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Toward a better understanding of market potentials for vegan food. A choice experiment for the analysis of breadsticks preferences

Francesco Marangon[a], Tiziano Tempesta[b], Stefania Troiano[a]*, Daniel Vecchiato[b]

[a]*University of Udine, via Tomadini 30/a, 33100 Udine, Italy*
[b]*University of Padua, via dell'Università, 35020 Legnaro, Padov, Italy*

Abstract

Recently, vegan food has received increased attention from Italian consumers. Despite this fact, it has rarely been the subject of analysis. Our study focuses on consumer preferences for breadsticks in North-Eastern Italy. We applied a choice experiment where a hypothetical market was designed to analyze five characteristics of breadsticks (country of origin, vegan product certification, production method, type of flour, and price). We collected data by interviewing 487 consumers and analyzed them by means of the random parameter logit model. Results suggest that 8% of respondents are willing to pay a premium price for vegan breadsticks and that there is the opportunity to develop local chains for vegan niche markets.

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Keywords: vegan food; choice experiment; marketing; willingness to pay; random parameter logit model.

1. Introduction

The avoidance of all products derived from animals (i.e. vegan products) has become an increasing trend in modern life style (Davis and Melina, 2000; Radnitz et al., 2015). Veganism is the most extreme type of vegetarianism, as it prescribes abstaining from either eating or utilizing animal products (Larsson et al., 2003), including by-products. The reasons of adopting a vegan lifestyle are mainly ethical and moral (Dwyer, 1991; Zamir,

* Corresponding author. Stefania Troiano, Tel.: +039 0432 249221; fax: +039 0432 249229.
E-mail address: troiano@uniud.it

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2004), and its reported health benefits (Craig, 2009; Key et al., 2006), but other reasons that affect the decision to avoid meat products include sensory disgust and the influence of friends (Santos and Booth, 1996). In fact, although being a vegan may simply require the individual to adhere to a vegan food diet, a number of vegans extend this philosophy into other areas of their lives and consider veganism a lifestyle with specific ethical, environmental and spiritual characteristics. Giddens (1991) stated that becoming a vegan is a 'life project' while McDonald' (2000) concluded that the elements of the process of becoming a vegan include catalytic experiences that trigger a specific response. It we accept that vegetarianism has challenged conventional culture, it could also be affirmed that veganism is challenging the same conventions to a greater degree (Povey et al., 2001).

The Vegan society was created in 1944 in order to eliminate all forms of animal exploitation and recognize the errors which existed in the vegetarian movement. Throughout the '90s veganism became more widespread, though still remaining a fairly rare phenomenon (Beardsworth and Keil, 1991), but during the 2000s it became increasingly popular and vegan food became available in supermarkets and restaurants in many countries. It would seem that this market is no longer limited solely to those consumers who are willing to seek out and pay the price for a premium product. A recent report suggested that in Italy as many as 0.6 - 1.1% of the population now consume vegan food (Eurispes, 2013 and 2014) and that the vegan market is still increasing.

In spite of the increasing presence on the market of this type of vegan consumption, veganism has been largely ignored in research carried out by economists. To date, few studies have been published and these are more concerned with predicting certain behaviors or dietary intakes than with explaining and evaluating the choice of vegan food and analyzing this specific niche market. For example, Povey et al. (2001) compared the attitudes and beliefs of meat eaters, meat avoiders, vegetarians and vegans from a psychological point of view. They found that respondents tended to have most positive beliefs and attitudes towards their own diet, and most negative attitudes towards the diet most different from their own. Larsson et al. (2003) described the process of becoming a vegan among adolescents using grounded theory and the adolescents' perceptions in the framework of symbolic interactionism. Eckart et al. (2010) evaluated the nutrient profiles of vegan and non-vegan menu items offered in school lunches in Florida and demonstrated that students were clearly willing to purchase vegan menu item. More recently, Adise et al. (2015) investigated people's willingness to try, and their ratings of disgust, danger and distaste for animal and vegan versions of foods and found that vegan foods and the foods that the subjects were told were vegan were rated as being familiar as the versions of animal origin.

There is also fairly sizeable literature that evaluates the dietary intakes and lifestyle factors of vegans (Abdulla et al., 1981; Craig, 2009; Haddad et al., 1999; Key et al., 2006; Lightowler and Davies, 2000; Rana and Sanders, 1986; Roshanai and Sanders, 1984; Waldmann et al., 2003).

Our paper is fundamentally different from the main traditional studies which examine vegan consumers as it adopts an economic point of view. In fact, it seeks to analyze the attitudes, preferences and willingness to pay (WTP) of Italian consumers living in northeastern Italy when they purchase vegan food. We studied these characteristics in subjects who were both familiar and clearly not familiar with vegan products.

