DO NUTRITIONAL CLAIMS MATTER TO CONSUMERS? AN EMPIRICAL ANALYSIS CONSIDERING EUROPEAN REQUIREMENTS

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Do nutritional claims matter to consumers?

An empirical analysis considering European requirements

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Abstract

The Reg. 1924/2006 has introduced a European legal framework for nutrition messages to be put on front labels. The study analyses consumer interest towards nutritional label and claims, trying to identify the information consumers consider important during their purchasing decisions, and the main characteristics of consumers interested in nutritional claims and nutritional labels use. The survey was conducted in northern Italy and the sample consists of 1,025 consumers. We estimate one binary logit model to investigate the use of the nutritional label, and other seven ordinal regression models to analyze the consumer interest towards the nutritional claims. The results suggest consumers who use nutritional label are interested in nutritional attributes, food safety, and quality concerns, whereas consumers interested in nutritional claims show less interest in food safety and consider important factors such as price, brand and flavour.

Keywords: nutritional claims, consumer, logit model, European Union

1. Introduction

Growing consumer interest in the relationships between health and diet has led to an increasing role of nutrition labelling on food packaging (Cheftel, 2005). In the European Union nutritional labelling is voluntary, thus the level of accuracy of nutritional information on food products can differ from product to product.
The objective of introducing Reg. 1924/2006 has been to guarantee a high level of consumer protection, providing a legal framework across Europe for nutrition and health claims. The Regulation ensures the dissemination of correct information to consumers facilitating consumer food choice and allowing the free movement of foods within the European countries. With regard to nutritional claims, Reg. 1924/2006 has introduced fixed parameters on front labels, giving short messages about energy, fat, sugar, sodium/salt, fibre, protein, vitamins and/or minerals. Also some provisions related to the claims of 'light' and 'naturally/natural' are provided by the Regulation.

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The authors acknowledge financial support from the Regional Institute for Research of Lombardy (IRER) for the consumer survey. The paper is the result of the collaboration of the authors. The text is attributed as follows: sections 4.1and 5 to A. Banterle; sections 3 and 4.2 to L. Baldi; sections 1 and 2 to S. Stranieri.

Starting from the recent literature that shows the interest of consumer toward nutritional information the paper, first, analyses the variables that can influence the use of nutritional label. Second, focussing on nutritional claims, we assess the interest of consumer for each message provided by Reg. 1924/2006 and identify the main specific determinants affecting the use of nutritional claims.
The survey employed a telephone questionnaire consisting of 34 questions arranged in a multiple choice format with rating or dichotomic scales. The stratified sample consists of 1,025 consumers resident in Lombardy, a region in northern Italy. We estimate one binary logit model to investigate the use of the nutritional label, and other seven ordinal regression models to analyse the consumer interest towards the nutritional claims introduced by the European Regulation. To identify the main specific determinants in the models we used factors as socio-demographic and individual characteristics, factors affecting purchasing behaviour (price, brand, etc.), healthy life attitude, nutrition knowledge, source of information and food safety attitude. The consequences for firm strategies and supply chain management are also considered.
The paper is organised as follows: the economic issues and the theoretical framework are examined in section 2; the methodological issues and the survey conducted are examined in section 3; the results are analysed in section 4 and the concluding evidence is set out in section 5.

2. Theoretical framework and economic issues

Food demand in developed countries has become more fragmented, heterogeneous and dynamic leading to situations where quality differentiation of food products is necessary in order to satisfy consumers needs (Grunert, 2005).
Quality differentiation is based on the presence of specific intrinsic and extrinsic food product attributes, where intrinsic cues refer to physical properties of the product, whereas extrinsic cues refer to everything else (Olson and Jacoby, 1972). Economic studies have also characterized product attributes as search, experience, or credence attributes (Nelson, 1970). Search goods are those for which consumers examine product characteristics. Experience goods are those for which consumers evaluate attributes after purchasing the product. Credence goods have attributes that consumers cannot evaluate even in use.
Food labels can transform credence attributes into search attributes, making the content of nutritional attributes more evident, allowing consumers to formalise their purchasing decision more easily and choose products that correspond to their qualitative preferences. Labelling can influence individuals' quality perceptions, qualitative preferences, prior expectations, and may enhance economic efficiency by helping them to target expenditures toward products they most want (Golan *et al*. 2001; Wansink *et al*., 2004).
Different theoretical approaches have formalised the food quality perception and its impact on consumer food choice. The most notably are the means–end approach, the expectancy value approach, the satisfaction/dissatisfaction approach, and the economics of information (Grunert, 2005). Common to these approaches is the interest in understanding how consumers form judgements of quality under uncertainty, and how they formalize their purchasing decision in presence of many experience and credence attributes.
The economics of information is usually used as a framework in the evaluation of the effects of nutrition label use on consumer behaviour and food choices (Drichoutis *et al.*, 2005). This economic model was firstly introduced by Stigler (1961) and assumes that the utilization of information is part of a process that involves also searching information. Consumers will

