

Consumption of organic strawberries in Italy: demand analysis

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Introduction

In recent years the agri-food sector has experienced major changes and the concept of food quality has taken on a very different meaning. An important indicator of such changes is market restructuring: there has been rapid concentration among retailers and chain stores have become dominant, imposing their cost and quality constraints (Cembalo et al., 2007; Tijskens, 2003). Retailers are currently believed to play a more important role in ensuring food product quality and safety than public authorities (Henson, 2008).

To analyze this new aspect in the food sector, we carried out a survey on organic strawberry consumption in Italy. The choice of this product stems from the fact that strawberries represent, for Italian consumers, the very essence of fruit: they possess a series of both aesthetic and organoleptic properties such as to make the fruit particularly desirable. Awareness of this fact may well have made a major contribution to the expansion of strawberry farming in recent years. However, conventional strawberry farming is notable for its intensive use of chemical inputs. Consequently, the standard product may be viewed as unsafe, which makes the segment of organic production particularly interesting. Moreover, as is specified in the sections below, cultivation of or-

Abstract

Major changes have occurred in the agri-food sector in recent years, generating new and complex concepts of food quality. One of the most significant indicators of these changes is market restructuring, in terms of rapid concentration among retailers, the dominance of chain stores and their imposition of cost and quality constraints. To analyze this new aspect in the food sector, we carried out a survey on organic strawberry consumption. Interestingly, although the conventional strawberry may be considered unsafe, due to the widespread use of chemical inputs in the production process, the demand for organic strawberries remains fairly low. We attempted to investigate such concerns through a questionnaire-based survey. The data were analyzed using a Logit model to derive a demand estimate for organic strawberries. Our initial results indicate the presence of a major role played by large retailers and consumer lifestyles to drive the final demand.

Keywords: organic strawberry consumption; food quality and food safety; large retail; Logit model.

Résumé

Ces dernières années, le secteur agroalimentaire a connu des changements importants qui ont généré de nouveaux concepts de qualité des aliments. L'un des indicateurs les plus probants de ces changements est la restructuration du marché en termes de concentration rapide parmi les détaillants, la dominance de la grande distribution et leur imposition de coûts et de contraintes qualitatives. Afin d'analyser ce nouvel aspect du secteur alimentaire, nous avons mené une enquête sur la consommation de fraises biologiques. Malgré l'utilisation de produits chimiques dans la production de fraises conventionnelles, la demande de fraises bio est modeste. Notre enquête se base sur l'utilisation d'un questionnaire. Les données ont été analysées par le biais d'un modèle Logit pour estimer la demande de fraises biologiques. Les résultats préliminaires montrent que la demande finale est influencée par la grande distribution et par le style de vie des consommateurs.

Mots clé: consommation de fraises biologiques, qualité et sécurité alimentaires, grande distribution, modèle Logit.

ganic strawberries is of appreciable importance for several agricultural areas in Italy both in terms of acreage and income. Nevertheless, the demand for organic strawberries is still fairly low (Louriero and McCluskey, 2000; Bertino, 2006). In addition, Italian production faces competition from other countries, whether European, such as Spain (Llorens Abando and Rohner-Thielen, 2007), or non-European, such as Latin American countries where, due to particularly favorable agroclimatic conditions, the strawberry crop is year-round, while in Italy it is a seasonal crop (Willer et al., 2008). Since the difficulty finding the certified product on the market combined with the lack of information about the differences between the organic and conventional product (Cicia and de Stefano, 2007) are among the most

reliable determinants of organic strawberry consumption, we investigated such concerns through a questionnaire-based survey. The aim was to highlight which variables may play a major role in strawberry consumption (Wier et al., 2005) and hence draw some implications for the expansion of this sector in Italy. For this purpose, our analysis envisaged two distinct phases. The first consisted in exploratory analysis of the different variables so as to highlight how they are distributed in the sample and obtain preliminary information on their reciprocal importance in determining consumer purchase behavior. The second consisted in using a Logit model to derive a demand estimate for organic strawberries. In the following sections we illustrate the results obtained. The last section is devoted to drawing some conclusions.

