

Genetically Modified Labeling and the Implications for Consumers' Willingness to Buy in the Brazilian Market: A comparison between 2007 and 2014

ABSTRACT

The main intention of this research was to compare the impact of Genetically Modified Labeling on consumers' willingness to buy genetically modified food during the years of 2007 and 2014. The survey used and its analysis were identical in both performed studies, which allowed us to analyze the acceptance of genetically modified and its relationship with brands, consumers' trust in institutions, knowledge of biotechnology and the impact of labeling in consumers' decision. Are 2007 results valid face 7 years of commercialization of genetically modified products? How consumers' preferences evolved during these years?

KEY-WORDS: Genetically modified foods; GM labeling; Willingness to buy

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1 INTRODUCTION

World potency in agribusiness, Brazil is nowadays the second biggest genetically modified food producer, only behind USA. According with ISAAA (International Service for the Acquisition of Agri-Biotech Applications, 2014) information, the area of genetically modified plants in Brazil increased 4,7% in 2014 , reaching to 42.2 million hectares.

The introduction of genetically modified (GM) elements in food has been the object of controversial debates in several countries for over a decade. GM content is a credence attribute that cannot be identified by consumers through taste or appearance, so without labeling consumers will not have enough information to express their true preferences for this attribute in their purchasing behavior (Dannenberg et al., 2011)

Additionally, several questions emerge from such a debate: how genetically modified food labeling, trust in institutions, knowledge of biotechnology, power of brands and demographic characteristics impact in consumers' willingness to buy genetically modified food?

How different brands affect consumer's willingness to buy genetically modified labeled and non-labeled products?

How consumer's demographics affects willingness to buy genetically modified labeled and non-labeled products?

How the level of knowledge and involvement of consumers impact on willingness to buy genetically modified labeled products and non-labeled products?

How trust in institutions and companies, government, farm producers, consumer advocacy groups and environmental preservation organizations affect willingness to buy genetically modified labeled products

In March 24, 2005, the government of Brazil created the law 11.105, or simply, the Biosafety Law. In this date also the National Technical Committee of Biosecurity (CTNBio) was created, aiming to establish technical standards about genetic modifications and ensure their implementation, track the progress of everything related to biosafety and analyze its risk for human health and the environment.

As a solution to inform and prevent consumers, the law imposed an identification symbol to be used in the package of products with genetically modified ingredients.

The Article 40° of Brazilian law 11.105 says that: “Food and food ingredients intended for human or animal consumption containing or produced from genetically modified organisms or products shall contain information to that effect on their labels, according to regulation.” The Figure 1 shows the Genetically Modified Food Symbol.



Figure 1: Genetically Modified Food Identification Symbol used in Brazil

Although the labeling is required in many countries, now, almost a decade after the creation of the Brazilian law, it is possible to realize that the labeling is still unfamiliar for Brazilians and it is not used in the majority of the products. Very few products founded in supermarkets have the GM labeling and this theme still causes many debates. Several companies which industrialize grains have been involved in controversies about GM labeling in Brazil and forced to use the symbol in all their packages, which can be considered an achievement for the Biosafety Law in Brazil.

The difficulties concerning the application of transgenics labeling legislation come mainly from the complexity of the theme discussed. Genetically modified organisms are, first, a matter of public health, since the possible risks that their consumption can bring about to human health are still unknown. In addition, the theme can be designed under the aspect of the right to information, it should be ensured, in this sense, the right to choice by the consumer of the product that will consume based on a well explained judgment. (Martins et al., 2008)

By the time of 2007, Scare et al. (2014) performed a research that identified consumer's willingness to buy genetically modified labeled margarine in Brazilian market. However, we did not find other studies regarding the theme in the Brazilian market since this study. We assumed that there is an opportunity to fill this gap in related literature.

