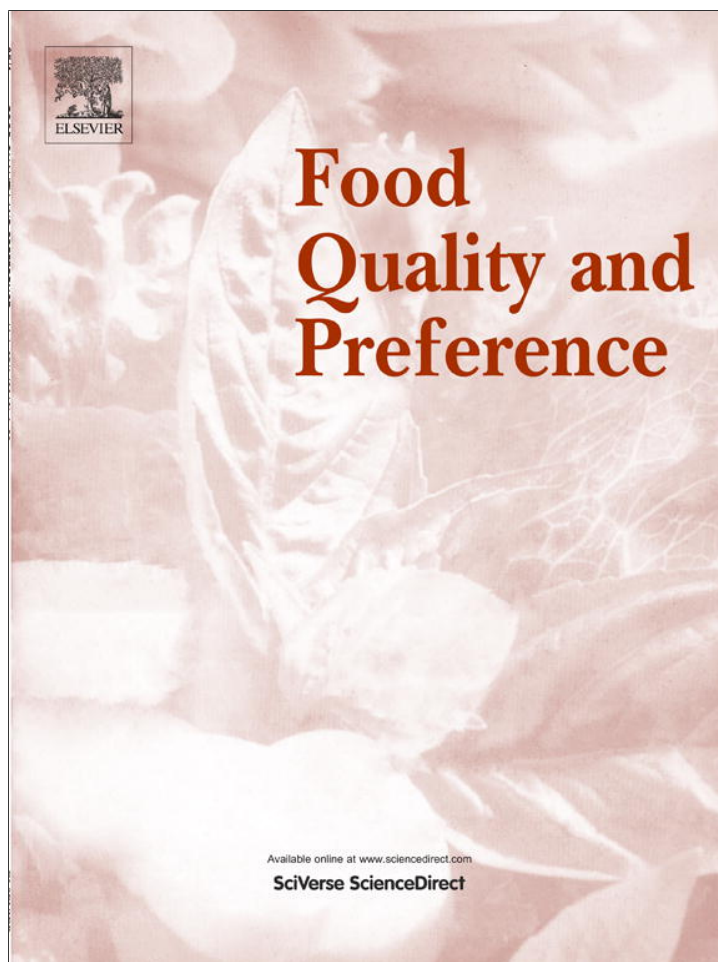


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# Food Quality and Preference

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## Sustainability and organic production: How information influences consumer's expectation and preference for yogurt

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### ABSTRACT

The purposes of this experimental study are to investigate consumers' attitude and general knowledge about sustainability; to evaluate how information about organic production may affect consumers' food acceptability and expectations; to establish whether and how much commitment to sustainability influences individuals' preferences for organic products. Results showed that consumers are aware of the sustainability concept, but they are not able to define it precisely thus indicating that sustainability is a widespread issue in individuals' mind. This was confirmed also by the lack of information perceived by respondents about sustainable products. When subjects were grouped according to their sustainability level, the majority of them (74%) were defined as "uncertain". A major difference was found between "sustainable" and "non-sustainable" individuals in the attitude, purchase intentions, and behaviors as regarding organic products. Sustainable subjects were more interested in and proactive for such products. This behavioral discrepancy is in line with the liking gap for organic products found between the two groups. Indeed, when organic and conventional yogurts were evaluated for liking in blind, expected and informed conditions, sustainable subjects had a higher expectation towards organic yogurt than non-sustainable individuals. Furthermore, non-sustainable subjects expressed lower expectations from organic samples than from conventional ones, whereas the opposite behavior was observed in Sustainable subjects. Only for sustainable and uncertain subjects, organic yogurts produced negative disconfirmation, which was associated with an incomplete assimilation effect. Hence, the information about yogurt's organic origin may affect people's expectations, and this influence is especially found in the case of respondents which are committed to sustainability or are uncertain about this issue as compared to non-sustainable individuals.

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### 1. Introduction

A great deal of interest in sustainability issues has been globally expressed in recent years. The academic interest for the topic has enormously increased, especially in the last decade: 400 journal articles about sustainability were issued in 2005, whereas in 2010 they became more than 1000. Also politics and institutions' interest is growing, as long as sustainability is a crucial issue for the economic growth and development: sustainability is by far a strategic goal in economic and social policies on an international ground (Bologna, 2005).

The term *sustainability* comes from the verb "to sustain", namely "to carry the weight", "to support", and it refers to the

capability to live within the carrying capacity of the system we belong to (Daly, 1996). According to the official definition provided in 1987 by The World Commission on Environment and Development (WCED), *sustainable development* is "a development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). Sustainability is now a positive concept in consumers' minds, but there are still some contradictory aspects to be pointed out. Sustainability is an overall issue involving institutional policies and companies' decisions, but also consumers' purchases and behaviors in various situations of everyday life; nevertheless, consumers show poor awareness of problems related to it, and it's difficult to find a unique and generally accepted definition of the concept. Furthermore, a widespread inconsistency between beliefs, opinions, values, and behaviors is noticed: consumers have developed behaviors and habits in contrast with their intentions, attitudes, and opinions (de Barcellos, Krystallis, Saab, Kugler, & Grunert, 2011; Vermeir & Verbeke, 2006).

*Abbreviations:* ACA scale, awareness concern and action scale; TPB, theory of planned behavior.

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Scientific literature directed little attention to consumer's perception of the sustainability concept as well as to the understanding of its influence on hedonic expectations.