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2. National consumer survey

2.1 General characteristics of the Italian strawberry market

Of fundamental importance for defining our approach were the findings from previous studies both on the characteristics of the organic strawberry production chain in Italy and on the consumption characteristics of organic products in general (Castellani, 2008; Ciccia et al., 2010; Torjusen et al., 2004; de Magistris and Azucena, 2008). As regards the first point, to date there is no reliable system of data collection for the organic sector across the various regions of Italy. This is evident from existing discrepancies among the various statistical sources as regards acreage under strawberry cultivation. According to FederBio¹ (2006), organic strawberry crops account for little more than 64 hectares, of which 50% is in Emilia Romagna, 9.4% in Sicily, 8.7% in Piedmont, 7% in Puglia and 6.4% in Veneto. However, according to SINAB², in 2006, the area used for this crop was 158 hectares, which is more credible than the previous acreage (SINAB, 2006). That said, the crop is concentrated within a few regions: in the north in Emilia Romagna, Piedmont and Veneto, in the south in two important farming areas in Sicily and in the Metaponto plain in Basilicata. Strawberry farming is substantially affected by the crop environment, which is why the various strawberry-growing areas in Italy, with their different soils and climates, have their own variety standards.

Organic strawberry farming techniques, such as crop rotation, green manuring and application of organic matter or humus, incur fairly high production costs compared with the conventional system. From estimates made by crossing information on the area harvested in the various farms with data from SINAB, organic strawberry production in Italy is slightly over 3,000 tons (2013) of which about 1000 are produced in the north, 1500 in the south and islands, and 500 in central Italy.

The organic strawberry market is adversely affected by problems tied to various factors. These include high production costs often matched by fairly low retail prices, as well as major shortcomings in marketing logistics. The only logistic platforms of a certain interest are Apofruit Italia and Apo Concerpo, both headquartered in Emilia Romagna. Apofruit cur-

rently groups 44 farms with 16 hectares under organic strawberry production, thanks to the increase in sales both on the domestic market and abroad with the Almaverde Bio³ brand (the only private brand in Italy not belonging to the large distribution chains but found in their outlets, which market the organic strawberry). This logistic platform is a strategic one also for production areas in southern Italy (the regions of Calabria, Sicily and Basilicata). Thanks to its market strategies Apofruit enables organic producers to obtain a price differential of between 50% and 70% against the conventional product, depending on market conditions.

The scarce presence of logistic platforms in Italy means that part of the organic strawberry crop is sold as conventional (25-30% of the product). However, the entry into the organic sector of large distributors, which account for about 50% of strawberry sales in Italy, has various effects on consumers and producers. While it has reduced the price differential between the conventional and organic product, it has led to a concentration of demand, considerably reducing the margins for negotiation. Suffice it to think that in Italy, unlike what occurs on foreign markets, all the producers who supply the large chains (especially COOP and Esselunga) have to forgo their own brand.

The domestic market, excluding large distribution chains, absorbs only small quantities of the product (about 15%) earmarked, in particular, for catering (organic canteens). The remaining 35% is exported. The domestic market needs strengthening, with the emphasis both on benefits conferred by the proximity of production and on improvement of the end product, a key element in consumer choice. Organic production experiences much stiffer competition from conventional (much cheaper) than integrated production. The latter especially provides, in the perception of the consumer, the same guarantees to safeguard the environment and human health, combined with the additional benefit of a lower price (Del Giudice et al., 2007; Hassan and Monier-Dilhan, 2006).

2.2 Sampling and questionnaire structure

The field survey was conducted by means of a questionnaire administered telephonically to a representative sample consisting of 318 consumers⁴ resident in all Italian regions. To enhance the reliability of the results we chose, as an eligibility criterion, only those responsible for purchasing food products. The survey was conducted in June and July 2008, in other words in the last phase of the customary period for marketing the fresh product in Italy. This choice was dictated by the need to get reliable responses on strawberry purchase and consumption habits. The questionnaire was administered to those who responded positively to the question "*Do you buy strawberries?*". Structured into 24 questions, it comprises three areas of information. The first was designed to reveal the strawberry purchase and consumption habits, especially focusing on consumer preferences vis-à-vis the main intrinsic and extrinsic attributes of the product. This set of questions concerned: the period of product purchase; the types of retail outlets most commonly frequented (small retailers, supermarkets or the farm itself); the importance attributed to

¹ FederBio is the Italian Federation of Organic and Biodynamic Farming (Federazione Italiana Agricoltura Biologica e Biodynamica). It was established in 1992 with the aim of constituting a single representative body to safeguard and promote organic and biodynamic farming.