Are these results valid face 7 years of commercialization of genetically modified labeled products? How consumers' preferences evolved during these years? Is the Genetically Modified Food

identification symbol perceived by consumers today? What are the impacts on their buying behavior?

Trying to answer these questions, this research has been performed to track the evolution of genetically modified food labeling in Brazil, as consumers' knowledge about genetic modifications, their believe in institutions involved in this process and the impact of all this for consumers' willingness to buy.

2 OBJECTIVES

The main objective of this research is to understand how genetically modified food labeling, trust in institutions, knowledge of biotechnology, power of brands and demographic characteristics impact in consumers' willingness to buy genetically modified food in 2014, almost ten years after the beginning of Brazilian Biosafety Law, and compare these results with the study performed seven years before, in 2007, by Scare et al (2014).

The specific objectives contemplated at the questionnaire are: a) to understand how different brands affect consumer's willingness to buy genetically modified labeled and non-labeled products; b) to verify how consumer's demographics affects willingness to buy genetically modified labeled and non-labeled products; c) to understand how the level of knowledge and involvement of consumers impact on willingness to buy genetically modified labeled products and non-labeled products; d) to understand how trust in institutions and companies, government, farm producers, consumer advocacy groups and environmental preservation organizations affect willingness to buy genetically modified labeled products

3 PREVIOUS RESEARCHES AND BACKGROUND

Many markets for novel food products are characterized by the lack of information. To counter the lack of information, governmental and non-governmental entities often want to provide consumers with information but do not know exactly what information would be most valuable for consumers (Rousu and Lusk, 2009).

Consumers normally value non-GM food higher than GM food. They only value the presence of GM ingredients when it comes along with certain benefits, for example, increased shelf life or better taste. Secondly, the willingness-to-pay (WTP) varies geographically. Thirdly, the WTP varies between type of products and type of genetic modifications. Attitudinal variables, such as concerns for health and environment, generally seem to be more important for the valuation of GM food than socioeconomic variables, such as gender or age (Dannenberg et al., 2011).

Several studies showed that the concerns of consumers about GM goods and their acceptance may vary among different countries as shown by the meta-analysis of Dannenberg et al. (2009) and Lusk et al. (2005). Other studies can be highlighted as Lusk et al. (2005), Dannenberg (2009), Hu et al. (2009), Dannenberg et al. (2011), Sleenhoff and Osseweijer (2013), Colson and Rousu (2013) and Scare et al. (2014).

However, despite the existence of various studies on GM food acceptance worldwide, just one of them has focused on Brazilian market until now. Even more, this single study was performed on 2007. Thus, this paper might be relevant in order to fill this gap in literature about Brazilians' willingness to buy GM labeled foods in current market situation and its evolution during recent years.

4 METHODS AND DATA

The research was performed in November of 2014 and collected data from an Internet-based survey that was sent to students, teachers and professionals of personal contact base of the authors. Although the sampling process was not representative, it permitted us to reach a raw sample of 447 respondents. By checking and refining the data, we obtained 366 effective answers. In the section we must highlight a limitation of this study: we were not able to collect a representative data. However, we were motivated by the size of the collected sample and continued with the analysis. The questionnaire used to collect information was structured in five parts, as shown in table 1:

Table 1 : Questionnaire Sections

Consumer's buying profile	Randomized image	Purchase intentions	Knowledge and interest about GM and biotechnology	Socioeconomic profile
Questions 1- 4	Random exhibition of the margarine	Questions 5 - 9	Questions 10 - 31	Questions 32 - 39

	image to each respondent			
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The selected product to be used in the questionnaire was margarine (a type of butter made of vegetal oils because it is a very common product, present in 98% of Brazilians homes, according to Nielsen Consultancy. Besides, it is composed basically of vegetal oils; consequently, it should have the GM food identification symbol, according to Biosecurity Law. However, this practice is not common for type of products.