Despite being one of the strongest food preference and consumption determinants, the hedonic dimension remains the most difficult aspect to assess objectively (Pagliarini, 2002). When approaching the crucial moment of a food product choice, consumers retrieve information stored in memory and coming from previous experiences with the same product or a similar one. This aspect is part of the decision-making process. After consumption, the sensory and hedonic properties of a chosen product, along with other variables such as the brand and the packaging labels, may result in changes in consumer expectations (Deliza & MacFie, 1996). A confirmation is generated if, at the moment of the choice/consumption, the product characteristics meet consumer's expectations. A mismatch between expected and actual product characteristics results in a disconfirmation, which can be either positive (when product characteristics are better than expected) or negative (when product characteristics are worse than expected) (Cardello & Sawyer, 1992). According to the selection/consumption/reselection model proposed by Deliza and MacFie (1996), a confirmation and a positive disconfirmation of the expectations will result in consumer's satisfaction followed by a repeated choice of the product with increased expectations for it, whereas negative disconfirmation will likely lead to dissatisfaction and product rejection with a consequent expectations decrease.

Consumer's expectation is often measured in terms of disparity degree between expected and perceived product performance (Anderson, 1973). Over the past decades, several works have been carried out in an attempt to investigate whether and how information about food products influences hedonic expectation. In most of these studies, consumers were given food samples and asked to answer questions about their liking degree under different information circumstances: the blind condition (*i.e.* consumers taste and judge the product without any kind of information); the expected condition (*i.e.* consumers do not taste the product and judge it only on the basis of a written or visual information); and the informed condition (*i.e.* consumers taste and judge the product after having read a written information and/or seen an image). This approach has been used to investigate the effect on consumer's product evaluation of (i) health and nutritional information (Saba et al., 2010), (ii) country of origin (Caporale & Monteleone, 2001; Caporale, Policastro, Carlucci, & Monteleone, 2006; Stefani, Romano, & Cavicchi, 2006), (iii) brand (Di Monaco, Cavella, Di Marzo, & Masi, 2004; Lange, Martin, Chabanet, Combris, & Issanchou, 2002); and (iv) price (Ares, Giménez, & Deliza, 2010). All these studies reported that quality perception can be affected by the expectations induced by the information. Different predictive models (*e.g.* assimilation and contrast) have been suggested in an attempt to reveal the effect of discrepancy between expectations and actual product performance on acceptability (Anderson, 1973). When expectations are disconfirmed, the assimilation model is generally applicable, which means that hedonic ratings move towards the expectations when information is provided.

Some studies have been undertaken about hedonic expectations and food sustainability using bread (Kihlberg, Johansson, Langsrud, & Risvik, 2005; Kihlberg & Risvik, 2007), cheese (Napolitano, Braghieri, Piasentier, Favotto, Naspetti & Zanoli, 2010a), meat (Napolitano, Braghieri, Piasentier, Favotto, Naspetti & Zanoli, 2010b), beer (Caporale & Monteleone, 2004), and pineapple (Poelman, Mojte, Lyon, & Sefa-Dedeh, 2008) as experimental products. In this context, the understanding of how and whether sustainability drives consumers' preferences is a crucial subject which needs to be systematically explored, especially in the food domain.

Based on the above considerations, this study is intended (i) to assess consumers' understanding and attitude towards sustainabil-

ity; (ii) to evaluate the influence of information about organic production on consumers' food acceptability and expectation; (iii) to establish whether and how much commitment to sustainability drives individuals' preference for organic food. As compared to previous studies in literature, our approach included the administration of a questionnaire devised to explore consumer's general knowledge, attitudes, beliefs and behaviors related to sustainability combined with the hedonic evaluation of a food product under different consumption situations. The respondents were grouped according to their sustainability level (namely their propensity and willingness to perform sustainable actions) using the answers provided to the questionnaire, which included several questions concerning sustainability (*e.g.* respect of the environment, enhancement of local production, promotion of clean and green energies), and food (*e.g.* enhancement of organic cultivation, contrasting GMO food, enhancement of free-preservatives food products). The same consumers were also involved in a hedonic test and were asked to express their liking degree for conventional and organic yogurt samples in blind, expected, and informed conditions. Among the several meanings of sustainability related to food, the concept of organic production was chosen as reference in this study. This choice is based on data showing increased organic food products purchases in the European market, corresponding to 8% in 2010. In Italy, this increase is especially prominent in organic yogurt purchases, with a percentage of 27.5% in 2010. For this reason, yogurt was chosen as experimental product in the present study.

## 2. Materials and methods

### 2.1. Subjects

One hundred and fifty-seven (100 females and 57 males) regular yogurt consumers aged between 20 and 42 ( $M = 23.6$ ;  $sd = 2.8$ ) were recruited among the students of the Faculty of Agronomy (Università degli Studi di Milano) and the Faculty of Communication, Public Relations and Advertising (Libera Università di Lingue e Comunicazione IULM). The subjects' recruitment was based on yogurt liking degree and consumption frequency. Only individuals who reported to like strawberry yogurt and to consume it more than once-twice a month were involved in the study.

### 2.2. Samples

Eight commercially available full-fat-milk, strawberry-flavored yogurts were used as experimental samples: three organic yogurts (Fattoria Scaldasole Srl, Como, Italy; Parmalat SpA, Parma, Italy; Esselunga SpA, Italy) and five conventional yogurts (Yomo-Granarolo SpA, Milano, Italy; Parmalat SpA, Parma, Italy; Latteria Sociale Merano, Merano, Italy; Müller Italia, Italy; Esselunga SpA, Italy). Samples were stored at 4 °C and served at room temperature during the tasting sessions. Yogurt samples were purchased in local supermarkets: for a given brand all samples were chosen from the same batch and across brand the difference in shelf-life was no more than few days. The strawberry-flavored yogurt was selected because it is the most popular yogurt in Italy and it is available in a large variability of brands both from conventional and organic production.

