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Development of a Mixed Beverage with the Addition of Prebiotics: Consumer Acceptance and Focus Groups

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ABSTRACT
A innovate cashew-based mixed fruit beverage incorporated with prebiotics was elaborated consumer acceptance and expectation were applied to evaluate the product; a possible package for the beverage was survey, using focal group, in order to verify the influence of this on consumer buying intention. Acceptance analyzes were performed in three sessions, along with the focus group technique. The beverage showed the greatest acceptance when mixed with mango or guava. The package chosen as most adequate for the 245 mL single dose had a layout with simple, practical colors, and for the larger volumes the packages was chosen made of glass and the Tetra Pak system, with an open-shut mechanism and 1 L volume. The format and type of package had an impact on the choice, but the decision to buy depended on the price of the final product, and their acceptance.

Introduction
In Brazil beverages are regulated by Law nº 8.918 of July 14th 1994 of the Ministry of Agriculture, Livestock and Food Supply, and controlled by Decree nº 2.314 of September 4th 1997 (Brasil, 1994, 1997). Beverages are defined as “all industrialized products in the liquid state, destined for human consumption, with no medical or therapeutic objective”, and classified as non-alcoholic or alcoholic beverages. The types and definitions of non-alcoholic beverages are contemplated in articles 40 to 60 of Section I, including fruit juices (Art. 40), pulps (Art. 41) and nectars (Art. 43).

The consumption of fruit-based beverages has been highlighted in campaigns that encourage the consumption of healthy foods, resulting in a growth of the fresh fruit market and also in the processed fruit market,
including fruit juices and nectars (SEAG. Secretaria da Agricultura, Abastecimento, Aquicultura e Pesca, 2012).

According to SEBRAE. Serviço Brasileiro de apoio às Micro e Pequenas Empresas (2015), fruit growing is one of the sectors that most stands out in Brazilian agrobusiness. Brazil has an infinity of fruits appreciated the world over, representing great potential for new product development (Freitas & Marttietto, 2013). Cashew (*Anacardium occidentale* L.) is one of these and is considered to be a source of vitamins C and the B complex and of iron, and also a relevant source of antioxidant compounds, which are necessary for human health (Lopes, Miranda, Moura, & Enéas Filho, 2012). The caja (*Spondias mombin* L.) fruit is rich in carotenoids and has an elevated tannin content, such that the fruit pulp is indicated as a probable natural antioxidant (Mattietto, Lopes, & Menezes, 2010). The mango (*Mangifera indica* L.) is a fruit considered as an important source of phytochemicals, such as antioxidants, fibers and vitamins, for example pro-vitamin A, and also contains phenolic compounds, which, together with the carotenoids and fibers, present functional properties (Ferreira, 2010). The guava (*Psidium guajava* L.), an important source of vitamin C, also contains large amounts of sugars, vitamin A and the vitamin B group, such as thiamin and niacin, as well as significant amounts of phosphorus, potassium, iron and calcium, as well as being fiber-rich (Ferre, et al. 2012). Acerola (*Malpighia emarginata* D.C.), in addition to being a potential natural vitamin C source, is a reasonable source of pro-vitamin A and has low contents of the vitamin B complex vitamins such as thiamin, riboflavin and niacin, as well as minerals such as calcium, iron and phosphorus (Ritzinger & Ritzinger Prata, 2011).

Various studies have been carried out to evaluate the acceptance of a product by way of the sensory acceptance test, which refers to the expectation for the effective use of the product (Dutcosky, 2013), and can also be applied to the acceptance of fruit-based beverages. According to Kemp (2013), most new foods fail commercially by not including consumers part of the innovation process. Innovation should seek to meet consumer needs. Studies can also be found in the literature which evaluated the influence of the package and of information found on the label, on consumer acceptance and buying intention of food products, especially those that used the focus group technique, a qualitative sensory test (Carneiro et al., 2005) applied to the choice of the ideal package for the mixed beverage elaborated in the study in question.