According to data from Céleres Consultancy, in the next crop (2015), 93,2% of all soybean cultivated in Brazil will be genetically modified, an increase of 6,1% in comparison with 2014, so it is plausible to infer that the majority of margarine commercialized in the country contains genetically modified ingredients, although they do not have the genetically modified label in their packages.

Two Brazilian margarine brands were tested – **Doriana** – a leader brand, and the other one – **Vigor** – a brand not as famous as the previous one, as a way to check the influence of brand in consumer's tendency to buy genetically modified products.

In the first part of the survey, each participant was randomly exposed to one of the 4 images of margarines showed in Figure 2 : 1) Genetically modified labeled with leader brand, 2) Non-Genetically modified labeled with leader brand, 3) Genetically modified labeled with regular brand and 4) Non-Genetically modified labeled with regular brand.

Figure 2. The 4 images of margarines randomly exposed to respondents.



1 - GM labeled with leader brand



2 - Non-GM labeled with leader brand



3 - GM Labeled with regular brand



4 - Non GM labeled with regular brand

After the randomized display of margarine images, the participants answered questions regarding their buying profile, buying intentions, knowledge and interest about genetically modified products and biotechnology, trust in institutions, regulatory mechanisms, knowledge about transgenic, ethical worries and socioeconomic information. We aimed to evaluate the relationship between those variables and the willingness to buy GM labeled products. Proceeding with the tests we conducted the multinomial logistic test and the results had statistical significance. The differentiation between groups of consumers who saw the GM identification symbol or not became possible through the post estimation that calculated the marginal effects for the variables.

From the statistical analysis of the responses obtained in 2014 and from the comparison with the results of the research performed in 2007, we pretend to check the following assumptions:

Assumption1: Consumers' willingness to buy genetically modified labeled products of a leader brand changed between 2007 and 2014.

Assumption 2: The relationship between the level of trust in institutions and consumers' willingness to buy genetically modified labeled products has increased in these years

Assumption 3: Consumers' knowledge of biotechnology and genetic engineering increased between 2007 and 2014

5 RESULTS

The variables about buying option, buying intention and product recommendation in the survey, were reduced through factor analysis with only one factor explaining 85,65% of the variance. The values of the factor loading are shown in the table below with values of 2007 for comparison.

Table 2. Factor Loadings of Willingness to Buy

Questions	Factor: Willingness to Buy	
	2007	2014
Buying option	0,926	0,927
Buying intention	0,949	0,936
Product recommendation	0,923	0,913
Eigenvalue	2,619	2,569
Cronbach's Alpha	0,925	0,916
Total N	1634	366

Source: Adapted from Scare et al (2014) and study results

The factor is composed by the variables buying option, buying intention and product recommendation, described by the questions 8,9 and 10 of the survey. The internal reliability and robustness of the questionnaire were verified used Cronbach's Alpha, obtaining a value of 0.916 guaranteeing that variables with high factor loading in the analysis are highly correlated with the factor.

Regarding the factor that represents willingness to buy, a cluster analysis was conducted to classify the consumers who have low willingness to buy and those who have high willingness to buy. The consumers were separated into two groups, one group contains the respondents who were exposed to GM labeled and the other contains the respondents who saw the regular labeling (Scare et al. 2014).

This method of analysis enabled measuring the impact of the difference between the GM labeling and the standard labeling in willingness to buy margarine, as is represented in table 3.

Table 3. Clusters means for consumer's willingness to buy margarine

Clusters	Low WTB		High WTB	
	2007	2014	2007	2014
Exposed to GM labeled margarine	1,80	0,84	4,03	3,38
Exposed to Non-GM labeled margarine	1,86	1,10	4,05	3,28

Source: Adapted from Scare et al (2014) and study results

Table 3 shows representative changes between results of 2007 and 2014. In the recent study the impact of genetic modification labeling was lower than the result obtained in the previous study. The genetic modification labeling image had little or any influence in Brazilian consumer willingness to buy in 2014, although it had significant impact in 2007, what can indicate that the main factors that influence consumers have changed.