² SINAB is the National Organic Farming Information System (Sistema di Informazione Nazionale sull'Agricoltura Biologica) set up by the Ministry of Agricultural, Food and Forestry Policy in collaboration with the regional authorities.

³ The brand Almaverde Bio actually embraces the following firms: Besana, Ca'Nova, Fileni, Fruttagel, Novissime, Oranfrizer, Organic oils, S.I.P.O., Zanellini.

⁴ The telephone numbers were chosen by using national directories of subscribers identified by drawing a set of random numbers (about 400). The survey took place in June and July 2008. The interviews were conducted on various days of the week and in different time slices.

various product characteristics, some of which are intrinsic like taste and color, and others extrinsic like organic or integrated certification; the production area and its distance from sales outlets. The second was designed to analyze the competitive ranking of the various types of strawberries and identify possible strategic tools to increase demand for the certified product. The third section included so-called control questions. It aimed to characterize the Italian consumer of organic strawberries especially in cultural and socio-economic terms. The questions therefore covered age, education, profession, family members, income and lifestyle. The questions were multiple choice and for particular variables we used Likert scales 1-7⁵.

Analysis was conducted in two phases: the first consisted in exploratory analysis of the information gathered; in the second, the results obtained were used to implement a Logit model to estimate organic strawberry demand. In this context, it is worth stressing that administration of the questionnaire was not preceded by any selection of the interviewees, the sample being randomly drawn. Indeed, all were asked the same questions regardless of the type of strawberries consumed (organic, integrated or conventional). Only those who stated that they never ate this product, were asked questions concerning their motivation for this choice.

2.3 Results of exploratory analysis

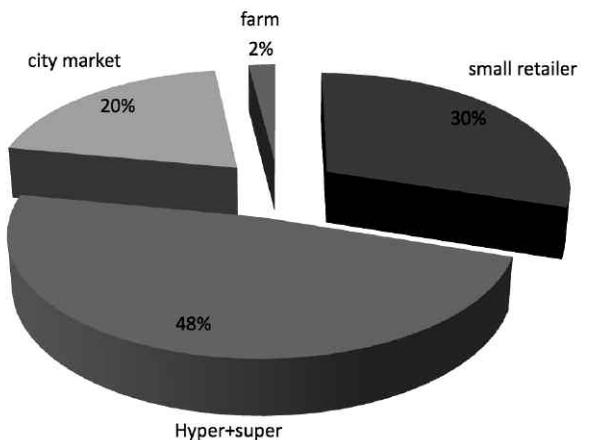
In terms of socio-demographic characteristics, it is women who are chiefly in charge of food shopping, accounting for as many as 84% of interviewees, while the age classes with the greatest concentrations are those between 31 and 50 (38%), and over 50 (32%). As regards marital status, 63% of the sample are married, against 7% single. Many of the nuclear families (42%) consist of four to six members, while over 38% have at most three members. In 60% of cases there are no children below the age of 10, while infants are found in 23% of cases.

With regard to the features of the sample that might be termed cultural and/or professional, only 4% have a university degree, and lower/higher secondary school leavers account for roughly equal percentages (40%). In terms of monthly net income, there is a considerable concentration (36%) in the classes between €1000 and 3000 while 26% state they can count on more than €3000.

As regards purchase and consumption habits, only 18% of the sample state they do not purchase this product at all for various reasons (preferences, food allergies, they grow strawberries themselves); the same percentage purchase them often while 47% and 17%, respectively, purchase them occasionally or rarely. To be more precise, with reference to the two months prior to the questionnaire being administered, that is, in the final period sales campaign, as much as 56% of the sample habitually consume strawberries (at least once a week); 24% purchase them once or twice a month and only 1% never buy any.

Of the various forms of distribution, the most commonly used channel is confirmed to be that of large distribution chains (48% of purchases), followed by small retailers (30%) and local markets (20%). Few consumers state they purchase the product directly at the farm gate (Figure 1).