continue to search and use products information as long as the costs for additional information will be lower than the additional benefits.
In this paper the use of nutrition labels and claims is considered as an act of information search by consumer. Following this framework consumers use labelled nutrition information as long as the related benefits, as better food choice, more nutrient diet, reduced risk of disease and the possibility to follow specific diets, outweigh the costs in terms of time spent in reading nutrition labels (Nayga *et al.*, 1998).
Economic studies on nutritional information have investigated the determinants of the consumers' use of this kind of information and the relationship between diet and health, analysing, in particular, the use of nutritional labels and the orientation of consumer behaviour towards healthy diet (Kim *et al.*, 2000; Teils *et al.*, 2001; Weaver and Finke, 2003; Variyam and Cawley, 2006).
With regard to the determinants of the consumers' use of food labels, different factors were found in the literature. Our conceptual framework summarized these factors, grouping them in five categories:

- socio-demographic and individual characteristics, including age, gender, education, working status, income, body mass index, etc.;
- factors affecting purchasing behaviour, including variables such as price, brand, flavour, origin of products, traceability, quality certification, and being the shopper;
- healthy life attitude, representing variables such as dietary habits, sport habits, smoking status, diseases connected to food;
- nutrition knowledge and source of information, representing variables such as the level of food knowledge and the kind of information source usually used by consumers;
- food safety attitude, including variables such as attention to food safety issues, packaging conditions, meat label use, attention to ingredients.

Referring to socio-demographic and individual characteristics, the age is considered a significant factor to explain the usage of food labels. Some authors concluded that older consumers are likely to process less information than younger consumers because less capable in processing large amount of information and characterised by a greater market experience (Phillips and Sternthal, 1997). Bender and Derby (1992) found younger consumers more likely to use nutritional labelling. However, Mitchell (1993) and Mitchell and Boustani (1993) found older respondents perceived risk-reducing strategies to be more useful than for younger consumers.
With reference to the gender's and education's effects, some studies pointed out that women are more likely to use food labels and that higher levels of education lead to increasing levels of information's search (Mitchell and Boustani, 1993; Wang et al., 1995; Nayga, 1996, 1997, 1998, 2000). This can be explained by the fact that consumers with a high level of education are more capable of interpreting the information provided on nutritional labels.
The working status is statistically significant in most studies. Generally, unemployed individuals are more able to allocate time to use nutritional labels whereas employed individuals can not spend too much time shopping (Nayga *et al.*, 1998). Empirical evidence also suggests that consumers time pressure affects the type of information used in decision making and that the working status and the income can be considered as proxies (Nayga, 1996, 2000). However, Drichoutis et al., (2005) found that employees catch more information during the food shopping because more interested in the contents of vitamins and minerals and Nayga (1999) showed that consumers with high income find nutritional labelling an important factor in the food choice.
Referring to the factors affecting purchasing behaviour, empirical studies indicated that individuals who place greater emphasis on price while shopping are less likely to use nutrition

information, whereas individuals who place greater importance on taste are more likely to use labels (Guthrie et al., 1995; Nayga et al., 1998).
Consumers healthy life attitude should be positively correlated to food label use. Generally, who has a higher perception of the diet's healthfulness is more likely to use nutritional information on packages (Wang et al., 1995; Nayga, 1996). Nayga et al. (1998) found that the variable special diet is statistical significant for the use of nutritional labels. Kim et al. (2000) analysed that nutritional label use reduces individuals' intakes of calories from total and saturated fat, of cholesterol and sodium and increases intakes of fibres. Also McLean-Meyinsse (2001) confirmed these results. Moreover, Weaver and Finke (2003) found that consumers that use sugar information consume less added sugar than consumers that do not use food labels.
Nutrition knowledge and source of information are considered other two important factors by the economic literature. Concerning nutrition knowledge, there is already considerable debate about the effect of nutritional knowledge on consumer behaviour. Guthrie et al. (1995) and Kim et al. (2001) showed a positive link between heath knowledge and label use. However, Nayga (2000) suggested that nutritional knowledge did not have an effect on label use. Moreover, Drichoutis *et al.*, (2005) further explored this item confirming the positive link between consumers' nutrition knowledge and label use.
Referring to the factors connected to the source of nutrition information, Jensen and Kesavan (1993) investigated the relationships between different information sources and consumption of diary products. Navder (1993) pointed out that nutrition labels are the most used source of information and food labels should be more informative to consumers. Also Nayga *et al.* (1998) confirmed these results, and suggested that if the primary source of nutrition information is books, magazines, radio, TV, and newspaper consumers are less likely to use labels while shopping than those who use labels as their primary source of nutrition information.
Finally, the group of variables representing the consumer food safety attitude investigated if the levels of consumers perceived food safety can influence the use of nutritional label and/or claims. Several studies are oriented to investigate the relationship between meat label use and consumers behaviour in order to test the level of meat safety perceived and to find the kind of information consumers are really interested in while food purchasing (Bernués *et al.*, 2003; Verbeke and Ward, 2006).
Considering the role played by nutritional information, many kinds of attributes can be labelled, and it is important to understand the kind of information consumers are really interested in when they purchase food products. In this context, the introduction of nutritional claims should determine some changes in consumer purchasing behaviour as the nutritional information reported on labels is clearer, more concise and more understandable for consumers. Considerable literature is oriented to analyse how the amount of information and the type of information on food labels might influence consumer behaviour and purchasing decision (Bender and Derby, 1992; Roe et al., 1999; Wansink et al., 2004).
Until now it is not clear if it is better too offer more and more information to consumer or if too much information results in a decrease of the accuracy of consumer judgments about products. Moreover, the recent literature is mostly oriented to define the characteristics of consumers that use nutritional information and not to define those that use the other nutritional messages on food packages. To fill this void we, firstly, tried to understand which kind of information consumers consider important during their purchasing decisions. Secondly, we tried to define the characteristics of consumers that use nutritional claims trying to verify if there are differences between consumers who use nutritional label and nutritional claims.