To elicit WTP we designed a hypothetical market based on a choice experiment (CE) to simulate a real purchase situation with breadsticks as a good.

A number of studies have previously used either breadsticks or bread in a CE, but none have taken into consideration the vegan attribute. For example, Aerni (2011) and Aerni et al. (2011) tested and revealed consume preferences for genetically modified (GM) corn bread. Similarly Rigby et al. (2009) and Burton and Rigby (2009) chose bread to investigate preferences for Non-GM, GM and GM derived foods and assessed the roles of process and product composition in determining responses. A stated preference survey of choices of pre-packaged sliced bread in which different labeling contexts were associated with the presence of GM ingredients was conducted by Hu et al. (2006). In addition, the trade-offs made by consumers between possible risks associated with GM ingredients and potential health or environmental benefits of bread were examined by Hu et al. (2004). Foster and Mourato (2002) used bread in the context of a contingent ranking to study preferences of bread types whose production process implied varying health (private) and environmental (public) effects. The mixed logit (ML) using Bayesian methods was employed to examine WTP to consume bread produced with reduced levels of pesticides by Balcombe et al. (2009). Furthermore, the estimation of consumer WTP for bread was the aim of the studies conducted by: Hellyer et al. (2010), who used bread containing functional ingredients; Anyam et al. (2013), who identified the importance of food safety attributes in bread in Lagos metropolis; and Saito and Saito (2013), who

highlighted the WTP of Japanese consumers for local wheat bread. Moreover a CE using different prices, brands and labels was conducted for bread, beer and milk to point out the importance of local production in Germany by Roosen et al. (2012).

In our study, the analysis was carried out in a random parameter logit (RPL) framework to take into account the presence of preference heterogeneity across respondents.

Results from this paper can inform the marketing strategies of firms seeking to promote the sale of vegan food. In detail, findings provide suppliers with information about what kind of consumer would be interested in vegan food and also provide them with practical recommendations on how to better market their products. In addition, our study may contribute positively to the debate on the relationship between the attitudes of vegan consumers and their food choices.

The paper proceeds as follows. Section 2 presents the survey as such, together with its associated development and design and the economic/econometric specification, while 3 presents the econometric results. Finally, 4 discusses the results and their implications together with some concluding remarks.

2. Material and methods

The consumer theory of Lancaster (1966), the information processing and decision making in psychology (Anderson, 1970) and the random utility model of McFadden (1974) are the statistical economic framework for the CE used to estimate behavioral models of consumer choice. Using this framework, an individual chooses from a number of alternatives and selects the one that reaches the highest utility level on any given choice situation. In a CE, the alternatives are decomposed into their key attributes, then a range of levels are associated to each attribute. With the experimental design it is then possible to create different choice sets. The overall utility of an alternative can be decomposed into separate utilities for its attributes and becomes a function of alternative characteristics. The utility function of each respondent is the sum of a deterministic term (a function of factors that influence the respondent's utility), and a stochastic random term (unobservable to the researcher).

In a discrete choice modeling framework all alternatives must satisfy some criteria. In detail: alternatives are exhaustive, mutually exclusive and their number is finite. The respondents are assumed to maximize their expected utility when facing a choice among different alternatives that give back different levels of utility. The observer is not able to directly observe respondent utility, nevertheless the attributes about competing alternatives can be observed.

Unlike the conditional logit model where consumers' preferences are assumed to be homogeneous, a model that relaxes the assumption of homogeneity of preference allowing for heterogeneity is the RPL model.

In this study, consumer attitudes toward and WTP for vegan food were analyzed using a consumer survey with a CE, which was designed to develop an understanding of the level of knowledge on and preferences regarding vegan food. This permits the analysis of consumers' preferences in terms of the utility they perceive will result from a vegan attribute. We chose to use breadsticks in the present survey after the results of pre-tests and a number of focus group discussions indicated them as the most suitable, reasonable, and neutral product when comparing the food preferences of vegans and "conventional" consumers. Breadsticks can be considered an item which everyone is familiar with but which does not possess the same personal, cultural and religious connotations as bread (Aerni, 2011).

The attributes and their levels were decided during preliminary focus group discussions. A total of five attributes, including country of origin, vegan certification, organic certification, flour, and price, were set to examine the interactions between different attributes (Table 1).

The "country of origin" attribute assumed one of three levels: produced in Friuli Venezia Giulia Region, a Region of North-Eastern Italy, bordering Austria and Slovenia; in other Italian Regions; and in other exporting countries.