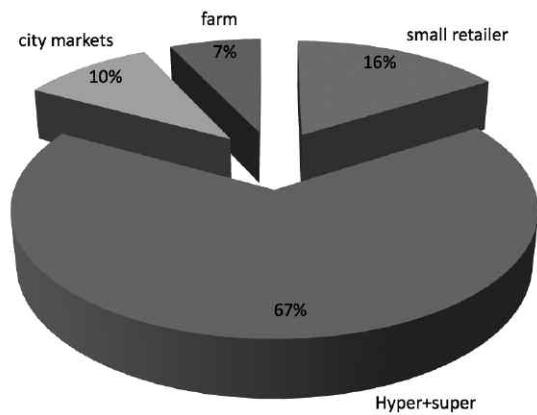
Figure 1 - Sample breakdown by strawberry purchase location.



Source: our elaboration on data survey

Using a Likert scale from 1 to 7 to record consumption preferences regarding the main intrinsic and extrinsic attributes of strawberries, the most preferred characteristics were: taste, quality certification, Italian origin, and biodegradable packaging. A high score was also attributed to all the intrinsic characteristics such as smell, appearance, color and degree of ripeness. Lower scores were given to credence attributes such as the country of origin and certified origin from integrated or organic farming. Of the 318 interviewees, 38% stated they

Figure 2 - Sample breakdown by organic and integrated strawberry purchase location.



Source: our elaboration on data survey

⁵ With 1 corresponding to *not at all important* and 7 to *very important*.

had purchased organic strawberries in the month prior to the interview and only 3% those from integrated farming. In both cases, the large distributors were preferred. Indeed, when asked: “*where do you buy organic or integrated strawberries?*”, 67% of the interviewees stated they bought them in hyper- or supermarkets, 16% preferred small retailers, 10% city markets while the short filière plays a marginal role (7%) (Figure 2).

The choice of large distributors as a preferred channel is conditioned by several variables, the main ones being a significant importance attributed to: the possibility of finding the organic product, which is unlikely to be available in other distribution channels; ensuring greater controls on products; the possibility of having more information on product characteristics and brand confidence. An interesting result is that concerning the information source in question. For consumers who purchased organic and integrated strawberries (41% of the sample), the distinction between the two types occurs mainly (85%) on the basis of labeling and for 12% thanks to leaflets available in the retail outlet. Of the 130 interviewees who purchased organic or integrated farming strawberries, 55% revealed the presence of children under 10 years of age in their nuclear family and also preferred organic products when it came to buying jam, biscuits for milk, spreadable paste, fruit juices, and so forth.

Given that the consumption of organic products is generally associated to particular lifestyles, the questionnaire contained several related questions. Interviewees were asked to indicate to what extent they agreed⁶ with the statements listed in table 1.

Table 1 - *Importance of some portrait values.*

“I see myself as a person”	Average score Scale from 1 to 7	Standard deviation
who adopts actions that may lead to a fairer world	4.7	1.3
who is personally committed to actions that may improve the quality of the environment	5.0	1.5
who is sensitive to social inequity	5.4	0.7
who is loyal to a specific distribution chain (Coop, Carrefour, Auchan, Conad etc.)	5.9	1.2
who is environmentally aware	6.3	0.7
who appreciates all that is natural	6.5	0.7
who believes traditions are important	6.6	0.8
with an active lifestyle	6.6	0.7
who is attentive to the seasonality of fruit and vegetables	6.7	0.7
who is very attentive to the quality of food purchased	6.8	0.4
who is family-oriented	6.8	0.5
who is health-conscious	6.9	0.4
who is very attentive to value for money of the goods I buy	6.9	0.4
who is very attentive to the country of origin of the food products I buy	6.9	0.3
Source: our elaboration on data survey		

⁶ According to a Likert scale where 1 = *strongly disagree* and 7 = *strongly agree*.

From the average scores it may be inferred that the interviewees pay great attention to country of origin of foodstuffs in connection with product safety. This aspect is of great importance: attention to health and the quality of food consumed were given high scores, similar to those of origin. There also emerges a certain importance attached to fruit and vegetable seasonality, traditions and loyalty to a specific distribution chain.