The analysis of consumer behaviour towards nutritional claims and label has interesting implications for firm strategies. The understanding of different consumer characteristics toward the information reported on food label leads firms to orientate the product differentiation based on nutritional attributes in different ways, depending on the type of consumer considered. The market orientation of product can lead to a reorganisation of firm networks and supply chains. In the case of industrial brand the relations between processor and suppliers are involved in the reshaping of the marketing strategies, whereas in case of private labels the reshaping regards the relationship between retailers and processors.

3. Methodological issues and data

Data were collected from a telephone survey carried out during the 4th, 5th, 6th, 11th and 12th of December 2006 utilising the specific system C.A.T.I. (Computer Aided Telephone Interview). On total of households contacted, the refusal rate to participate in the survey was about 12% while no contact rate was 20%. The sample obtained was composed by 1,025 households resident in Lombardy, a region in northern Italy, corresponding to a sampling fraction of 0.3‰. This sample was stratified by regional share of gender, age, town and province of residence and was representative of Lombardy population.
A specific questionnaire was designed with questions arranged in a multiple choice format with rating or dichotomic scales. A previous pilot survey was made to test this questionnaire with the aim to maximise response rate and minimise error rate on answers. We determined 34 questions to be asked following existing literature and identified 6 groups of questions. The first group explores socio-demographic features and includes Body Mass Index too. The second one represents aspects affecting purchasing behaviour while the thirds expresses consumers attitude to healthy life habits. In the fourth set of questions consumers knowledge toward nutritional aspects are investigated and the fifth group points the attention to interest in food safety. Finally we present other 8 questions strictly linked to label use and to nutritional claims.
Nutritional label use is often analysed by the economic approach to information, as consumer choices are based on an evaluation of product information (Sexton, 1979; Senauer *et al*., 1991; Caswell, 1992; Golan *et al.*, 2000; Drichoutis *et al*., 2005).
The paper focuses on factors that influence consumer interest in information on nutrition, assuming the following functional relationship between groups of variable:

$$NI = f\,(IC, PBF, HLA, NKS, FSA) \qquad [1]$$

Nutrition Information (NI) is measured in different ways and we estimate separately the following eight equations:

$$NI_1 = f\,(IC, PBF, HLA, NKS, FSA) \qquad [2]$$

$$NI_2 = f\,(IC, PBF, HLA, NKS, FSA) \qquad [3]$$

$$NI_3 = f\,(IC, PBF, HLA, NKS, FSA) \qquad [4]$$

$$NI_4 = f\,(IC, PBF, HLA, NKS, FSA) \qquad [5]$$

$$NI_5 = f\,(IC, PBF, HLA, NKS, FSA) \qquad [6]$$

$$NI_6 = f\,(IC, PBF, HLA, NKS, FSA) \qquad [7]$$

$$NI_7 = f\,(IC, PBF, HLA, NKS, FSA) \qquad [8]$$

$$NI_8 = f\,(IC, PBF, HLA, NKS, FSA) \qquad [9]$$

More precisely, NI_1 is an ordinal variable (scale 1-5) and it represents the importance of the nutritional label among consumers. Label use (0 if labels are not used, 1 if labels are used by consumers) is a binary variable expressed by NI_2.
Ordinal variables from NI_3 to NI_8 denote the importance that consumers attribute to the different nutritional claims provided by the European regulation during their purchasing decision (scale 1-5). In particular NI_3 reflects the importance attributed to low energy claim, NI_4 the importance to low fat or fat-free claim, NI_5 the importance to low sugar or sugar-free claim, NI_6 the importance to low sodium/salt or sodium-free claim, NI_7 the importance to high fibre and high vitamin claim and finally, and NI_8 the importance attributed to the light claim.
For each equation we considered 26 independent variables and we divided them into 5 different groups. The first group, named IC, identifies socio-demographic and individual characteristics and includes age, gender, work, income, number of family members and the body mass index. PBF expresses factors affecting purchasing behaviour. It takes into account if the respondent is usual shopper and it considers the importance (scale 1-5) of price, brand, flavour, information, place of origin, traceability, quality certifications on purchasing decision. The group of HLA (Healthy Life Attitude) is characterized by the variables dietary habits, sport habits, diseases connected to food, and smoking status. NKS groups factors representing consumers nutrition knowledge and the source of nutrition information. The food knowledge factor, measured by a scale 0-4 (from uninformed consumer to very informed consumer), measures the level of consumer knowledge through some questions regarding the principal nutritional items. The source of information factor contains questions about the different levels of nutritional information channels. The survey considers as possible source of nutrition information media (TV, radio, newspaper), experts (doctors, health authorities/ agencies) and relatives or friends. Also no interest in this kind of information is considered.
Finally Food Safety Attitude (FSA) represents attention to food safety issues, attention to packaging conditions, propensity to use meat label and attention to ingredients of products.
To estimate the 8 equations introduced above we used different models on the basis of the nature of dependent variables considered.
Label use expressed by equation [3] is estimated as a logit model provided that dependent variable is expressed in a dichotomic way (use or non use of nutritional label). This model take the following form (Bohrnstedt and Knoke, 1994):

$$logit(p_i) = \ln\left(\frac{p_i}{1-p_i}\right) = \alpha + \sum_j \beta_j X_{ji} \qquad [10]$$

with:
i=1,....1025; correspond to number of consumers interviewed
p_i=probability of the dependent variable taking the value of 1 (label use)
j=1,....26; correspond to number of independent variables
X_{ji}=independent variables (answers for each consumers)
α= constant
β_j= regression coefficients

For what that concerns equation [2] and equations from [4] to [9] where the response variable takes on values in a set of ordered categories (a 5 level rating scale from “not agree” to “totally agree” about importance of nutritional label, low energy claim, low fat claim, etc.), the *proportional odds model* for *ordinal logistic regression* is utilised (McCullagh, 1980). This model provides a useful extension of the binary logistic model in those situations where, precisely, dependent variable is ordered.

Ordinal logistic model takes the following form:

$$c_j(X_i) = \ln\left\{\frac{P(Y > j|X_i)}{P(Y \leq j|X_i)}\right\} = \beta_1 X_{i1} + ... + \beta_k X_{ik} - \tau_{j+1} \qquad [11]$$

with:
i=1,....1025; correspond to number of consumers interviewed
j=score from 1 to 4
k=1,...26; correspond to number of independent variables
Y= response variable
X_i=independent variables (answers for each consumers)
β= regression coefficients
τ = parameter referred to as "cutpoints" between intervals of values of response variable

In this kind of model β coefficients represent the log odds ratio of scoring > j versus ≤ j for a one unit change in X.

4. Results

4.1 Descriptive analysis

The survey underlined a high interest of the consumers for the nutritional attributes of food products, since 84% of the interviewees consider these attributes very important for the choice of food products (fig. 1). Similar percentages are revealed for the flavour (87%) and for quality signals (80%), whereas a slightly lower percentage is shown for the origin of product (74%). On the contrary, the price and the brand seem to play a less considerable role in the purchasing behaviour, as only the 54% and 37% of interviewees, respectively, consider these attributes very important.
In line with the previous remarks, the analysis revealed a high consumer demand for nutritional information, as most of consumers consider the presence of nutritional label an important factor for the choice of a food product. The high interest is shown by the 66% of interviewees which "totally agree" and "agree" with the question regarding the nutritional label, whereas the 19% were neutral, and only 15% were not interested on this issue (fig. 2).

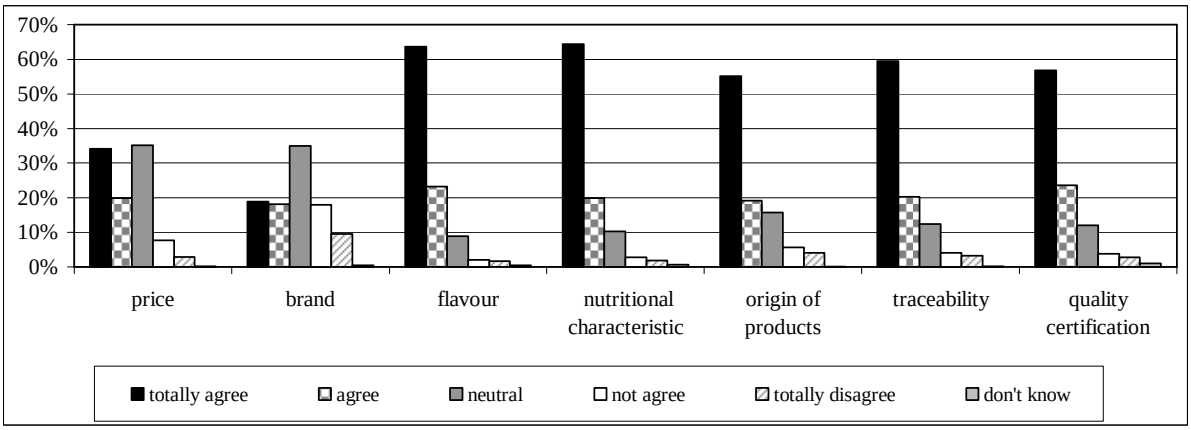

Fig. 1 – Attributes affecting purchasing behaviour
Source: our survey

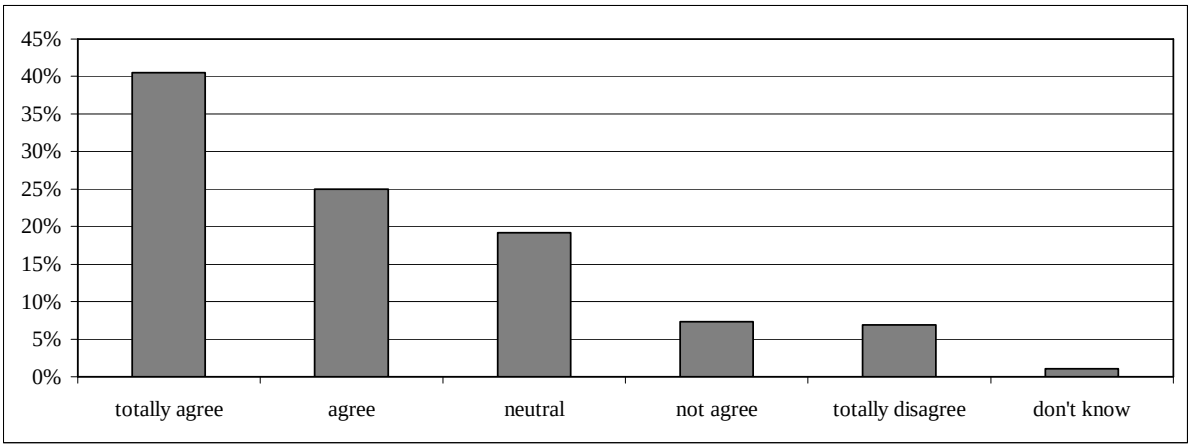

Fig. 2 – Importance of nutritional label
Source: our survey

The importance given by interviewees to nutritional information does not necessarily lead the consumer to read nutritional labels during the formulation of purchasing decisions. The part of interviewed consumers that stated to use the nutritional label drops to 55%, therefore, a quite high percentage of interviewees does not check this information (fig. 3). Instead, other elements, such as freshness conditions of products and the expiry date, are checked by a large majority of interviewees.
The apparent contrast between the presence of nutritional label and its use can be explained in terms of opportunity to have the nutritional information and choice to use this kind of information. The results seem to show that for consumers it is a chance to have the nutritional label, though it is a choice to use it.
With regard to nutritional claims, the results revealed a quite high interest of the interviewees towards the claims provided by Reg. 1924/2006, nevertheless, the analysis highlighted different levels of importance among the nutritional claims categories (Banterle et al., 2007) (fig. 4). The survey showed a great interest for the claims "high fibre/vitamin" (66% of interviewees were "totally agree" and "agree" with the question concerning the importance of this claim), "low fat" (58%) and "low sugar" (50%), whereas consumers revealed quite low interest in the claims "light" (31%), "low energy" (44%), and "low sodium/salt" (47%).

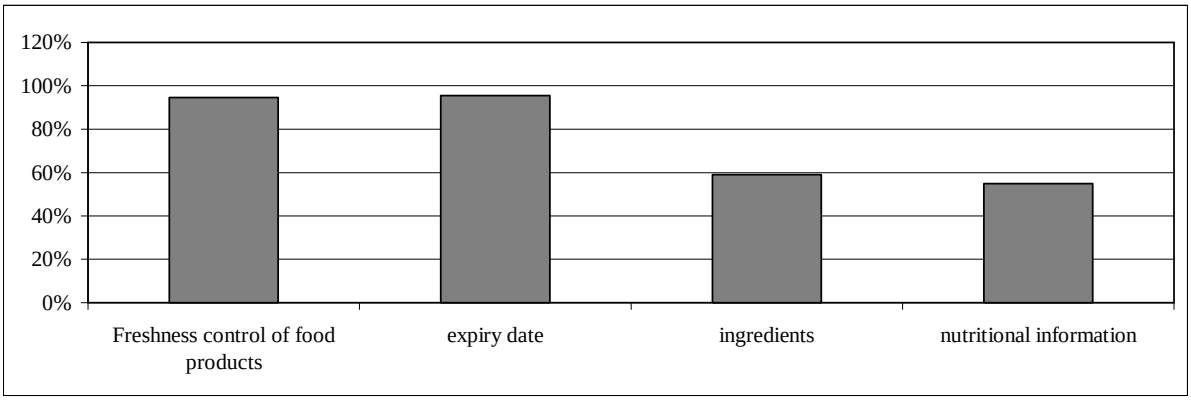

Fig. 3 – Elements checked in the choice of a food product
Source: our survey

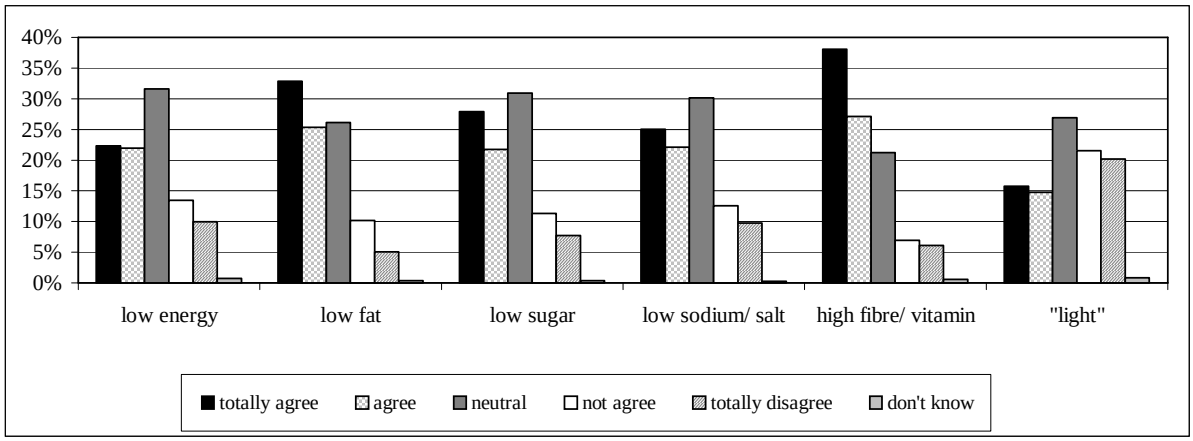

Fig. 4 – Importance of nutritional claims
Source: our survey

4.2 Empirical results

Equations [10] and [11] were estimated separately using maximum likelihood estimation method and the results are shown in table 1. Pearson's Chi-Square Statistics confirms that all the models with the independent variables included are significantly better then model with just intercepts and Nagelkerke's R^2 indicate adequate goodness of fit[2].
Estimates of model [10] show that no socio-demographic and individual variables (IC) significantly affect the dependent variable "label use" whereas food safety attention variables (FSA) play an important role. Respondents who obtain nutritional info by expert, in agreement with Nayga *et al.* (1998), are more likely to use nutritional label. The estimated effects of being an usual shopper and being interested to traceability are also statistically significant. Moreover, consistently with the results of Wang et al. (1995) and Nayga (1996), the variable dietary habits is statistically significant and positive. Interestingly, price, brand and flavour appear not influencing label use; this means that consumers that usually read nutritional label do not care typical aspects concerning purchasing behaviour.
The characteristics of respondents toward the importance of nutritional label can be analysed by NI_1-model estimates. Origin and certification have a significant and positive effects on the importance of nutritional label, whereas, also in this case, price and brand don't have any effect on the dependent variable.
The results of the others 6 ordinal regression models (NI_3-NI_8) appear quite similar. Among the socio-demographic and individual variables (IC) those concerning age and gender appear significant and positive, whereas the BMI shows a positive relation only to "low energy", "low fat" and "low sugar". Income has a significant and negative effect on "low energy", "low sugar", "low sodium" and "fiber-vitamine". The negative sign is consistent with the literature that links nutritional information and time pressure.
With regard to the variables concerning purchasing behaviour (PBF), price, brand, origin of products and quality certification greatly influence consumer interest towards nutritional claims. For the variables regarding healthy life attitude (HLA), the results are different in the 6 analysed models. Sport habits are significant and positive for the models "low energy", "low sodium" and "light"; the diseases connected to food are significant for the models "low

[2] Nagelkerke's R-Square (Nagelkerke, 1991) is a modification of the Cox and Snell R^2 and divides this measure by its maximum in order to achieve a measure that ranges from 0 to 1.

fat" and "low sugar". Among the variables NKS, the index estimated for the assessment of food knowledge is not significant, whereas the main information sources are the experts and the media. Finally, food safety attention variables (FSA) play an important role just for "low sodium" model.

Table 1 – Estimates of the 8 models

		nutritional label	**label use**	**low energy**	**low fat**	**low sugar**	**low sodium**	**fibre-vitamin**	**light**
		NI $_1$	***NI*** $_2$	***NI*** $_3$	***NI*** $_4$	***NI*** $_5$	***NI*** $_6$	***NI*** $_7$	***NI*** $_8$
		[ordinal regression]	*[logit]*	*[ordinal regression]*	*[ordinal regression]*	*[ordinal regression]*	*[ordinal regression]*	*[ordinal regression]*	*[ordinal regression]*
	τ_1	**2.78 ****	-	**4.28 ****	**2.59 ****	**3.32 ****	**4.05 ****	**2.09 ****	**5.01 ****
	τ_2	**3.75 ****	-	**5.45 ****	**3.93 ****	**4.51 ****	**5.17 ****	**3.05 ****	**6.26 ****
	τ_3	**5.02 ****	-	**7.12 ****	**5.53 ****	**6.23 ****	**6.78 ****	**4.49 ****	**7.62 ****
	τ_4	**6.25 ****	-	**8.32 ****	**6.74 ****	**7.33 ****	**7.88 ****	**5.78 ****	**8.58 ****
	α	-	**-3.21 ****	-	-	-	-	-	-
IC	age	-0.03	-0.08	**0.10 ****	**0.16 ****	**0.19 ****	**0.18 ****	**0.12 ****	0.07
IC	gender	-0.05	-0.03	**0.59 ****	**0.34 ****	**0.47 ****	0.11	0.09	**0.23 ****
IC	work	0.13	-0.05	0.21	0.13	-0.11	-0.05	-0.08	0.25
IC	income	**-0.14 ****	0.00	**-0.15 ****	-0.06	**-0.26 ****	**-0.10 ***	**-0.14 ****	-0.08
IC	n.r family members	0.05	-0.08	0.08	**0.13 ****	0.04	0.07	-0.01	-0.02
IC	BMI	-0.02	0.01	**0.14 ****	**0.08 ***	**0.09 ****	0.01	-0.05	0.07
PBF	price	0.09	0.01	**0.21 ****	**0.16 ****	**0.16 ****	**0.17 ****	**0.22 ****	**0.21 ****
PBF	brand	0.07	0.01	**0.24 ****	**0.19 ****	**0.14 ****	0.05	0.06	**0.26 ****
PBF	flavour	0.05	-0.02	**0.13 ****	-0.02	-0.02	0.01	0.04	**0.18 ****
PBF	origin	**0.15 ****	-0.03	**0.12 ****	**0.16 ****	**0.15 ****	**0.17 ****	**0.15 ****	**0.11 ****
PBF	traceability	0.07	**0.20 ****	-0.04	-0.01	**0.15 ****	**0.12 ****	0.06	-0.09
PBF	certification	**0.16 ****	0.10	**0.20 ****	**0.22 ****	**0.24 ****	**0.24 ****	**0.42 ****	**0.29 ****
PBF	shopper	0.20	**0.32 ****	0.06	0.15	-0.05	0.07	0.11	0.06
HLA	dietary habits	**0.13 ****	**0.12 ****	0.04	0.05	0.05	0.02	-0.06	0.03
HLA	sport habits	0.18	0.00	**0.36 ****	0.19	0.18	**0.23 ****	0.04	**0.24 ****
HLA	fooddeseases	0.04	0.00	0.12	**0.25 ****	**0.37 ****	0.13	0.04	-0.08
HLA	smoke	0.12	-0.15	**0.29 ****	0.16	0.17	**0.38 ****	**0.35 ****	**0.31 ****
NKS	food knowled.	0.06	-0.01	-0.01	0.04	0.07	0.05	-0.03	0.04
NKS	noinfo	0.12	-0.08	0.05	0.11	0.12	0.31	0.06	0.32
NKS	infomedia	0.19	0.17	**0.30 ****	0.03	0.17	**0.37 ****	0.23	**0.42 ****
NKS	infoexpert	**0.41 ****	**0.48 ****	0.21	0.11	**0.24 ****	**0.48 ****	**0.33 ****	**0.37 ****
NKS	infofriend/relative	0.13	0.04	**0.28 ****	0.20	0.16	0.11	**0.23 ****	0.13
FSA	food safety attention	**0.47 ****	**0.21 ****	**0.23 ****	**0.21 ****	**0.17 ****	**0.17 ****	**0.14 ***	**0.22 ****
FSA	packaging condition	0.08	**0.59 ****	-0.38	-0.34	0.14	**0.61 ****	0.09	-0.03
FSA	meat label use	0.03	0.04	0.04	0.05	0.09	**0.11 ****	0.10	0.00
FSA	ingredients attention	**0.25 ****	**0.90 ****	0.08	-0.02	-0.16	-0.04	0.06	-0.15
	χ^2 *(Sig. 0,000)*	*185.830*	*147.121*	*229.049*	*169.819*	*215.400*	*200.761*	*191.437*	*214.092*
	Pseudo R^2 *(Nagelkerke)*	*0.190*	*0.190*	*0.223*	*0.172*	*0.212*	*0.198*	*0.193*	*0.210*

Source: our survey
Note: Significance level: **: 0.05; *: 0.10

5. Concluding remarks and management implications

The aim of this work was to analyze the possible impact of the new European Regulation about nutritional claims on consumer behavior and food choices. The study examines the characteristics of consumers using food label and nutritional claims and tries to define also the

main specific determinants that can influence the use of different kind of information on food labels.
In the empirical analysis different aspects can be highlighted. Empirical evidence shows that nutritional label is considered an important instrument for the choice of products by most of consumers interviewed but not all of them use the labelled information during food shopping. Moreover, the percentage of consumers who use nutritional labels is smaller than that representing consumer interest for nutritional claims. This interest is highlighted especially for the claim about vitamins and energy content.
The analysis shows also that consumers who use nutritional labels reveal different characteristics compared to those who use nutritional claims. Consumers using nutritional label show a high interest in food safety concerns, use as source of information that provided by experts and has specific dietary habits. On the contrary, for consumers with nutritional claims interest the survey shows significant links with a set of factors influencing purchasing behavior, such as price, brand, flavor, etc. Socio-demographic characteristics are statistical significant and show a positive link with age, the female gender, and a negative linkage with the income. The BMI is significant for the claim “energy”, “fat” and “sugar”.
The results of the consumer survey outline interesting implications for the firm strategies. Indeed, the identification of different consumer features, based on the type of information used, lead to the definition of different marketing strategies.
With regard to those consumers using precise information such as that reported on nutritional label, the product differentiation should be principally based on nutritional properties, and marketing activities should be oriented to enhance the information related to these properties. In this case, socio-demographic characteristics of consumer target are not so important, whereas the attractiveness of products is particularly affected also by safety information reported on labels as traceability, ingredients and so on.
On the other side, with regard to consumers interested in nutritional claims, the product differentiation should be based on several attributes, not only on the nutritional properties, like brand, price, the level of product convenience and so on. Furthermore, the product should be oriented to specific consumer categories in socio-demographic terms.
Moreover, management implications could also be derived from the implementation of Reg. 1924/2006, as only those firms who respect rules of European regulation can use nutritional claims. This means that some firms have to reorganise their activities in order to comply with European requirements for nutritional claims, whereas others firms can choose not to use these claims. In particular, a new way of communication and a new packaging design should be applied by firms, considering that stricter and more precise messages and information cues should be on labels.
The reshaping of marketing strategies of the firms and the requirements of European Regulation can affect the relationships among economic agents in the firm networks and supply chains, distinguishing between industrial brands and private labels. With regard to industrial brands, the redefinition of marketing strategy and the reorganisation of the firm activities can involve the relations between processor and suppliers. With regard to private labels, the introduction of new product strategies can modify the vertical relations between retailers and processors in the supply chains, as new agreements and production rules have to be implemented in order to respect European requirements related to nutritional claims and to implement the changes connected to intrinsic and extrinsic product features chosen by retailers.
Finally, nutritional fixed messages on front labels of food products introduced by Reg. 1924/2006 seem to be useful improving information level and facilitating consumers food choices. The information asymmetry is reduced for two main reasons. First, nutritional claims can transmit information also to those consumers that do not usually read the labels. This

suggests that short messages on front labels can increase the information for consumers leading them to follow their qualitative preferences and target expenditures toward products they most want. Secondly, the introduction of a mandatory format for the nutritional claims can reduce the opportunistic behaviour of the economic agents of the supply chains, leading them to give messages that can not be interpreted in different ways by consumers.
However, for further research it should be considered that nutritional claims reduce the information asymmetry only of specific categories of food products and not of all food products. Moreover, further investigation is needed to understand if nutritional labels have to remain voluntary or mandatory and, if voluntary, to study the possibility to introduce a fixed nutritional format for all food products.

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