Another factor related to the lack of importance given to the picture of the labeled product is respondents' demographic characteristics. 81,96% are graduates or post graduates, and 40,71% have income higher than R\$10.000,00, what may indicate that in situations involving consumers of high socioeconomic level and good knowledge of genetic engineering, the acceptance of genetically modified product is a complex procedure, that doesn't involve simply the genetically modified labeling image

Table 3 represents the comparison between the years 2007 and 2014 for the relationship of each observable characteristic in variables such as brand, trust in institutions and socio economics information. Consumers were separated in two groups: consumers exposed to GM labeled margarine and consumers exposed to unlabeled margarine. A positive value in the characteristic would make a consumer belong to each cluster. This impact can be observed by the marginal effects of the multinomial logistic regression.

Coefficients of the multinomial logistic regression prove that the most striking factors of consumers' willingness to buy in both years were the same, although in 2014 they are more accentuated. Trust in links of the food chain, as companies and farm producers, and socioeconomic characteristics, as age, gender and educational level, were the most impacting factors of consumers' willingness to buy in 2007 and 2014. In the opposite situation, trust in institutions not directly involved with food production, as researchers, advocacy groups and environmental organizations was less important in 2014 than in 2007.

In 2014 factor brand acquired much more importance for consumers' willingness to buy. While in 2007 this coefficient was of $-.036407$, in 2014 it was $.1133629^*$, proving that in 2014 consumers' exposed to GM labeled margarine of the leader brand had more willingness to buy than those exposed to GM labeled margarine of the regular brand. All these factors are represented in table 4.

Table 4. Marginal effects in consumers's willingness to buy

	Exposed to GM Labeled Margarine				Exposed to Non-GM Labeled Margarine			
	2007	2007	2014	2014	2007	2007	2014	2014
	Coefficient	Standard Deviation	Coefficient	Standard Deviation	Coefficient	Standard Deviation	Coefficient	Standard Deviation
Brand	-.036407	.0304289	.1133629*	.0690696	.1395657***	.034144	-.027713	.0702311
Trust in Companies	.09666***	.0169458	.1224486***	.0373583	-.0160324	.0206534	.0333165	.0449928
Trust in Government	.0063482	.0147866	-.0227642	.0326753	.022909	.016992	-.0294832	.0327888
Trust in Researchers	.1053241***	.0190679	-.0023907	.0442317	.0552623**	.0227134	.0942599**	.0452895
Trust in Advocacy Groups	-.0359659*	.0191176	.0336024	.0408291	-.0156419	.0202854	.0007496	.0400745
Trust in Producers	.0539022***	.0182622	.0641774**	.0366476	.0098756	.0212759	-.0167916	.0423373
Trust in Environmental Organizations	-.0503182***	.0175316	-.0507784	.035042	-.0057611	.0187817	-.0132925	.0383088
Age	-.0442619***	.0170228	-.0781657**	.0334	-.0649118***	.0185544	-.0220675	.034914
Gender	.1053209***	.0305843	.12282**	.0717754	.0854724***	.0356026	.1273106**	.0694937
Education Background	-.0456748**	.0188456	-.0688993**	.0405113	-.0575872	.0214315	.0737638**	.042929
Income	-.0042697	.0139732	.0010797	.0239695	.014213	.0157675	.0304764	.0247432

Note: *, **, *** significance level at .10, .5 and .01 respectively Total N = 1634 (2007), 366 (2014).

Source: Adapted from Scare et al (2014) and study results

5.1- Assumption 1: Consumers' willingness to buy genetically modified labeled products of a leader brand increased from 2007 and 2014

Results of 2007 research did not confirm that consumers' willingness to buy genetically modified labeled products of a leader brand is higher than genetically modified products of a regular brand. The assumption was rejected because there was not a significant difference of acceptance between both products.