Finally, to find out the level of information, credence and motivations behind the purchase of organic products, we used questions requiring *yes/no/don't know* answers. Of the 172 interviewees (54% of the sample) who responded, all pointed to the need for ministerial certification for organic produce, but only slightly more than half knew the difference between organic and integrated farming. Although most of the interviewees felt the information available on organic products was not clear, knowledge of their characteristics was sufficient. Of the various sources of information, great confidence is laid in information campaigns, in consumer associations and in environmental organizations, as well as in information gathered at specialized retail outlets or directly from the farm concerned. By contrast, information disseminated by public authorities or by the television and internet enjoys a lower degree of confidence. Lastly, some questions were asked to identify the strategic tools to boost organic strawberry consumption (table 2).

Table 2 - *Importance of various strategic tools.*

Questions	Average score	Standard deviation
	Scale from 1 to 7	
Clearer certification with greater guarantees	7.0	0.2
Origin in the production area closest to my home	6.5	0.8
Better taste	6.3	0.9
Lower price	5.2	1.1
Source: our elaboration on data survey		

Clearer and better defined certification emerged as the main tool on which to act, followed by proximity to the production zone. A better taste and lower price would appear less incisive marketing tools.

2,4. The econometric model: estimates and results

Binary choice models are known to assume that individuals make a choice between two possible alternatives, influenced by socio-economic or psychographic characteris-

tics. If we know the attributes of the subjects involved, it becomes straightforward to estimate an equation that can predict the choice made by individuals of a population. The first objective of such modeling is to determine the probability of a given individual, characterized by known explanatory variables, making one choice rather than another.

One approach consists in logit models (Maddala, 1988), where it is assumed that there is a latent response variable y_i^* defined by the following relation:

$$y_i^* = \beta' x_i + u_i$$

In practice, y_i^* is not observable and will supply in the following models the point of contact with Random Utility Theory. Instead, the observable variable is represented by a dichotomous y which assumes the following values:

$$\begin{aligned} y &= 1 && \text{if } y_i^* > 0 \\ y &= 0 && \text{otherwise} \end{aligned}$$

In this model $\beta' x_i$ is equal to $E(y_i^*|x_i)$. In probabilistic terms, we have:

$$\begin{aligned} \text{Prob}(y_i=1) &= \text{Prob}(u_i > -\beta' x_i) \\ &= 1 - F(-\beta' x_i) \end{aligned}$$

where F is the empirical distribution function of u .

In this case the observed values of y are the realizations of a binomial with probabilities dependent on x_i . The functional form for F will depend on the assumptions made for u_i which, in the case of organic strawberry demand estimation, was assumed logistical:

$$F(-\beta' x_i) = \frac{\exp(-\beta' x_i)}{1 + \exp(-\beta' x_i)} = \frac{1}{1 + \exp(\beta' x_i)}$$

$$1 - F(-\beta' x_i) = \frac{\exp(\beta' x_i)}{1 + \exp(\beta' x_i)}$$

In the statistical model implemented, we considered 255 individuals out of 318, given that the remaining part returned a questionnaire which was not sufficiently complete for insertion in the analysis.

⁷ The variables for inclusion in the model were chosen on the basis of their statistical significance. In the initial estimation phase we considered all the variables detected in the questionnaire insofar as they were deemed possible explanatory variables of the demand for organic strawberries. The final formulation of the statistical model is thus derived from joint evaluation of the model's indices of significance and that of the independent variables used. The variables inserted in the final model all have a significance below 10% except for the Seas variable (significance level: 13,3%). However, the latter level was both due to the high interpretative value and to the non-negligible contribution of the improvement in the model's global reliability.

Taking account of the variables deriving from the various areas of information into which the questionnaire was divided, it was possible to formalize the following empirical model:

$$\begin{aligned} \text{BOS}_i &= \beta'_{\text{Kids}} \text{Kids}_i + \beta'_{\text{Fam_n}} \text{Fam_n}_i + \beta'_{\text{Nat}} \text{Nat}_i + \beta'_{\text{Ret}} \\ \text{Ret}_i + \beta'_{\text{Seas}} \text{Seas}_i + u_i & \quad i = 1, 2, \dots, 255 \end{aligned}$$