### 2.3. Procedure

#### 2.3.1. Consumer test

Participants were involved into two tasting sessions performed in two different days one week apart. Each session lasted about 30 min. The sessions were held during mid-morning and

mid-afternoon at the sensory laboratory of the Department of Food, Environmental and Nutritional Sciences (DeFENS, Università degli Studi di Milano) designed according to ISO guidelines (ISO 8589, 2007). Data were collected using Fizz v2.31g software program (Biosystemes, Couternon, France). Consumers were asked not to smoke, eat or drink anything, except water, for one hour before the tasting sessions.

According to Deliza and MacFie (1996), yogurt samples were evaluated under blind, expected, and informed conditions. During the first tasting (day 1), participants performed the blind and the expectation test. Firstly, they were asked to rate the liking degree of the eight yogurt samples under blind conditions (*i.e.* without any information about the product). The only information provided to the participants was that they were about tasting strawberry yogurt samples. Thus, for each product, participants received about 20 mL of yogurt served in plastic cup coded with 3-digit numbers and judged them in individual booths under white light at room temperature. Participants rated yogurt samples liking degree using a 100-mm unstructured, linear scale anchored at the extremes with the terms “extremely disliked” (left of the scale) and “extremely liked” (right of the scale). After tasting each yogurt, participants were instructed to rinse their mouth with mineral water.

After a short break, they all rated the expectation liking score of each product induced by the relevant image and the information about its organic origin without tasting the sample (expectation test), using a 100-mm unstructured, linear scale anchored at the extremes with the terms “extremely disliked” (left of the scale) and “extremely liked” (right of the scale). Every participant was shown on a screen the image of the package of each yogurt sample without the yogurt brand. The original packages of the yogurts were modified by removing the brand imagery in an attempt to decrease the brand effect on consumer's expectations. In the case of the organic samples, the following information was provided: “Product made with organic farming techniques and sustainable manufacturing processes”. The image of each conventional product was shown without providing any information.

After a one week interval, the same participants were invited again to the tasting center (day 2) and performed the informed test. Apart the fact that participants were provided with the product image and information about the organic production in the case of organic yogurts, the procedure was exactly the same as for the blind test.

In order to balance the effects of serving order and carryover, the presentation orders of the samples (yogurts, images of the package, or yogurts associated with the image of their package) were chosen according William Latin squares (MacFie, Bratchell, Greenhoff, & Vallis, 1989).

### 2.3.2. Questionnaire

At the end of the second tasting session (day 2), participants were administered a questionnaire devised to assess their general knowledge, attitudes, beliefs and behaviors related to sustainability.

The questionnaire had been administered and validated in a previous study on a representative sample of 800 Italian consumers aged 18–65, within a research on sustainability and food consumption conducted at IULM University of Milan “Istituto di Consumi, Comportamento e Comunicazione” in 2009–2010 (Castelli, 2010; Russo, Milani, & Castelli, 2011). The questionnaire is based on the theory of planned behavior (TPB) (Ajzen, 1991), which has been proven to be a proper theoretical framework for understanding sustainable and ethical consumer behaviors concerning food (Bissonette & Contento, 2007), although contrasting data are provided by scientific literature (de Barcellos et al., 2011). According to the TPB, behavioral intention is the most reliable indicator

for predicting behavior, and it is in turn related to different variables, such as beliefs and attitudes towards the behavior, social norms to perform the behavior and perceived control over it. According to these assumptions, the topics included in the questionnaire were based on all of the specific psychological constructs indicated by the TPB, except for the social norms, which were not considered by the present study.

The purposes of the questionnaire reported in Appendix A were to collect information about participants' general attitude and awareness about sustainability and to group subjects according to their sustainability level. The questions were related to: (a) individuals' socio-demographic information; (b) general knowledge about sustainability; (c) intention to adopt a sustainable behavior; (d) actual sustainable behavior; (e) sustainability and food choices in terms of opinions and beliefs. In addition, the level of awareness, concern and action for ethical consumption behaviors was rated through a scale adapted from the awareness concern and action (ACA) scale introduced by Freestone and McGoldrick (2008). The Italian version of the ACA scale has been proposed and validated in 2010 on a representative sample of 800 Italian consumers (Castelli, 2010).

## 2.4. Data analysis

### 2.4.1. Questionnaire

Two scales have been used to group the subjects according to the sustainability level: the actual sustainable behavior scale (“Recently, how often have you performed the following actions?”) and the ACA scale (“For each of the following items, please indicate the statement which best fits with your experience”). The choice to use the first scale was based on the above mentioned national study (Castelli, 2010; Russo et al., 2011), whose results showed that the actual sustainable behavior scale is highly associated with those investigating other constructs from the TPB and used in the present questionnaire. The statistical approach adopted to group participants is described in the results section.

### 2.4.2. Consumer test

Data were subjected to Analysis of variance (ANOVA) considering *participants* (nested within sustainability level), *sustainability level* (non-sustainable, uncertain and sustainable), *method of production* (organic and conventional), *samples* (the eight yogurt samples, nested within method of production), *conditions* (blind, expected and informed) and the 3-way interaction *sustainability level by method of production by condition* as factors and hedonic scores as dependent variable. *Participants* and *samples* were considered as random effects in the model, whereas the other factors were considered as fixed effects. Since the dataset was not balanced, ANOVA was performed using the GLM (generalized linear model) procedure (type III SS). Least-Squares means (LS-means) and relevant standard errors were computed for each factor. LS-means are predicted population margins; that is, they estimate the marginal means over a balanced population. When the ANOVA showed a significant effect ( $p < 0.05$ ), *t*-tests were used as multiple comparison test (pdiff SAS LS-means option).