The vegan and organic certification attributes were indicated as present or absent.

As regards flour, three different types were considered for this survey: Kamut®, "00", and whole wheat. Kamut® Khorasan Grain is a trademarked type of khorasan grain (or *triticum turgidum*) which originated in a region stretching from present-day Jerusalem, through Syria, Lebanon and Iraq. The grain passed out of common knowledge until it was rediscovered. Now it is a protected species grown with organic farming methods and under controlled conditions. It seems also that the consumption of Kamut floor could be a potential remedy for gluten

intolerance (Molberg et al., 2005; Spaenij–Dekking et al., 2005). The name "00" ("*Doppio Zero*" simply meaning double zero) refers to specifically Italian refined white flour, which contains only endosperm of grain and is usually used for pasta and bread making or baking. The grading system (2, 1, 0 or 00) indicates how finely ground the flour is and how much of the bran and germ has been removed. 00 is the most refined and has the lowest level of bran content. Commercial common wheat flour (white) is usually classed as double zero. Whole-wheat or wholemeal flour is made using all of the grain (bran, germ, and endosperm) in the process of making the flour. Because of this process, it has a textured, brownish appearance, but contains more vitamins than refined flour.

The attribute price has 3 levels ranging from € 0.75-2.25 per package (250 gr).

By means of a fractional factorial orthogonal design, 18 alternatives (or profiles) were selected. The profiles were randomly combined into 6 choice sets involving the comparison among different breadsticks with varying levels of attributes. Each choice task required respondents to choose from three different breadsticks defined according to the attributes, and the" opt-out" alternative, to give the consumers the freedom of choice that they have in real market situations, where they can also decide not to purchase any breadsticks at all. The respondents were also informed that, except for these attributes, the chosen breadstick packages had no difference in any other aspects. Then they were asked to consider the choice tasks as separate situations and answer each choice task.

A pilot survey was conducted and 50 consumers filled in the pilot questionnaire. The pre-tests resulted in a number of minor changes in the formulation of questions. The final questionnaire was developed based on the findings, and was divided into two main parts. After socio-demographic questions, it included a number of questions about the individuals' knowledge and consumption of vegan and organic food, while the second part included the CE.

Before the survey, interviewers were trained in survey administration while the attributes of the breadsticks were described in the survey so that the interviewers could explain differences in the levels of each attribute to survey participants. Moreover, following good practice in conducting CE (Lockshin et al. 2006; Loureiro and Umberger 2007), the choice sets were shown in color pictures to the respondents. An example of a choice set is illustrated in Figure 1.

Data were collected from January 2013 to January 2014 through a face-to-face survey with 500 consumers in the Friuli Venezia Giulia Region. As is usual in this kind of research, interviewees were contacted in the main lobby area of a number of supermarkets and groceries by using a random sampling approach (Rossi et al., 2013). Only people over 17 were contacted.

The research made use of the data of 487 respondents. The dataset was based on 2922 choice observations (6 choices completed by each of the 487 respondents).

Table 1. Attributes and levels in the choice experiment design

Attributes	Levels
Country of origin	Friuli Venezia Giulia Region, Other Italian Regions, Other exporting countries
Vegan	Yes, No
Organic	Yes, No
Flour	Kamut®, "00", whole-wheat (or wholemeal)
Price (€/250 gr.)	0.75, 1.50, 2.25

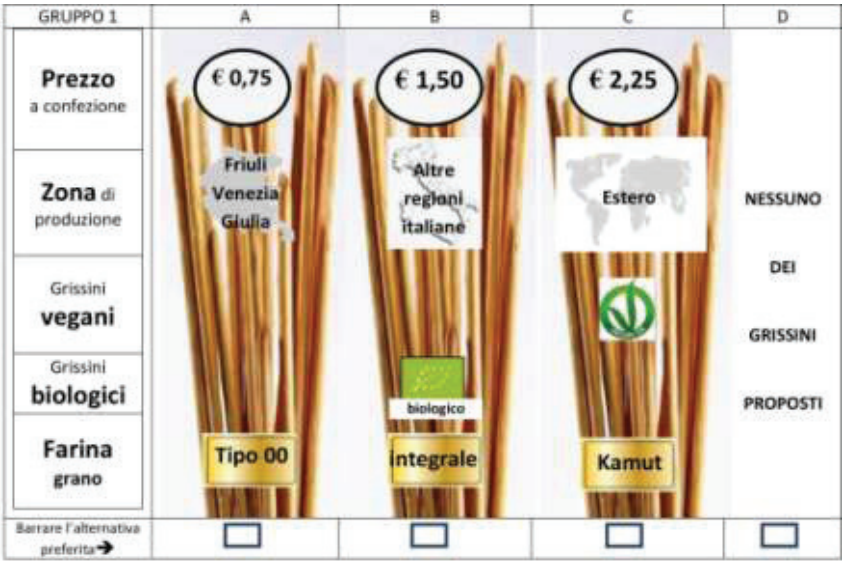

Fig. 1. Graphical representation of a choice set (in Italian).

Through the program NLogit4® the choice data were analyzed and an RPL model was estimated. The utility function considered is illustrated as follows:

$$U(xi) = \beta_0 \cdot OPT\text{-}OUT + \beta_1 \cdot FVG_i + \beta_2 \cdot ITALY_i + \beta_3 \cdot VEGAN_i + \beta_4 \cdot ORGANIC_i + \beta_5 \cdot WHOLEW_i + \beta_6 \cdot KAMUT®_i + \beta_{price} \cdot PRICE_i$$

where: OPT-OUT = dummy for the "none of these / no choice" option; FVG = dummy for production in Friuli Venezia Giulia; ITALY = dummy for production in the remaining Italian Regions; VEGAN = dummy for vegan attribute; ORGANIC = dummy for organic food; WHOLEW = dummy variable for whole-wheat flour; PRICE = price in €/package. The β_s coefficients can be considered as the marginal utilities of each attribute of the utility function.

Considering the aim of the research, five interaction terms were added to the base model: interviewees older than 55 years, educational level lower than secondary school, breadsticks consumption (never or rarely), knowledge of vegan food, knowledge of organic food. In the final model only the significant interactions were taken into account. The random parameters of the model were assumed to be normally distributed.

It was also possible to estimate the premium price (or WTP) for each attribute level by dividing β coefficients by β_{price}

$$WTP = - \beta / \beta_{price}$$

3. Results

The sample, although not representative in terms of age and educational level, was highly diverse on key socio-demographic variables and this will be helpful in understanding the factors affecting the purchase of vegan products. Female made up 52% of the sample. Each relevant age group was represented. In general, it is possible to note that the sample was younger and had a higher educational level than average among the citizens of Friuli Venezia Giulia (Table 2).

The vast majority of the sample (85.6%) declared that they are familiar with organic food and 56% said that they sometimes consumed it. Respondents (51%) knew about vegan food, but mainly did not consume it.

The majority preferred to consume bread (76.4%), while only 8.8% regularly consumed breadsticks. In fact, 61.2% of respondents declared they only occasionally eat breadsticks, while 11.9% never eat them.

Table 2. Interviewee characteristics

		n.	%	Friuli Venezia Giulia Region*
Gender	Female	253	51.9	52.2
	Male	234	48.1	47.8
Age	Under 25	78	16.0	10.6
	25-40	218	44.8	20.5
	41-55	110	22.6	28.1
	56-70	78	16.0	27.3
	Over 70	3	0.6	22.1
Educational level	Primary and lower secondary	80	16.5	49.4
	Secondary	232	47.6	37.9
	Graduate	172	35.7	12.7
Organic food: knowledge	Yes	417	85.6	
	No	70	14.4	
Vegan food: knowledge	Yes	248	50.9	
	No	234	48.1	

* People over 14 years old

The RPL model has an acceptable fit (McFadden Pseudo R-squared = 0.16) (Table 3). All the coefficients are statistically significant ($p < 0.05$). The same applies to the interaction terms with the sole exception of the interaction Wholemeal x Organic knowledge ($p = 0.06$). As expected, the price coefficient is negative.

The most important characteristic affecting the interviewees' utility is the place of production. Similarly to other Italian studies, people tend to prefer a product coming from their own country of residence (region or nation) (Mauracher et al., 2013; Tempesta and Vecchiato, 2013; Troiano et al., 2014). The WTP for the breadsticks manufactured in the Friuli Venezia Giulia Region is equal to €2.38 compared with foreign products. The WTP for regional products is higher for people with a lower educational level. With reference to the vegan breadsticks, on average the WTP is negative. Nevertheless, from the analysis of the cumulative frequency distribution of individual WTPs it is possible to observe that nearly 8% of respondents have a positive WTP for the vegan certification. This highlights the presence of a market segment that may constitute the target of vegan breadstick producers. Furthermore, the propensity to buy vegan increases in the case of people who know about vegan and organic production and are not regular breadsticks consumers. On the contrary, people with a lower educational level seem to be less attracted by this kind of product. The attitudes toward organic food are not affected by the individual characteristics, which were used as interaction terms. On average, people are willing to pay €0.96 more for organic breadsticks in comparison with to conventional ones. Moreover, the type of floor seems to be another important potential factor for market segmentation.

The average WTP for the use of wholemeal flour is equal to €1.18, but it decreases in the case of people who do not consume breadsticks regularly, and in the case of who people declared they knew about organic and vegan production methods. The attractiveness of Kamut® floor has an opposite trend: on the one hand, the WTP is (on average) negative and older people seem to be less interested in this kind of floor; on the other hand WTP increases when respondents are acquainted with organic production.

Table 3. RPL model results

		Coeff.	Std. Error	T-value	p-value	WTP
	Random parameters in utility function					
Friuli		1.060	0.100	10.647	0.000	2.389
Italy		0.570	0.102	5.599	0.000	1.285
Vegan		-0.646	0.181	-3.576	0.000	-1.455
Organic		0.428	0.110	3.881	0.000	0.965
Wholemeal		0.524	0.174	3.013	0.003	1.182
Kamut®		-0.508	0.176	-2.887	0.004	-1.145
	Non random parameters in utility function					
OPT-OUT		-0.983	0.187	-5.258	0.000	
Price		-0.444	0.046	-9.571	0.000	
	Heterogeneity in mean, parameter: variable					
Friuli	Educational level: primary and lower secondary	0.492	0.158	3.108	0.002	1.110
Vegan	Breadsticks consumption: never or rarely	0.450	0.125	3.595	0.000	1.015
Vegan	Organic knowledge	0.502	0.165	3.046	0.002	1.131
Vegan	Vegan knowledge	0.401	0.121	3.322	0.001	0.903
Vegan	Educational level: primary and lower secondary	-0.491	0.150	-3.269	0.001	-1.106
Wholemeal	Breadsticks consumption: never or rarely	-0.380	0.123	-3.087	0.002	-0.855
Wholemeal	Organic knowledge	-0.304	0.163	-1.863	0.063	-0.684
Wholemeal	Vegan knowledge	-0.412	0.117	-3.524	0.000	-0.929
Kamut®	Organic knowledge	0.329	0.149	2.206	0.027	0.741
Kamut®	Older than 55 years	-0.308	0.142	-2.169	0.030	-0.694
	Derived standard deviations of parameter distributions					
Friuli		0.809	0.079	10.299	0.000	
Italy		0.663	0.106	6.248	0.000	
Vegan		0.446	0.123	3.624	0.000	
Organic		0.512	0.114	4.491	0.000	
Wholemeal		0.637	0.080	7.977	0.000	
Kamut®		0.573	0.090	6.373	0.000	

Number of observations = 2922
Number of iterations = 800
McFadden Pseudo R-squared = 0.16
Log likelihood function = -3396.86

4. Discussion and conclusions

This paper analyzed Italian consumers' attitudes, preferences and their WTP for a vegan food product in the context of food attributes which are considered important when decisions are made regarding food consumption. The aim was to examine consumers' awareness of vegan food, to investigate the possible impact of consumer demographics on their attitudes and preferences, to explore appropriate strategies, and to segment consumers based on their preferences toward vegan food.

Food attributes related to country of origin, organic production, and type of flour are found to be critical in the purchasing process. The respondents' highest WTP proved to be the country of origin, which is higher for people with a lower educational level. In addition, results suggest that 8% of respondents are willing to pay a premium

price for vegan food. The propensity to buy vegan increases in the case of people who know about vegan and organic production and who do not consume breadsticks regularly. On the contrary, people with a lower educational level seem to be less attracted by this kind of product. These findings suggest that there is the opportunity to develop local chains for niche markets.

Although our study should be considered as exploratory, it contributes to the emerging literature on consumer perceptions about vegan food by identifying the drivers of vegan products consumption. The information generated may be useful to the marketers of vegan foods. From our results distinct consumers' characteristics can be established which provide insights on how to target, and communicate these consumers to choose more vegan food products. In particular, our findings point toward the importance of designing tailored initiatives when encouraging a vegan product. For instance, consumers holding a higher educational level and knowledge of organic method of production may be the segment of most interest, since they apparently are the most willing to pay for vegan products. However, solutions to encourage consumers to choose vegan food may lie on targeted communication for other segments and may also include information on the country of origin, since these emerged as motivators for choosing a food product.

Given the scope of the survey data, not all aspects of vegan food are included in this study. Therefore, it is suggested that future studies should incorporate consumer opinion on a larger spectrum of vegan food products. In addition, it would be interesting to investigate preferences in other regions and countries in order to compare findings.

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