

Nutritional information and willingness to pay (WTP)[#]

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Abstract

In this paper the impact of nutritional information on consumers' willingness to pay for two food products (orange juice and bread) were studied in a real incentive context thanks to a non-hypothetical method where consumers' willingness to pay (WTP) were collected for different product variants under different information conditions. We firstly examined the effect of simple information concerning the nutrient content of the product, and then we examined if adding a claim with more detailed nutrition or health information has some additional effect. We observed an effect of simple information on WTP but participants were not ready to pay more when they received claims with detailed information.

Keywords: nutritional information; experimental economics; willingness to pay (WTP); consumer behaviour

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1. Introduction

Consumers' valuation towards different variants of a given food product are influenced by different attributes of the product. These attributes can be classified into two main categories: the intrinsic attributes such as the sensory characteristics which are experienced by the consumer and are linked to the chemical and physical characteristics of the product and, the extrinsic attributes, such as brand, product denomination, product origin, nutrition facts or health claims.

Different methods are used to evaluate the impact of extrinsic attributes on consumers' valuation. A first approach is based on purchase intent measurements. Different procedures are used but the common point is that no purchase takes place at the end of the session. Thus, there is no real economic commitment and consequently, these methods can suffer from a hypothetical bias (Lusk and Hudson, 2004; Völckner, 2005): the maximum price that consumers are ready to pay in such a hypothetical context is higher than the maximum price observed in non-hypothetical contexts where consumers are asked to pay the products. The second approach is based on non-hypothetical measurements. Two main types of methods are used: methods based on auctions or similar procedures and choice experiments with posted prices. The advantage of auctions or similar procedures is that they permit to obtain a reservation price (maximum price) for each consumer and each variant of a product. These methods theoretically lead participants to truthfully reveal their value for the product in auction because they are sure to buy the product at a price equal or lower than their reservation price. When they answer to the question about their "reservation price" (their WTP) for a good, consumers do not have interest to announce a price higher than they really want to pay because they commit themselves to really pay this price. Conversely, they do not have interest to announce a price lower than those they really want to pay because they take the risk to not have the product. The most currently used methods are Vickrey auctions (Vickrey, 1961) and BDM method (Becker, DeGroot and Marschak, 1964). In the second-price Vickrey auction (one current option of Vickrey auctions), the reservation prices given by the consumers are recorded, ranked from the highest one to the lowest one and then reported for public information. The participant who gave the highest price wins the auction and really buys the good at the second highest price. In the BDM procedure, the reservation price given by the consumers are individually compared to a "selling price". To do this, each consumer draws at random a "selling price" in a predetermined price distribution (which represents the real distribution of the product prices). If this "selling price" is higher than the

reservation price, there is no selling. If the “selling price” is equal to or lower than the reservation price, the participant really buys the good at this selling price, he/she really pays this price and thus makes a surplus equal to the difference between his/her reservation price and the selling price (if this difference is not nul). Each method has its pros and cons (Lohéac and Issanchou, 2007). However, in the experiments reported here we used the BDM procedure because this procedure is easily understood by consumers, because results are not influenced by the number of participants in each experimental session, and because there is no risk of competition between participants.

In this paper we present two independent experimental studies aiming to evaluate the impact of nutritional information on consumers’ WTP. The first experiment was conducted on orange juice and the second on bread. In the two experiments reported here we examined that effect of a simple information concerning the nutrient content of the product, and we examined if adding more detailed nutrition information (for the orange juice experiment) or a positive health claim in relation with the product content (for the bread) induced an increase of consumers’ WTP.

For testing the impact of health claim, we used a within-subject design for orange juice and a between-subject design for bread. For orange juice, the same consumers gave their WTP for different variants of orange juices, successively in three conditions with more and more information. For bread, there were two groups of consumers who gave their WTP for different baguettes, firstly in a blind condition (i.e. without any extrinsic information) then when a label “Source of fibre” was added for two of the 4 baguettes. For half of the consumers a health claim about fibre was given between these two stages of the experiment.