Dluzniewski, Gonçalves, and Copetti (2014) evaluated the buying profile and consumption of functional yogurts and applied the focus group technique with the objective of obtaining information about packaging, labeling and sensory and nutritional aspects, and pointed out that food labels are not objects of attraction, due to factors related to difficulties in the sense of vision and a lack of interest.
Another study carried out by Francisco (2014) used the same technique to evaluate two types of commercial soluble coffees of the same brand, and the acceptance of the package. The package used for the soluble coffee with added micro-ionized roasted and ground coffee was little appreciated due to the difficulty in identifying the product. The acceptance was only influenced by extrinsic factors for the conventional product, for which the high expectation generated by greater familiarity with the product or package increased its acceptance.

Considering the current consumer demand for healthier and functional foods and the development of new products with good acceptance, which present beneficial attributes for the consumers, the insertion of the prebiotic fructooligosaccharides (FOS) into the mixed fruit beverage could be an excellent alternative, since it does not modify the sensory characteristics, but aggregates value to the product developed.

FOS is considered to be a prebiotic, which is a non-digestible nutritional ingredient which benefits the host by selectively inciting the development and activity of one or more beneficial colon bacteria, thus improving the health of the host (Rayes, 2007).

The objective of the present work was to develop mixed flavored beverages with the addition of prebiotics and evaluate the impact of the package on the buying intention with the aid of sensory tests.

**Material and methods**

**Sensory acceptance analysis**

**Sample**
The mixed flavored beverages were elaborated with the following fruit pulps: cashew, acerola, caja, guava and mango, provided by the Beija-Flor fruit pulp company (Gerson Gesteira Fonseca & Cia.Ltda – Epp), Valença, BA, Brazil. Sample A was made with cashew and acerola pulps with 6.3º Brix; sample B was made with cashew and guava with 4.9º Brix; sample C was made with cashew and mango with 7.1º Brix; and sample D with cashew and caja with 6.2º Brix.

**Elaboration of the mixed beverages**
The types of fruit pulp used to obtain the mixed beverages were defined in this step of the study, and Table 1 shows the respective choices and concentrations for each 100 grams of finished product.

A simple design was used to elaborate the beverages. All formulations contained 1.5% (g/100 mL) of fructooligosaccharides, 4% (g/100 mL) of crystal sugar, 44.5% g/100 mL of filtered water and 50% of fruit pulp. The fruit pulps, FOS, sugar and water were homogenized in a semi-industrial blender (JBM
brand, model JBM 59) for about 25 seconds at a speed of 2200 rpm until a homogenous liquid was obtained. The juices were prepared and maintained under refrigeration (7–10ºC) until used in the sensory acceptance analysis.

### Sensory acceptance analysis

The participants were selected based on their appreciation of cashew juice and availability to take part in the tests. A total of 70 evaluators were recruited to take part in the acceptance test, composed of students and workers of the Federal University of Bahia (UFBA), Ondina Campus. The evaluators filled in a free and clarified Term of Consent and a socioeconomic questionnaire. The project was evaluated by the Ethics Commission of the Federal University of Bahia under the number: CAAE 5100 7515.7. 0000 5531.

The acceptance test was carried out in the Sensory Analysis Laboratory of the Faculty of Pharmacy – UFBA (Ondina) in three sessions each of approximately 10 minutes. The beverages were evaluated in individual booths under white light. A 10 cm hybrid hedonic scale was used for scoring, anchored at the extremes and middle by the terms “disliked immensely”, “neither liked nor disliked” and “liked immensely” (Villanueva, Petenate, & Silva, 2005). The samples were coded and presented in a monadic, completely balanced way. Water was offered to cleanse the palate between samples.

In the first session (Blind), the evaluators were only informed that the samples were mixed fruit juices, and then rate the liking.

In a subsequent test (session 2 – Expectation), the evaluators were only informed that the samples were fruit juices with addition of fructooligosaccharides (prebiotic additive), and then rate the expected liking.

In the third session (Information), the evaluators were informed that fruit juices were functional beverages and nutritional and health claims framed in a short text about the products were presented and consumers, and then rate the informed liking.

### Statistical analysis

The results of the statistical analysis were evaluated by the analysis of variance (ANOVA) for the samples and their scores, followed by the Tukey
test at a significance level of 5%, using the Statistica program (version 7). The influence of the information on the acceptance of juices was determined by the t-test for paired samples.

**Analysis of the packages by the focus groups**

**Sample**
In order to choose an adequate package for the mixed beverage with added prebiotic, packages of non-alcoholic beverages of different sizes, materials and formats were obtained from local supermarkets.

**Qualitative evaluation of the packages and of the concept of the mixed beverage with prebiotic by the focus groups**
A total of 40 non-trained evaluators were recruited for the focus group analysis, who initially filled in a recruitment form. The group composition and number of focus groups depended on the particularities and evaluation requisites of the ideal package for a functional mixed fruit juice. The participants were selected so as to guarantee a certain degree of homogeneity in each group and formed three groups with different compositions.

Three sessions were carried out in a closed ambience (room with a group table) each session lasting a maximum of 70 minutes at room temperature under white light, guided by a moderator and with the aid of an assistant to note down the opinions of the participants. The sessions were audio recorded to facilitate transcription. The presentation of the packages was at random in each session.

The points for discussion were raised according to the context and approached according to the dynamics of the evaluation. In all groups the discussion was guided by the sequence of questions described in Frame 1.

**Description of the packages used for evaluation by the focus groups**
In the groups, each package and its respective label was evaluated individually by all the participants, and the moderator followed the sequence of questions referring to the visual characteristics and information found on the packages, so as to stimulate the judges to express their opinions. Frame 2 shows the description of the respective packages.

**Analysis of the results of the focus groups**
The results from the focus groups were analyzed qualitatively, uniting the most frequent replies given by the evaluators, with the objective of identifying the ideal package for the mixed beverage.
1: Do you take notice of the labels/packages of the products you consume?
2. What most calls your attention on the label/package of an industrialized juice?
3. Have you drunk any of the juices exposed here? Which ones?
4. Did the package of the product you consumed call your attention? Why?
5. What importance do you give to the material of a juice package?
6. What importance do you give to the ease of opening/maintaining closed a juice package?
7. What importance do you give to being able to see the juice?
8. What do you understand by the expression functional properties of a food?
9. What do you think of specifying on the label the functional properties of the product?
10. If the information “prebiotics” or “functional properties” was specified on the label, would you buy it?
11. What appearance/characteristics do you expect for the package of a mixed fruit juice with prebiotics?
12. What do you think is important to highlight on the label of such a juice?
13. Would you pay more for such a product?

Frame 1. Sequence of questions to guide the discussions of the focus groups.

<table>
<thead>
<tr>
<th>Identification/brand</th>
<th>Description of label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Beverage brand A</td>
<td>Single dose package; 245ml; plastic; transparent; simple label; With information about the specific characteristics of the product on the label.</td>
</tr>
<tr>
<td>2. Beverage brand B</td>
<td>Single dose package; 290ml; cup shape; predominant color black; With information about the specific characteristics of the product on the label.</td>
</tr>
<tr>
<td>3. Beverage brand C</td>
<td>Single dose package; 330ml; Tetra Pak; color black; with open &amp; shut system; With information about the specific characteristics of the product on the label.</td>
</tr>
<tr>
<td>4. Beverage brand D</td>
<td>Single dose package; 335ml; can; color red; with images of fruits on front; With information about the specific characteristics of the product on the label.</td>
</tr>
<tr>
<td>5. Beverage brand E</td>
<td>Single dose package; 260ml; glass; color red; with images of fruits on half of the package and the rest transparent; with open and shut system; With information about the specific characteristics of the product on the label.</td>
</tr>
<tr>
<td>6. Beverage brand F</td>
<td>Larger volume package; 500ml; plastic; transparent; with images of fruits on front; with open and shut system; With information about the specific characteristics of the product on the label.</td>
</tr>
<tr>
<td>7. Beverage brand G</td>
<td>Larger volume package; 1000ml; light green glass bottle; with images of fruits on front; with open and shut system; With information about the specific characteristics of the product on the label.</td>
</tr>
<tr>
<td>8. Beverage brand H</td>
<td>Larger volume package; 1000ml; Tetra Pak; with images of fruits on front; with open and shut system; With information about the specific characteristics of the product on the label.</td>
</tr>
</tbody>
</table>

Frame 2. Description of the packages displayed for discussion by the focus groups.
Results and discussion

Sensory acceptance

Table 2 gives a summary of the demographic characteristics of the participants of the sensory acceptance analysis. With respect to gender, 50% were male and 50% female. Most (80%) of the participants were between 20 and 30 years of age and 75.7% had incomplete higher education. With respect to the consumption of fruit juices, 61.4% consumed them daily, and 50% of the participants were not responsible for buying the food consumed at home. According to a study carried out by Vidigal, Dias, Dias, and Finger (2011), who analyzed the effect of the health allegations of exotic Brazilian fruit juices on consumer acceptance, the majority of those interested in taking part in the sensory analysis were women (66%) with a family income below 12 minimum salaries (84.3%), and 86.8% had incomplete graduation courses. Of these participants, 63.3% reported consuming fruit juices more than 3 times a week, and the price was one of the main difficulties related to an increase in fruit juice consumption.

In the present study, despite the fact that the majority (78.6%) (Table 2) had a family income below 6 minimum salaries they evaluated the health benefits as the most important factor for acquiring fruit juices, showing concern in consuming foods that contributed to good health and quality of life.

Table 3 shows the results of the global evaluation of the mixed cashew-based juices with the addition of prebiotic. The data obtained in each of the three sessions (blind test, expectation test and information test) indicated

Table 2. Profiles of the evaluators who took part in the sensory analysis.

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Class</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>50.0</td>
</tr>
<tr>
<td>Age</td>
<td>20–30</td>
<td>80.0</td>
</tr>
<tr>
<td></td>
<td>≥30</td>
<td>20.0</td>
</tr>
<tr>
<td>Instruction level</td>
<td>Incomplete higher education</td>
<td>75.7</td>
</tr>
<tr>
<td></td>
<td>Complete higher education</td>
<td>4.1</td>
</tr>
<tr>
<td>Monthly family income</td>
<td>1 to 5 minimum salaries by person</td>
<td>78.6</td>
</tr>
</tbody>
</table>

Table 3. Hedonic means in relation to the global impression of the mixed cashew-based juices with added prebiotic.

<table>
<thead>
<tr>
<th>Samples</th>
<th>Blind</th>
<th>Expectation</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.9&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.5&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>B</td>
<td>6.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.7&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>C</td>
<td>5.9&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>5.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.9&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>D</td>
<td>6.4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.1&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>*Means followed by the same letter in the same column do not differ significantly (p < 0.05) according to Tukey’s HSD test. Formulations: Sample A (cashew and acerola); Sample B (cashew and guava); Sample C (cashew and mango); and Sample D (cashew and caja).</sup>
a significant difference \((p < 0.05)\) between the acceptance means for each juice, and hence Tukey’s means comparison test was applied.

In session 1 (blind test), the mixed cashew/caja and cashew/guava juices showed the highest acceptances, not differing from the cashew/mango juice, whereas the flavor of the cashew/acerola juice was the least accepted by the consumers, a fact which could be attributed to the high acidity and astringency of this mixture (Table 3). The acceptance means varied between 4.9 (for sample A) and 6.4 (for sample D).

On developing and evaluating the acceptability of mixed juices made from mango, guava and acerola, Faraoni et al. (2012) verified that all the formulations obtained from the fruits were accepted by the consumers. The highest acceptance scores were obtained for mixtures with greater proportions of mango and guava pulps, whereas the acerola pulp contributed to lower hedonic scores.

Mamede, Kalschne, Santos, and Benass (2015) prepared mixed flavored beverages based on caja, and verified their consumer acceptance. The author found that the caja-strawberry and caja-cashew mixtures were excellent proposals, being the mixtures most accepted by the consumers.

Silva et al. (2011) developed a mixed beverage based on caja and cashew enriched with FOS and inulin with the objective of evaluating the global impression on a 9-point hedonic scale. The formulations with added FOS were well accepted as compared to the control formulation (without the addition of the prebiotic), whereas those with added inulin, although accepted, received lower scores. Within the perspective of developing new products with good acceptance, and which present beneficial characteristics for the consumers, the addition of the prebiotic FOS could be an excellent alternative, since it does not modify the sensory characteristics of the product developed.

In session 2 (expectation test), the acceptance means varied between 5.2 (sample A) and 6.1 (sample D). The four samples did not differ from each other \((p > 0.05)\) in relation to global impression. The information concerning the types of fruit pulp did not cause any difference in sensory perception between the samples.

In session 3 (information test), the acceptance means varied from 5.5 (sample A) to 6.9 (sample C). The formulations of cashew plus guava and of cashew plus mango were the most accepted \((p < 0.05)\), not differing from the mixed cashew and caja juice. Providing information about the health benefits modified the acceptance of the mixed juices with added prebiotic, in relation to the other sessions.

The individual hedonic scores of the consumers, and not just the mean obtained in the blind test, were evaluated by way of Internal Preference Mapping (Figure 1). The first principal component explained 38.02% of the total variance in the data, and the second 34.97%, hence the two components
explained the greater part of the variability of the data set. The correlation of the consumers with the first and second principal components revealed the heterogeneity of the consumer preferences. The spatial dispersion of the samples indicated the formation of four distinct groups which differed from one another in relation to the global acceptance of the samples. The mixed cashew/caja and cashew/mango juices were the most accepted by the consumers. On the other hand, the majority of the consumers did not like the cashew/acerola formulation.

In the expectation test and that with information (Figures 2 and 3), it can be seen that the two first principal components explained the greater part of the variance in the data, 73.74% and 74.97%, respectively. Thus, just the first two principal components are sufficient to discriminate the samples with respect to acceptance.

In the expectation test (Figure 2), three distinct groups were formed: samples A (cashew and acerola) and C (cashew and caja) (group 1); sample G (cashew and guava) (group 2) and sample M (cashew and mango) (group 3), juice G (cashew and guava) being the least accepted by the consumers.
In the information test (Figure 3), two distinct groups were formed consisting of samples C (cashew and caja) and M (cashew and mango) (group 1) and the other by samples A (cashew and acerola) and G (cashew and guava) (group 2). The juices C and M, located in the first quadrant, correlated positively with the first principal component and were the most accepted by the consumers.

Thus, the acceptance was altered, influenced by the contexts of each session (blind and expectation tests and that with information).

Tables 4, 5 and 6 show the results for the t-tests of the paired samples, aiming to verify the differences between the hedonic means obtained in each session for each juice sample.

Table 4 shows the results for the t-test calculated as from the hedonic scores awarded by the consumers in the blind test (session 1) and in the expectation test (session 2). The difference between the acceptance means found in sessions 1 and 2 was not significant for any of the formulations. Thus, it can be seen that consumer expectation in relation to all the mixed juices produced the process of confirmation, which occurs when the performance of a product combines with the standard established by the evaluator.

Figure 2. Internal preference map of the dispersion of the mixed juice formulations with prebiotics and the correlation of the acceptance data of each consumer (expectation test) with the first and second principal components. Formulations: M (cashew and mango); G (cashew and guava); A (cashew and acerola); and C (cashew and caja).
That is, the expectation generated by the attributes concerning acceptance of the product, was confirmed, which is frequently the response looked for when studying the characteristics of a food and consumer behavior.

On comparing the hedonic means between sessions 1 (blind test) and 3 (test with information), the assimilation phenomenon was only observed for

**Figure 3.** Internal preference map of the dispersion of the mixed juice formulations with prebiotics and the correlation of the acceptance data of each consumer (test with information) with the first and second principal components. Formulations: M (cashew and mango); G (cashew and guava); A (cashew and acerola); and C (cashew and caja).

**Table 4.** Comparison between the hedonic means obtained for each juice formulation in the blind test (session 1) and in the expectation test (session 2) by way of the t-test.

<table>
<thead>
<tr>
<th>Samples</th>
<th>Session</th>
<th>Mens</th>
<th>t-test</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>4,88</td>
<td>-0,58</td>
<td>0,5651ns</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5,11</td>
<td></td>
<td>(Confirmation)</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>6,18</td>
<td>0,60</td>
<td>0,5532ns</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5,99</td>
<td></td>
<td>(Confirmation)</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>5,80</td>
<td>-0,20</td>
<td>0,8383ns</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5,87</td>
<td></td>
<td>(Confirmation)</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>6,49</td>
<td>1,15</td>
<td>0,2524ns</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>6,03</td>
<td></td>
<td>(Confirmation)</td>
</tr>
</tbody>
</table>

*ns* not significant difference (p > 0,05); *significantly different (p < 0,05).

Formulations: Sample A (cashew and acerola); Sample B (cashew and guava); Sample C (cashew and mango); and Sample D (cashew and caja).
the ‘cashew + mango’ treatment (Table 5). Thus, the information concerning the health benefits positively influenced (p < 0.05) acceptance of the cashew + mango mixed juice. For the other treatments (cashew + acerola, cashew + guava and cashew + caja), the difference between the hedonic means for sessions 1 and 3 was not significant (p > 0.05), evidence that the information did not affect acceptance of the treatments.

Table 5. Comparison between the hedonic means obtained for each juice formulation in the blind test (session 1) and in the test with information (session 3) by way of the t-test.

<table>
<thead>
<tr>
<th>Samples</th>
<th>Session</th>
<th>Means</th>
<th>t test</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>4.88</td>
<td>1.73</td>
<td>0.0880ns</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>5.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>6.18</td>
<td>1.55</td>
<td>0.1257ns</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>5.80</td>
<td>3.09</td>
<td>0.0029*</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6.82</td>
<td></td>
<td>(Assimilation)</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>6.49</td>
<td>1.44</td>
<td>0.1531ns</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ns not significant difference (p > 0.05); * significantly different (p < 0.05).
Formulations: Sample A (cashew and acerola); Sample B (cashew and guava); Sample C (cashew and mango); and Sample D (cashew and caja).

Table 6. Comparison between the hedonic means obtained for each juice formulation in the expectation test (session 2) and in the test with information (session 3) by way of the t-test.

<table>
<thead>
<tr>
<th>Samples</th>
<th>Session</th>
<th>Means</th>
<th>t test</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>5.11</td>
<td>1.14</td>
<td>0.2570ns</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>5.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>5.99</td>
<td>2.47</td>
<td>0.0158*</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>5.87</td>
<td>3.22</td>
<td>0.0020*</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>6.03</td>
<td>0.07</td>
<td>0.9435ns</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ns not significant difference (p > 0.05); * significantly different (p < 0.05).
Formulations: Sample A (cashew and acerola); Sample B (cashew and guava); Sample C (cashew and mango); and Sample D (cashew and caja).
expectation generated does not overlap with the sensory quality of the product, as in the case of the ‘cashew + acerola’ mixed juice.

**Qualitative sensory analysis by the focus groups**

The 40 evaluators were divided into 3 groups. The first group consisted of 15 specialists in the food science area (5 men and 10 women), who assumed or divided the responsibility for doing the domestic shopping. The second group consisted of 15 individuals of varying ages, genders and professions (9 men and 6 women) with less responsibility for buying food to take home. The last group consisted of 10 housewives, aged between 24 and 70, with great responsibility for doing the domestic shopping. Table 4 describes the characteristics of the evaluators as verified from the questionnaire filled in at the beginning of the experiment.

The participants of the focus group divided their opinions about consuming fruit juices. When the participants of the focus group were asked if they knew what a functional food was, 77% said they did. With respect to responsibility for buying food to take home, 50% of the individuals declared 100% responsibility for domestic shopping.

With respect to the recruitment questionnaire, the majority of the participants (82.5%) reported reading the labels of new products, the items most verified being the price, expiry date and brand (98%, 97% and 75%, respectively), except when dealing with products of a known brand, habitually consumed, when only the expiry date and brand were noted. Carneiro et al. (2005), Dantas (2005), Della Lucia, Minim, Silva, and Minim (2007) and Reis (2007), also observed that the expiry date and brand were the package characteristics most noted at the time of purchase.

The responses of the evaluators of the focus groups were grouped together in Table 7, only the most frequent responses being included.

The packages were evaluated with respect to their color, type, brand, price and information. Table 8 shows the most frequent replies given in the focus group sessions. The brand A package attracted the majority of the evaluators as the ideal package for single doses, since it was practical and simple. For larger volumes, the evaluators preferred those similar to those used for brands G and H with respect to the type of package, but the opinions were divided between glass and Tetra Pak. With respect to information, they were unanimous about the presence of the fruits contained in the juice on the label, and the information that the beverage contained prebiotic being emphasized.

Studies carried out by Carneiro (2002) and by Murphy, Cowan, and Henchion (2000), who evaluated the influence of packaging factors on consumer preference, indicated that the factor ‘type of package’ also influenced the process of consumer choice, buying and acceptance.
Profiles of the evaluators who took part in the focus group sessions.

<table>
<thead>
<tr>
<th>Question</th>
<th>Replies</th>
</tr>
</thead>
</table>
| 1 | “Yes/sometimes I note the price, expiry date (when in promotion), brand, package, new product and amount cited”  
“Only look at label when buying a new product – maybe some different information.”  
“I check on the label for any amounts of determined compounds.”  
“Differentiated label, esthetics, different designs that catch one’s attention.” |
| 2 | “Difference between nectar and juice, amount of juice, flavor, ‘any differential aspect being industrialized’, juice brand.”  
“100% natural, no additives, no preservatives, firstly attractive esthetics …, figures, visible letters, package format, practicality, hygiene, volume, material.”  
“brand, ingredients, nutritional information.” |
| 3 | “Beverages of the brands B, F, G and H” |
| 4 | Package of Brand A beverage- “practical”, “individual amount”, attractive esthetics, “more presentable”, “you can see the product”.  
Package of Brand G beverage – “Practicality, glass because it is more hygienic, inert, possible to recycle and reuse.”  
Packages of Brands F & H beverages – “can be sanitized and are practical, open, consume and then close and consume later”.  
“When alone I take a small package. When with others I prefer the larger package. Format of the package makes it easy to use.” |
| 5 | “I don’t consider it, I only consider the price”  
“I prefer glass, important for visualization, can reuse and is more hygienic”  
“Very important to be able to open and shut the package”  
“I like plastic because it’s always cheaper” |
| 6 | “Very important.”  
“depends on the size”, “I think individual amounts are unnecessary”, “larger volume, open/shut interesting to store better”, “opens easily and shuts securely”.  
“To maintain the quality of the juice inside the fridge, preserves better, better for consumption”.  
“I always use the larger juice package and keep it in the fridge, better an open and shut stopper so you don’t have to consume all at once.”  
“Lets you keep it for several days without losing the flavor”. |
| 7 | “I like to see the juice”, “I like to see the consistency”, “I like to see the concentration” “observe if there’s any change”  
“Very important to see the aspect of the juice. Visualize turbidity”. “Interesting to have a package that allows you to see if the juice has an ugly color, better not”.  
“Package with characteristics that avoid the interference of light, oxidation”.  
“I like glass because you can see the color and texture” |
| 8 | “I know that it’s good. It influences the purchase“.  
“If there’s something written about a ‘functional’ juice, I would see it and it would attract me to read the label”.  
“A juice with prebiotics would attract me, avoids taking pills”. |
| 9 | Highly important, “those who practice sport will want it” “the latest fad is for healthy”  
“Information on the label attracts me. It is the differential. The public should know what is functional”.  
“I think they should explain more, clearly explain on the label the importance of a functional product”.  
“they should explain what it is on the label”  
“explain by way of the media”  
“If I like it I buy it, I economize on other things but would pay for the juice”. |
| 10 | “Package of Brand A beverage, PET or glass and explains the properties of the juice using popular language”  
“Have a good label that attracts. If the color of the juice is ugly, better use a package that hides it”.  
“Package of Brand E beverage, very good in terms of attracting esthetically, the colors, the fruits call one’s attention. Good to put the fruits that make up the juice”.  
“Must use attractive colors that call one’s attention, information on prebiotic”.  
“Can no. Makes one think of soft drinks, can’t store afterwards, volume too big to drink all at once.  
“Material – ideal for individual dose, not glass, type of Package of Brand A beverage” |

(Continued)
Table 7. (Continued).

<table>
<thead>
<tr>
<th>Question</th>
<th>Replies</th>
</tr>
</thead>
</table>
| 12       | “Important to emphasize the image of the fruit in the juice and its properties”  
|          | “Explain the functionality of the juice, it’s not just functional”  
|          | “All the ingredients used; expiry date; contraindications for some diseases; clear language” |
| 13       | “Depends on the price, how much more expensive than normal juice”.  
|          | “Only if the juice is good for me, for my problem, for example”. |

Conclusions

The mixed juices were well accepted, with mean acceptances above the hedonic term ‘neither liked nor disliked’. The beverages obtained with the cashew based mixtures with the addition of prebiotics were better accepted when mixed with caja or guava.

The most adequate package as chosen by the focus group evaluators was differentiated according to volume. For the single dose volume, the package chosen was close to that of brand A, made of a plastic material, with a volume of 245 mL, transparent, simple label, containing information about the specific characteristics of the product on the label plus the presence of the fruit representing the flavor of the juice. For larger volumes they preferred packages the same as those of brands G and H, made from glass or Tetra Pak, respectively, with images of the fruits representing the flavor of the beverage on the front, an open and shut system, and with information concerning the specific characteristics of the product on the label.

With respect to the decision to buy, the majority of the evaluators replied that this would depend on the price, that is, on how much more expensive the product was as compared to the conventional product. They would only pay more for the product if it showed functionality for the specific case of the consumer.

The packages had an impact in the discussions of the focus groups with respect to their choice, when considering the individual volume, the format and the type of package, but the decision to buy depended on the price of the final product.

The evaluation of mixed beverage with the addition of prebiotics by the quantitative (acceptance test) and qualitative (focus group) approaches made the study more complete by expressing the opinions, impressions and attitude of the consumers.

Chefs can take inspiration from this work to prepare exotic tropical juices and innovate in the preparation of non-alcoholic beverages, and even think about using these flavors other foods or even condiments.
Table 8. Summary of the most frequent replies in the focus group sessions.

<table>
<thead>
<tr>
<th>Brand A</th>
<th>Brand B</th>
<th>Brand C</th>
<th>Brand D</th>
<th>Brand E</th>
<th>Brand F</th>
<th>Brand G</th>
<th>Brand H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Attractive, simple colors</td>
<td>Black not attractive</td>
<td>Attractive colors</td>
<td>Very happy and attractive colors makes you want to drink it</td>
<td>Not very attractive</td>
<td>The colors of the juices themselves, this attracts one</td>
<td>White background with images of the fruits, attractive and emphasizes the fruits</td>
</tr>
<tr>
<td>Type of package</td>
<td>Very interesting, practical and attractive</td>
<td>Practical but not hygienic</td>
<td>Practical, interesting open and shut system, good for sanitizing</td>
<td>Not adequate, reminds one of soft drinks which are not healthy</td>
<td>Hygienic, bad for putting in one's bag, good seal</td>
<td>Plastic for large volumes, not adequate for storing in fridge, but has a good open and shut system</td>
<td>Ideal package for large volumes, glass, good for sanitation, with open and shut system</td>
</tr>
<tr>
<td>Brand</td>
<td>I don't know it</td>
<td>Highly consumed</td>
<td>In a can – no</td>
<td>I don't know it</td>
<td>I don't know it</td>
<td>Little consumed</td>
<td>Highly consumed</td>
</tr>
<tr>
<td>Price</td>
<td>Very expensive, I wouldn't pay that</td>
<td>I don't know it</td>
<td>I don't pay for juice in a can</td>
<td>Although highly sophisticated, gives the impression of being very expensive, I wouldn't pay that</td>
<td>Cheap, but I'm not used to drinking concentrated juice</td>
<td>I always pay for this juice</td>
<td>Good price, yes, I would pay for this one</td>
</tr>
<tr>
<td>Information</td>
<td>I like the way the information is presented, but in Portuguese</td>
<td>The information could be more evident</td>
<td>The information is lost on the dark package</td>
<td>&quot;No preservatives&quot; I don't believe this information. I check if it is nectar or juice, the name &quot;nectar&quot; is highlighted on the package</td>
<td>They could emphasize the information more</td>
<td>The information could be given more importance</td>
<td>The information is attractive and well distributed on the package</td>
</tr>
</tbody>
</table>
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ORCID

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References


BRASIL. (1997). Ministério da Agricultura, Pecuária e Abastecimento. Decreto nº 2.314, de 04 de setembro de. Regulamenta a Lei nº 8.918, de 14 de julho de 1994, que dispõe sobre a padronização, a classificação, o registro, a inspeção, a produção e a fiscalização de bebidas.

Carneiro, J. D. S. (2002). Impacto da embalagem de óleo de soja na intenção de compra do consumidor, via “conjoint analysis” (80 f. Dissertação (Mestrado em Ciência e Tecnologia de Alimentos)). Universidade Federal de Viçosa, Viçosa.