In order to establish whether a hedonic disconfirmation took place, *t*-tests were performed on the differences between blind and expected mean hedonic ratings for both organic and conventional yogurts. A disconfirmation occurs when this difference is significantly different from zero. In order to establish whether the disconfirmation was associated with an assimilation or a contrast effect, *t*-tests were carried out on the differences between the informed and blind mean hedonic ratings. When this difference is significantly different from zero, it means that there was a

significant effect of the information on hedonic scores. Furthermore, in case of negative disconfirmation, if this difference is higher than zero, an assimilation effect occurs; if the difference is lower than zero, a contrast effect occurs. In the assimilation case, when the difference between expected and informed liking is significantly different from zero, the consumers do not completely assimilate towards their expectation and assimilation is not total (Siret & Issanchou, 2000).

All statistical analyses were performed using SAS/STAT statistical software package version 9.1.3. (SAS Institute Inc., Cary, USA).

### 3. Results

#### 3.1. Questionnaire: participant segmentation according to sustainability level

As above mentioned, subjects were grouped according to the sustainability level on the basis of the actual sustainable behavior (TPB) and the ACA scales. Both scales have been tested for consistency. Cronbach's alpha for the TPB scale was  $\alpha = 0.69$  (15 items) and  $\alpha = 0.86$  (14 items) for the ACA scale (Cronbach, 1951). For each subject, an ACA and a TPB index were calculated as mean of the scores over the different items for each of the two scales (ACA: 25th percentile = 3.17, 75th percentile = 3.92; TPB: 25th percentile = 3.00, 75th percentile = 3.53). Pearson's correlation test has been performed to investigate the relationship between the ACA scale and the TPB scale, which have shown to be significantly correlated ( $r = 0.314$ ,  $p < 0.01$ ). Then, the distribution frequency of such scores was calculated for each index. The subjects with a score within the 25th percentile of both distributions were defined as "non-sustainable" (19 subjects; 12%), whereas the subjects with a score over the 75th of both distributions were defined as "sustainable" (23 subjects; 14%). The rest of the subjects were defined as "uncertain" (115 subjects; 74%). The groups' size matches with the results of the previously mentioned study (Castelli, 2010; Russo et al., 2011) conducted on a representative sample of Italian consumers aged 18–65, pointing out that the 10% of the population are non-sustainable subjects, and the 12% of the population are sustainable subjects. Values describing the distribution of the present consumers' group ( $N = 157$ ) and of the wider group ( $N = 800$ ) are as follows:  $ACA_{157}$ :  $M = 3.54$ ,  $sd = 0.55$ ,  $asymmetry = -0.032$ ,  $kurtosis = -0.136$ ;  $ACA_{800}$ :  $M = 3.72$ ,  $sd = 0.68$ ,  $asymmetry = -0.386$ ,  $kurtosis = -0.034$ ;  $TPB_{157}$ :  $M = 3.29$ ,  $sd = 0.42$ ,  $asymmetry = -0.124$ ,  $kurtosis = 0.574$ ;  $TPB_{800}$ :  $M = 3.03$ ,  $sd = 0.46$ ,  $asymmetry = -0.111$ ,  $kurtosis = 0.342$ ).

**Table 1**  
Questionnaire results: Percentage of answers to the question "Recently, how often have you performed the following actions?" (Never = 0 times, Rarely = 2–3 times a month, Sometimes = 1–2 times a week, Often = 3–4 times a week, Always = every day). In the last column the sum of the percentages of answers "Often" and "Rarely" is reported. S = sustainable action; NS = non-sustainable action.

Action	Never	Rarely	Sometimes	Often	Always	Often/Always
Recycling (S)	3.2	3.8	5.7	11.5	75.8	87.3
Using public transportation (S)	5.7	8.3	4.5	20.4	61.1	81.5
Buying seasonal food (S)	0.0	3.8	15.9	45.2	35.0	80.2
Eating meat (NS)	1.9	13.4	29.9	21.7	42.0	63.7
Saving electric energy (S)	10.8	12.7	21.7	22.3	32.5	54.8
Buying regional food (S)	3.8	15.3	34.4	39.5	7.0	46.5
Avoiding GMO food (S)	25.5	24.8	8.9	14.6	26.1	40.7
Avoiding preservatives in food (S)	6.4	22.3	36.9	32.5	1.9	34.4
Buying local food (S)	5.1	27.4	40.1	23.6	3.8	27.4
Eating organic food (S)	15.9	37.6	30.6	13.4	2.5	15.9
Leaving the lights on when unnecessary (NS)	36.3	38.2	14.0	9.6	1.9	11.5
Eating exotic food (S)	15.3	50.3	26.8	7.6	0.0	7.6
Mixing waste (NS)	65.6	19.7	8.9	2.5	3.2	5.7
Buying fair trade products (S)	41.4	42.7	10.2	5.1	0.6	5.7
Buying clothes from ethical fashion (S)	60.5	28.0	7.6	3.2	0.6	3.8

#### 3.2. Questionnaire: general knowledge about and attitudes towards sustainability

When asked "Have you ever heard about sustainability?", only 3% of the responses were negative. As concerning the question "In your opinion, what is the meaning of sustainability as referred to food?" the three items most frequently highlighted were "Integrating the conservation of natural habitats with the economic system survival" (chosen by 69% of subjects), "Being aware of life quality in daily consumer choices" (57%), and "Guaranteeing the farming animals health and welfare" (43%).