In the research performed in 2014, the same result was confirmed. The acceptance of the genetically modified labeled margarine of both brands had almost the same results, and in some cases the regular brand had better acceptance than the leader

Table 5. Consumers' willingness to buy genetically modified labeled margarine in 2014

	Leader Brand	Regular Brand

Consider the product as a purchasing option*	33,96%	34,73%
Would buy the product*	42,45%	47,36%
Would recommend the product for family and friends*	24,52%	26,31%

* Answers AGREE and COMPLETELY AGREE were considered affirmative about product acceptance

5.2- Assumption 2: The relationship between the level of trust in institutions and consumers' willingness to buy genetically modified labeled products has increased in these years

Results of 2007 research showed that consumers with high level of trust in institutions had higher willingness to buy genetically modified products comparing with consumers with lower level of trust in institutions.

To check how this relation evolved, in 2014 we analyzed consumers' trust in many kinds of institutions, as government, companies, researchers, environmental organizations, farm producers and consumer advocacy groups, and the results can be seen in table 6.

Observing the willingness to buy of respondents who saw the genetically modified labeled product (regular and leader brand) and their trust in institutions, we confirm the situation presented in table 3: consumers with high level of trust in institutions have higher willingness to buy genetically modified products.

Trust in farm producers also got more important. In 2007, it was represented in consumers' willingness to buy in a factor of .0539022 (significant level 0.01), and in 2014 this factor increased for .0641774 (significant level 0.5), so it caused more positive impact in 2014 than in 2007.

One more time the negative impact of trust in environmental organizations to willingness to buy genetically modified products was verified.

Table 6. Trust in institutions and consumers' willingness to buy genetically modified labeled products in 2014

Trust in researchers and would buy GM	16,41%
Do not trust in researchers and would buy GM	10,44%
Trust in consumers' advocacy groups and would buy GM	13,93%
Do not trust in consumer' advocacy group and would buy GM	14,92%

Trust in companies and would buy GM	17,91%
Do not trust in companies and would buy GM	11,44%
Trust in government and would buy GM	16,91%
Do not trust in government and would buy GM	18,40%
Trust in farm producers and would buy GM	9,45%
Do not trust in farm producers and would buy GM	21,89%
Trust in environmental organizations and would buy GM	8,45%
Do not trust in environmental organizations and would buy GM	21,89%

N = 201 (i.e. people exposed to genetically modified labeled margarine)

*Answers **Do not agree** and **Completely do not agree** were considered negative

** Answers **Neither agree or disagree** were considered neutral

***Answers **Agree** and **Completely agree** were considered positive

****All questions affirmed the high reliability of institutions checked

5.3- Assumption 3: Consumers' knowledge of biotechnology and genetic engineering increased between 2007 and 2014

Using a knowledge test, we analyzed consumer's knowledge about biotechnology and genetic engineering and compared the results of both studies (2007 and 2014). We also compared Brazilians' consumers with consumers from USA and UE.

The section of the questionnaire used to analyze consumers' knowledge was composed of direct questions to check how respondents consider their knowledge of theme, and another group of tests, used to evaluate consumer's knowledge indirectly.

As is expected in a country that is the second biggest producer of genetically modified food all over the world, Brazilians showed a good knowledge of genetic engineering and biotechnology. 93,98% of respondents said that already knew something about transgenics, although only 42,34% considered to know enough or a lot about genetically modified food.

Omnipresence of genetically modified product also is noticed by consumers. 96,17% of participants believe that there are transgenic products on supermarkets, and 95,35% believe that they have already eaten genetically modified food.

Although consumers seen to be very familiarized with these products, the majority of respondents do not use to discuss about genetically modified food, what can indicate that the population is not

very involved with the theme, that already is part of people' routine. 61,47% affirmed that they rarely talk about genetic modifications, and 16,93% said that never speak about it. Only 21,58% is used to talk about transgenics more often. The same lack of interest was observed in 2007, when only 17,7% said that used to talk about the theme frequently or always.