In such experimental sessions where WTP are given for different variants of a product in different information conditions, a problem that can occur with non-hypothetical procedures is a demand reduction or “wealth” effect for participants. To avoid this problem, the solution is to consider independently each product and condition by introducing an “isolation effect” (Kahneman and Tversky, 1979). The principle is straightforward: rather than really play for each variant and condition, only one of the situations (i.e. variant \times information condition) is randomly drawn at the end of the experimental session, individually or for the whole group of participants. Thus, the wealth effect does not take place and participants are in the same incentive condition all along the session for all variants and conditions.

Section 2 presents the designs of the two experiments. Section 3 presents the results about impact of nutritional information and health claims on consumer behaviours. Last, section 4 discusses and concludes these results.

2. Experimental designs

The standard design for an experimental session is the following. Participants are welcomed in a laboratory room designed to conduct food experiment (as in the sensory Platform at INRA Dijon). After a presentation of experimenters and development of the session, the principles of elicitation method and of incentive system are explained. The core of experiment is organized around the product and the information conditions in which consumers give their WTP (with BDM procedure). At the end of these rounds, a first drawing is done to choose one situation amongst all situations (i.e. amongst all variants \times conditions), then each consumer draws a price to determine, if for the drawn situation, he/she buys the product and at which price. The two experiments presented here followed this general principle but had some specificities which are presented below.

The aim of the first experiment was to study the impact of information on consumers' behaviour for four variants of orange juice. These four variants were a nectar first price brand, a nectar distributor brand, a pure juice first price brand, and a pure juice distributor brand. Consumers evaluated these products in three successive information conditions. This experiment was conducted at Dijon (France) in spring 2005. Firstly participants saw successively pictures of packaging of the four orange juices (condition 'Label'). In the following condition, they saw the previous pictures with the legal definition of the two product type, i.e. of the nectar or pure juice (see Appendix A). In the third condition, they saw the two previous information plus nutritional information and recommendations extracted from the guides of the National Programme Nutrition Health (PNNS) (see Appendix B). Consumers' behaviours were recorded through hedonic ratings and WTP at the same time. Only WTP data are reported here (see Combris, Issanchou and Lohéac, 2007, for more details).

The aim of the second experiment was to study the impact of information about the fibre content on WTP for baguettes with different hedonic values, and with or without information about the nutritional effects of fibres. Four French baguettes (two baguettes made with "55

flour type” – LF1 and LF2 – and two baguettes made with flour containing a higher proportion of wheat grain envelopes made with “brown flour” – HF1 – and made with “wholemeal flour” – HF2 –) were presented to 123 consumers who gave their WTP in different information situations. Experiment was conducted at Dijon (France) in spring 2006. According to the French legislation (AFSSA, 2004), all baguettes could have the label “source of fibres” due to their fibre content. However, this label was only attributed at the two baguettes not made with “55 flour type”, i.e. to the baguettes HF1 and HF2. In a first stage, the baguettes were presented without any information about their composition. Consumers had to evaluate each baguette after observation and manipulation (visual-tactile situation) and independently after tasting. Only data concerning the visual-tactile situation are reported here (see Issanchou *et alii*, 2006, for more details): it corresponds to a situation in a shop where consumers can only look at the baguettes and, in some shops, can touch them. After this first evaluation, the consumers received general information about bread (see Appendix C). Half of the participants (group 1 with health claim) also received information about the potential health benefits of fibres (see Appendix D). Then, the participants had to evaluate the same baguettes but, two baguettes (HF1 and HF2) were presented with “source of fibre” label. In a previous stage (which took place few weeks before), participants were asked to rate, for the four baguettes, their expected liking after a visual-tactile examination (how much they expect to like the baguette based on its visual and tactile characteristics) and their liking after tasting.

All consumers who participated to these experiments came from the “general population” in Dijon area. They were recruited through a phone survey after receiving an information letter. They represented real consumers and buyers of the products used in the experiments (orange juice and French baguette). Socio-demographic characteristics of these consumers are presented in table 1.

Table 1. Socio-demographic characteristics of participants in the two experiments

	“Orange experiment”	“Baguette experiment”
	(n=87)	(n=123)
Proportion of Females (%)	64.37	60.16
Mean Age (years)	38.0	43.5
Mean Household monthly income (euros)	2686	2477
Mean Household size (number)	2.7	2.4

For the baguette experiment the two groups (i.e. the one receiving a health claim and the one receiving no health claim about fibres) were non significantly different for these socio-demographic characteristics.

4. Results

In order to evaluate the effect of nutritional information on consumers' WTP, we calculated the mean WTP by product for each information condition (or by group) and compared them with appropriate statistic tools. For orange juice, we used paired t-test for comparing two conditions for each variant, and analysis of variance for comparing variants within a condition. For bread, we used analysis of variance for comparing variants within a condition and for a given group, and paired t-test for comparing the two conditions per variant and group.

Figure 1 presents the mean WTP for each of the 4 orange juice variants in each of the 3 information conditions. In the condition "Label", the nectars were less valued than the pure juices and, not surprisingly, within each type of juice, the distributor brand was more valued than the first price brand. This ranking was confirmed in the following information conditions but the difference between nectars and pure juices increased after revelation of the legal definitions of nectars and pure juices. This information induced a significant increase of the WTP for pure orange juices and a significant decrease for orange nectars, even if, in this case, the change in WTP was less important (mean change in price: -0.12 euros for orange nectars and +0.30 euros for pure orange juices; mean change in percent: -35.5% for orange nectars and +45.1% for pure orange juices). Thus it appears that the information referring to the pure orange juice ("without food colouring, neither preservative, nor added sugar") was particularly valued. However, there is no significant additional effect of introducing information about nutritional advantages of consuming pure orange juice: WTP for pure orange juice did not increase and WTP for nectar did not significantly decrease.

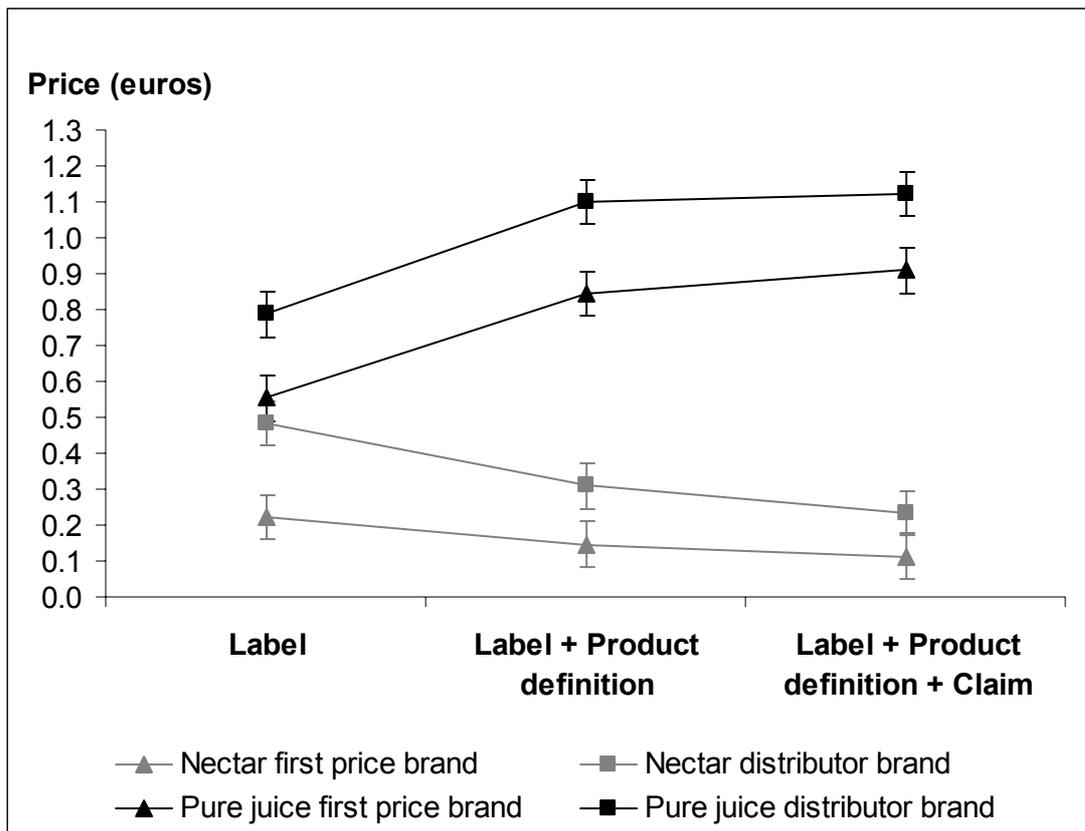
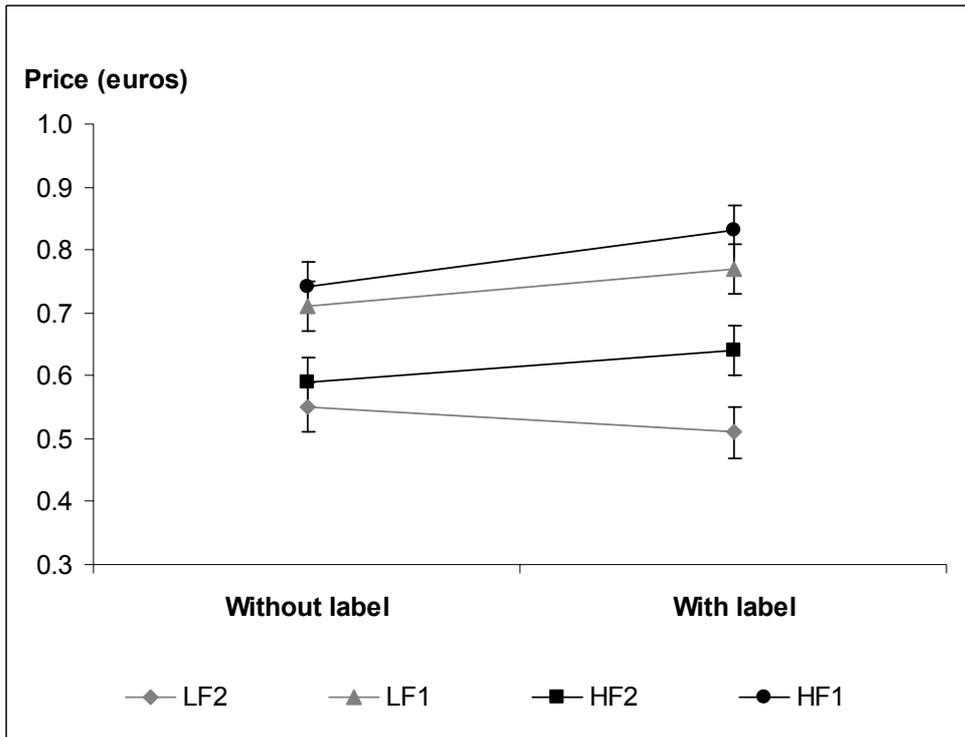
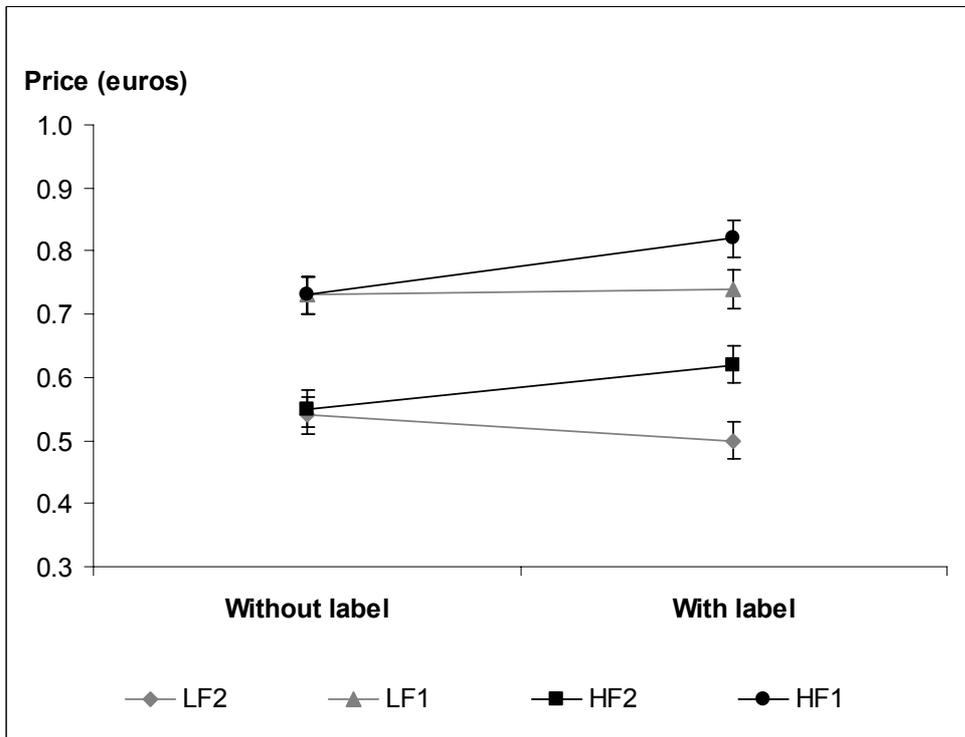


Figure 1. Mean reservation prices (95% confidence intervals) for orange juice experiment

Figure 2 presents the mean WTP for each of the 4 French baguettes, for each of the 2 information conditions and for each group of consumers (Figures a and b, respectively for the group with and without a health claim). The willingness to pay for these baguettes from the lowest to the highest is LF2, HF2, LF1 and HF1. At this level, it is not possible to find an explanation for the difference of WTP between the two groups of consumers (note that in this first condition both groups had received the same information). The introduction of information and a label 'Source of fibre' for HF1 and HF2 baguettes induced a significant increase of WTP for all the products, except for LF2, a baguette for which the expected liking score was lower than for the other three baguettes. However, there was no significant difference between the group which received specific information about fibre and health and the group which just received the general information. Moreover, we can say that they converged toward the same mean price. In this study, an absence of a label 'Source of fibre' was not perceived by the consumers as being a negative point justifying a depreciation of the products without this label. On the contrary, there is an unexpected significant increase of WTP for LF1, the baguette with the highest expected liking score.



a) Group 1 (general information + health claim)



b) Group 2 (general information)

Figure 2. Mean reservation prices (95% confidence intervals) for baguette experiment by group of consumers, without label and with label (i.e. with a label 'Source of fibres' for HF1 and HF2).

5. Conclusion

A first conclusion is that consumers differently valued products with different quality: different processes and composition for orange juice and, different sensory (visual and tactile) characteristics or different composition for bread. However, consumers did not appear to be ready to pay more when nutrition or health benefits were mentioned in a claim. Several hypotheses can be suggested to explain these results. Firstly it is possible that participants previously knew the information contained in the claims. So, when the legal definitions in the case of orange juice and the label "Source of fibre" in the case of bread were revealed, they inferred the nutrition health benefits and thus had no reason to change their WTP when these benefits were underlined. In the case of bread, participants were asked to answer to a Quiz at the end of the experiments and it was possible to compare results obtained by the two groups. We found that both groups knew the positive impact of fibres on the intestinal transit time but only group 1, who received the health claim, obtained a proportion of right answers higher than random on the impact of fibre on cholesterol reduction. One can suppose that both groups have the same initial level of knowledge and thus that group 1 did not know the effect of fibre on cholesterol before reading the health claim. So, even if they read the information and probably learned a positive effect of fibre, they were not ready to pay more when they received the full information. Secondly, it is possible that the information contained in the claim was too complicated. Indeed several works showed that consumers better understood simple claims (see Leathwood *et alii*, 2007). In particular for the orange juice, the claim is not simple and is even ambiguous as it was written "fruit juices are less satisfactory than fruit, because it is less rich in fibres". A third possible explanation is that participants had no positive attitudes towards the information revealed in the claim (for orange juice, the additional information in the nutritional information from the PNNS was about the lack of minerals and vitamins in nectars) and were not concerned by the health claim in the bread experiment (Leathwood *et alii*, 2007). A fourth possible explanation is that in these two experiments the information concerned benefits and several authors (e.g. Fox, Hayes and Shogren, 2002; Rousu *et alii*, 2004; Marette *et alii*, 2006) have shown that information on risks has more impact than information on benefits. Finally even if participants have learnt something positive about the pure juice and about fibre when reading the claims, they are simply not ready to pay more.

In conclusion, for orange juice and bread, two products, regularly bought and with a low unitary value, consumers do not seem to be ready to pay more when a nutrition or health

claim is mentioned. This result obtained in a laboratory context would certainly apply in a real life situation. Indeed, in a laboratory context consumers' attention is focused on the nutrition or health information: as pointed out by Leathwood *et alii* (2007): participants are asked to look at and to respond to a claim. Impacts of such claims are thus certainly heightened in a laboratory context compared to a shopping situation. However if two similar products are presented at a same price, one cannot conclude if the product with a health claim will be or will not be selected by a greater proportion of consumers.

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Appendix A. Definition of orange juices in “Orange experiment”

Pure orange juices are juices which contain 100% of orange juice, without food colouring, neither preservative, nor added sugar, in accordance with regulation.

Juices made with concentrate are prepared from concentrated juices and a quantity of water in order to obtain the essential composition and initial quality of juices.

Orange nectars are juices made with concentrate, with a minimum of 55% of fruit, and where water, sugar and acid are added.

Appendix B. Nutritional information in “Orange experiment”

Even if it is not completely equivalent to a fruit, a fruit juice, with the mention “100% pure juice”, can contribute to achieve the nutritional goals.

A fresh fruit juice or a half glass of fruit juice “without sugar added” account as one of the 5 fruits/vegetables to consume each day. However, it must be known that the fruit juice is less satisfactory than fruit, because it is less rich in fibres.

Choose fruit juices “without added sugar”. Do not confuse them with drinks sweetened containing fruits and nectars, which contain primarily sugar, without the advantages of the fruits (mineral and vitamins).

These advices are extracted from the guides of the National Programme Nutrition Health (PNNS):

« la santé vient en mangeant – le guide alimentaire pour tous »

« la santé vient en mangeant et en bougeant – le guide nutrition des enfants et ados pour tous les parents »

Appendix C. General information in “Baguette experiment”

“Breads differ according to the type of flour and to the type of process. These differences induce a large diversity of taste and texture.”

Appendix D. Health information in “Baguette experiment”

“Bread is a product which favours a balanced diet. This a natural source of complex glucides (starch) and of fibres. Fibres are beneficial for health: they decrease intestinal transit time; they reduce cholesterol and heart pressure, thus help to reduce risk of cardio-vascular diseases.”