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ACCEPTANCE AND PURCHASE INTENTION OF IRRADIATED FOODS IN BRAZIL: EFFECT OF POSITIVE INFORMATION

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Abstract

Food irradiation remains underutilized in Brazil, despite the approval and regulation of the official health authority since 1973. However, consumers risk perception, mostly due to lack of information about the technology, seem to be the main barrier to the adoption of food irradiation by the Brazilian industries, like in other countries. The aim of this study was to investigate the effect of information on the acceptance and purchase intention of minimally processed and irradiated organic watercress (*Nasturtium officinale*). Consumers (N=236) participating in the sensory acceptance test were divided into four experimental groups according to an experimental design which combined presence or absence of information about the food irradiation process – main characteristics, benefits to food safety and preservation, cost-benefit and environmental issues - and identification or not of the irradiated product in a sensory acceptance test. Results did not show significant effect ($p>0.05$) of information either on acceptability or in purchase intention of the irradiated product compared to the non irradiated counterpart, although an exploratory statistical analysis revealed underlying patterns suggesting that consumers segmentation must exist as well as favorable and unfavorable attitude to food irradiation.

Keywords: consumer behavior, sensory evaluation, purchase intention, watercress, food processing, gamma radiation.

1. Introduction

The use of ionizing radiation in food processing for the purpose of assuring food safety and extension of shelf-life of food products has been extensively studied during past decades, but still remains as an underutilized technology in some countries around the world (Sommers, 2004). This happens in Brazil, where food irradiation was first approved in 1973 and revised and extended in 2001. Like in other countries, irradiated foods must be labelled with the inscription “treated by irradiation process” and the process is recommended for disinfestation, microorganism load reduction or sterilization, without causing major nutritional losses and functional or sensory changes to the food (Anvisa, 2001).

The main barriers to the adoption of new processes by food industries are either technical or economical in nature. In Brazil, with respect to food irradiation, the main reasons pointed out in surveys with Brazilian consumers are the fear and doubt about the use of nuclear energy in food processing (Oliveira and Sabato, 2004; Ornellas and Gonçalves, 2006). But such concerns appear among consumers elsewhere, even in markets where irradiated foods had already been launched (Resurreccion et al., 1995; ICGFI, 1999; Vickers and Wang, 2002; Cardello, 2003; Gunes and Tekin, 2006).

According to the International Atomic Energy Agency (IAEA), early researches indicated that food irradiation is unfamiliar to most consumers and a firsthand conclusion is that communication strategies should be developed. Without previous information, fear of the effects of radioactivity is far the most frequent concern among consumers (Resurreccion et al., 1995; Lusk et al., 1999; Gunes and Tekin, 2006, Behrens et al., 2009).

Sensory experience is by far the most important dimension driving consumer’s food choices. On the hand, other factors can affect consumer perception, attitude and behaviour. Brand, price and information (e.g. nutrition, health claims and technology) have an undoubted impact on food decisions (Behrens et al, 2007). Information can create positive expectation aimed at modifying consumer perception and enhancing purchase intent. During the decision making process, previous experience and all the amount of information available are processed in the consumer's mind and the higher the expectation level, the more likely is the purchase. Conversely, low expectation leads to lower chances of purchase.

In addition to the importance of communicating consumers about food irradiation, it is also important for police makers and producers to know the consumers views on the technology. This includes the level of public trust in all the actors directly involved in the food chain: farmers, industries, retailers, regulators and scientists (Frewer et al., 1998; Eiser et al., 2002; Poortinga and Pidgeon, 2005). Siegrist et al. (2000) argue that trust is the minimum requirement for the development of consumer confidence (the individual's general expectation that a food product will not cause any harm to health or environment).

Based on the exposed assumptions, the objective of this study was to investigate the effect of information on the acceptance and purchase intention of an irradiated food product by Brazilian consumers. Minimally processed organic watercress - both irradiated and nonirradiated - was used as test samples since minimally processed food products are potential candidates for irradiation for both quality and safety purposes. São Paulo was selected as the most important Brazilian consumer market, reflecting urban consumption patterns within Brazil. The intention was to gain understanding in a relatively under-researched area and to continue the process of developing a communication strategy for irradiated foods in Brazil.

2 Material and Methods

2.1. Participants

Consumers were approached and recruited in the São Paulo downtown area. The participants were selected taking into account their willingness to participate, health conditions and acceptance of the product. Those willing to participate in the study were directed to a market research location close to the recruiting site, where the tests were performed. Altogether, 236 subjects participated in the study and Table 1 shows the profile of sample participation in the study.

Table 1. Profile of the participants in the study (n= 236).

