

Labelling effects on consumer intention to purchase for soybean oil

João de D.S. Carneiro^a, Valéria P.R. Minim^a, Rosires Deliza^{b,*}, Carlos H.O. Silva^a,
Joel C.S. Carneiro^a, Fabiana P. Leão^a

^a Departamento de Tecnologia de Alimentos, UFV—Universidade Federal de Viçosa, Viçosa—MG, CEP 36571-000, Brazil

^b Embrapa Food Technology, Av. das Américas, 29501, CEP 23020-470 Rio de Janeiro—RJ, Brazil

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Abstract

The effect of some soybean oil label attributes on consumer intention to purchase was evaluated by using conjoint analysis. Four attributes with two levels each were chosen and manipulated. They were: brand name (familiar and unfamiliar), price (high and low), nutritional information (with and without cholesterol, and rich in vitamin E) and soybean type (with and without the term “transgenic”). A complete factorial design was used and 16 hypothetical soybean oil packages were created and evaluated by 144 consumers based on their intention to purchase. The term transgenic had a negative impact on the purchase intention of 76% of consumers, i.e., they declared an intention not to buy the transgenic soybean oil. Overall purchase intention was affected by price, with the low priced oils obtaining a higher purchase intention.

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1. Introduction

Soybean oil accounts for 29% of the world-wide oil production, being the highest production of any vegetable oil (United, 2001). A total of 4.37 million tons of soybean oil were produced in Brazil from February 2001 to January 2002, with a domestic consumption of 2.94 million tons.

Food selection and consumption are complex phenomena influenced by various factors, which can be classified as marketing-related, psychological and sensory related. Several strategies are used by consumers to choose a food product, influencing both initial product evaluation and satisfaction after use. In this context, the quality has been recognised as a key factor, and can be defined in many different ways. Despite this broad view of quality, its concept from a marketing and consumer behaviour perspective is well recognised and can greatly contribute to a market driven product development approach (Oude Ophuis & Van Trijp, 1995) for novel products. Additionally, the sensory properties perceived

by consumers have also been considered as determining factors in choosing a product. However, it is evident that extrinsic product aspects, such as information and price, also play an important role in this process (Guerrero, Colomer, Guardia, Xicola, & Clotet, 2000).

The effect of package/label attributes and product information on consumer attitudes towards product evaluation have been widely studied (Costa, 1999; Costa, Deliza, Rosenthal, Hedderley, & Frewer, 2000; Deliza, MacFie, & Hedderley, 2003; Rowan, 2000; Wansink, Park, Sonka, & Morganosky, 2001), reflecting the role they play in consumer expectation and hedonic product evaluation. It is well known that the effect of consumer expectation on quality perception is based on intrinsic and extrinsic factors. Within this context, packaging (an extrinsic factor), plays a fundamental role on consumer buying behaviour, acting as a mean to attract attention and provide information, thus affecting the perception of product quality (Bower, Saadat, & Whitten, 2003; Deliza, 1996). Claims, illustrations and symbols convey important information on what one can expect of the product from the package (Cardello, 1995).

One of the greatest difficulties in this type of research is to quantify the effect of each package attribute on the consumer purchase intention. Conjoint analysis is a

* Corresponding author. Tel.: +55-21-410-7524; fax: +55-21-410-1090.

E-mail address: rodeliza@ctaa.embrapa.br (R. Deliza).

useful tool to investigate the effect of these attributes (Deliza, Rosenthal, & Silva, 2003).

Conjoint analysis can be used in several different applications, such as novel products and packaging development, estimation of market segmentation for a particular product, ingredient composition, determination of the favourite brand, market segmentation based on consumer preference and consumer preference simulation (Malhotra, 1998).

Conjoint analysis derives from the field of mathematical psychology and psychometrics and has helped marketing professionals to understand the relative importance of product attributes and services on the choice and buying processes. The relevance of this type of information on planning the industry marketing strategies is rather significant. This type of information is of great relevance for industrial marketing strategies. It can be very useful to define changes and adaptations in particular products or services as well as in the process of developing novel products for different consumers.

This study investigated the effect of some soybean oil label attributes on the consumer intention to purchase using conjoint analysis. The impact of attitudinal and demographic data on the result was also considered.

2. Material and methods

2.1. Consumers

Two hundred and fifty questionnaires were distributed among residents of Viçosa—MG, and 144 consumers were selected to take part in the study. All participants were soybean oil consumers and shoppers at supermarkets to buy groceries for household consumption.

