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Exploring Consumer Biased Evaluations: Halos Effects of Local Food and of Related Attributes

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ABSTRACT

The paper explores the (mis)perceptions related to local food to identify potential halo effects. It also investigates whether product beliefs relate to the food category itself or to its perceived attributes. 133 students answered a questionnaire regarding four cheeses labelled as local, conventional, organic, or PDO. Results show that local claims lead to perceiving the cheese as healthier, but less hygienic. Results suggest also other two potential halos: (i) the "tradition halo" that links perceived traditional character to healthiness and taste; and (ii) the "environmental and animal care halo" that links respect for environment and animal welfare to food safety.

Keywords: *local food; halo effect; food values; tradition halo; environmental and animal care halo*

1 Introduction

The local food production is often advocated as a sustainable method to respond to consumers request for more transparency in food production. Alternative food networks have been found to increase consumer trust towards food products because of the direct link between producers and consumers (Kneafsey et al., 2013). Indeed, in the last two decades, consumers have shown favourable attitudes towards products marketed as 'local', i.e. produced by short supply chains and sold directly by the producers (Vecchio, 2009), and their demand has increased accordingly (Feldmann and Hamm, 2016).

Food-related literature has investigated the increasing consumer demand for local food following different points of view. Many authors have focused on consumer WTP for local products (Chang et al., 2016; Bruno and Campbell, 2016; Willis et al., 2016; Gracia, 2014; Onken et al., 2011; Thilmany et al., 2008). Others have analysed the consumer intention-behaviour gap for this kind of products (Menapace and Raffaelli, 2013; Lim and Hu, 2012). Moreover, the determinants of the demand for locally produced food have been explored. Socio-demographic variables, such as age, living area and gender play a role in shaping consumer attitudes towards local products (Stanton et al., 2012; Zepeda and Li, 2006). Consumer knowledge has also been found to influence the formation of positive attitudes towards local food products (Sirieix et al., 2013; Zepeda and Deal, 2009). Variables related to contextual factors, such as price, product availability, or convenience seem to affect consumer preferences (Stranieri et al., 2017; Grebitus et al., 2013; Conner et al., 2010). Furthermore, consumer beliefs towards local food have also been analysed. More in detail, consumers seem to perceive that local food provides better quality, taste, healthiness, environmental friendliness, and better farmers working conditions (Del Giudice et al*.,* 2018; Stranieri and Baldi, 2017; Stranieri and Banterle, 2015; Adams and Adams, 2011; Bingen et al., 2011; Darby *et al*., 2008). However, some authors claim that consumers may fall into the so called "local trap", that is to overestimate the actual characteristics of local products (Demartini et al., 2017; Bellemare et al., 2015).

The present study is positioned within this last research line. Overall, this study aims at understanding cognitive associations towards local food in order to identify potential misleading attributions that could lead consumers to buy a product according to attributes that it does not possess. More specifically, based on different values associated to the concept of local food highlighted in the literature, the first aim of this paper is to explore perceptions and misperceptions regarding local food products. Secondly, we evaluate if the beliefs relate to the specific product category (i.e., at being local) or to the attributes recognized in that type of product (that could be also present elsewhere).

To achieve our goal, we refer to the 'halo effect' framework and the 'food values' identified by Lusk and Briggeman (2009). The halo effect refers to the cognitive bias that occurs when people use their overall feeling towards an object or a person to make inferences about its/his/her objective characteristics. Since the seminal paper by Thorndike (1920), the halo effect has been well documented in people's judgement and, in the last decade, it has been also detected in food perceptions. For example, consumers may fail to evaluate the characteristics of organic food, considering these products different in taste, lower in fat or calorie content, and higher in fibre than conventional foods (Lee et al., 2013; Schuldt and Schwarz, 2010). Moreover, it seems that when the organic label is added to a highly artificial product, this is believed to be less effective in helping to alleviate malnourishment (Schuldt and Hannah, 2013). Indeed, the relation between perception of healthiness and taste expectations has been found to be either positive or negative depending on the study or on the targeted product (Lee et al., 2013; Werle et al., 2013). Similarly, fair trade labelling may imply irrational healthy perceptions related to food products (Schuldt et al., 2012). These misjudgements regarding food products may lead to undesirable outcomes in consumer behaviour. For example, Chandon and Wansink (2007) discussed the effects of low-calorie food claims in fast food restaurants on high-calorie food intake. Faulkner et al. (2014) warned about the risk of health claims in promoting over consumption of healthy food, describing a sort of 'healthy halo' that may lead consumers to consider such food as healthier than it actually is, and to consume it with less hesitation than conventional products. Sometimes, the interaction between brand, caloric information, and diet conditions can impact on consumer flavour perceptions and actual consumption of foods (Cavanagh et al., 2014). In the same way, indicating that the product contains "fruit sugar" can lead people to think that it healthier that if it had 'regular' added sugar (Sütterlin and Siegrist, 2015).

To the best of our knowledge, there is no research on halos related to local food. This implies not only that little is known about whether halo effects may be documented for local food. Thus, we designed an exploratory study aimed at answering the following research questions (RQ):

RQ1 – Does a "local halo" exist? And, what does 'local' labelling convey to consumers?.

RQ2 – What other halos may derive from perceiving certain characteristics (attributes) in food products? More specifically, are there any unfounded correlations among food products characteristics?.

To reach our goals we conducted a computerized experiment with 133 students on the basis of a questionnaire on perceptions about food products. The present study is, to our knowledge, the first attempt to implement a systematic exploratory analysis of halo effects on local food and on food attributes. More precisely, our findings outlined that halos may arise from the association with specific food categories, which are here defined by different labels on production methods (conventional, Protected Denomination of Origin, i.e., PDO , organic, local). Moreover, our results suggest that halos previously linked to food category labelling may emerge due to the perceptions of the attributes carried by the food category itself. Thus, the analysis may help scholars better understand the relations among consumer misperceptions about food. Furthermore, from a methodological point of view, it presents a research framework that could be useful for those interested in exploring any perception issues related to food products.

The rest of the paper is organized as follows: Paragraph 2 describes the methods applied in the analysis, with a description of the questionnaire, the measures and the analytical framework adopted; the results are discussed in Paragraph 3; while Section 4 discusses some reflections and policy implications of the study.

2 Methodology

2.1 Data collection

One hundred and thirty-three students (97 females and 36 males) from the course of Business and Marketing (Bachelor of Science in Animal Science) of the University of Milan completed a questionnaire in the computer lab of the Faculty in exchange for partial course credit. Each participant expressed his/her agreement - on a 7-point Likert scale - with eleven statements referring to four types of quartirolo[1] cheese labelled as either as 'local', or 'conventional', or 'organic', or 'PDO'. Each statement was selected from a list of food values identified by Lusk and Briggeman (2009) and adapted to the scope of the research. More in detail, the evaluation of the four cheeses followed the structure depicted in Figure 1, that reports the initial statement, the scale for the evaluation, and the set of items evaluated.

In addition to rating all four cheeses, participants self-reported their attitudes towards the environment, using the Revised New Ecological Paradigm (Revised NEP, Dunlap et al., 2000), and their ethical food consumption using the Ethical Food Choice scale (EFC, Lindeman and Väänänen, 2000). Their food nutritional knowledge was also tested using some of the items of the General Nutrition Knowledge (GNK) questionnaire (Parmenter andWardle, 1999). Finally, some socio-demographics and other information about the respondents were collected. These included: age, gender, domestic arrangement, political orientation (from 1 = conservative, to 10 = liberal), cheese consumption, local food consumption, and participation to alternative food supply chains, like community-supported agriculture.

The images and names of the cheeses for the research were selected by means of a pilot study. The aim was to make sure that question framing would not influence the ratings, thus ensuring that the scoring assigned to the four types of quartirolo cheese would depend on the production-type label (product category) and not on the image and/or the name assigned to it. In order to do so, we tested a selection of images and names to identify a subset of four images and names that respondents would rate in a similar way with respect to the items considered in the study. Forty-one respondents answered to an on-line questionnaire rating 15 images and 12 fictional names of quartirolo using 7 attributes (see Appendix A for materials). The results of the pilot study allowed to select four pairs of one image and one name that showed no significant differences on the respondents' ratings. These combinations were used for the data collection of the main study, where a computer algorithm randomly assigned one image/name pair to each quartirolo type (local, conventional, organic, or PDO), creating a randomized questionnaire for each respondent.

[1]Quartirolo is a typical cheese from the Lombardy Region that has been recognized under the Protected Denomination of Origin with the name "Quartirolo Lombardo DOP" with the Reg. Cee 1107/96. Formally, it is not possible to sell other quartirolo than "Quartirolo Lombardo DOP"; nonetheless, the term "quartirolo" is commonly used to refer to squared cow cheese produced using procedures traditionally applied in the Lombardy Region.

The product shown in the photo *[photo1; photo2; photo3; photo4]* is *[name1; name2; name3; name4]*, that is a quartirolo cheese produced by *[a local diary; a cheese factory; an organic certified cheese factory; the Quartirolo Lombardo PDO Consortium]*

Please indicate how much you agree with the following statements about the product:

Completely disagree			Neither agree nor disagree			Completely agree
1	2	3	4	5	6	7

1. It is produced using traditional methods
2. It is produced within a limited geographical area
3. It is tasty
4. It is cheaper than other similar cheeses
5. It possesses good hygienic conditions
6. It contains less cholesterol than similar cheeses
7. It is less caloric than similar cheeses
8. It ensures an adequate income for the producers of the territory where it is produced
9. Its production is environmentally friendly
10. Its production is respectful of animal welfare
11. It is healthier than other similar cheeses

Figure 1. Evaluation scale used in the analysis as translated from Italian

The sample of 133 students used for the main study had a mean age of 21.2 years (SD= 2.0 years), and was composed mostly by females (72.9% of the sample), indicatively liberal (mean of political orientation is 6.4, SD= 2.0) and cheese consumers (76.7% of the sample declares to consume at least one portion of cheese per week). Only 36.1% of the sample declared to buy local food at least once a month and to know about community-supported agriculture. Moreover, only 20.8% stated to actually take part to this form of alternative food supply chain.

2.2 Exploring the halo effects

To explore the presence and nature of halo effects, we conducted two types of analyses comparing results 'between products' and 'within products'. More in detail, we looked for differences in the evaluation of the same attribute (related to one of the 11 items of the questionnaire) between different product categories (i.e., production-type label) and, also, analysed the correlations among different attributes pertaining to the same product category.

Note that at least one of the eleven attributes can be linked to one of the food products (Gaviglio et al., 2015), while some of the items should not be attached to any specific production type (see Table 1 for a summary of the relations). For instance, the items "*It is produced using traditional methods*" and "*It is produced within a limited geographical area*" can be used for both local and PDO cheeses. Instead, we consider the item "*It ensures an adequate income for the producers of the territory where it is produced*" as a reference for local products. Indeed, the specific methods of production and selling of this type of food should favour remuneration of local farmers. Nonetheless, it is not so clear that consumers perceive this to be a core characteristic of local foods (Weatherell et al., 2003; Onozaka et al., 2010). Furthermore, the item "*It is cheaper than other similar cheeses*" refers to conventional quartirolo, while "*Its production is environmentally friendly*" and "*respectful of animal welfare*" links to organic quartirolo. On the contrary, the items "*It possesses good hygienic conditions*", "*It contains less cholesterol than similar cheeses*", "*It is less caloric than similar cheeses*" and "*It is healthier than other similar cheeses*" should not be attached to any specific product, as there is no evidence that they should differ in relation to the production-type label. Indeed, food safety is guaranteed by law at the same level regardless of the production or retail processes.

Table 1.
Links between attributes used in the research and food categories

Product attributes	Product categories				Not attributable link
	Local	Conventional	Organic	PDO	
It is produced using traditional methods	X			X	
It is produced within a limited geographical area	X			X	
It is tasty					X
It is cheaper than other similar cheeses		X			
It possesses good hygienic conditions					X
It contains less cholesterol than similar cheeses					X
It is less caloric than similar cheeses					X
It ensures an adequate income for the producers of the territory where it is produced	X				
Its production is environmentally friendly			X		
Its production is respectful of animal welfare			X		
It is healthier than other similar cheeses					X

Similarly, there is no rationale to infer any differences in terms of calories, cholesterol content, or healthfulness for any of the four different quartirolo due to the type of the factory producing it. Moreover, no a priory hypothesis is made on the item "It's tasty" as tastiness of food derives from producers recipes and literature shows contrasting results (Werle et al., 2013).

On the basis of this a-priori analysis, we controlled for halo effects in two ways:

- *Between production-type label analysis*. This analysis was performed to evaluate the effect of 'being local' on product evaluation. To do so, we looked for statistically significant differences in local product evaluation compared to the other three types of cheese (namely, conventional, organic and PDO), applying paired *t*-tests on the scorings of the different product categories for each of the 11 items. For instance, we checked whether respondents perceived local food as being tastier, healthier, more hygienic, and less caloric than other products, and if respondents thought local quartirolo contained less cholesterol than similar cheeses.
- *Within production-type label analysis*. This analysis was performed to evaluate if attributes that – on the basis of the a priori analysis - should be unrelated are instead found to be correlated in the evaluations by consumers, as proposed by Thorndike in his seminal paper of 1920. Thus, we controlled for correlations among attributes within the same cheese category in order to understand if the some attributes (items) recognized in a product also imply negative or positive unmotivated perceptions on other attributes.

3 Results

3. Exploring local food halos

According to the explorative aim of the study, descriptive statistics offer a first perceptual representation of the food categories considered. Table 2 suggests that the reference descriptors chosen for each type of quartirolo are adequate for the study. Indeed, local and PDO cheeses score the highest evaluation for the items "*It is produced using traditional methods*" and "*It is produced within a limited geographical area*", as conventional quartirolo does for "*It is cheaper than other similar cheeses*" and organic quartirolo for "*Its production is environmentally friendly*" and "*respectful of animal welfare*". On the contrary, the item "*It ensures an adequate income for the producers of the territory where it is produced*" shows the highest ratings for PDO quartirolo, while local quartirolo obtains only the second-highest score. However, also the mean scorings of organic and conventional cheese are relatively high on this attribute, thus suggesting that it is not perceived as specific to local products. Respondents show also small mean differences on the items "*It contains less cholesterol than similar cheeses*" (maximum difference between means is of 0.17 between the organic and PDO cheese) and no differences for "*It is less caloric than similar cheeses*" (maximum difference between industrial and organic of 0.18). The items "*It is tasty*" and "*It possesses good hygienic conditions*" show a maximum mean difference of only 0.60 (local-industrial) and 0.40 (local-PDO), respectively; while the means of the item "*It is healthier than other similar cheeses*" show quite a large difference in scoring between organic and conventional quartirolo (1.35).

In order to test the significance of the above differences and answer RQ1, a paired *t*-test was performed between the item scores of the quartirolo labelled as local and the other ones. Table 3 shows that local quartirolo is perceived as tastier (4.98±1.37) than the conventional (Tastiness= 4.38±1.25) and organic ones (Tastiness= 4.60±1.42), and also healthier (4.38±1.38) than the conventional (3.14±1.21) and PDO ones (4.06±1.20). On the contrary, local quartirolo is perceived to be less hygienic than organic and PDO quartirolo, while it shows no significant differences with differently labelled cheeses with regards to calorie and cholesterol content.

Table 2.
Evaluation of the different types of quartirolo on the 11 attributes.

Evaluation item	Local		Conventional		Organic		PDO	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
It is produced using traditional methods	5.35	1.303	3.05	1.468	4.52	1.423	5.16	1.348
It is produced within a limited geographical area	5.68	1.259	2.60	1.370	4.18	1.595	5.71	1.445
It is tasty	4.98	1.371	4.38	1.254	4.60	1.419	4.96	1.406
It is cheaper than other similar cheeses	3.40	1.314	4.93	1.410	2.59	1.249	3.31	1.292
It possesses good hygienic conditions	4.71	1.021	4.86	1.254	4.97	1.094	5.11	1.105
It contains less cholesterol than similar cheeses	3.55	1.234	3.55	1.171	3.68	1.196	3.51	1.185
It is less caloric than similar cheeses	3.53	1.165	3.47	1.178	3.65	1.231	3.53	1.112
It ensures an adequate income for the producers of the territory where it is produced	4.73	1.136	4.15	1.535	4.59	1.161	4.88	1.142
Its production is environmentally friendly	4.87	1.170	3.24	1.238	5.68	1.234	4.70	1.108
Its production is respectful of animal welfare	4.88	1.231	3.43	1.344	5.43	1.339	4.76	1.268
It is healthier than other similar cheeses	4.38	1.380	3.14	1.213	4.49	1.490	4.06	1.205

Table 3.
Comparison among items not attributed to specific product categories

Items	Comparison with Local	Paired Differences					*t*	Sig.	Expectation on evaluation	Results
		Mean	Std. Deviation	Std. Error Mean	95% C. I. of the Difference					
					Lower	Upper				
It is tasty	Conventional	.602	1.609	.140	.325	.878	4.310	.000	Local=Conventional	Local is tastier
	Organic	.383	1.248	.108	.169	.597	3.545	.001	Local=Organic	Local is tastier
	PDO	.023	1.118	.097	-.169	.214	.233	.816	Local=PDO	No difference
It possesses good hygienic conditions	Conventional	-.158	1.512	.131	-.417	.101	-1.204	.231	Local=Conventional	No difference
	Organic	-.263	1.199	.104	-.469	-.057	-2.531	.013	Local=Organic	Organic is more hygienic
	PDO	-.406	1.273	.110	-.624	-.188	-3.677	.000	Local=PDO	PDO is more hygienic
It contains less cholesterol than similar cheeses	Conventional	.000	1.187	.103	-.204	.204	0.000	1.000	Local=Conventional	No difference
	Organic	-.135	1.140	.099	-.331	.060	-1.369	.173	Local=Organic	No difference
	PDO	.038	1.003	.087	-.134	.210	.432	.666	Local=PDO	No difference
It is less caloric than similar cheeses	Conventional	.060	1.324	.115	-.167	.287	0.524	.601	Local=Conventional	No difference
	Organic	-.128	1.170	.101	-.329	.073	-1.259	.210	Local=Organic	No difference
	PDO	.000	1.193	.103	-.205	.205	.000	1.000	Local=PDO	No difference
It is healthier than other similar cheeses	Conventional	1.233	1.642	.142	.951	1.515	8.662	.000	Local=Conventional	Local is healthier
	Organic	-.113	1.608	.139	-.389	.163	-0.809	.420	Local=Organic	No difference
	PDO	.316	1.345	.117	.085	.546	2.708	.008	Local=PDO	Local is healthier

Table 4.
Correlations among items of local food

Items	It is produced using traditional methods	It is produced within a limited geographical area	It ensures an adequate income for the producers of the territory where it is produced	It is tasty	It is cheaper than other similar cheeses	It possesses good hygienic conditions	It contains less cholesterol than similar cheeses	It is less caloric than similar cheeses	Its production is environmentally friendly	Its production is respectful of animal welfare	It is healthier than other similar cheeses
It is produced using traditional methods	1	.443** (.000)	.181* (.037)	.376** (.000)	-.223** (.010)	.185* (.033)	-.110 (.209)	-.231** (.008)	.292** (.001)	.309** (.000)	.264** (.002)
It is produced within a limited geographical area	.443** (.000)	1	0.044 (.613)	.366** (.000)	-.242** (.005)	0.144 (.099)	-.051 (.562)	-.172* (.047)	.213* (.014)	0.107 (.221)	.180* (.039)

**. Pearson Correlation is significant at the 0.01 level (2-tailed), *. Pearson Correlation is significant at the 0.05 level (2-tailed); value in parenthesis are actual significance, Subj.= 133.

3.2. Exploring attribute-related food halos

Focusing on the within production-type label analysis, which helps to respond to RQ2, we also evaluated the relations among attributes within the same product category. Focusing on the local production-type label, results indicate some halo effects (see Table 4). More in detail, respondent evaluations on tastiness (0.376; 0.366), environmental friendliness (0.292; 0.213), and healthfulness (0.264; 0.180) show significant positive correlations with both the evaluations of being traditional and coming from a geographically limited production. Moreover, negative correlations emerge with the items "*it is cheaper*" (-0.223; -0.242) and "*it is less caloric*" (-0.231; -0.172). The tradition recognized in locally produced quartirolo is also positively associated with the items "*It ensures an adequate income for the producers of the territory where it is produced*" (0.181), "*It possesses good hygienic conditions*" (0.185), and "*Its production is respectful of animal welfare*" (0.309).

According to these results, being produced using traditional methods leads consumers to perceive local foods as tastier and healthier, even if they consider them to be more caloric. Furthermore, looking at the correlations in local food, consumers seem to link care for the environment and for animal welfare with better hygienic conditions, i.e., food safety.

To test whether these two potential halos pertain to all the food categories (or production-type labels), indicating the presence of new distinctive food halos led by attributes, we extended the analysis also to conventional, organic, and PDO cheeses (see Tables 5 and 6).

With regards to the halo effects related to a 'traditional' production method, a positive association between perceived traditional character and tastiness and healthiness is confirmed also in conventional and PDO cheeses. On the contrary, calorie-content shows a different pattern in the case of conventional quartirolo. Indeed, the more respondents perceive the production process to be in line with the traditional standards, the lower calories they perceive in the cheese. Furthermore, as the correlation between tradition and calories is not significant for PDO and organic quartirolo, the halo found in local cheese could be spurious or linked to local labelling. Finally, when focusing on organic quartirolo, none of the correlations with traditional characteristics are significant. This may relate specifically to organic labelling and to certain strong specific expectation related to this food category.

Table 5.
Correlations among items highlighting the "tradition halo" effect

	LOCAL			
	Traditional production	*Tasty*	*Less calories*	*Healtier*
Traditional production	1	.376** .000	-.231** .008	.264** .002
Tasty	.376** .000	1	-.270** .002	.223** .010
Less calories	-.231** .008	-.270** .002	1	.201* .020
Healtier	.264** .002	.223** .010	.201* .020	1

	CONVENTIONAL			
	Traditional production	*Tasty*	*Less calories*	*Healtier*
Traditional production	1	.244** .005	.209* .016	.204* .018
Tasty	.244** .005	1	.006 .943	.203* .019
Less calories	.209* .016	.006 .943	1	.573** .000
Healtier	.204* .018	.203* .019	.573** .000	1

	ORGANIC			
	Traditional production	*Tasty*	*Less calories*	*Healtier*
Traditional production	1	.006 .949	.090 .302	.169 .052
Tasty	.006 .949	1	.020 .817	.104 .236
Less calories	.090 .302	.020 .817	1	.349** .000
Healtier	.169 .052	.104 .236	.349** .000	1

	PDO			
	Traditional production	*Tasty*	*Less calories*	*Healtier*
Traditional production	1	.343** .000	.040 .646	.349** .000
Tasty	.343** .000	1	-.089 .308	.203* .019
Less calories	.040 .646	-.089 .308	1	.327** .000
Healtier	.349** .000	.203* .019	.327** .000	1

**. Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level (2-tailed); value in parenthesis are actual significance, Subj.= 133.

Table 6.
Correlations among items highlighting the "environmental and animal care halo" effect

	LOCAL		
	Environmentally friendly	*Animal welfare*	*Hygienic conditions*
Environmentally friendly	1	.778** .000	.425** .000
Animal welfare	.778** .000	1	.436** .000
Hygienic conditions	.425** .000	.436** .000	1

	CONVENTIONAL		
	Environmentally friendly	*Animal welfare*	*Hygienic conditions*
Environmentally friendly	1	.775** .000	.197* .023
Animal welfare	.775** .000	1	.232** .007
Hygienic conditions	.197* .023	.232** .007	1

	ORGANIC		
	Environmentally friendly	*Animal welfare*	*Hygienic conditions*
Environmentally friendly	1	.777** .000	.363** .000
Animal welfare	.777** .000	1	.299** .000
Hygienic conditions	.363** .000	.299** .000	1

	PDO		
	Environmentally friendly	*Animal welfare*	*Hygienic conditions*
Environmentally friendly	1	.719** .000	.393** .000
Animal welfare	.719** .000	1	.403** .000
Hygienic conditions	.393** .000	.403** .000	1

**. Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level (2-tailed); value in parenthesis are actual significance, Subj.= 133.

Nonetheless, given that perceived traditional production leads consumers to perceive food as tastier and healthier in all food categories - with the exception of organic quartirolo -there are reasons to believe that the pattern of results might be indicative of a distinctive halo effect that could be labelled as "tradition halo". The choice of the name relates to the fact that production processes with (perceived) traditional features seem to convey to consumers the message that the food product will be tastier and healthier, highlighting a link between traditional process and health and between traditional process and taste that has no theoretical backing.

Concerning the halo effects related to perceived care for the environment and for animal welfare, the positive association with good hygienic conditions is confirmed in all food categories. Hence, it is plausible to consider it as a new generalized halo that could be labelled as "environmental and animal care halo".

4 Discussion and conclusions

The main objective of the present research was to examine the presence of halo effects related to food products. We focused on the perceptions of local food compared to conventional, organic and PDO products and, then, explored also the cognitive associations among product attributes, regardless of their production method. To do so, we designed an exploratory analysis in order to identify potential misleading attributions that could lead to unconsciously unwanted choices.

The results confirmed that food perception can be affected by halo effects. Firstly, we confirmed that halos may stem from the association with a particular food category, that in our study is identified by a different production-type label.

Our results indicate that local quartirolo is perceived as less hygienic than the organic and PDO ones, and as healthier than the conventional and PDO ones. The latter result extends to local foods the results previously found for organic (Lee et al., 2013; Schuldt and Schwarz, 2010) and fair-trade products (Schuldt et al., 2012), that are perceived as healthier.

Focusing on food safety, this is a public good that is warranted by law by means of hygienic standards for food. Thus, there are two possible interpretations of our findings: respondents either think that local (and conventional) quartirolo are below the required standards, or they realize that local (and conventional) quartirolo meets legal requirements, but consider organic and PDO products to be even better than required. Further data and analyses are needed to explore more in depth these tentative interpretations. Nonetheless, the present findings offer new hints on the theme of hygienic conditions of local food. Previous literature findings suggest that small-local production systems may be characterized by higher food safety risks than industrialized farming (Bellemare et al., 2015), or that, at least in terms of farmer knowledge of food pathogens, there are no substantial differences between the two scales of production (Parker *et al*., 2016).

Furthermore, the correlations found among the attributes within the same product category indicate that the recognition of a certain characteristic in food may lead consumers to erroneous judgments. This suggests that halos previously linked to food category labelling may actually relate to the perception of product attributes conveyed by the food category. If confirmed, this result seems an interesting contribution to the literature. More in detail, we found that "tradition", which is an attribute that consumers normally search in food (Lusk and Briggeman, 2009; Peniak et al., 2009), may bring positive expectations on taste and healthiness of food, thus we called it "tradition halo". Furthermore, our results also indicate that the recognition of a production process that is respectful of the environment and of animal welfare may suggest to consumers better hygienic conditions of the product. This halo, that we called "environmental and animal care halo", is confirmed in all food categories. Given that perceived environmental or animal care are well-known positive determinants of food consumption (Mannion et al., 2000; Gracia and Albisu, 2001) and considering that, as already discussed, intrinsic food safety is set by standards, consumer scientists should consider the risky outcomes of this misconception that may affect choices among products. Indeed, halo effects may be at the base of market failures. For example, people may overestimate the value of a product and pay for attributes that food does not possess. They may also underestimate the content of calories or substitute supposedly unhealthy cheese with supposedly healthy cheese. From an economic point of view, the final question relates to the costs that these cognitive biases have for society and to the design of the possible remedial actions.

In conclusion, it is worth to note that the results of this study should be considered as an initial evidence that needs to be confirmed in larger and more representative samples. Nonetheless, the results point to interesting and novel potential halo effects on food perception that can represent a starting point for future research.

References

Adams, D. C., Adams, A. E. (2011). De-placing local at the farmers' market: Consumer conceptions of local foods. *Journal of Rural Social Sciences*, **26**(2): 74–100.

Bellemare, M. F., King, R. P., and Nguyen, N. J. (2015). Farmers markets and Food-Borne illness. MPRA Paper.

Bingen, J., Sage, J., and Sirieix, L. (2011). Consumer coping strategies: A study of consumers committed to eating local. *International Journal of Consumer Studies*, **35**(4): 410–419.

Bruno, C. C., Campbell, B. L. (2016). Students' Willingness to Pay for More Local, Organic, Non-GMO and General Food Options. *Journal of Food Distribution Research*, **47**(3).

Cavanagh, K. V., Kruja, B., and Forestell, C. A. (2014). The effect of brand and caloric information on flavor perception and food consumption in restrained and unrestrained eaters. *Appetite*, **82**: 1-7.

Chandon, P., Wansink, B. (2007). The biasing health halos of fast-food restaurant health claims: lower calorie estimates and higher side-dish consumption intentions. *Journal of Consumer Research*, **34**(3): 301-314.

Chang, K. L., Xu, P., Warmann, J., Lone, T., Munzimi, Z. S., and Opuko, E. (2016). Consumer Characteristics and Willingness to Pay for Locally Produced Product: A Case Study of Rib-eye Steaks in the Northern Great Plains. *Journal of Agriculture, Food Systems, and Community Development*, **4**(1): 99-121.

Conner, D., Colasanti, K., Ross, R. B., and Smalley, S. B. (2010). Locally grown foods and farmers markets: Consumer attitudes and behaviors. *Sustainability*, **3**(2): 742–756.

Darby, K., Batte, M. T., Ernst, S., and Roe, B. (2008). Decomposing local: A conjoint analysis of locally produced foods. *American Journal of Agricultural Economics*, **90**(2): 476–486.

Del Giudice, T., Stranieri, S., Caracciolo, F., Ricci, E.C., Cembalo, L., Banterle, A., and Cicia, G. (2018) Corporate Social Responsibility certifications influence consumer preferences and seafood market price. *Journal of Cleaner Production*, **178**: 526-533.

Demartini, E., Gaviglio, A., and Pirani, A. (2017). Farmers' motivation and perceived effects of participating in short food supply chains: evidence from a North Italian survey. *Agricultural Economics* (Zemědělská Ekonomika), **63**(5): 204-216.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., and Jones, R. E. (2000). New trends in measuring environmental attitudes: measuring endorsement of the new ecological paradigm: a revised NEP scale. *Journal of social issues*, **56**(3): 425-442.

Faulkner, G. P., Pourshahidi, L. K., Wallace, J. M. W., Kerr, M. A., McCaffrey, T. A., and Livingstone, M. B. E. (2014). Perceived 'healthiness' of foods can influence consumers' estimations of energy density and appropriate portion size. *International Journal of Obesity*, **38**(1): 106-112.

Gaviglio, A., Demartini, E., Pirani, A., Marescotti, M. E., and Bertocchi, M. (2015, March). National Brands versus Private Labels versus Niche Products: a graphical representation of consumers' perception. In *143rd Joint EAAE/AAEA Seminar, March 25-27, 2015, Naples, Italy* (No. 202731). European Association of Agricultural Economists.

Gracia, A. (2014). Consumers' preferences for a local food product: a real choice experiment. *Empirical Economics*, **47**(1): 111-128.

Gracia, A., Albisu, L. M. (2001). Food consumption in the European Union: main determinants and country differences. *Agribusiness*, **17**(4): 469-488.