Gender (%)		**Age**		**Socioeconomical status**[a]		**Educational level**[b]	
Male	48.7%	18-29 yr	37.3%	class A	11.0%	low	17.4%
Female	51.3%	30-39 yr	26.7%	class B	35.6%	intermediate	61.4%
		40-49 yr	21.6%	class C	53.4%	high	21.2%
		50-60 yr	14.4%				

[a] Class A: > 15 minimum wages; class B: 5-16 minimum wages; class C: < 6 minimum wages, according to demographic criteria of the Brazilian Association of Research Companies (ABEP, 2008).

[b] Low: elementary school or equivalent; intermediate: high school or equivalent; high: academic or equivalent.

2.2. Food Samples

Minimally processed organic watercress (*Nasturtium officinale*) samples were acquired in a processing plant located in São Roque, Sao Paulo, Brazil, on the day of processing. The vegetables were submitted to minimal processing that consisted of selection, cutting, washing and sanitization with 0.08 ppm of ozone within 24 hours of harvesting.

2.3. Irradiation process

Samples were irradiated using a gamma radiation ^{60}Co source with 92 kCi (dose rate: 2.0 kGy/h) located at Instituto de Pesquisas Energéticas e Nucleares, in Sao Paulo, SP. The irradiation dose was determined in a previous work (Martins et al., 2007). The dosimetric system used was the Harwell Amber (United Kingdom) dosimeter, with accuracy of ± 5 % and precision of ± 2 %.

Polyethylene packages, each containing 1.000 g of minimally processed organic watercress were exposed to 2.0 kGy. These samples plus a non-irradiated control were kept at 7 ± 1 ˚C during the period of analysis.

2.4. Information about food irradiation

Information about food irradiation was framed in the form of a leaflet similar to those distributed to consumers in supermarkets or other food outlets. Most of the pieces of information were extracted from a brochure edited by the International Atomic Energy Agency (ICGFI, 1999). Information about the price (a plus of R$0.50/kg of vegetables and R$1.00/kg of meats) was estimated with the help of a Brazilian irradiation factory.

Essentially positive information composed the leaflet and the major interest in this communication strategy was to observe how consumers would react to an advertise presenting irradiation as an innovative food processing technology. So that is why the IAEA material was chosen to be the main source of information about the irradiation technology.

The leaflet comprised the following pieces of information:

- **What is the irradiation process?**
The irradiation process consists of the exposition of food to controlled doses of ionizing radiation. Ionizing radiation is energy similar to that of radio and TV waves, microwaves and sun radiation. During the process, there is no direct contact between the food and the source of radiation: the energy waves pass through the food and reduce the number of microorganisms, such as bacteria and fungi, responsible for deteriorating food or causing illness in humans. Irradiation also delays the ripening of fruits and vegetables since it inhibits cell division and also the reproduction of insects.

- **How does the process of irradiation work?**
The food, already in package, is placed in the machine where it will be irradiated. The food is then exposed to a source of radiant energy such as cobalt or electron beam. The amount of energy applied depends on the type of food. The waves of energy or electrons pass through the food and finding microorganisms or larvae or eggs of insects, cause the death of the microorganisms or failure of reproduction in the insects. The food remains unchanged, but free of bacteria such as *Salmonella*, among others. Furthermore, shelf life can be improved with the decrease of the number of microorganisms.

Does irradiation process change the quality of nutrition?
The nutritional changes caused by irradiation are similar to those that occur in other types of processing such as cooking, pasteurization, and canning. The appearance of irradiated food is the same as before being exposed to irradiation.

- **How do I know that food has been irradiated?**
The World Health Organization recommends that irradiated foods must be labelled with the words "treated by irradiation" or that the packages bear the international symbol for irradiation known as “radura”.

- **Will the irradiated food cost more?**
Like any other food production process, irradiation implies an additional cost to the product. According to researches carried out at the University of Sao Paulo and Instituto de Pesquisas Energéticas e Nucleares, the estimated increase in the cost of vegetables will be around R$ 0.50/kg and of meat and fish, from R$ 0.60 to R$ 1.00/kg. This is not a large increase if we consider the improvement of food safety and shelf life.

- **Is irradiation safe?**
YES. In fact, the exposure of the food to the radiation is similar to the luggage going through the x-rays in an airport. Food will not become radioactive after being submitted to the irradiation process. As a consequence of the process the so-called radiolytic compounds are formed in small quantities, not harmful to the human health. Such compounds allow the identification of irradiated food when needed. Besides, foods may not be subjected to high radiation doses because they lose sensory acceptability. The commercialization of irradiated food is allowed in almost 40 countries and the technology is approved by FAO/Word Health Organization. In Brazil ANVISA regulates the use of radiation in food processing. For more than 40 years the safety of the irradiated

food designed for human consumption has been investigated by scientists in many countries and the conclusion is that irradiation is a safe technology.

- **Are the irradiation plants safe for employees and neighboring communities?**
  The radiators are projected with several levels of protection for human beings in order to detect any problem that occurs during the work process. For this reason, employees and neighbors are protected from accidental exposure to radiation. Irradiation plants in Brazil are checked periodically by the *Comissão Nacional de Energia Nuclear* (CNEN) that reports to IAEA, an organ directly related to the United Nations

2.5. Consumer sensory test

Four different experimental conditions were designed to assess the effect of information on the acceptance and purchase intention of irradiated watercress: 1) presence of information with sample's labelling (irradiated and non irradiated), 2) presence of information without sample's labelling, 3) absence of information with sample's labelling (irradiated and non irradiated) and 4) absence of information and labelling - a completely blind condition. Table 2 summarizes the experimental conditions utilized in the study.

Table 2. Experimental conditions used to assess the effect of information on the acceptability on the purchase intention of minimally processed and irradiated watercress.

	Experimental condition			
	I (n=59 consumers)	**II (n=58 consumers)**	**III (n=59 consumers)**	**IV (n=60 consumers)**
Information	yes	yes	no	no
Labelled samples	yes	no	yes	no

Subjects, as they accepted to participate in the test, were randomly assigned to each of the four experimental conditions. First they were asked to read the informational leaflet and then the watercress samples (10g each) were monadically served for evaluation on disposable white plates coded with a 3 digit number. Forks, salt, and water were also available to the participants. In each group, a balanced complete block design was used to control the serving orders and to avoid bias on the responses.

Overall liking was measured on 10-cm hybrid hedonic scale (0= dislike extremely; 5 = neither like, nor dislike; 10 = like extremely) (Villanueva et al., 2005) and the intention to purchase was measured on 11-point scale (0 = I certainly would not buy; 5 = maybe I would buy, maybe not; 10 = I certainly would buy).

2.6. Statistical Analysis

Means, medians, t tests for paired samples, Box & Whisker plots and correlation analysis were used to determine if the acceptance and purchase intention scores differed due to irradiation, information on the process or sample identification, which created the four different conditions. Pearson product-moment correlation coefficients were calculated to analyze the linear dependence between acceptability and purchase intention. The statistical package Statistica™ (2008) was used for the statistical analyses.

3. Results

Table 3 presents the statistics (means and standard deviations, medians, p-values for the t tests and quartiles) related to the acceptability of the watercress samples evaluated in the four experimental conditions. In Table 4 the same statistics are found for the purchase intention.

For each sample, in all conditions, the overall liking mean ratings were about 6.5 in the hedonic scale, which evidences that both irradiated and nonirradiated samples were fairly accepted. No significant differences ($p>0.05$) between the means of the irradiated and the non irradiated samples were found.

In Table 4 the consumers' intention to purchase irradiated watercress were the practically same observed for the non irradiated product. Again, no significant differences ($p>0.05$) were found.

On the other hand, Box & Whisker plots (Figures 1 and 2) show differences among the response patterns of the groups.

Group 1 comprised consumers who received information about the technology and labeled samples. Despite the similarity of the mean acceptance ratings for both the non irradiated and the irradiated samples (6.1 vs 6.2), the irradiated sample showed a median of 7.0, against 6.0 for the non irradiated counterpart (Table 3 and Figure 1).

Groups 2 and 3 got either the information about irradiation or the identified irradiated sample. In both cases, the non irradiated sample had slightly higher medians, and the lower and upper quartiles tended to present higher ratings for the non irradiated sample – a difference of about one point.

Differences in the purchase intention of the samples in group 1 (Table 4) was not significant ($p>0.05$), in spite of the apparent difference between the means. With respect to group 3 (no information and labeled samples), the purchase intention of the irradiated samples reached a mean score of 5.4 and median of 5.0, suggesting that these consumers would hesitate to purchase an irradiated product without having a minimal amount of information about the new product. Indeed, in Table 4 and Figure 2, in the lower quartile the purchase intention was about 2.0 for the irradiated sample and 5.0 for the non irradiated counterpart. Here the absence of information may have produced distrust and consequently, the acceptability and willingness to purchase were lowered.

Data in group 4, which did not receive either information or labeled irradiated sample, serves as baseline for comparison with the other groups. Looking at Tables 3 and 4 and Figure 3, it can be seen that both irradiated and nonirradiated watercress samples obtained higher overall liking scores (6.7) in group 4. No significant differences ($p>0.05$) were observed, and even the medians evidence good acceptance of both samples. Purchase intention mean ratings were not significantly different ($p>0.05$) and the medians of both samples were also very similar.

Figures 3 and 4 present the plots of purchase intention as a function of overall liking. In the four groups, high and positive correlations between acceptability and purchase intention were found, ranging between 0.83 and 0.93.

The results indicate that the intention to purchase was quite related to the acceptability of the products, as it is normally observed in sensory studies. The quality dimensions in this research were both of intrinsic (sensory) and extrinsic (information) nature, being the sensory not a significant effect. So, information, although it is not apparently clear, may have played its role and affected the responses of some consumers, especially those in groups 2 and 3.

Table 3. Overall liking mean ratings* and medians (nonirradiated/irradiated 2kGy) displayed by information and identification conditions.

		Mean ratings (Std. deviation)			Medians		Lower quartile		Upper quartile	
Conditions	**N**	**Nonirradiated**	**Irradiated 2kGy**	**T value (p)**	**Nonirradiated**	**Irradiated 2kGy**	**Nonirradiated**	**Irradiated 2kGy**	**Nonirradiated**	**Irradiated 2kGy**
Group 1	59	6.1 (2.65)	6.2 (2.69)	-0.1533 (0.8787)	6.3	7.0	4.0	4.6	8.0	8.0
Group 2	58	6.9 (3.19)	6.4 (3.21)	1.7168 (0.0914)	8.0	7.0	5.9	4.0	9.7	9.0
Group 3	59	6.7 (2.86)	6.2 (2.84)	1.2721 (0.2084)	7.0	6.0	5.0	4.0	9.0	9.0
Group 4	60	6.7 (2.86)	6.7 (2.78)	0.1702 (0.8654)	8.0	7.0	5.0	5.0	9.0	9.0

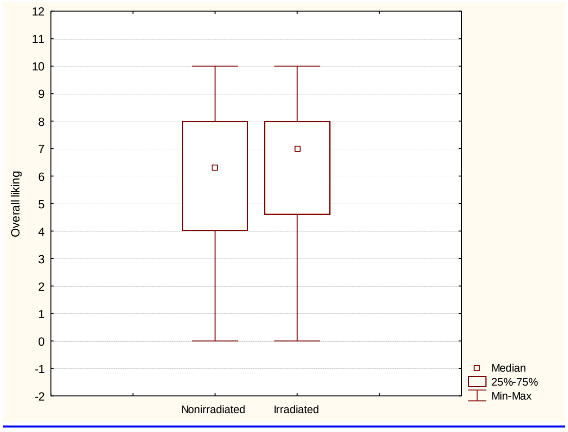
* Scores on a 10-cm hedonic scale (0= dislike extremely; 5 = I neither like, nor dislike; 10 = like extremely).

Table 4. Purchase intention mean ratings* and medians (nonirradiated/irradiated 2kGy) displayed by information and identification conditions.

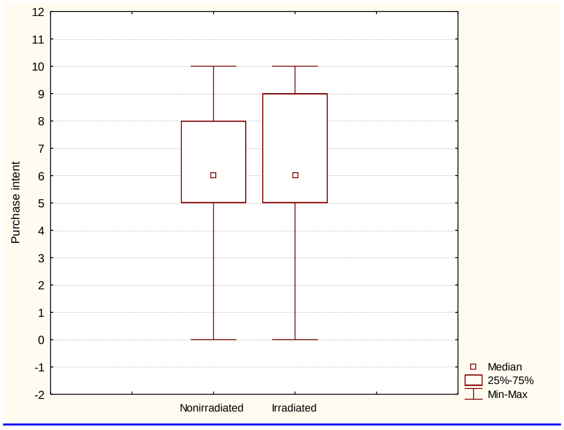
		Mean ratings (Std. deviation)			Medians		Lower quartile		Upper quartile	
Conditions	**N**	**Nonirradiated**	**Irradiated 2kGy**	**T value (p)**	**Nonirradiated**	**Irradiated 2kGy**	**Nonirradiated**	**Irradiated 2kGy**	**Nonirradiated**	**Irradiated 2kGy**
Group 1	59	6.1 (2.71)	6.4 (2.69)	-0.9054 (0.3690)	6.0	6.0	5.0	5.0	8.0	9.0
Group 2	58	6.4 (3.48)	6.0 (3.61)	1.0090 (0.3173)	7.0	7.0	5.0	3.0	10.0	9.0
Group 3	59	6.3 (3.30)	5.4 (3.57)	1.6259 (0.1094)	7.0	5.0	5.0	2.0	10.0	9.0
Group 4	60	6.5 (3.26)	6.6 (3.03)	-0.2832 (0. 7780)	7.0	7.0	4.5	5.0	9.5	10.0

* Scores on a 11-point purchase intention scale (0 = I certainly would not buy; 5 = maybe I would buy, maybe not; 10 = I certainly would buy).

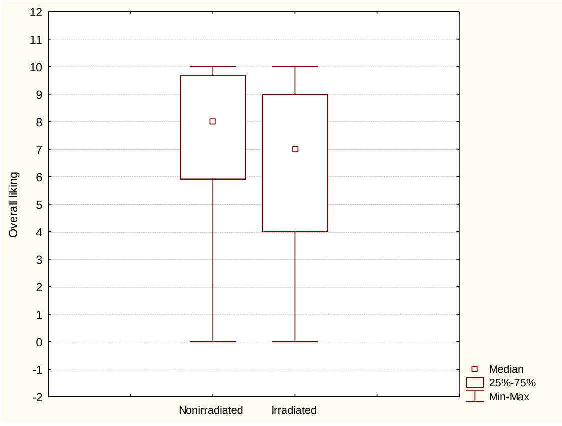
Figure 1. Box and Whisker plots for the acceptance and purchase intention data comparing the nonirradiated vs irradiated sample for groups 1 (information + labeled samples) and 2 (information, unlabeled samples).



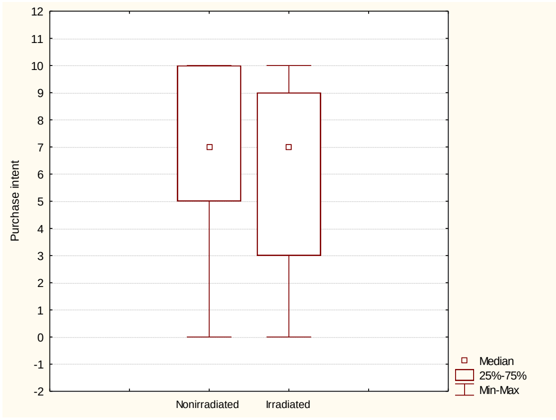
Group 1: Overall liking watercress



Group 1: purchase intention

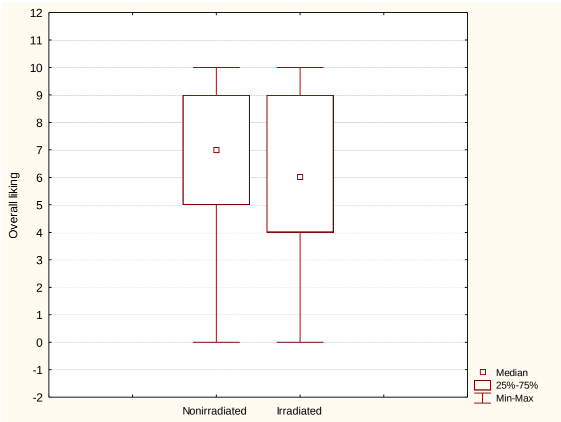


Group 2: Overall liking

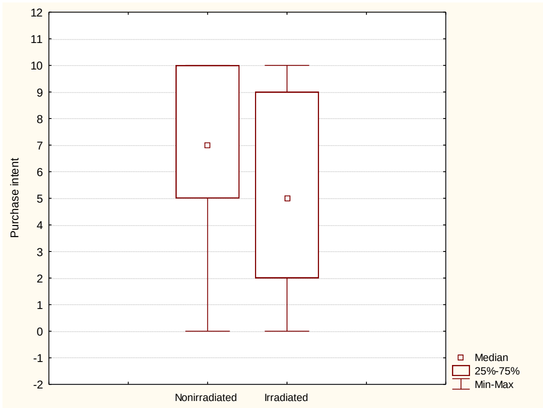


Group 2: purchase intention

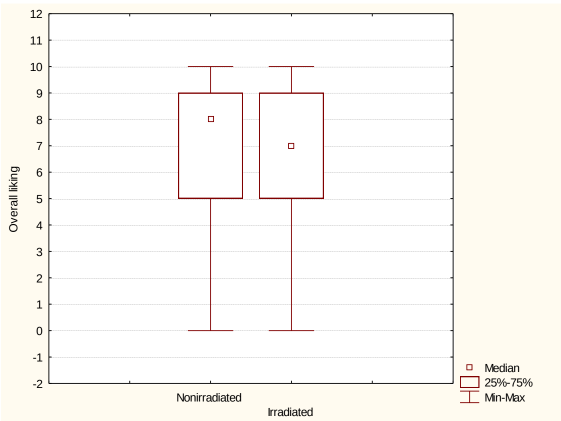
Figure 2. Box and Whisker plots for the acceptance and purchase intention data comparing the nonirradiated vs irradiated sample for groups 3 (no information + identification of the sample) and 4 (no information, no identification).



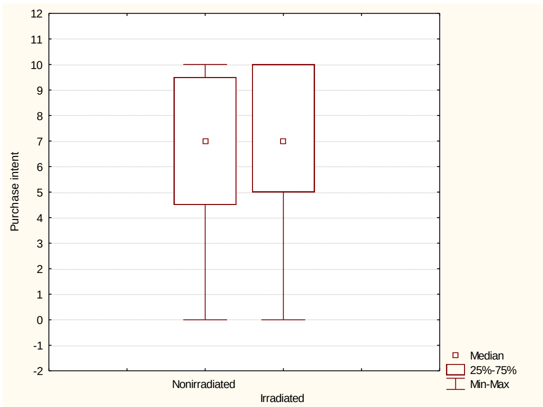
Group 3: Overall liking



Group 3: Purchase intention

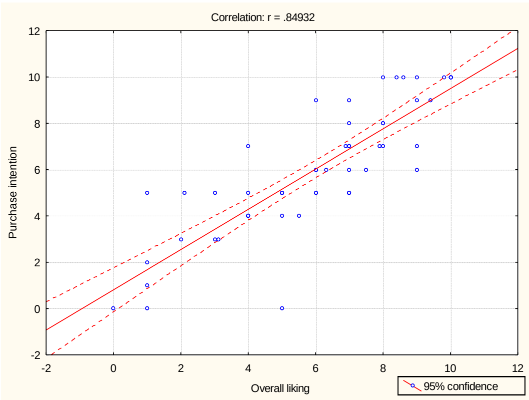


Group 4: Overall liking

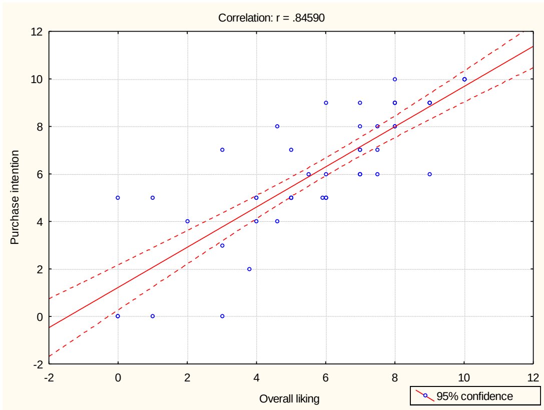


Group 4: purchase intention

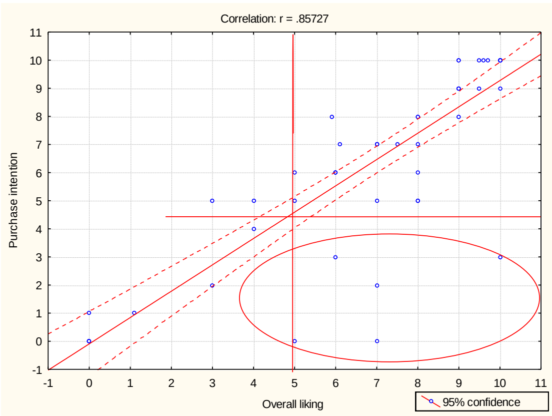
Figure 3. Scatter plots of the purchase intention x acceptance for groups 1 (information + identification of the sample) and 2 (information, no identification).



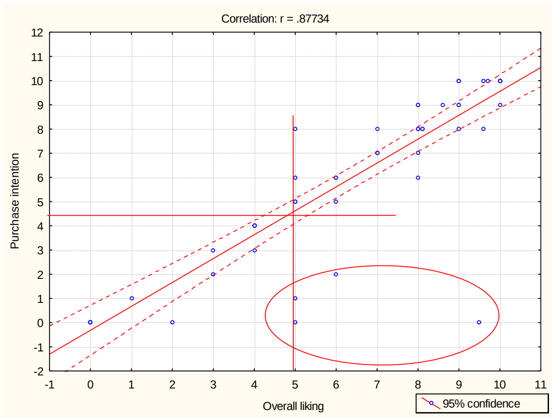
Group 1: nonirradiated watercress



Group 1: irradiated watercress

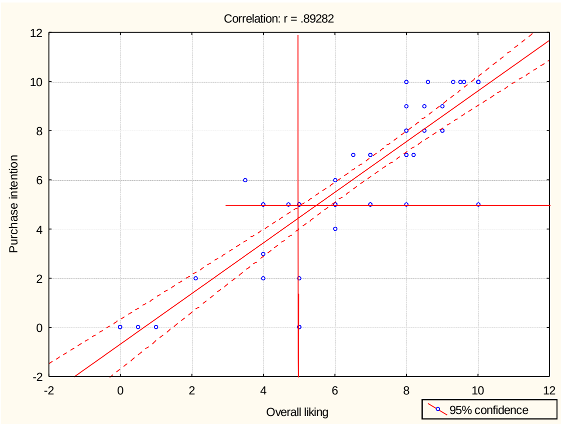


Group 2: nonirradiated watercress

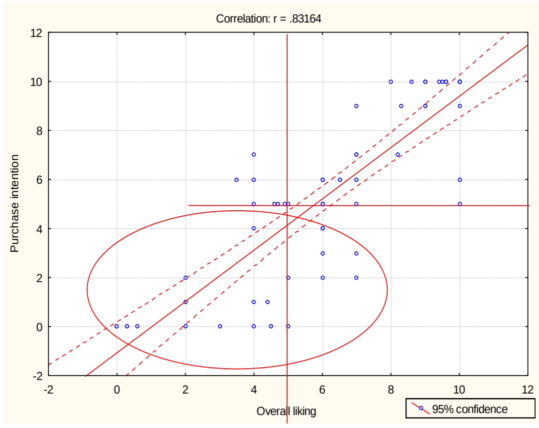


Group 2: irradiated watercress

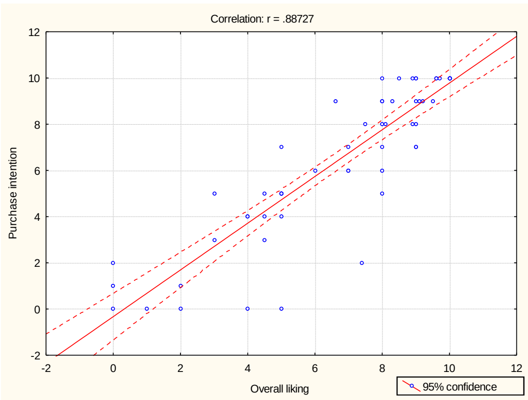
Figure 4. Scatter plots of the purchase intention x acceptance for groups 3 (no information + identification of the sample) and 4 (no information, no identification).



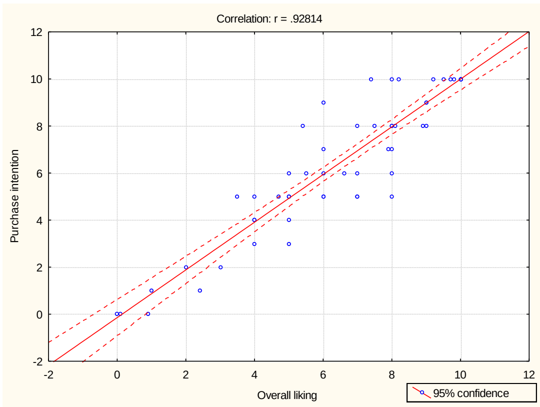
Group 3: nonirradiated watercress



Group 3: irradiated watercress



Group 4: nonirradiated watercress



Group 4: irradiated watercress

4. Discussion

A number of works in the literature point out that food irradiation is viewed as a high-risk technology when consumers have never heard about the process (Bruhm and Noell, 1987; Resurreccion et al, 1995; Lusk et al., 1999; Vickers and Wang, 2002; Oliveira and Sabato, 2004; Gunes and Tekin, 2006, Behrens et al, 2009). Concerns are usually expressed through metaphors such as *atomic bomb*, *x-rays*, *Chernobyl*, *cell destruction* and *catastrophes*, which in part reflect the perception of risk associated with the use of nuclear power, even in non-defense activities.

As observed in other research works, non-conventional technologies, despite differences in nature and concepts, may provoke the same perceptions among consumers: uncertainty, negative consequences and risks (Backström et al.,2003; Deliza et al., 2003). This must be caused by inability to understand the scientific basis and the implications of the technology (Turney,1996).

According to Siegrist et al. (2000), science and technology are areas where many consumers lack sufficient scientific literacy to make personal decisions. In such context, they tend to rely on organizations or public authorities they judge trustworthy to give them information they need to make choices. This leads to the concept of social trust or the people's willingness to trust in those who are in charge of making decisions and taking actions related to technology, such as the public health authorities and scientists. In this line, the content of the information presented to the participants in this study focused the approval and support of the Brazilian health authority (Anvisa), as well as other international organizations such as FAO, WHO and IAEA. In a previous qualitative research consumers had recognized the good reputation of these social actors – especially the Brazilian health authority – as sources of information in food science and technology (Behrens et al., 2009).

Although the favourableness of the information, significant effects on overall liking and purchase intention were not clearly defined. Perhaps, the low sensory appeal of the samples – green leaves – might have contributed to lower acceptance ratings since the overall liking means were all about 6 in a 10-cm hedonic scale, evidencing that the samples, both the irradiated and the non irradiated watercress, were fairly accepted. It is not surprising since some foods (e.g., vegetables, cereals, etc.) are less appealing than tastier and more complex products such as meats, chocolate, desserts, beverages, etc.

Looking at the mean acceptance ratings in Table 3, statistics lead to the conclusion that irradiation had no effect on the acceptability of the watercress because the samples mean ratings were quite similar. However, average calculations may reduce the power and mask skewed data. Thus, examining the medians made some differences come up: first, in group 4 (a completely blind condition) medians were equal to 8.0 and 7.0 for the nonirradiated and irradiated watercress, respectively. This suggests that irradiation might have affected the product yielding minimal but perceivable changes in the watercress' sensory properties - especially in flavor and texture.

Interestingly, when the same samples were tasted labelled and after information (group 1), the medians showed an inverse pattern: 6.3 for the nonirradiated and 7.0 for the irradiated watercress. As stated in the leaflet, one of the goals of irradiation is to improve the shelf life of foods and this piece of information might have been assimilated by some individuals making them relate their perception (crispness, taste, etc.) to this benefit. Such effect was also observed in another research work when consumers had to point out which of two blind samples - irradiated and non irradiated lettuce, roast chicken and mango slices - was the irradiated one. Although some individuals were able to perceive sensory differences, the controversy among consumers was about indicating the irradiated sample. Part of them related positive attributes like freshness, crispness, juiciness to the benefits of irradiation that they had learned from a previous presentation about the technology, even though they were actually referring to the non irradiated counterpart (Behrens et al., 2009).

In conditions 2 and 3 the non irradiated sample showed median values about one point higher than the irradiated product. The sensory difference must have been perceived, despite of the experimental conditions (group 2 was informed about the process, but received no labelled sample, while group 3 was not informed and got a labelled sample). The absence of information might have caused decrease of the medians in group 3 – about one point lower than those of group 2 – probably due to the distrust caused by the labelled irradiated sample (radiation causes fear and increased risk perception).

There is substantial literature about the positive effect of information on the consumer intention to purchase and acceptance of irradiated foods. Proper information about food irradiation - its nature and benefits to food safety and consumer health - seems to reduce consumer anxiety and risk perception and make the technology more favourably seen (Bruhn and Noell, 1987; Pohlman et al., 1994; Resurreccion et al., 1995; Fox and Olson, 1998; Lusk et al., 1999; Cardello, 2003; Oliveira and Sabato, 2004; Zienkewicz and Penner, 2004; Nayga et al, 2005; Behrens et al., 2009).

Nonetheless, it does not work in the same way for all consumers since communication, to be effective, depends on the relevance of the information (and its source) to the public so that it can be assimilated favourably and improve public attitude (Turney, 1996; Behrens et al, 2007). The individual's perception of risks is, in turn, related to a number of factors including the level of risk associated with the processing technology, how the information is gathered and processed and the personal experience of the risk (Siegrist et al., 2000; Hansen et al., 2003). In this sense, communication of risks and benefits about food irradiation should take into account the actual consumer perceptions about the technology. Otherwise, communications based solely on technical or scientific information would be inefficient to reduce perception of risk associated with the consumption of irradiated foods.

The perception of higher cost appeared to be a great concern among Brazilian consumers in a qualitative research performed prior to this work (Behrens et al, 2009). Such concern was more striking among people of lower socioeconomic classes, where budget is restricted. In the informative leaflet it was stated that irradiated foods, in comparison with the traditional processes, would cost R$0.50 to R$1.00 plus. Although the effect of price itself was not evaluated herein, it must not have had a major effect on purchase intention.

In a survey conducted with Turkish consumers, Gunes and Tekin (2006) reported an expectation of higher price and consumer intention to pay no more than a 5% premium price for irradiated foods. Researches conducted in the US came to different conclusions: groups of consumers willing to pay a little bit more for irradiated meats, seafood and chicken – up to 10% - as long as irradiation assures more safety to such products (Fox and Olson, 1998; Nayga et al., 2005). Muscle food and seafood seem to receive more favourable responses to irradiation compared to fruits and vegetables (Resurreccion et al., 1995), since the former are seen by consumers as more risky foods.

In this study purchase intention was highly correlated with acceptability, that is, as the acceptability of the products grew, purchase intention grew as well. Anyway, group 3 showed the most interesting results: the purchase intention of the irradiated sample tend to be lower in absence of information, suggesting that consumers would be in doubt about whether to buy an irradiated food or not in such situation. Noteworthy is the willingness of consumers in the upper quartiles to purchase the irradiated product. This reinforces the likelihood of a segment of consumers more open to this technology in Brazil.

5. Conclusions

This study has provided some important findings about Brazilian consumer acceptance and purchase intention of irradiated foods. Despite its exploratory nature, the study demonstrated the positive assimilation of information about food irradiation– benefits, safety, endorsement and regulation – by part of the participants in the study.

This study suggests that consumer segments with diverse views on food irradiation may exist. So further research is required taking into account a more representative sampling of the Brazilian population – considering education backgrounds, socioeconomic status and lifestyles - in order to identify consumers segments with different attitudinal patterns and behaviours. This will provide police makers, industries, retailers and consumer groups with more accurate knowledge about Brazilian consumer behaviour towards the use of nuclear energy in food processing and more effective communication strategies can be conceived.

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