Table 7 shows that Brazilians' knowledge of transgenics and biotechnology was a little higher in 2014 than in 2007, what confirms that Brazilians have a good knowledge about it, and is more informed about genetic engineering than USA and European Union respondents.

Table 7. Evolution of Brazilians' knowledge about genetic engineering between 2007 and 2014

Quiz Questions	2007			2014		
	Correct Answer	Incorrect Answer	Don't know	Correct Answer	Incorrect Answer	Don't know
Regular tomatoes do not contain genes, while transgenic tomatoes contain	78,30%	5%	16,60%	81,14%	5,19%	13,66%
If a person eats a transgenic fruit this person's genes can also be modified	82,90%	1,8%	15,40%	78,96%	4,64%	16,39%
The mother's genes determine the child gender	77,70%	10,90%	11,40%	74,31%	16,93%	8,74%
Transgenic animals are always bigger than the normal animals	73,70%	4,20%	22,10%	78,68%	4,64%	16,66%
It is not possible to transfer animal genes to plants	44,80%	16%	39,30%	46,99%	14,48%	38,52%
Transgenic tomatoes with fish genes would probably taste like fish	61,10%	3,40%	35,50%	73,77%	1,91%	24,31%
The cloning of living creatures produces genetically identical copies	77,40%	8,90%	13,70%	82,78%	9,01%	8,19%
Over half of the human genes are identical to the monkeys	59,40%	7,40%	33,10%	64,20%	7,37%	28,41%
Researchers frequently modify plants so that they won't be able to reproduce	37,90%	28,10%	34,10%	34,15%	35,24%	30,60%
Larger organisms have more genes	72,40%	3,10%	24,60%	80,60%	2,73%	16,66%

Source: Adapted from Scare et al (2014) and study results

For the comparison between Brazilian and respondents from USA and European Union, were used data from 2002 and 2004 (USA and EU) because more recent information could not be found, what

shows another gap of literature, and indicates the lack of recent studies of the theme in these places. Table 8 shows the complete comparison between Brazilians and foreign respondents.

Table 8. Percentage comparison of correct answers among participants of Brazil, USA and EU

Percentage of respondents with correct answer	Brazil N = 366	USA N = 600	EU N = 16.500
Regular tomatoes do not contains genes, while transgenic tomatoes contain	81,14%	40%	36%
If a person eats a transgenic fruit this person's genes can also be modified	78,96%	45%	49%
The mother's genes determine the child gender	74,31%	57%	53%
Transgenic animals are always bigger than the normal animals	78,68%	36%	38%
It is not possible to transfer animal genes to plants	46,99%	30%	26%
Transgenic tomatoes with fish genes would probably taste like fish	73,77%	42%	***
The cloning of living creatures produces genetically identical copies	82,78%	54%	66%
Over half of the human genes are identical to the monkeys	64,20%	40%	52%
Researchers frequently modify plants so that they won't be able to reproduce	34,15%	44%	***
Larger organisms have more genes	80,60%	38%	***

***questions not researched

Source of USA and EU results: Curtis et al.2004 and Gaskell et al.2002

6 CONCLUSION

In this article it was possible to reach the objectives of tracking the evolution of genetically modified food labeling in Brazil, check consumers' knowledge about genetic modifications, their trust in institutions and it's impact in consumers' willingness to buy. We can conclude that people acceptance about GM foods has not changed. The results of this paper were very similar to the 2007 study, showing that even seven years after the law imposing the GM labeled symbol , the majority of Brazilians consumers still do not have a positive image of genetically modified foods, and do not consider it a buying option, as shown in table 4.