2.2. Label attributes and their levels

Three focus groups sessions were carried out with a total of 24 consumers to identify attributes of soybean oil labels that most influenced participant's choice of products. Consumers were recruited through a questionnaire distributed among 50 people aiming at selecting those who consumed soybean oil, came regularly to supermarkets, and read food labels. The sessions followed a structured interview and were carried out by the same moderator. Four soybean oil bottles, including commercial ones available in the Brazilian market, and others specially prepared for this study, were used during the interviews. The products varied in several characteristics and their use mimicked the situation usually faced by consumers at the supermarket, i.e. having to choose the product by looking at the package/label. Besides, they were useful in motivating the discussion.

Table 1
Label attributes and their levels

Attribute	Levels/Description
Price ^a	1—High: R\$ 1.60 2—Low: R\$ 1.15
Brand	1—Familiar: Liza 2—Unfamiliar: Vitóleo
Nutritional information	1—No information 2—Yes: without cholesterol*, rich in vitamin E * “as all vegetable oil”
Information on type of soybean	1—No 2—Yes: transgenic

^a Using the Brazilian currency, which is called Real (R\$).

Further information about the focus group interviews is presented in Carneiro et al. (2002). The experimental procedures regarding the sessions conduction and interpretation followed recommendations presented in the literature (Casey & Krueger, 1994; Deliza et al., 2003; Krueger, 1988; Stewart & Shamdasani, 1990). The results of the focus group interviews identified the following attributes as relevant for participants in the purchase process: price, brand, and type of soybean used in the oil production. Nutritional information was also included in the design to verify its effect on consumer intention to purchase, even knowing that this information is unnecessary and also misleading, since all vegetable oils do not have cholesterol. However, such information appears in the majority of the vegetable oil labels available in the Brazilian market. Two levels of each label attribute were used in the study (Table 1). For the price, the values of R\$ 1.60 and R\$ 1.15 reflected the variations on the soybean oil prices found in local supermarkets at the time of the study. The brand Liza was chosen because it is very well known in Brazil, while Vitóleo was regarded as an unfamiliar name for participants. Consumer's concerns towards the genetically modified products motivated participants during the focus group sessions, and labels with and without such information were used in the designed trial.

2.3. Experimental design and data collection

A complete factorial design was used to define the treatments (cases) of the study (see for example Green & Srinivasan, 1978). Using this approach, each treatment (case) is created by the combination of all levels of each factor. For instance, as there were four factors with two levels each, then $2^4 = 16$ treatments were evaluated by consumers. In the fractionated factorial design, the experimental design provides a schematic whereby the researcher creates a number of alternative package/label stimuli to test, in a way that each stimuli contains different executions of the factors. The package/label de-

signs may look different, but they are all connected by the experimental design.

2.4. Label manipulation

Sixteen soybean labels were created using the Corel program (licensed for the UFV, 2002), based on the four previously identified features, which were incorporated into the label according to the food labelling norms. Labels varied only in the front view, where brand, nutritional information and type of soybean were displayed. They were printed in glossy paper, coated with contact paper and stuck on 16 identical 900 ml PET bottles (polyethylene tereftalate) containing soybean oil available in the local market. This procedure ensured that all treatments had the same shape. Price was added using a manual labelling machine. The created products looked very similar to vegetable oils found in the Brazilian market. This was a condition highly recommended by Deliza (1996) in order to mimic as close as possible the real situation faced by consumers during the product evaluation. Fig. 1 shows two labels.

2.5. Product evaluation and questionnaires

The soybean oil bottles were evaluated in individual sensory booths illuminated with white light, and the purchase intention of 144 soybean oil consumers collected via a non-structured, horizontal line nine centimetre scale. This scale was labelled with two anchors on both ends, with the expression “definitely would not buy” written on the left side, and the expression “definitely would buy”, on the right one (Costa, 1999). Consumers were asked to mark with a vertical line on the scale, the position that best described his/her product intention to purchase. Consumers had been told about the testing procedure before starting the evaluation, and

requested to behave as if they were in a supermarket, buying soybean oil.

The bottles were codified with three digit numbers, and presented monadically, with no time restriction, in the same session, following a design (given by MacFie, Bratchell, Greenhoff, & Vallis, 1989), which was balanced for order of presentation effect to each consumer. According to this design, each soybean oil bottle appeared the same number of times in each position. The first package was the same for all consumers, to prevent the first sample effect and carryover effect (Deliza, 1996; Wakeling & MacFie, 1995). It consisted of a soybean oil bottle displaying no brand, price, nutritional information and type of soybean. Thus, the presentation order and the residual effect were eliminated. Residual effect is the influence one sample has on the next sample’s evaluation.

The selected design contained 48 different sequences for sample presentation, sufficient to estimate four main effects (brand, nutritional data, soybean type and price in a non-biased way. Three replications (3 × 48 = 144 consumers) were applied. The evaluation of each consumer’s purchase intention was transformed into scores and statistically analysed. They were obtained by measuring the distance between the left anchor of the scale to the consumers marked evaluation.

After intention to purchase evaluation, consumers were asked to answer three attitudinal and demographic questionnaires. The first questionnaire evaluated consumers’ concerns related to the environment (Frewer, Howard, & Shepherd, 1997, validated by Costa, 1999). Information about consumers’ opinions on the use of genetic engineering (transgenic food) in soybean oil processing was obtained by asking consumers to complete a questionnaire proposed by Frewer et al. (1997) and validated by Costa (1999). The HCS (Health Consciousness Scale), developed by Oude Ophuis (1989), and validated by Dantas, Minin, & Deliza (2003), was applied to evaluate the extent to which people were concerned with their health.

2.6. Statistical analysis

The additive model was used as a composition norm. This model assumes that global evaluation is made up as the sum of contributions of the factor levels (Steenkamp, 1987). In this study, the global evaluation was the intention to purchase, with the factor levels being the package attributes. The overall additive model for *n* factors, each one with *m* levels was presented by Steenkamp (1987):

$$Y = \sum_{i=1}^n \sum_{j=1}^{m_i} v_{ij} X_{ij} \tag{1}$$

where *Y* is the global consumer evaluation of a given product, *v* is the unknown part-worth (estimated in the



Fig. 1. Examples of two labels used in the study.

conjoint analysis) associated to the j th level of the i th factor (with $i = 1, 2, \dots, n$ and $j = 1, 2, \dots, m$) and X is the variable ($X_{ij} = 0$ or $X_{ij} = 1$) which indicates the presence of the j th level of the i th attribute.

The results were analysed according to the clustering segmentation model (Moore, 1980). Initially, the data were individually submitted to a conjoint analysis, i.e., the part-worths for each consumer were calculated. According to the results from these individual analyses, the consumers who did not fit the model ($p > 0.10$), i.e., those whose ANOVA did not indicate any significant effects of any package factor in the evaluations, were excluded from the subsequent analyses. The consumers who fit the model ($p < 0.10$) were divided into groups, by using the average link method and the Euclidean distance as dissimilarity measure, applied to the part-worths values estimated in the conjoint analysis. Hence, the groups were formed by consumers presenting similar buying behaviour (similar purchase intention), based on the part-worths values estimated in the conjoint analysis. Later, aggregated conjoint analyses were carried out for each group of consumers, and resulted in part-worth estimates similar to the part-worth's averages estimated in the individual model for each group, as mentioned by Moore (1980). The part-worths were estimated by applying the least squares method in a multiple linear regression analysis model with dummy variables. This is the simplest form of conjoint analysis.

The results from the attitudinal questionnaires were changed into scores for each consumer and descriptively analysed. For the questionnaire on attitude towards the environment, consumers who attributed scores higher than 4 for two or more questions were classified as concerned with the environment. The remaining consumers were classified as unconcerned. For the questionnaire on health consciousness, consumers who gave scores higher than five for, at least, six questions, were classified as concerned with their health. Similarly the remaining was considered as unconcerned. Considering the attitude towards the application of genetic engineering in soybean oil processing, consumers who attributed scores equal to or higher than five to at least nine questions were classified as against the use of transgenic products and the remaining as in favour of it. After classification by consumers, a frequency data analysis was carried out for each group formed from the grouping analysis through the results of the conjoint analysis.

The demographic factors: gender, age, income and level of education were considered descriptively, to determine the profile of the consumers participating in the study. All analyses were carried out using the SAS program (Statistical Analysis System-SAS Institute Inc., Caroline Cary, NC, USA SAS, 1999) version 8.0, licensed for the UFV, 2002.

3. Results and discussion

The profile of the 144 consumers who participated in this study is shown in Table 2. All of them consumed soybean oil and bought themselves the food they ate at home. The predominant age ranged from 20 to 39 years (76%), with 54% being female. Family income ranged between 1 and 5 minimal wages for 41% of the participants, 5 and 10 for 35%, 10 and 20 for 21% and only 3% above 20 minimal wages. Concerning consumers' educational level, 67% of participants were college-educated or had a graduate degree.

The percentage of consumers who declared as having the habit of reading the food labels (always or frequently) was much higher than those who read labels sometimes or occasionally (72% against 28%, respectively). Among the characteristics observed by participants, 92% had the habit of observing the "best before" date, 88% the price and 71% the brand. Those three factors were the most observed characteristics. It has also been noticed that consumers with a higher educational level tended to read food labels more frequently. The majority of consumers with primary and secondary education declared that they read food labels only occasionally/rarely, against always/frequently reported by graduate and undergraduate people. A study carried out by Nayga, Lipinski, & Savur (1998) showed that level of education had a positive impact on the frequency of reading food labels, in agreement with the results obtained in this research. Similarly, Mueller (1991) reported that food labels were the most important source of information for two-thirds of Americans, despite two-fifths reporting that health claims were not very believable. Considering that labels have the potential to deliver real benefits for consumer in terms of choice, because they are often the sole source of information available to them at the point of sale, it is important that they communicate clear messages (NCC, 2003) to reach the majority of consumers.

The results of the ANOVA for each participant excluded from the subsequent analysis 18 consumers who did not fit in the model, i.e., those consumers whose ANOVAS did not have any significant effect ($p > 0.10$) for any package attribute. From the grouping analysis, with the part-worths of the 126 remaining consumers who were fitted by the model, seven groups were obtained. As the three of these groups contained only one consumer, their data will not be discussed further in the analysis.

Table 3 shows the aggregate containing 26% of consumers, information on soybean type and price significantly affected ($p \leq 0.01$) the consumer intention to purchase. Information on soybean type had a relative importance (RI) of 89.0%, and the information "transgenic" had a negative impact on the purchase intention for this group.

Table 2
Profile of the consumers who participated in the study ($n = 144$)

Characteristic	Description	Frequency (%)
Gender	Male	46
	Female	54
Age	20–29 years	56
	30–39	20
	40–49	16
	50–59	8
Level of instruction	Primary	3
	Secondary	11
	Undergraduate—uncompleted	19
	Undergraduate—completed	20
	Graduate level	47
Income (number of minimal Brazilian wages)	1 a to 5	41
	>5 a to 10	35
	>10 a to 20	21
	>20	3
Who does the shopping?*	Yourself	100
	Others	38
Oil consumed*	Soybean	100
	Corn	18
	Sunflower	29
	Cotton	1
	Olive	26
	Canola	11
Read labels?	Always	35
	Frequently	37
	Sometimes	26
	Occasionally	2
What is observed in the labels*	Brand	71
	Price	88
	“Best before” date	92
	Nutritional information	60
	Information on ingredients	58
	Additives	63

The purchase intention of Group 2, containing 31% of the consumers participating in the research, was significantly affected ($p \leq 0.01$) by the brand, soybean type and the price. Information on soybean type had a RI of 63% and the indication in the label that transgenic soybean had been used caused a negative impact on their purchase intention. Price and brand RI were 24% and 11%, respectively, with the familiar brand (LIZA) and the lowest price contributing positively for their purchase intention.

Brand, nutritional information, soybean type and price significantly ($p \leq 0.01$) affected consumers in Group 3 ($n = 28$), representing 19% consumers. All four attributes had practically the same impact on consumers' intention to purchase, with a RI close to 25%. Such result shows that for this consumer group all the attributes were important in evaluating soybean oil purchase intention, and that consumers showed a higher intention to purchase a conventional, familiar brand, with nutritional information and low-priced product.

Intention to purchase of consumers in group 4 ($n = 14$), which accounted for 10% of participants, was significantly influenced ($p \leq 0.01$) by nutritional information and price. Price caused the highest impact (RI = 73%), with low priced products positively contributing to purchase intention. Thus, this group could be considered price-driven consumers as the buying intention was based mainly on this factor.

Brand showed an RI above 10% for consumer in groups 2 and 3. Participants in those groups attributed higher buying intention to LIZA oil, suggesting that they probably associated the familiar brand with a better quality product, compared to the unfamiliar brand VITÓLEO. Brand name has been regarded as a very important quality cue, which has been demonstrated in multiple labelling studies (Allison & Uhl, 1964; Costa, 1999; Deliza, 1996; Makens, 1965; Stokes, 1985). Most consumers (56% of the total participants) in the groups were not affected by this information. Actually, the majority of them (56% of the total participants) in the

Table 3
Aggregate analysis results for each* consumer group

	Group 1 (n = 37)	Group 2 (n = 44)	Group 3 (n = 28)	Group 4 (n = 14)
% of total consumers	25.7%	30.6%	19.4%	9.7%
Attributes and levels/relative importance	Part-worths			
<i>Brand</i>				
1. Liza	0.08 ^a	0.34 ^a	0.40 ^a	0.20 ^a
2. Vitóleo	-0.08 ^a	-0.34 ^b	-0.40 ^b	-0.20 ^a
<i>Relative importance</i>	1.9%	10.6%	25%	5.8%
<i>Nutritional information</i>				
1. Yes	0.10 ^a	0.09 ^a	0.40 ^a	0.46 ^a
2. No	-0.10 ^a	-0.09 ^a	-0.40 ^b	-0.46 ^b
<i>Relative importance</i>	2.6%	2.8%	25%	13.4%
<i>Information on soybean type</i>				
1. No	3.54 ^a	2.04 ^a	0.38 ^a	0.26 ^a
2. Yes; Transgenic	-3.54 ^b	-2.04 ^b	-0.38 ^b	-0.26 ^a
<i>Relative importance</i>	89%	62.7%	23.3%	7.5%
<i>Price</i>				
1. High (R\$ 1.60)	-0.2574 ^a	-0.7781 ^a	-0.4310 ^a	-2.5223 ^a
2. Low (R\$ 1.15)	0.2574 ^b	0.7781 ^b	0.4310 ^b	2.5223 ^b
<i>Relative importance</i>	6.5%	23.9%	26.7%	73.3%

Different letters in the same column for the same attribute and group denote a significant difference ($p \leq 0.05$) by the *t* test. The negative signals mean negative impact on consumer intention to purchase.

* $n = 21$ or 14.6% of the 144 consumers were not included in this analysis.

referred groups did not consider this information important. It might have been because they already had some knowledge on vegetable oils, and they knew that those products do not contain cholesterol and neither are rich in vitamin E.

The purchase intention of 76% of the consumers (groups 1, 2 and 3) was influenced by information on soybean type. The price vs. information on soybean type interaction was investigated but the results showed no significant interaction effect ($p > 0.05$). However, it must also be emphasised that for consumers in groups 1 and 2 (56% of the total participants), this was the attribute with the highest relative importance, revealing the consumer interest for this kind of information. The expression transgenic had a negative impact on these consumers' purchase intention, i.e., they declared lower intention to purchase for transgenic soybean oil. One can speculate that those people would reject genetically modified soybean oil, if it was available in the market. This result confirms those obtained by Massarani (2000) in the city of Porto Alegre (south of Brazil) in which 72% of the participants indicated an intention not to buy transgenic soybean oil nor transgenic margarine.

All consumers had their purchase intention affected by price, with this label attribute reaching a higher RI for those in groups 3 and 4. Low-priced soybean oils obtained a higher purchase intention than high priced-ones, for all participants in this study. The results confirm those reported by Dantas (2001) and Deliza (1996), reinforcing the positive impact of low priced products on consumers' purchase intention. Previous studies presented in the literature have also demonstrated the

importance of price on the product perception and consumer choice (Lange, Issanchou, & Combris, 2000; Oude Ophuis & Van Trijp, 1995; Steenkamp, 1987), revealing that this extrinsic product attribute had a key role, even considering the evaluation of a low involvement product. However, other studies have shown opposite results, i.e., consumers attributed higher purchase intention for the high-priced products (Baker & Crosbie, 1994; Chung & Fu, 1995; Costa, 1999; Steenkamp, 1987). These results may seem incoherent; however, the participants in the above studies might have associated high price with high quality. This can also be explained by the tendency of some consumers to try to impress the researcher with their answers. This effect is called impression management, and has been reported several times in the literature (Flett, Blankstein, Pliner, & Bator, 1988; Leary & Kowalsky, 1990).

The attitudinal and demographic questionnaires used in this study contributed to the interpretation and understanding of the consumer's attitude and intended purchase behaviour for different soybean oils. Fig. 2 shows the results of the questionnaires on attitude towards the use of genetically modified soybean for oil process, environment attitude and health consciousness scale for the four groups of consumers identified in the study.

Most consumers in groups 1 and 2 were classified as being against the use of transgenic (genetically modified) products. This result can explain the higher negative impact that the attribute "information on soybean type" had on consumer purchase intention. For consumers in groups 3 and 4, an expressive minority (less than 10%)

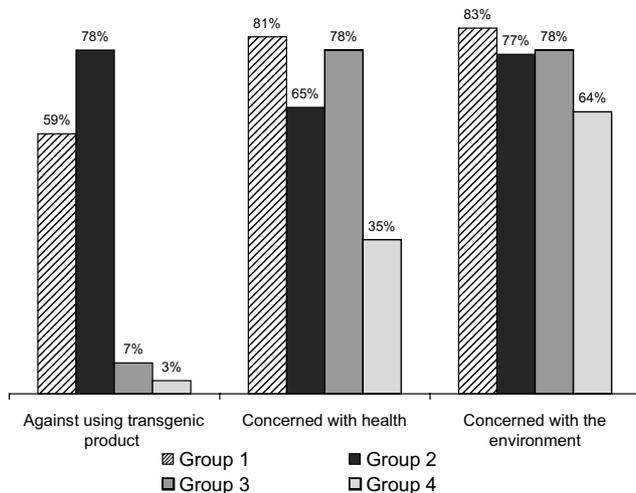


Fig. 2. Results of consumers' attitude questionnaires. From Table 3, showing the four groups of consumers identified after using conjoint and cluster analyses on the data. The percentages above each bar indicate the percentage of consumer for each attitudinal questionnaire used in the study.

were against transgenic products, confirming the smaller impact the attribute "information on soybean type" had on their purchase intention.

There was not a great difference among consumers regarding the environment concerns, mainly considering groups 1, 2 and 3. Dantas (2001) investigated the package effects on the consumer perception of minimally processed cabbage, and used the attitude towards the environment to help the results interpretation. The author reported no difference between the two groups of consumers identified after conjoint and cluster analyses application, but in both of them, the concern about the environment was high. Costa et al. (2000) have demonstrated that the consumer intention to purchase for environmentally friendly sunflower oil was higher for participants who declared a higher concern about the environment. In the present study, consumers in segments 1, 2 and 3 were classified as concerned with the environment, confirming the results reported by Dantas (2001) and Costa et al. (2000).

A large number of consumers in groups 1, 2 and 3 (over 65%) were classified as concerned with their health, compared to only 35% of people in group 4. However, no relationship was found between concern about health and consumers' purchase intention regarding nutritional information on the labels.

4. Conclusions

Brand name had a relative importance (RI) higher than 10% for about 50% of consumers. These consumers attributed a higher purchase intention for the familiar brand LIZA, suggesting that they might have regarded

these well-known brand products to have better quality than the unfamiliar VITOLEO. Most consumers (more than 50%) in groups 1 and 2 were not affected by nutritional information ($RI < 10\%$) when evaluating soybean oil intention to purchase, showing that they did not value this attribute. Transgenic information had a negative impact on the purchase intention of 76% of the consumers who participated in this study, suggesting that they would reject transgenic soybean oil. All consumers had their buying intention affected by price, with lower priced products achieving higher buying intention than the higher-priced ones.

Based on the results of the attitudinal questionnaires (environment, health consciousness, and application of genetic engineering in food production), most consumers were classified as concerned with the environment and their health. However, no relationship was found between this result and the consumer's intention to purchase. The results of the questionnaire on the attitude towards the use of genetic engineering in soybean oil production, showed that consumers in groups 1 and 2 had a higher rejection of transgenic products than people in groups 3 and 4. This might have justified the great importance given by consumers in these two former groups to the label attribute "information on soybean type".

Our study indicates that when developing, elaborating or modifying food products it is necessary to identify the extrinsic attributes (e.g. package, label information) used by consumers to improve the likelihood of product acceptance. Conjoint analysis also provided a format for presentation of results (e.g. part-worth's) that clearly identified the relative importance of different product attributes or marketing strategies.

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