Consumers' Willingness to Pay for a Functional Food

Moro D.[1], Sckokai P. [1] and Veneziani M.[1,2]

[1] Istituto di Economia Agroalimentare, Facoltà di Agraria, Università Cattolica del Sacro Cuore, Piacenza, Italy
[2] DiSES, Facoltà di Economia, Università Cattolica del Sacro Cuore, Piacenza, Italy

mario.veneziani@unicatt.it

Paper prepared for presentation at the 1st AIEAA Conference
'Towards a Sustainable Bio-economy: Economic Issues and Policy Challenges'

4-5 June, 2012
Trento, Italy

Summary

In recent years food manufacturers have been devoting a large portion of their R&D budget to the development of functional foods, as a competitive strategy within food demand markets; on the other hand, consumers, despite functional foods exhibit a significant level of information asymmetry, show an increasing attention towards them, recognizing their role in preventing or reducing health risks and/or improving other general functions of the organism. The objective of this paper is to evaluate the Italian consumers' willingness-to-pay for functional attributes in a food product (a probiotic yogurt with the addition of catechines). For this purpose, a web-based stated choice experiment involving a representative sample of 600 Italian consumers has been carried out and the willingness-to-pay for two functional attributes (probiotic and catechine-enriched) has been measured using the panel data version of a Random Parameters Logit model. The results show that Italian consumers are willing to pay a rather high price premium for a catechine-enriched yogurt (0.36 €/pot, that is a 40% premium, on average) well above their willingness-to-pay for the probiotic attribute (0.23 €/pot). Further, there is a statistically significant heterogeneity within the sample; then, averaging across sample sub-groups indicates that the willingness-to-pay for the new attribute (catechine-enriched) may be related to age, income, health-status, life-style and education.

Keywords: functional foods, willingness-to-pay, stated choice experiment, random parameter logit, catechines

JEL Classification codes: C35, C93, D12

Consumers' Willingness to Pay for a Functional Food

Moro D.[1], Sckokai P. [1] and Veneziani M.[1,2]

[1] Istituto di Economia Agroalimentare, Facoltà di Agraria, Università Cattolica del Sacro Cuore, Piacenza, Italy
[2] DiSES, Facoltà di Economia, Università Cattolica del Sacro Cuore, Piacenza, Italy

1. NUTRITION AND HEALTH: THE ROLE OF FUNCTIONAL FOODS

The link between diet and health has been recognized since the Grecian period: as Hippocrates said, "Let food be your medicine and medicine be your food". Nowadays, consumers are increasingly aware that a balanced diet has large positive effects on their health. While malnutrition clearly raises healthcare expenditure, eating "good" food might prevent the insurgence of diet-related pathologies whose cure may similarly be burdensome for the public budget. Therefore, agricultural and food policy, as one of the policy tools available to a policy maker devoted to the maximization of a multidimensional welfare measure, has been receiving growing attention on such premise. The Common Agricultural Policy (CAP) is mainly focused on food safety, as a public good produced by a multifunctional agriculture. However, food safety cannot overshadow the issue of a correct use and a healthy relation with food, especially in rich nations where diverse sources of nutrients are plentiful. Indeed, Denmark has recently introduced a fat tax, that is a surcharge on foods that contain more than 2.3% saturated fat, in addition to a tax on sugary drinks, aiming to reduce the incidence of obesity and to prevent cardiovascular and cancer diseases in Danish people. This is expected to yield significant savings in the public finances devoted to treat the related illnesses.

In recent years functional foods have been proposed to consumers as an additional mean for a healthy life. In turn, the consumer seems to have appreciated this extension of the product range since functional foods have been gaining relevance in food purchasing. The term functional food is "used to describe a range of novel foods […] which are designed to deliver some other benefit beyond nutrition to the person consuming them" (Frewer et al., 2003). A processed food is functional if it contains ingredients that aid specific functions in addition to being nutritious, thus having a role in disease prevention/reduction and health promotion. However, as stated in Poulsen (1999), the "product which has been modified or enriched with naturally occurring substances […] must also be part of the normal daily consumption of food/fluids".
Functional foods have been promoted, by food manufacturers, since they may provide higher returns to their R&D investments while being used as a viable competitive strategy in food markets dominated by a largely static demand, at least in quantitative terms. According to the available data, the world market for functional foods amounted to 78.3 bn$ in 2007, and it is expected to increase to 128 bn$ by 2013; consumers reveal an increasing attention towards functional foods, given their role in preventing or reducing health risks related to food nutrients and/or improving other general functions of the organism. This happens despite functional foods exhibit a significant level of information asymmetry (Zou and Hobbs, 2006), since consumers are not necessarily aware of the functional attributes. In turn, the latter may be considered mainly as credence attributes, which makes the case for an increased role for labeling and brand advertising in delivering a correct message to the final consumer. Information asymmetry pertains to either the actual presence of the functional component or the credibility of the health claim (Zou and Hobbs, 2006); if the functional attributes can be identified, and the information asymmetry fully overcome, then consumers may be willing

to pay a price premium for the beneficial food (see also Markosyan et al., 2009). The price premium provides a measure of the value placed by consumers on the health risk associated with the functional attributes.

Catechines are natural phenolic compounds that can be found in tea, mainly green tea, but also feature in wine, chocolate and in a few fruits. They have important health effects, and medical studies confirm that a regular daily intake of such components may provide positive effects (antioxidant, antidiabetic, antimutagenic, antiviral, antibacterial, antihypertensives), and also control the level of total and LDL cholesterol, triglycerides, free fatty acids, and fat accumulation. Catechines can thus help individuals in reducing, inter alia, obesity, cardiovascular problems, aging. Thus, they can be used to fortify food products. We have hypothesized a new technically-feasible product, that is a yogurt enriched with catechines. Yogurt has been chosen since it is a very common component of consumers' diet, often on a daily basis, with a high degree of penetration and, even without fortification, is already perceived as a "functional product". Since medical studies suggest that catechines' benefits can be observed with a prolonged daily consumption, yogurt represents a good "candidate" food to deliver catechines to the human body. The daily-recommended intake of catechines can be added to the yogurt without altering the taste and other organoleptic characteristics of the product.

In applied research, there is a large body of literature devoted to the economic evaluation of attributes of food products; the main objective is that of trying to estimate the consumers' willingness-to-pay (WTP) for quality and/or health attributes. The WTP for food attributes is a relevant information for manufacturers developing new products, providing insights on the expected size of the likely market when demand has not been expressed yet. In order to obtain an estimation of the WTP for health attributes in a new functional food product, a stated preference experiment, grounded in random utility theory, has been conducted; the stated preference approach is usually followed when evaluating nonmarket goods and/or new products, since consumers' response to product characteristics can be evaluated requiring consumers to choose from a hypothetical set of products differing for the level of their attributes (Quagrainie et al., 1998). The major drawback of the stated preference method is the hypothetical nature of choices, which translates into consumers not being required to make an actual choice involving a monetary outlay. Empirical estimation is carried out using discrete choice econometric models.

2. THE THEORETICAL FRAMEWORK

Health attributes can be interpreted as a food 'characteristic'; goods' characteristics can be evaluated using discrete choice models, where choices are made among mutually exclusive finite alternatives within an exhaustive choice set. Discrete choice models rely on Lancaster's consumer theory (Lancaster, 1966), where goods are interpreted as a bundle of characteristics, and consumers' preferences are stated over characteristics; McFadden (1974) proposed the econometric framework for discrete choice models in the context of random utility theory. For an individual *i* the (indirect) utility obtained by a good *j*, U_{ij}, can be decomposed in a deterministic part, V_{ij}, related to the *K* observed good's characteristics (including monetary variables), and in a stochastic part, ε_{ij}, accounting also for unobserved variables:

$$U_{ij} = V_{ij} + \varepsilon_{ij} = \sum_{k} x_{jk}\beta_{ik} + \varepsilon_{ij} \quad (1)$$

where x_{jk} is the level of attribute *k* in good *j* and β_{ik} is the individual preference parameter for the k^{th} characteristic (i.e., the deterministic part of individual utility is a linear function of product's characteristics). The choice rule is utility maximization: therefore good *j* is chosen among all alternatives iff:

$$U_{ij} \geq U_{ih} \qquad \forall h \neq j \tag{2}$$

Different assumptions on the structure of the stochastic component ε_{ij} lead to different models; in the Mixed Logit (ML) model the stochastic part ε_{ij} is decomposed as $\varepsilon_{ij} = \eta_{ij} + u_{ij}$, where η_{ij} is an additive random term that can be related to attributes and alternatives and can account for correlation and heteroscedasticity, while the u_{ij} term is an i.i.d. random component with an extreme value distribution. In our study, we have employed the Random Parameter Logit (RPL) model, where the ML specification is obtained by allowing the set of preference parameters β_i to be distributed across individuals according to a statistical distribution, $\beta_i \sim f\left(\beta_i \middle| \beta, \sigma_\beta\right)$, characterized by mean β and standard deviation σ_β. The RPL model has gained popularity in stated-choice studies, because of its ability to take into account preference heterogeneity and its flexibility in accommodating a variety of model specifications (McFadden and Train, 2000; Jain et al., 1994).

Then, the (conditional) probability that individual *i* with preference parameters β_i will choose alternative *j* is given by:

$$P_i\left(j \middle| \beta_i\right) \equiv L_{ij}\left(\beta_i\right) = \frac{e^{V_{ij}(\beta_i)}}{\sum_h e^{V_{ih}(\beta_i)}} \tag{3}$$

and, by integrating the conditional probability, we obtain the probability of choosing alternative *j*:

$$P_i\left(j\right) = \int L_{ij}\left(\beta_i\right) f\left(\beta_i \middle| \beta, \sigma_\beta\right) d\beta \tag{4}$$

The RP-ML specification is not affected by the Independence of Irrelevant Alternatives (IIA) property, thus it does not restrict substitution patterns as in the Multinomial Logit (ML) model. Therefore, the ratio of probability of choosing between two alternatives, *j* and *h*, depends also on attributes and alternatives other than *j* and *h*. Furthermore, the RP-ML specification can be also generalized to panel data (i.e., each sampled individual *i* makes more than one choice: Train, 2003), by simply assuming that parameters are constant over time/choices.

In order to evaluate the consumers' WTP for health attributes, consider that in the random utility model each preference parameter represents the marginal utility of the attributes, that is $\partial u / \partial x_k = \beta_k$. Thus, the WTP for any attribute *k* is given by the negative of the ratio between the marginal utility of the attribute *k* and the marginal utility of money:

$$WTP = -\frac{\beta_k}{\beta_{price}} \tag{5}$$

Given that the preference parameters are distributed across individuals and each individual will make repeated choices, the individual average WTP will be computed as (see Cicia et al., 2008):

$$WTP_i = -\frac{\frac{1}{T}\sum_t \frac{-\beta_{ik}}{\beta_{i,price,t}} L(\beta_{it})}{\frac{1}{T}\sum_t L(\beta_{it})} \tag{6}$$

and the estimate of the WTP will be obtained by averaging WTP_i across individuals.

3. THE STATED-CHOICE EXPERIMENT

In a stated-choice (SC) experiment respondents choose within a (finite) set of (hypothetical) alternatives. When products characteristics are not available (i.e., new products), as it is the case of a yogurt enriched with catechines, a SC experiment is the only available approach to investigate consumers' preferences. A number of applications of this model in SC agricultural and food marketing studies have been recently made available (e.g., West et al., 2002; Lusk et al., 2003; Alfnes, 2004; Rigby and Burton, 2005).

To evaluate the consumers' perception of potential health benefits related to a functional attribute (catechine-enriched yogurt), the SC experiment was conducted in June 2011 on a sample of 600 Italian consumers. A web-based survey using a structured questionnaire was administered by Lightspeed Research Ltd.; the sample was randomly chosen, under some constraints (quotas), from a wider representative panel taken from the Italian population.

The questionnaire has three parts. In the first part, catechines and their potential health effects are briefly described in order to provide the necessary preliminary information which will allow consumers to make a "rational and informed choice" while a definition of the term "functional food" is given.

In the second part, information on consumers' habits is collected (related to responsibility in food purchases, consumption of yogurt, lifestyle). Furthermore, in this section the surveyed individuals are required to make repeated choices within different sets of alternatives: each individual makes three choices (i.e., a panel dataset is obtained), each time selecting one product within a set of three alternatives (i.e., three products differing for different levels of their relevant attributes). Choice sets are constructed through an experimental design.

Finally, in the third part socio-demographic information is collected (gender, age, geographic location, employment status, education, marital status, household size, presence of children, income).

Regarding the experimental design, first the main attributes x_k have been defined: we have selected a product packaging (yogurt, a pot of 125g), and six different attributes: milk, type, taste, probiotic, catechine-enriched and price. Table 1 lists the attributes and their levels.

The probiotic functional attribute has been added to the catechine-enriched one since, being a well-established functional attribute in yogurt, it should help respondents in making more consistent choices while it is likely to reduce the potential for overestimating the health benefits of catechines.

According to the selected attributes, choice sets may be constructed choosing among a total of $2 \cdot 3 \cdot 4 \cdot 2 \cdot 2 \cdot 7 = 672$ alternatives (the full factorial experimental design). In order to reduce the dimension of our experiment while allowing to identify the main consumers' responses, we have resorted to a D-optimal experimental design which permits to select a more limited number of alternatives (29 out of 672 in our case), based on a model in which we consider only linear individual effects for the attribute variables. Furthermore, we have included an additional alternative, which is considered as the first alternative in all choice-sets (conventional milk, whole, creamy fruit, no probiotic, no catechine-enriched, with a price of

0.70€): this alternative, according to retailing data, can be assumed as the type of yogurt most frequently purchased by Italian consumers, (i.e., the "status-quo" alternative). To each participant three choice sets were submitted and thus three choices were made, providing a balanced panel of observations. In each of the three choice sets administered, the respondent was asked to choose among three alternatives, the first always being the "status-quo" alternative; all other alternatives have been randomly selected, without replacement, within the set of the 29 possible alternatives.

Table 1 - Yogurt attributes and their levels in the SC experiment

Attributes	Levels
Milk	Conventional - Organic
Type	Whole (A) - Drinking (B) - Skimmed (C)
Taste	Creamy Fruit (A) - With Fruit Pieces (B) - Other Tastes (C) - White (D)
Probiotic	Yes - No
Catechine-Enriched	Yes - No
Price (€/Pot)	0.60 - 0.70 - 0.80 - 0.90 - 1.00 - 1.10 - 1.20

Source: own elaboration

4. RESULTS AND DISCUSSION

Table 2 presents the sample's summary statistics. Our sample records an incidence of overweight/obese people which is in line with national statistics (45.7%) while more than 50% of the surveyed individuals are trying to lose weight, but only a small proportion (13.5%) pays attention to nutritional labels on food products. Respondents appear to consume yogurt very frequently since more than 50% of them consumes yogurt more than once a week.

The empirical model has been estimated using the econometric software NLOGIT 4.0 assuming that all the attribute parameters are random in nature, the attributes milk, type, taste, probiotic and catechine-enriched follow a normal distribution and the attribute price is distributed as a triangular random variable. All attributes, except price, have been introduced in the model using sets of mutually exclusive dummy variables.

Although the correct set of explanatory variables for our empirical model, assumed to affect V_{ij} in (1), should include both product and socio-demographic characteristics, we control only for the former in our estimated specification. This is consistent with the existing literature (Hu et al., 2011) which suggests that, in a RPL model, heterogeneity among individuals can be accounted for relying on the assumptions made on the stochastic nature of parameters. Thus, since socio-demographic characteristics are not crucial for estimating consumers' WTP for a hypothetical product, we decided to exploit individual heterogeneity only through the random distribution of the parameters for the product's attributes.[1] Thus, the final selected model has the following specification:

$$U_{ij} = \beta_{pr} price + \beta_{ty\_B} type\_DuB + \beta_{ty\_C} type\_DuC + \beta_{ta\_B} taste\_DuB + \beta_{ta\_C} taste\_DuC + \beta_{ta\_D} taste\_DuD + \beta_{pb\_no} prob\_Du + \beta_{ca\_no} catec\_Du + \beta_{mk\_co} milk\_Du + u_{ij} \quad (7)$$

The estimated model performs quite well. The McFadden Pseudo R-squared (R^2), which is a measure of the goodness-of-fit in discrete choice models, is particularly high (0.727); as a consequence, the χ^2 test

[1] We have tried many different specifications including different sets of socio-demographic variables but the latter resulted, overall, insignificant and did not improve the model statistics.

(with 54 degrees of freedom) on the explanatory power of the model rejects the null that the model does not explain consumers' choices.

Table 2 - Main summary statistics for the sample composition

GENDER	%
FEMALE	55.0
MALE	45.0
AGE	
18 – 24	7.2
25 – 34	16.7
35 – 44	21.2
45 – 54	17.8
55 – 64	15.3
>65	21.8
GEOGRAPHICAL AREA	
NORTH – WEST	28.3
NORTH – EAST	20.5
CENTRE	20.7
SOUTH	30.5
MARITAL STATUS	
MARRIED	56.5
LIVE-IN PARTNER	10.2
NOT MARRIED	21.8
DIVORCED	7.2
WIDOWED	4.3
EMPLOYMENT STATUS	
HOUSEWIFE	11.2
SEARCHING FOR NEW JOB	5.2
SEARCHING FOR FIRST JOB	1.3
EMPOLOYED	54.7
RETIRED	23.8
STUDENT	3.8
EDUCATION	
JUNIOR SCHOOL DEGREE	3.3
JUNIOR HIGH SCHOOL DEGREE	12.3
SENIOR HIGH SCHOOL DEGREE	54.8
ACADEMIC DEGREE	29.5
INCOME	
<10,000 €	6.0
FROM 10,000 TO 20,000 €	21.5
FROM 20,000 TO 40,000 €	36.3
FROM 40,000 TO 70,000 €	19.3
>70,000 €	3.8
NO ANSWER	13.0

# OF HOUSEHOLD COMPONENTS	%
1	13.2
2	31.3
3	24.8
4	24.3
>4	6.3
PURCHASING FREQUENCY	
ONCE EVERY TWO WEEKS	3.8
ONCE A WEEK	21.3
MORE THAN ONCE A WEEK	51.5
EVERY DAY	23.3
FREQUENCY IN CONSUMING YOGURT	
ONCE A MONTH	8.8
ONCE EVERY 15 DAYS	5.8
ONCE A WEEK	34.7
>ONCE A WEEK	12.5
EVERY DAY	38.2
BMI	
<18.5	3.7
18.5 – 24.9	50.7
25 – 29.9	32.5
30 – 34.9	9.2
>35	3.9
HABITS TOWARDS WEIGHT	
DOING NOTHING	17.7
TRYING TO GAIN WEIGHT	4.7
TRYING TO KEEP WEIGHT	26.3
TRYING TO LOSE WEIGHT	51.3
WORKOUT	
NEVER	28.3
ONCE A WEEK	30.8
TWO-THREE TIMES A WEEK	32.0
>THREE TIMES A WEEK	8.8
SMOKING HABITS	
NO	75.3
YES	24.7
ATTENTION TO FOOD LABELS	
NO	86.5
YES	13.5

Source: own elaboration based on 600 responses to the questionnaire.

Estimates for the model parameters (mean and variances) are reported in Table 3. Looking first at the β coefficients (means), it appears that, on average, product attributes play a relevant role in consumers' choices; the price coefficient is highly significant (and negative, as expected). Likewise, the two coefficients for functional attributes (probiotic and catechine-enriched) being negative suggest that the absence of functional attributes reduces utility, hampering the probability of choosing that alternative. Moreover, the attributes type and taste may play a non-neutral role given the significance of some of the coefficients for the two sets of dummy variables with respect to the base product. On the contrary, the attribute milk does not influence the choice, on average and ceteris paribus.

Table 3 - Estimated parameters for product attributes for the RPL model

Parameter	Estimates†	Parameter	Estimates
β_{pr}	-2.538*** (0.499)	σ_{pr}	1.088 (1.844)
β_{ty_B}	-1.539*** (0.358)	σ_{ty_B}	6.160*** (1.148)
β_{ty_C}	0.270 (0.240)	σ_{ty_C}	4.139*** (0.824)
β_{ta_B}	0.148 (0.211)	σ_{ta_B}	2.246*** (0.658)
β_{ta_C}	-0.640** (0.286)	σ_{ta_C}	3.083*** (0.751)
β_{ta_D}	-2.042*** (0.427)	σ_{ta_D}	4.426*** (0.764)
β_{pb_no}	-0.633*** (0.223)	σ_{pb_no}	2.462*** (0.401)
β_{ca_no}	-1.013*** (0.221)	σ_{ca_no}	2.511*** (0.627)
β_{mk_co}	-0.230 (0.214)	σ_{mk_co}	2.559*** (0.464)

Source: own elaboration using NLOGIT 4.0
† *** significant at 1%, ** significant at 5%; estimated standard errors in parentheses

Further insights on consumers' responses to product attributes can be gained inspecting the estimated standard deviations (σ coefficients) for the preference parameters. With the exception of the price coefficient, all standard deviations are highly significant, revealing the existence of a strong heterogeneity among the respondents.

The estimation of consumers' evaluation of the health risks associated with functional attributes, that is their WTP to obtain a functional food, is instrumental to quantify a price-premium for the functional food. Given the assumption of random parameters introduced above, we can compute a WTP for each of the individuals in the sample, according to (6) on the basis of their socio-demographic characteristics, and then average it out across the sample and socio-demographic groups. Attention is focused on the WTP for functional attributes (catechine-enriched (catec.) and probiotic (prob.)).

The sample average WTP for the addition of catechines is 0.36 €/pot; it is the average amount that consumers are willing to pay for a "catechine-enriched" yogurt, and given that one single pot contains the RDA (recommended-daily intake) we can assume that this value is a good approximation of the absolute value of the premium a consumer is willing to pay to obtain the related functional attributes and the ensuing protection from the health risks. Given that the average price used in the experiment is 0.90 €/pot, the estimated average WTP indicates a 40% price-premium, a value in line with other studies on functional attributes and/or health-related attributes (for example, organic vs. conventional food products).

We have also computed the WTP for the probiotic attribute. As stated above, we have introduced this functional attribute in the experiment to compare our findings on a new attribute with respect to a (supposedly) well-established one. Consumers in fact have experienced this attribute for quite a long time such that we expect them to be acquainted with it. Therefore, having to choose among different characteristics may help consumers in reducing their tendency to overestimate their evaluation for a single and new attribute. In fact, we expect the WTP for probiotic to represent a sort of lower threshold of the WTP for catechines while the difference between the two WTP will allow us to have a sense of the consumers' evaluation of different health-related attributes. Further, it should prevent consumers from mistakenly attribute the functional benefits of catechines to the other, more generic, functional properties of yogurt,

including the otherwise non-specified probiotic effect. The sample average WTP for the probiotic functionality is 0.23 €/pot, which is about 1/4 of the average price and about 2/3 of the WTP for catechines.

In Table 4 average WTP for socio-demographic groups are reported. Trying to summarize the results we focus on those representing larger deviations with respect to the overall average and establish that markedly large values of WTP for catechines are expressed by respondents in the 45 to 64 years of age range (0.44 - 0.45 €/pot) while differences due to gender are much smaller (in fact, females have a slightly higher WTP than males, and generally appear more concerned with their health-status). People in the North-East and earning an income in the two highest classes, show particularly large WTP with respect to geographical location and income of the respondents (0.43 €/pot); moreover, it appears that WTP is U-shaped with respect to income with a minimum value of WTP expressed by individuals earning between 20 and 40 thousand Euros. Furthermore, there is a linkage between WTP and education (the higher WTP pertains to the more educated group), marital status (widowed people have a high WTP, 0.49 €/pot), and household size with larger households reporting a WTP of 0.43 €/pot.

People reporting to consume yogurt fairly frequently, also report a higher WTP for catechines, which may be due to the fact that they are likely to have the full benefit from a catechine-enriched yogurt with respect to less-frequent consumers. Overweight people report the highest WTP for catechines (0.38 €/pot), higher than that of obese people, probably due to the fact that the more severe is the problem the lower is the feeling of obtaining a positive effect on health through the benefits of a functional food (in fact, people severely obese have a very low WTP for both catechines and probiotic). Finally, also the life-style may impact on the WTP: those who are keeping their current weight (0.40 €/pot), workout more than three times a week (0.48 €/pot) and are aware of the link between nutrition and health (0.48 €/pot) show higher values for WTP.

Table 4 – Average WTP for probiotic and catechine-enriched attributes across groups (€/pot)

Characteristics	catec.	prob.
GENDER		
FEMALE	0.361	0.251
MALE	0.351	0.203
AGE		
18 – 24	0.263	0.248
25 – 34	0.214	0.302
35 – 44	0.360	0.192
45 – 54	0.451	0.281
55 – 64	0.441	0.242
>65	0.355	0.153
GEOGRAPHICAL AREA		
NORTH – WEST	0.348	0.188
NORTH – EAST	0.429	0.260
CENTRE	0.309	0.249
SOUTH	0.348	0.235
MARITAL STATUS		
MARRIED	0.391	0.208
LIVE-IN PARTNER	0.438	0.216
NOT MARRIED	0.205	0.258
DIVORCED	0.341	0.292
WIDOWED	0.494	0.291
EMPLOYMENT STATUS		
HOUSEWIFE	0.280	0.255
SEARCHING FOR NEW JOB	0.422	0.279
SEARCHING FOR FIRST JOB	0.249	0.430
EMPOLOYED	0.365	0.247
RETIRED	0.391	0.154
STUDENT	0.186	0.244

Characteristics	catec.	prob.
# OF HOUSEHOLD COMPONENTS		
1	0.353	0.138
2	0.377	0.240
3	0.355	0.224
4	0.312	0.263
>4	0.433	0.258
PURCHASING FREQUENCY		
ONCE EVERY TWO WEEKS	0.396	0.292
ONCE A WEEK	0.329	0.212
>ONCE A WEEK	0.358	0.233
EVERY DAY	0.371	0.227
FREQUENCY IN CONSUMING YOGURT		
ONCE A MONTH	0.301	0.396
ONCE EVERY 15 DAYS	0.255	0.232
ONCE A WEEK	0.214	0.142
>ONCE A WEEK	0.379	0.246
EVERY DAY	0.410	0.204
BMI		
<18.5	0.359	0.313
18.5 – 24.9	0.353	0.247
25 – 29.9	0.376	0.199
30 – 34.9	0.347	0.220
>35	0.109	0.165
HABITS TOWARDS WEIGHT		
DOING NOTHING	0.242	0.199
TRYING TO GAIN WEIGHT	0.375	0.340
TRYING TO KEEP WEIGHT	0.403	0.231
TRYING TO LOSE WEIGHT	0.370	0.229

Characteristics	catec.	prob.
EDUCATION		
JUNIOR SCHOOL DEGREE	0.218	0.033
JUNIOR HIGH SCHOOL DEGREE	0.416	0.149
SENIOR HIGH SCHOOL DEGREE	0.289	0.235
ACADEMIC DEGREE	0.471	0.275
INCOME		
<10,000 €	0.398	0.183
FROM 10,000 TO 20,000 €	0.365	0.147
FROM 20,000 TO 40,000 €	0.330	0.267
FROM 40,000 TO 70,000 €	0.407	0.218
>70,000 €	0.435	0.256
NO ANSWER	0.297	0.292

Characteristics	catec.	prob.
WORKOUT		
NEVER	0.241	0.234
ONCE A WEEK	0.371	0.209
TWO-THREE TIMES A WEEK	0.410	0.233
>THREE TIMES A WEEK	0.478	0.273
SMOKING HABITS		
NO	0.364	0.254
YES	0.331	0.154
ATTENTION TO FOOD LABELS		
NO	0.328	0.269
YES	0.361	0.223

Source: own elaboration

REFERENCES

Alfnes, F. (2004). Stated preferences for imported and hormone-treated beef: application of a mixed logit model. *European Review of Agricultural Economics* 31: 19-37.

Cicia, G., Del Giudice, T. and Scarpa, R. (2008). Quanto ci si può fidare delle stime ottenute con i Choice Models? Alcune riflessioni sui recenti sviluppi della letteratura. *Rivista di economia agraria* 63(2): 255.

Frewer, L., Scholderer, J. and Lambert, N. (2003). Consumer acceptance of functional foods: issues for the future. *British Food Journal* 105(10): 714 – 731.

Hu, W., Batte, M. T., Woods, T. and Ernst, S. (2011). Consumer preferences for local production and other value-added label claims for a processed food product. *European Review of Agricultural Economics* (in press). doi:10.1093/erae/jbr039.

Jain, D., Vilcassim, N. and Chintagunta, P. (1994). A random-coefficients logit brand choice model applied to panel data. *Journal of Business and Economic Statistic* 12(3): 317-328.

Lancaster, K. J. (1966). A new approach to consumer theory. *The Journal of Political Economy* 74(2): 132-157.

Lusk J. L., Roosen, J. and Fox, J. A. (2003). Demand for beef from cattle administered growth hormones or fed genetically modified corn: a comparison of consumers in France, Germany the United Kingdom and the United States. *American Journal of Agricultural Economics* 85: 16-29.

McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In Zarembka, P. (ed.) *Frontiers in Econometrics*, New York: Academic Press, 105-142.

McFadden, D. and Train, K. (2000). Mixed MNL models of discrete response. *Journal of Applied Econometrics* 15: 447-470.

Markosyan, A., McCluskey, J. J. and Wahl, T. I. (2009). Consumer response to information about a functional food product: apples enriched with antioxidants. *Canadian Journal of Agricultural Economics* 57: 325-341.

Poulsen, J. (1999). Danish consumers' attitudes towards functional foods. MAPP working paper, 62. Aarhus School of Business. www.mapp.asb.dk/wppdf/wp62.pdf

Quagrainie, K. K., Unterschultz, J. and Veeman, M. (1998). Effects of product origin and selected demographics on consumer choice of red meats. *Canadian Journal of Agricultural Economics* 46: 201-219.

Rigby, D. and Burton, M. (2005). Preference heterogeneity and GM food in the UK. *European Review of Agricultural Economics* 32: 269-288.

Train, K. E. (2003). *Discrete choice methods with simulation*. Cambridge: Cambridge University Press.

West, G. E., Gendron, C., Larue, B. and Lambert, R. (2002). Consumers' valuation of functional properties of foods: results from a Canada-wide survey. *Canadian Journal of Agricultural Economics* 50: 541–558.

Zou, N. N. and Hobbs, J. E. (2006). Modelling Functional Food Choice and Health Care Impacts: A Literature Review. Research Project Number CMD-06-02, Department of Agricultural Economics, University of Saskatchewan.