Once again, it was possible to confirm that the power of brands and even the trust in institutions is not enough to neutralize consumer's barriers to buy GM food. Factors related to level of education,

age, gender, confidence in producers and companies have been much more relevant to the perception of the consumer and their willingness to buy GM food than factors related only with the final steps of food production chain, as industrialization, labeling or brand.

The main difference noted between both studies (2007 and 2014) is the lower influence of the image exposed to the respondents and their willingness to buy. Seven years ago, people exposed to margarine with the GM labeling tended to have lower willingness to buy GM food. In this paper, this relation were less representative, challenging companies to question themselves if the problem of GM acceptance is caused because of the labeling or because of inappropriate and insufficient communication to create in consumer's mind a good and reliable image about genetically modified food.

This idea that the non-acceptance of genetically modified food is related to insufficiency of communication and elucidation about transgenics is reinforced by the information that 78,41% of the respondents do not discuss the theme and 57,65% consider their knowledge about genetic modifications not enough.

Comparing both studies, we can conclude that although GM labeling is not consolidated in Brazilian market, it still influences consumers' buying behavior and labeled products are not very well accepted. Although impact factors as trust in companies, demographic characteristics and brand got more accentuated in 2014 than in 2007, we could not identify factors responsible for the non-acceptance of GM products, that can not be explained by the labeling image. We suggest new studies to discover it and make possible to understand consumers buying behavior about GM.

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APPENDIX – Questionnaire

<u>Survey on food and Biotechnology</u>
Part 1 – Buying profile
1 – How often are you responsible for your household food purchasing? 1 - never 2 - rarely 3 - sometimes 4 - often 5 – always
2 - How often do you buy "organic" food (free from chemicals)? 1 - never 2 - rarely 3 - sometimes 4 - often 5 – always
3 – How often do you buy "light/diet" foods (low calories or less sugar)? 1 - never 2 - rarely 3 - sometimes 4 - often 5 – always
4 – How often do you read nutritional information on the labels of the food you buy? 1 - never 2 - rarely 3 - sometimes 4 - often 5 – always
Part 2 – Randomized image
Look carefully at this product:
Random exhibition of the margarine image to each respondent
Part 3 – Purchase intentions
5 – According to what you have been shown, the product is: 1 - transgenic (genetically modified) 2 – non-transgenic (not genetically modified)
6 – According to what you have been shown, the product brand is: 1 - Doriana 2 – Vigor

<p>7 – I consider the product above as one of my purchase choices.</p> <p>1 – totally disagree 2 - disagree 3 – neither agree nor disagree 4 - agree 5 – absolutely agree</p>
<p>8 – I would buy the product above.</p> <p>1 – totally disagree 2 - disagree 3 - neither agree nor disagree 4 - agree 5 – absolutely agree</p>
<p>9 – I would recommend the product above to my family and friends.</p> <p>1 – totally disagree 2 - disagree 3 – neither agree nor disagree 4 - agree 5 – absolutely agree</p>
<p>Part 4 - Knowledge and interest about GM and biotechnology</p>
<p>The remainder of the survey will deal with genetic modification or transgenic, which can be used for food production. Genetic modification or Transgenic involves methods that enable scientists to create varieties of plants and animals. They do so by removing genes from a plant or animal and putting them into other plant or animal cells. This process is also called genetic engineering or biotechnology.</p>
<p>10 – Before this survey did you already know what Transgenic (genetic modification) was all about?</p> <p>1 - yes 2 – no</p>
<p>11 – How much did you hear/read or watch something about transgenic (genetically modified) foods?</p> <p>1 – not at all 2 – very little 3 – neither much nor little 4 - enough 5 – quite a lot</p>
<p>12 – How often have you talked to someone about transgenic (genetically modified) foods?</p> <p>1 - never 2 - rarely 3 - sometimes 4 - often 5 - always</p>
<p>13 – Do you believe that transgenic (genetically modified) foods are already available for sales at supermarkets?</p> <p>1 - Yes 2 - No 3 – I don't know</p>
<p>14 – Do you believe you have already eaten food containing transgenic (genetically modified) ingredients?</p> <p>1 - Yes 2 - No 3 – I don't know</p>
<p>15 – How much do you believe to know about transgenic (genetically modified) organisms?</p> <p>1 – not at all 2 – very little 3 – neither much nor little 4 - enough 5 – quite a lot</p>
<p>16 - Common tomatoes contain genes while transgenic (genetically modified) tomatoes don't</p> <p>1 - True 2 – False 3 – I don't know</p>
<p>17 - On eating transgenic (genetically modified) fruit, a person's genes can also be modified.</p> <p>1 - True 2 – False 3 – I don't know</p>
<p>18 – A mother's genes determine her baby's sex.</p> <p>1 - True 2 – False 3 – I don't know</p>