When asked "In your opinion, how much sustainable the following actions are?", the three items which were rated the highest were "Performing waste separation", "Saving electric energy" and "Purchasing seasonal food" (these items were considered very or extremely sustainable by the 95%, 90% and 77% of the respondents, respectively). "Consuming organic food" (ranked #9 among 18 items) was considered very or extremely sustainable by the 43% of the respondents, a lower percentage than the actions "Buying local food" (62%), "Buying zero-mile products" (60%) and "Buying Fair Trade products" (46%).

#### 3.3. Questionnaire: intention to adopt a sustainable behavior

When asked "Thinking about food purchase, are you willing to perform the following actions within the next month?" the respondents answered "Buying seasonal food" (93%), "Buying meat from animals raised without growth hormones and antibiotics" (65%), and "Buying eco-products" (65%). As for the action "Buying organic food" (ranked #11 among 14 items), only 32% stated that they would probably or certainly perform this action during the following month. It needs to be pointed out that a relevant percentage (35%) declared that wouldn't certainly (9%) or probably (26%) perform this action.

#### 3.4. Questionnaire: actual sustainable behavior

The percentage of answers provided by respondents to the question: "Recently, how often have you performed the following actions?" is reported in Table 1. As shown, "Recycling" is the most regular sustainable action, followed by the "Use of public transportation" and the "Purchase of seasonal food" (more than respectively 87%, 81%, and 80% of the subjects declared to perform these actions at least three/four times a week). "Eating meat" (non-sustainable action) is performed by a relatively high

percentage (63.7%) of subjects. “Organic food consumption” is not too much taken into consideration (only about 16% of the respondents declared to consume organic food at least three/four times a week).

### 3.5. Questionnaire: sustainability and food choices in terms of opinions and beliefs

As for the question “Considering the choice of food products, how important are the following factors for you?”, results revealed that product quality is the most popular purchase criterion (for 98% of the respondents this item is very or extremely important), followed by health, intended as food safety (96%) and health care (89%). Sustainability criteria are less frequent. Again, the organic origin of the product is not a major factor in consumer's decision-making; only 37% of respondents (ranked #16 among 24 items) consider it very or extremely important.

When asked “Considering sustainable food products, please indicate how much you agree with the following statements”, subjects mostly feel these products as safe (only 6% of respondents agreed or somewhat agreed with the statement “I think that sustainable food products are less safe than the conventional ones”) and as high quality products (only 7% of the respondents agreed or somewhat agreed with the statement “in my opinion, the quality of sustainable food products is low”). Nevertheless, respondents reported that information about sustainable food is poor (72%) and confusing (43%).

### 3.6. Questionnaire: awareness concern and action scale

The percentage of answers provided by respondents for each item of the ACA scale is reported in Table 2. Subjects are more interested in and pro-active for “Recycling” and “Respect of the environment” (respectively 89.2% and 88.6% of the respondents declared to be active on these issues), followed by “Enhancing renewable/alternative energies” (63.1%), “Enhancing local production” (60.5%) and “Preserving natural resources” (58%). As for the remaining items, most of the subjects developed a knowledge and understanding of the issues, they are interested in them yet they have not undertaken any action to promote most of the sustainable issues displayed. Once again, only a small proportion of respondents (36.9%) declared to be active on the “Enhancement of organic cultivation”.

### 3.7. Questionnaire: results on sustainable and non-sustainable subjects

The descriptive analysis performed on the whole subjects' sample was conducted also for the two subgroups, in an attempt to

draw a more detailed profile of sustainable and non-sustainable individuals. The uncertain group was not considered at this stage since their percentages of answer were comparable to those of the total group. A summary of the main results is reported in Table 3. The most frequently chosen items were often the same for the two groups; however, for each item the percentages were lower for the non-sustainable group, meaning that there was more diversity in the answers within this group than within the sustainable group. A major difference was found between sustainable and non-sustainable subjects when attitudes, purchase intentions, and behaviors towards organic products were considered. Indeed, 44% of the sustainable respondents considered as a very or extremely sustainable action the consumption of organic food. The percentage was 26% for non-sustainable subjects. In addition, 70% of sustainable subjects stated that they would probably buy organic food during the following month and 70% declared to be a regular consumer of organic food. In the non-sustainable subjects' group, only 6% of the respondents stated to be willing to buy organic food during the following month, and only 16% of them consume it frequently. As regarding the most important criteria in the choice of food products, the organic origin is considered important by 66% of sustainable subjects, and only by 11% of non-sustainable subjects. If we consider the actions proposed by the ACA scale, the 5% and 82% of non-sustainable and sustainable individuals respectively are interested in and proactive for the “Enhancement of organic production”. Information about sustainable products is considered as “confused” by 25% of sustainable subjects, and by 42% of non-sustainable subjects; also, it is considered as “poor” by 62% of sustainable subjects, and by 74% of non-sustainable subjects.

### 3.8. Consumer test: influence of the information about organic production on consumer's expectation

Hedonic evaluation of yogurts in the three different experimental conditions (blind, expected and informed) has been performed to investigate the influence of sustainability information – intended as food grown according to organic production principles – on consumers' preference.

ANOVA results showed a significant effect for the main factor condition ( $F_{(2,3589)} = 17.52, p < 0.0001$ ). Ratings in the expected condition were the highest, followed by those in the informed condition and then those in the blind condition, which received the lowest score. The main factor *method of production* was not significant, even though organic yogurts (LS-means = 49.0) received lower hedonic scores than the conventional ones (LS-means = 53.4).

Despite the main factor *level of sustainability* was not significant, the 3-way interaction *level of sustainability by method of production*

**Table 2**

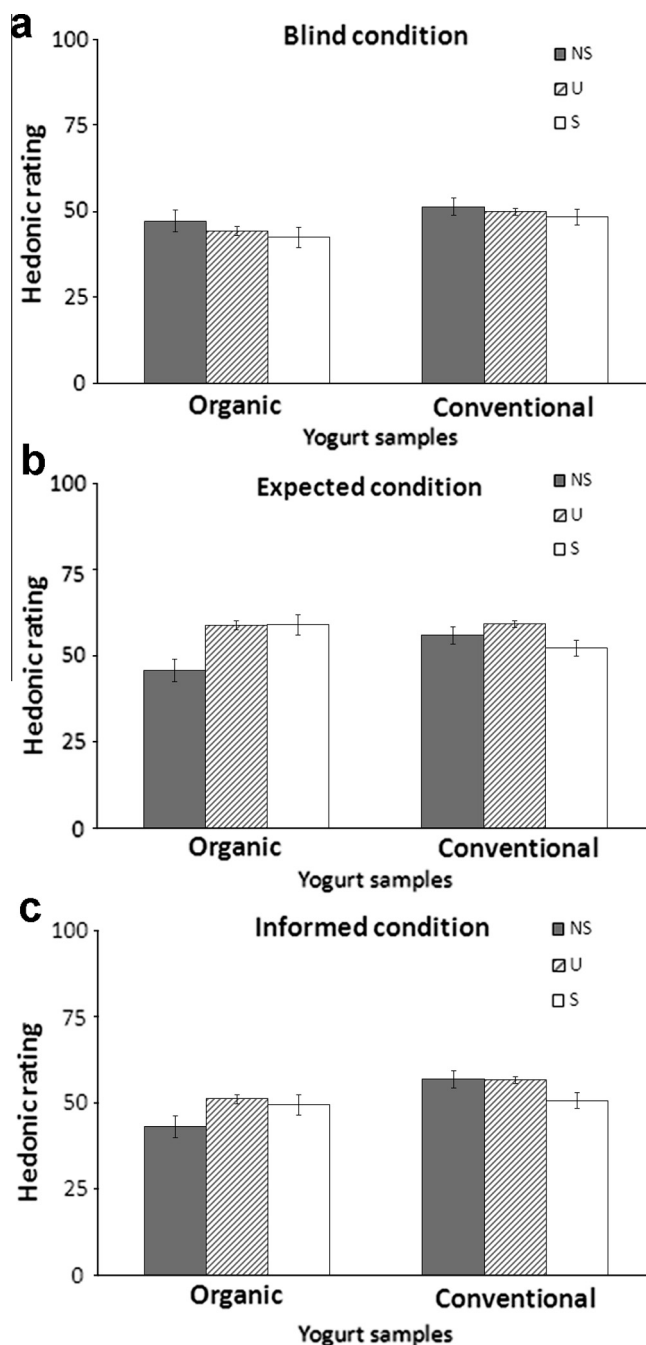
Questionnaire results: Percentage of answers to the question “For each of the following items, please, indicate the statement which best fits with your experience” (1 = I am not aware of this issue/I have never paid attention to it, 2 = I am aware of this issue but I am not interested in it, 3 = I am aware of this issue, I am interested in it, but I haven't done anything for it, 4 = I am interested in this issue and I have done something for it, 5 = I am interested in this issue and I have taken a significant action). In the last column the sum of the percentages of answers “4” and “5” is reported.

Action	1	2	3	4	5	4 + 5
Recycling	0.6	1.3	8.9	28.7	60.5	89.2
Respect of the environment	0.0	1.3	9.6	49.7	38.9	88.6
Enhancing renewable/alternative energies	0.0	7.0	29.9	38.9	24.2	63.1
Enhancement of local production	1.9	11.5	26.1	37.6	22.9	60.5
Preserving natural resources	1.9	5.7	34.4	41.4	16.6	58.0
Supporting local economy	2.5	10.2	36.3	35.7	14.6	50.3
Enhancement of free-preservatives food products	0.0	10.2	45.2	23.6	21.0	44.6
Enhancing sustainable production labels (i.e. ecolabels)	5.1	14.6	39.5	24.2	16.6	40.8
Enhancement of non-industrial farming	6.4	15.3	41.4	21.7	15.3	37.0
Enhancement of organic cultivation	3.2	21.7	38.2	26.1	10.8	36.9
Promoting environmental sustainable production	3.8	12.1	47.8	26.8	9.6	36.4
Contrasting the new developing countries exploitation	2.5	9.6	52.9	23.6	11.5	35.1
Contrasting GMO's food	3.8	21.0	42.0	19.1	14.0	33.1
Promoting workers' rights	2.5	14.6	51.0	21.7	9.6	31.3

**Table 3**  
Questionnaire results: Percentage of answers provided by sustainable (S) and non-sustainable (NS) subjects (for each question the items which were most frequently indicated by respondents as well as the item concerning organic production, when applicable, are reported).

Questions/Items	S (%)	NS (%)
Have you ever heard about sustainability?	100	95
In your opinion, what is the meaning of sustainability as referred to food?		
Integrating the conservation of natural habitats with the survival of economic system	65	79
Conservation and protection of water resources	52	42
Guaranteeing the health and welfare of animals in farming	48	53
Reduction or elimination of pesticides, hormones and antibiotics in livestock and agriculture	43	47
In your opinion, how much sustainable the following actions are?		
Performing waste separation	95	90
Saving electric energy	91	75
Buying zero-mile products	86	37
Purchasing seasonal products	78	53
Consuming organic food	44	26
Thinking about food purchase, are you willing to perform the following actions in the next month?		
Buying seasonal products	100	89
Buying eco-product	83	47
Buying meat from animals raised without growth hormones and antibiotic	83	37
Buying organic food	70	6
Recently, how often have you performed the following actions?		
Recycling	100	79
Saving electric energy	100	79
Using public transportation	96	79
Consuming organic food	70	16
Considering the choice of food products, how important are the following factors for you?		
Quality	96	95
Attention to health	91	84
Food safety	91	84
Organic farming origin	66	11
For each of the following items, please, indicate the statement which best fits with your experience		
Respect of the environment	96	79
Recycling	91	84
Preserving natural resources	91	32
Enhancement of organic cultivation	82	5
Promoting environmental sustainable production	70	53

by condition was significant ( $F_{(10,3589)} = 2.50, p < 0.01$ ). LS-means hedonic scores for each group of subjects by condition (blind, expected and informed) and method of production (organic and conventional) are reported in Fig. 1a–c. Considering the blind condition (Fig. 1a), no significant differences were found whatever the comparison was (no difference among the three groups for both the organic and the conventional products and no difference between organic and conventional products for each group of consumers). Considering the expected condition (Fig. 1b), non-sustainable subjects expressed the expectation of a lower preference for organic yogurts as compared to uncertain ( $p < 0.001$ ) and sustainable subjects ( $p < 0.01$ ), which in turn showed a comparable behavior. As for conventional yogurts, sustainable and non-sustainable subjects did not differ significantly, whereas uncertain subjects were comparable to non-sustainable but not to sustainable subjects. Furthermore, within each group of subjects, differences in liking for the two types of products have been found: non-sustainable subjects had a lower expectation from organic samples than from conventional ones ( $p < 0.05$ ). An opposite behavior has been observed for sustainable subjects as they had a tendency to expect the organic yogurts as better than the conventional ones ( $p < 0.07$ ). For uncertain subjects there was no significant difference between expectations for the two types of products. As concerning the



**Fig. 1.** a–c. Consumer test results: LS-means hedonic ratings provided by non-sustainable (NS), uncertain (U) and sustainable (S) subjects and relevant standard errors for organic and conventional yogurt samples under the three experimental conditions (Blind, 1a; Expected, 1b; Informed, 1c).

informed condition (Fig. 1c), non-sustainable subjects expressed a lower preference for organic yogurts as compared to uncertain subjects ( $p < 0.05$ ), whereas the difference between non-sustainable and sustainable subjects was not significant. As for conventional yogurts, sustainable subjects judged such samples as significantly less liked as compared to uncertain and non-sustainable subjects ( $p < 0.05$ ). Comparing LS-means hedonic scores of organic and conventional yogurts within each group of subjects, non-sustainable and uncertain subjects assigned significantly higher values to conventional yogurts than the organic ones ( $p < 0.001$ ), whereas sustainable subjects judged the two types of yogurts as equally good.

The influence of organic production information on sustainable, uncertain and non-sustainable consumers' expectations is reported in Table 4. As shown, the difference between blind and the expected liking scores (B–E) for organic yogurts was negative and significantly different from zero for sustainable and uncertain subjects, suggesting that a negative disconfirmation of expectations occurred for these consumers. The significance of the difference between informed and blind liking (I–B) scores was then calculated in order to establish whether the negative disconfirmation was associated with an assimilation or a contrast effect. This difference was positive and significantly different from zero for uncertain subjects and marginally different from zero for sustainable subjects, suggesting that the negative disconfirmation was associated with an assimilation effect. Furthermore, the significance of the difference between the informed and the expected liking (I–E) scores was calculated in order to establish whether assimilation was complete or not. As shown in Table 4, the assimilation effect was negative and significantly different from zero, suggesting that the information provided in the informed condition was not completely effective in reducing the difference between expectations and actual perception.

The difference B–E was not significantly different from zero in the case of conventional yogurts for both sustainable and non-sustainable subjects, suggesting that these products met consumers' expectations. On the contrary, for the uncertain group a disconfirmation of expectation was seen, which was associated with a marginally incomplete assimilation effect.

#### 4. Discussion

The present study results offer interesting highlights on two different issues: the influence of sustainability information on consumer's preferences towards a specific product, and whether being "sustainable" makes any difference in the impact exerted by information on individual's expectations.

When subjects were divided according to their sustainability level, the majority of them (74%) were defined as "uncertain" towards sustainability issues. This is in agreement with a larger survey carried out on Italian population (Castelli, 2010; Russo et al., 2011). For this uncertain group, there was no difference in expectation (expected condition) between the two types of yogurts (organic vs conventional). However, sustainable subjects had a higher expectation towards organic yogurt than the non-sustainable individuals. Furthermore, non-sustainable subjects expressed lower expectations from organic samples than from conventional ones, whereas the opposite behavior has been observed in sustainable subjects. Hence, sustainability awareness, positive attitude, and pro-active behavior on these issues may influence individuals' expectations about "sustainable" products. The results of the experiment in the expected condition reflect the actual purchase situation where the consumer is in a "complete informed" condition but he/she cannot taste the product before the actual purchase. In line with this assumption, Langen (2011) and

Chrysosoidis and Krystallis (2005) reported that – for some consumers – the positive attitude towards sustainable behavior is also revealed by food products choice. These results are also supported by the fact that the information about sustainability – intended as food produced according to organic production processes – had an influence on products' preference for sustainable and uncertain subjects. Indeed, organic samples produced a negative disconfirmation on consumers' expectations, which was associated with an assimilation effect, thus meaning that information about products affected hedonic scores since consumers tended to modify their perception towards their expectations in an attempt to reduce the gap between expectation and actual perception. However, the hedonic discrepancy between expected and perceived liking for organic products was not totally assimilated, suggesting that information about sustainability can't fill the liking gap. This outcome was not observed for non-sustainable subjects (12%) whom expectations for organic yogurts were confirmed. This means that for non-sustainable subjects liking scores for organic yogurts were comparable in all the three conditions tested (blind, expected and informed), suggesting that their preference was not influenced by the organic origin information. This may probably be ascribed to the fact that non-sustainable subjects are less involved in and proactive for organic production issues as indicated by the questionnaire results.

The effect of organic production information on hedonic judgments for beer was also investigated by Caporale and Monteleone (2004), who reported an overall positive effect of organic information on expected liking. The same results were found by Napolitano et al. (2010a), who observed an increased liking level for cheese, when the organic origin information was given. Napolitano et al. (2010b), when studying the information effect about welfare of cattle on acceptability for beef meet by regular and non-regular users, reported a high expected liking induced by the information in both groups. In these studies, a negative disconfirmation was associated with an assimilation effect, as in the present case. However, the assimilation was complete for meat but not for beer and cheese. Contrasting results were found by Poelman et al. (2008), who reported no influence of information about organic production and fair trade origin on pineapple liking. The discrepancy found in literature might be ascribed to the different nature of the food products tested, to the way the information about organic production was given, or to the specific consumers' target involved in the study. In this context, it should be stressed that participants involved in the present experiment were only university students.

The second issue addressed by this study is the "factual" presence of sustainability in consumer's life. The specific question was whether and how much sustainability affects consumers' life and preferences when buying goods and using services. As previously pointed out, most of the respondents developed sustainability awareness, but when questioned about sustainability meaning, most of them gave very broad and general definitions (e.g. "life quality care in daily actions" or "good, high-quality, and healthy food production"), no matter how much they are committed to sustainability. Only a reduced percentage of the subjects in each

**Table 4**

Consumer test results: Expectation effect on organic and conventional yogurt samples hedonic ratings (E = expected liking, B = blind liking, I = informed liking) for non-sustainable, uncertain and sustainable individuals.

Yogurt	Group	B–E		I–B		I–E	
		Lsmeans	p	Lsmeans	p	Lsmeans	p
Organic	Non-sustainable	1.5	n.s. Confirmation				
	Uncertain	–14.7	<0.0001 Disconfirmation	7.0	<0.001 Assimilation	–7.7	<0.0001 Incomplete
	Sustainable	–16.6	<0.0001 Disconfirmation	7.0	<0.10 Assimilation	–9.6	<0.05 Incomplete
Conventional	Non-sustainable	–4.6	n.s. Confirmation				
	Uncertain	–9.3	<0.0001 Disconfirmation	6.7	<0.001 Assimilation	–2.6	<0.10 Incomplete
	Sustainable	–4.0	n.s. Confirmation				



group associated the term with proper sustainable concepts (e.g. reduced presence of pesticides and antibiotics in food), thus confirming that sustainability is a widespread but not deeply understood concept. Furthermore, results show that most of the respondents usually perform actions with both practical and economic implications, such as waste separation, use of public transportation and purchase of seasonal food. In the food purchasing decision-making process, quality and health seem to be the most powerful triggers, followed by product's convenience, taste, and appearance. The factors related to sustainability concept are considered less important overall. Indeed, considering the results obtained from the whole group of consumers, the specific action of "Buying organic food" is not taken into such a consideration by respondents, which even hardly declare to have the intention to perform it. One reason might be that organic products are usually more expensive. Indeed, high prices are perceived as the biggest problem for over 40% of European respondents (Napolitano et al., 2010b). In this respect, 35% of respondents perceive sustainable products as too expensive. When analyzed as separate, the questionnaire results for sustainable and non-sustainable subjects change considerably, and this difference is mainly due to the attitude towards organic food products and production: sustainable subjects show a stronger awareness as regarding organic food and they are willing to buy and consume organic products. This behavioral discrepancy is in line with the liking gap for organic products found between the two groups in the expected condition.

Finally, the present experiment results show that the intention to behave sustainably is observed as generally low, even if sustainable products are perceived as safe, healthy, and high-quality, thus suggesting that people are quite aware of the sustainability concept, perform some "good propositions", but still they show a certain reluctance level towards the introduction of these practices in their every-day life. This could depend on the lack of information perceived by respondents about sustainable products, as shown also by Grunert, Bech-Larsen, and Bredahl (2000). It should be pointed out that this evidence could be due to the university students consumer specific target. This aspect, as well as the reduced number of total individuals considered, is a clear limitation of the study, which cannot be considered as representative of a larger community. Nevertheless, this aspect sounds quite alarming because the subjects involved in the experiment are supposed to be the more informed and aware about the issue for the young age, cultural level, and the attendance to university courses where sustainability is studied, investigated, and debated. Consequently, in this context, it is a key task to devise projects and strategies directed to foster stronger sustainability awareness among the younger and future consumers.

## Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.foodqual.2013.04.002>.

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