Grebitus, C., Lusk, J. L., and Nayga, R. M. (2013). Effect of distance of transportation oninvestigation. *International Journal of Consumer Studies*, **37**: 143–151.

Kneafsey, M., Venn, L., Schmutz, U., Balázs, B., T renchard, L., Eyden-Wood, T., and Blackett, M. (2013). Short food supply chains and local food systems in the EU. A state of play of their socio-economic characteristics. JRC Scientific and Policy Reports. Joint Research Centre Institute for Prospective Technological Studies, European Commission.

Lee, W. C. J., Shimizu, M., Kniffin, K. M., and Wansink, B. (2013). You taste what you see: Do organic labels bias taste perceptions? *Food Quality and Preference*, **29**(1): 33-39.

Lim, K.H., Hu, W. (2012). How local is local? Consumer preference for steaks with different food mile implications. In Selected paper for presentation at the American Agricultural Economics Association annual meeting, Orlando, USA, February 3–5, 2012, online available at:

Lindeman, M., Väänänen, M. (2000).Measurement of ethical food choice motives. *Appetite*, **34**(1): 55-59.

Lusk, J. L., Briggeman, B. C. (2009).Food values. *American Journal of Agricultural Economics*, **91**(1): 184-196.

Mannion, M. A., Cowan, C., and Gannon, M. (2000). Factors associated with perceived quality influencing beef consumption behaviour in Ireland. *British Food Journal*, **102**(3): 195-210.

Menapace, L., Raffaelli, R. (2013). Do 'locally grown' claims influence artisanal food purchase? Evidence from a natural field experiment. In Selected paper for presentation at the American Agricultural Economics Association annual meeting, Washington DC, USA, August 4–6, 2013

Onken, K. A., Bernard, J. C., and Pesek Jr, J. D. (2011). Comparing willingness to pay for organic, natural, locally grown, and state marketing program promoted foods in the mid-Atlantic region. *Agricultural and Resource Economics Review*, **40**(1): 33.

Onozaka, Y., Nurse, G., and McFadden, D. T. (2010). Local food consumers: how motivations and perceptions translate to buying behavior. *Choices*, **25**(1): 1-6.

Parker, J. S., DeNiro, J., Ivey, M. L., and Doohan, D. (2016). Are small and medium scale produce farms inherent food safety risks? *Journal of Rural Studies*, **44**: 250-260.

Parmenter, K., Wardle, J. (1999).Development of a general nutrition knowledge questionnaire for adults. *European Journal of Clinical Nutrition*, **53**(4): 298-308.

Pieniak, Z., Verbeke, W., Vanhonacker, F., Guerrero, L., and Hersleth, M. (2009). Association between traditional food consumption and motives for food choice in six European countries. *Appetite*, **53**(1): 101-108.

Schuldt, J. P., Hannahan, M. (2013). When good deeds leave a bad taste. Negative inferences from ethical food claims. *Appetite*, **62:** 76-83.

Schuldt, J. P., Schwarz, N. (2010). The" organic" path to obesity? Organic claims influence calorie judgments and exercise recommendations. *Judgment and Decision Making*, **5**(3): 144.

Schuldt, J. P., Muller, D., and Schwarz, N. (2012). The "fair trade" effect: Health halos from social ethics claims. *Social Psychological and Personality Science*, **3**(5): 581-589.

Sirieix, L., Delanchy, M., Remaud, H., Zepeda, L., and Gurviez, P. (2013). Consumers' perceptions of individual and combined sustainable food labels: a UK pilot investigation. *International Journal of Consumer Studies*, **37**(2): 143-151.

Stanton, J. L., Wiley, J. B., and Wirth, F. F. (2012). Who are the locavores? Journal of Consumer Marketing, **29**(4): 248–261.

Stranieri, S., Banterle, A. (2015). Consumer interest in meat labelled attributes: Who cares?. *International Food and Agribusiness Management Review,* **18** (4): 21-38.

Stranieri, S., Ricci, E.C., and Banterle, A. (2017). Convenience food with environmentally-sustainable attributes: A consumer perspective. *Appetite*, **116**: 11-20.

Stranieri, S., Baldi, L. (2017). Shelf Life Date Extension of Fresh-Cut Salad: A Consumer Perspective. *Journal of Food Products Marketing*, **23** (8): 939-954.

Sütterlin, B., Siegrist, M. (2015). Simply adding the word "fruit" makes sugar healthier: The misleading effect of symbolic information on the perceived healthiness of food. *Appetite*, **95:** 252-261.

Thilmany, D., Bond, C. A., and Bond, J. K. (2008). Going local: Exploring consumer behavior and motivations for direct food purchases. *American Journal of Agricultural Economics*, **90**(5): 1303-1309.

Thorndike, E. L. (1920). A constant error in psychological ratings. *Journal of applied psychology*, **4**(1): 25-29.

Weatherell, C., Tregear, A., and Allinson, J. (2003). In search of the concerned consumer: UK public perceptions of food, farming and buying local. *Journal of Rural Studies*, **19**(2): 233-244.

Werle, C. O., Trendel, O., and Ardito, G. (2013).Unhealthy food is nottastier for everybody: The "healthy=tasty" French intuition. *Food Quality and Preference*, **28**(1): 116-121.

Willis, D. B., Carpio, C. E., and Boys, K. A. (2016). Supporting Local Food System Development Through Food Price Premium Donations: A Policy Proposal. *Journal of Agricultural and Applied Economics*, **48**(02): 192-217.

Zepeda, L., Deal, D. (2009). Organic and local food consumer behaviour: Alphabet Theory. International *Journal of Consumer Studies*, **33**(6): 697–705.

Zepeda, L., Li, J. (2006). Who buys local food? *Journal of Food Distribution Research*, **37**(3): 5–15.

Appendix A – Materials and methods for pilot study

Express how much you agree that the cheese shown in the picture *[respondent see photo1 to photo15]*:

Completely disagree			Neither agree nor disagree			Completely agree
1	2	3	4	5	6	7

1. Is tasty
2. Is expensive
3. Contains additives, preservatives or other substances harmful to health
4. Is high in calorie content
5. Respects the environment
6. Is traditional
7. Is produced within a limited geographical area

Figure A.1. Evaluation scale used in the pilot study for images as translated from Italian

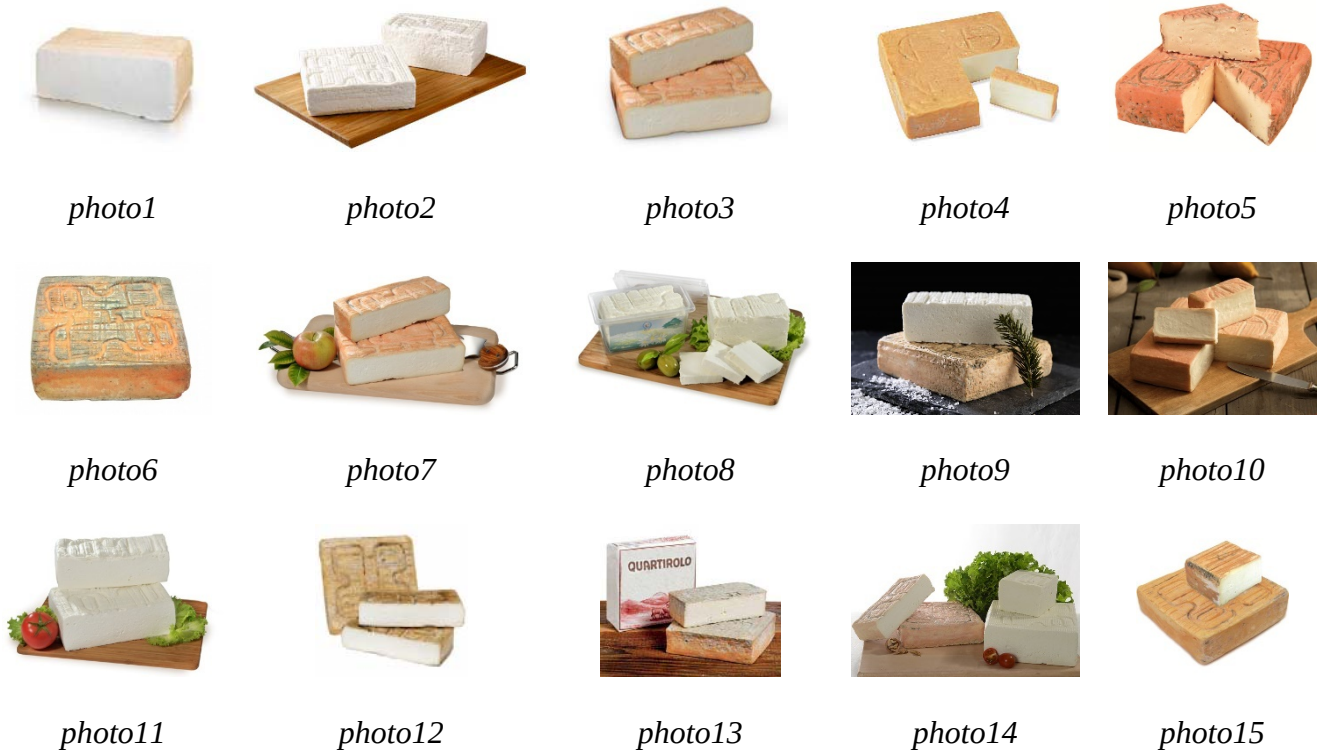

photo1 *photo2* *photo3* *photo4* *photo5*

photo6 *photo7* *photo8* *photo9* *photo10*

photo11 *photo12* *photo13* *photo14* *photo15*

Figure A.2. Cheese images evaluated in the pilot study

Express how much you agree that the cheese *[name1 to name12]*:

Completely disagree			Neither agree nor disagree			Completely agree
1	2	3	4	5	6	7

1. Is tasty
2. Is expensive
3. Contains additives, preservatives or other substances harmful to health
4. Is high in calorie content
5. Respects the environment
6. Is traditional
7. Is produced within a limited geographical area

Figure A.3. Evaluation scale used in the pilot study for names as translated from Italian

Table A.4.
Cheese names evaluated in the pilot study

name1	Quadretta	*name7*	MuccaSì
name2	Fettabianca	*name8*	Fiordivalle
name3	Latterino	*name9*	campanella
name4	Quartirò	*name10*	FieNò
name5	Rosella	*name11*	Campagnolo
name6	Pintella	*name12*	Montedor

Fettabianca *Latterino* *Rosella* *Quadretta*

Figure A.5. Pairs of images and names of cheeses used in study