<p>19 - Transgenic (genetically modified) animals are always bigger than ordinary animals 1 - True 2 - False 3 - I don't know</p>
<p>20 - It's not possible to transfer animal genes to plants. 1 - True 2 - False 3 - I don't know</p>
<p>21 - Transgenic (genetically modified) tomatoes with fish genes will probably taste like fish. 1 - True 2 - False 3 - I don't know</p>
<p>22 - The cloning of people produces genetically identical copies. 1 - True 2 - False 3 - I don't know</p>
<p>23 - More than half human genes are identical to apes genes. 1 - True 2 - False 3 - I don't know</p>
<p>24 - Researchers usually modify plants so that they cannot reproduce. 1 - True 2 - False 3 - I don't know</p>
<p>25 - Larger organisms have the most genes. 1 - True 2 - False 3 - I don't know</p>
<p>26 - Biotechnology (transgenic organism producers) companies are concerned about consumers' health. 1 - totally disagree 2 - disagree 3 - neither agree nor disagree 4 - disagree 5 - absolutely agree</p>
<p>27 - The government is able to regulate, control and inspect both the quality and safety of transgenic (genetically modified) foods. 1 - totally disagree 2 - disagree 3 - neither agree nor disagree 4 - disagree 5 - absolutely agree</p>
<p>28 - Scientists behave ethically and morally while conducting research on transgenic (genetically modified) foods. 1 - totally disagree 2 - disagree 3 - neither agree nor disagree 4 - disagree 5 - absolutely agree</p>
<p>29 - I always trust consumer advocacy groups (such as, PROCON, IDEC, etc.) 1 - totally disagree 2 - disagree 3 - neither agree nor disagree 4 - disagree 5 - absolutely agree</p>
<p>30 - Growers are aware of the benefits and risks of producing transgenic (genetically modified) foods. 1 - totally disagree 2 - disagree 3 - neither agree nor disagree 4 - disagree 5 - absolutely agree</p>
<p>31 - I always trust environmental conservation organizations (such as Greenpeace, WWF, etc.) 1 - totally disagree 2 - disagree 3 - neither agree nor disagree 4 - disagree 5 - absolutely agree</p>
<p>Part 5 - Socioeconomic profile</p>
<p>32 - Age</p>

under 16; 16 – 20; 21 -30; 31 – 40; 41 – 50; over 50
33 – Sex male; female
34 – Education background unfinished elementary (primary) school; finished elementary (primary) school; unfinished high (secondary); school finished high (secondary) school; unfinished tertiary education finished; tertiary education master/doctor degree holder
35 – Family Income ;Up to R\$ 1.000; R\$ 1.001 to R\$ 2.000; R\$ 2.001 to R\$ 4.000; R\$ 4.001 to R\$ 6.000; R\$ 6.001 to R\$ 8.000; R\$ 8.001 to R\$ 10.000; over R\$ 10.000
36 – How many members contribute to family income? 1; 2; 3; 4; 5; 6 or more
37 – How many members of the family are supported by this income? 1; 2; 3; 4; 5; 6 or more
38 – City:
39 – State:

