5	37.1470	0.000	*
	low	12	4	4	2			
	unconcerned	17	15	12	5			
	high	49	58	61	45			
	very high	23	23	23	43			
Health in the supply chain	Very low	2	1	8	5	26.0769	0.01	*
	low	9	8	8	12			
	unconcerned	15	8	12	12			
	high	36	52	33	33			
	very high	38	31	39	37			
Control of product quality in the supply chain	Very low	3	1	6	12	34.6549	0.00	*
	low	11	8	12	13			
	unconcerned	9	16	10	5			
	high	34	46	37	39			
	very high	42	29	35	30			
Nutritional facts	Very low	5	5	5	15	23.4546	0.02	**
	low	15	17	18	12			
	unconcerned	21	26	14	12			
	high	26	30	40	30			
	very high	32	21	23	30			
Origin of food	Very low	3	1	4	7,5	2.1801	0.43	-
	low	0	4	5	2,5			
	unconcerned	8	9	7	7,5			
	high	26	31	34	25			
	very high	62	53	50	57,5			
Transparency in the supply chain	Very low	6	3	7	14	36.1128	0.00	*
	low	22	13	10	9			
	unconcerned	19	27	8	10			
	high	18	26	39	23,5			
	very high	34	30	35	43,5			
Protection of the environment	Very low	6	6	8	15,5	19.8624	0.07	***
	low	27	22	16	21			
	unconcerned	23	30	22	17			
	high	16	26	34	32,5			
	very high	27	15	19	15			
Animal protection	Very low	8	11	6	22,5	14.8627	0.24	-
	low	22	21	15	22,5			
	unconcerned	26	29	29	12,5			
	high	24	26	29	27,5			
	very high	19	12	19	15			
Fair trade criteria issues	Very low	10	11	6	23,5	21.0498	0.05	**
	low	19	22	10	22,5			
	unconcerned	28	23	25	13			
	high	17	25	37	15			
	very high	26	18	21	25			

*** 10% significance level, ** 5% significance level, * 1% significance level

The second part of this research investigated the link between the main food labels and the items of food traceability. As expected, some items of food traceability are associated with qualitative food labels by consumers. Generally, our sample of consumers preferred food labels such as GMO free, organic certifications and short supply chain POD (66%) short supply chain (56%), GMO free (40%), and organic (49%). Only 28% were interested in fair trade products.

Table 5 provides the resulting model estimates for the importance of food traceability, the items that make up this concept for the five types of common food labels (GMO free, Organic certifications, Short Food Supply Chain, Fair trade label, POD). First, there are considerable differences in the importance of food traceability and other items these label cues give, and these differences in turn provide signals for judging what should and should not be included on the labels. The ordered logit regression results showed a significant relationship between the importance of food traceability and three different types of food labels: GMO free, organic product and short food supply chain. The origin is linked with organic product and short food supply chain labels, but no link emerged with the POD label, even though it concerns the product area of origin. The relationship between the nutritional facts item and fair trade labels was unexpected. The transparency in the supply chain was associated with the short food supply chain label and the items on control of product quality with the fair trade label, which provides some assurance that the products did really benefit the farm workers at the end of the supply chain.

As many other studies have found (Durham, 2007; Monier-Dilhan and Bergès, 2016), environmental protection was associated with the organic product certification, thus consumers look for this label in order to protect the environment. This relation is significant in our statistical model confirming the link between organic food products as a driver for environmental protection. When consumers search for information on workers' conditions, they look for fair trade labels. This result was expected and confirms consumers interest in fair trade (Carrigan *et al.*, 2005; Loureiro and Lotade, 2005).

Table 5

Ordered logit regression estimates for importance of food traceability items and food labels.

Food traceability investigated items	*Food Labels*														
	GMOs free			Organic certification			Short Food Supply Chain			Fair trade label			POD		
	Coef.	z	P> l z l	Coef.	z	P> l z l	Coef.	Z	P> l z l	Coef.	z	P> l z l	Coef.	z	P> l z l
Importance of food traceability in purchase decisions	.37	2.08	**0.03**	.74	4.07	**0.00**	.78	4.73	**0.00**	.24	1.26	0.20	.18	0.95	0.34
The **origin** of food is correctly displayed	.08	0.50	0.62	.34	1.90	**0.05**	.61	3.50	**0.00**	-.06	-0.33	0.74	.16	0.86	0.39
Food security considering **hygiene** and consumer's **health**	.10	0.62	0.53	.15	0.88	0.37	.08	0.50	0.61	.03	0.20	0.83	.01	0.08	0.93
Nutritional facts	-.09	-0.58	0.56	.05	0.33	0.74	-.03	-0.21	0.83	-.35	-1.95	**0.05**	-.15	-0.89	0.37
The **transparency** of all manufacturing **phases** of food for the whole **supply chain**	.02	0.14	0.88	.16	1.00	0.31	.30	1.88	**0.06**	-.15	-0.86	0.39	.15	0.90	0.36
Control of product quality	-.07	-0.45	0.65	.11	0.69	0.49	-.03	-0.23	0.81	-.37	-2.01	**0.04**	.05	0.29	0.76
Protection of the environment and correct information about **environmental impacts**	-.13	0.84	0.40	.28	1.72	**0.08**	.13	0.82	0.41	-.05	-0.29	0.77	-.05	-0.29	0.77
Safeguarding of **animal welfare**	-.01	-0.10	0.92	-.01	-0.06	0.95	.11	0.71	0.47	.01	0.08	0.93	-.00	-0.02	0.98
Respect of **fair-trade criteria** for producers, **fair working conditions** in supply chain	-.08	-0.52	0.60	-.02	-0.14	0.89	.05	0.33	0.74	.37	2.10	**0.03**	-.04	0.23	0.81

5 Conclusions

Food traceability has become one of the main tools for increasing food safety, following various food crises. The research findings confirm that information on food traceability increases consumer confidence and trust. The study highlights the importance of health and quality in terms of food traceability, as have many other studies (Giraud and Amblard, 2003), but it also shows that consumers need more information about product features. The perceptions of the interviewees regarding food traceability appear to be complex, as in addition to food health and quality they show interest in many other topics that are generally associated with food traceability.

The characteristics of particular interest that emerge included the effect of age; in fact for each age range food traceability tends to have a different meaning. For example, the oldest range in the sample are more interested in items such as nutritional facts or supply chain transparency, while the youngest are more concerned about environmental protection and fair trade. This result demonstrates that food traceability evolves following differing consumer lifestyles and the priorities associated with different ages.

In addition, a clear link was found between food labels and food traceability, demonstrating the role of food labels in providing information supporting food purchases. Food labels can be associated with multiple items of food traceability. For example, labels such as fair trade can be associated with quality assurance. Thus, labels appear to influence consumers' decision-making processes and feature evaluations. Food labels thus confirm their role as a marketing tool that can drive consumer purchases. This result confirmed Dangy *et al.* (2020) who found that the impacts of consumer socio-demographic and product-related factor categories were more pronounced than the supply chain. The results show that concerns about health and the environment, knowledge and awareness eco-labels and price followed by trust in organic food are the most important factors in organic food purchases.

The results should encourage policy makers to continue improving the information they provide on food traceability, not only concerning product safety or origin, but also extending it to other topics that consumers consider significant for their consumption.

The main limitation of the study concerns the over-representation of young consumers interviewed, which was thus not statistically representative of the Italian population. Consequently, the findings cannot be generalized to a wider population.

Secondly, there might be other items related to traceability that can affect consumers' purchasing choice, such as recyclable packaging. Hence, future studies should also consider these items, which may also affect consumers' preferences for traceable food.

Future research could also examine the relationship between food labels and food traceability, by investigating the link with food purchases in the Italian market.

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