In this specification, i is the index relative to the 255 individuals making up the sample; BOS_i is the dependent variable which expresses the purchase of organic strawberries made by the consumer ($\text{BOS}=1$ if the consumer has purchased organic strawberries; 0 otherwise); Kids_i , Fam_n_i , Nat_i , Ret_i , Seas_i , are column vectors which describe respectively the presence of children in the nuclear family (Kids_i for which the value 1 was used to indicate the presence of children, 0 the absence), the number of family members (Fam_n_i whose value indicated by each individual ranges from 1 to 6), respect for the environment (Nat_i for which a 7-level Likert scale was used in which 1 stood for *not at all important* and 7 *very important*), the preferred distribution channel ($\text{Ret}_i=1$ if he/she purchased in a large distribution chain; 0 otherwise), and finally the importance of food seasonality (the variable Seas_i for which the 1-7 Likert scale was always used). The model variables (Table 3) were all in agreement sign-wise with the expected impact⁷.

The significance of the model was verified with the Likelihood Ratio Test. The model's goodness-of-fit was verified with the Count R-squared index (0.73).

Interpretation of the results obtained with the aid of the econometric model leads to some interesting observations. The dependent variable considered in the statistical analysis allowed us to divide the sample into two groups. As regards purchase of organic strawberries, 49% of individuals (125 interviewees) responded negatively while the remaining part (130 interviewees) acquired the product. The presence of children in the nuclear family and particular attention to lifestyle naturalness were variables that most affected the purchase choice of organic strawberries. The third variable in order of importance was the purchase channel which in this case consisted of large distribution organizations. One parameter which agrees sign-wise with expectations but was characterized by marginal significance was the importance attributed to food product seasonality.

3. Concluding considerations

Driven by various demand components, the organic farming sector has experi-

Table 3 - Results of the econometric model.

Variables	Coefficient	z-Statistic	Prob.
Kids	0.769	4.363	0.000
Fam_n	0.240	1.791	0.073
C	-11.609	-4.764	0.000
Nat	0.634	2.913	0.003
Ret	0.464	3.311	0.000
Seas	0.408	1.502	0.133
Total obs	255	Obs with Dep=0	125
Obs with Dep=1			130

enced major changes in time. What has played a particularly important role is both the greater attention paid by end consumers to food product quality and the role played by distribution in mediating needs expressed by the consumer (Hassan and Monier-Dilhan, 2006; Louriero and McCluskey, 2000). This process has been accompanied and, in some ways, shaped by a changing regulatory framework, which is increasingly rigorous and attentive to food safety and hence has become stricter for organic production as well. Since the 1990s, interest in the sector on the part of institutions has become more intense, partly to ensure homogeneity in defining production techniques and create an efficient control system to avoid fraudulent behavior on the part of producers. While the phases of processing and marketing have substantially held up, which indicates the sector's stability and maturity, the production phase is experiencing intense structural reorganization. This has resulted in a stronger production chain which is extremely market-oriented. Compared with the past, the sector is more mature, business-oriented and less inspired by ideals. In the meantime, also in terms of commercial distribution there has been a certain dynamicity: the role of the large distributors has been consolidated, whose strategies based on private production standards appear to have structured agri-food production chains in a new way.

However, consumption of organic fruit and vegetables, especially the production and consumption of organic strawberries, appears somewhat limited. Our analysis shows that, to date, the consumption of organic strawberries is still perceived as niche consumption. Indeed, the variables that appear to positively affect the choice to purchase this product are the presence of children in the family, the environmentally friendly lifestyle of the interviewee and the distribution channel. The first two attributes show that organic strawberry consumption is more widespread in sensitive segments (food for children or lifestyles); by contrast, the last (distribution channel) demonstrates that it is large distribution which manages to satisfy this demand segment, both due to limited product availability in other channels, and to the quality assurance function is increasingly performed by hyper- and supermarkets.

The most significant elements emerging from our analysis are thus two-fold. First, there is the important question of product availability, with many consumers stating the difficulty finding certain categories of organic products in the most frequently visited retail outlets. This implies the need for greater uniformity of product distribution among the various distribution segments. The second aspect concerns the visibility of organic products, aside from the distribution channel in which the product is purchased. Given that quality certification increases the consumer's ability to assess food properties at the moment of purchase, but is not tied to any of the intrinsic aspects of the product, the communication strategies implemented by firms should focus on ways to enhance the visibility of quality characteristics associated to organic produce.

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