CARIBBEAN FOOD CROPS SOCIETY

49

Forty-ninth Annual Meeting 2013

Port of Spain, Trinidad and Tobago
Vol. XLIX

PROCEEDINGS

OF THE

49TH ANNUAL MEETING

Caribbean Food Crops Society
49TH Annual Meeting
June 30 – July 6, 2013

Hyatt Regency Hotel
Port of Spain, Trinidad and Tobago

"Agribusiness Essential for Food Security: Empowering Youth and Enhancing Quality Products"

Edited
by
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Published by the Caribbean Food Crops Society

ISSN 95-07-0410

Copies of this publication may be obtained from:

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P.O. Box 40108
San Juan, Puerto Rico, 00940

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Jardín Botánico Sur
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Proceedings of the Caribbean Food Crops Society. 49:47-63. 2013

SENSORY EVALUATION AS A TOOL IN DETERMINING ACCEPTABILITY OF PROCESSED LOCAL AGRICULTURAL PRODUCTS

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ABSTRACT: This paper discusses how university students were able to use sensory evaluation to determine the acceptability of new and innovative food products they developed. The report presents the individual cases where each entrepreneurial student: designed and chose a sensory evaluation method, designed their sensory questionnaire, determined their panel group size, and conducted statistical analysis on the data they collected. Since this was a pilot testing of the new and innovative food products, consumer oriented testing methods were chosen and a panel group of twenty was determined to be appropriate. Samples were presented to panelists in an appropriate test area, on an appropriate tray, at the right time and conditions (temperature) and with a well-designed scorecard/questionnaire. Data was collected from several different type of sensory evaluation tests including: hedonic ratings, food action rating, descripting rating, paired comparison and descriptive profiling. The data collected were treated statistically, for example by using two-tailed binomial test, and interpreted, thus allowing for valid information that can prove product quality and acceptability to be presented to any product development and marketing departments in any food and beverage company that may wish to adopt and produce these products. After conducting their evaluations and statistical analyses, the students determined and concluded that the products they presented to the panelists were acceptable but had room for improvement and also that the panelists had a highly positive attitude toward eating the products and even purchasing these if they were to become available on the market.

Keywords: Sensory evaluation, product development, food and beverage industry, panelists, test room.

Introduction

The primary consideration for selecting and eating a food commodity is the palatability or eating quality of the product; other quality parameters, such as nutrition and wholesomeness, are secondary (Meiselman and MacFie, 1996; Lawless and Heymann, 1998). Players in the food and beverage industry can gain a market edge, if the quality of their product is appealing and appetizing or more specifically that the eating quality attributes of aroma, taste, aftertaste, tactual properties and appearance are acceptable to the consumer so that they crave for more. Thus, if we accept that food quality is that "which the consumer likes best", then a good method of deciding quality of a food is through sensory evaluation.

A widely accepted definition for sensory evaluation is: "a scientific discipline used to evoke, measure, analyze and interpret those responses to products that are perceived by the senses of sight, smell, touch, taste and hearing" (Stone and Sidel 1993). Sensory analysis can be considered to be a multidisciplinary science that uses human panelists sensory perception related to thresholds of determination of attributes, the variance in individual sensory response -experimental design to measure the sensory characteristics and the acceptability of food products, as well as many other materials. Since there is no one instrument that can replicate or replace the human psychological and emotional response, the sensory evaluation component of any food study is essential and the importance of good experimental design cannot be overemphasised in sensory experiments. Sensory analysis is applicable to a variety of areas such as; inspection of raw materials, product development, product improvement, cost reduction, quality control, selection of packaging material, shelf life/storage studies, establishing analytical/instrument/sensory relationship and process development.

Grading methods for food and beverage products, traditionally involved one or two trained "experts" assigning quality scores on the appearance, flavor and texture of the products based on the presence or absence of predetermined defects. These traditional judging methods have several shortcomings: they can't predict consumer acceptance; their quality assessments are subjective; assigning quantitative scores is difficult; and they don't combine analytically oriented attribute ratings with affectively oriented quality scores (Claassen and Lawless, 1992). Thus by using traditional methods of evaluation, some products with very different sensory characteristics, such as those identified by a product flavour profile, but with no product defect will obtain the same quality score.

For all sensory assessment methods, humans are the measuring instrument. In order for a sensory assessment to provide reliable and valid results, the sensory panel must be treated as a scientific instrument; that is, members of the panel must be screened, calibrated and validated (Meilgaard *et al.*, 1999). Tests using sensory panels must be conducted under controlled conditions, using appropriate experimental designs, test methods and statistical analyses.

There are many types of sensory analysis methods, the most popular being difference tests, descriptive analysis and consumer acceptance testing (Lawless and Haymann, 1998). Difference tests estimate the magnitude of sensory differences between samples, but one limitation of these tests is that the nature of the differences is not defined. It is usually a common practice to use a combination of difference tests and descriptive sensory analysis for problem-solving. Descriptive sensory analysis uses several techniques that seek to discriminate between a range of products based on their sensory characteristics and also to determine a quantitative description of the sensory differences that can be identified, not just the defects. Consumer acceptance, preference, and hedonic (degree of liking) tests are used to determine the degree of consumer acceptance for a product. It is also considered to be consumer tests, since they should be conducted using untrained consumer panels. Acceptance of a food product usually indicates actual use of the product (purchase and eating).

This report emphasizes the importance of descriptive analysis and hedonic tests as sensory tools for food products, and it presents a few examples of how sensory analysis was applied successfully to resolving specific challenges and preparing new and unique food products for market acceptability by students in the University's Food Science and Technology programme. Since product flavor quality drives consumer acceptance and demand, the ability to measure sensory attributes characteristic of high-quality products is necessary for the development and production of products that meet consumer expectations. To increase the appeal of their offerings/products, food and beverage processors/manufacturers need to understand what flavor attributes affect flavor acceptance and then devise ways to control these critical flavor attributes.

Methods

Sample Preparation and Delivery

Students prepared and served samples to the panellists for evaluation based on guidelines included in the text: *Sensory Evaluation of Food: Principles and Practices* by Lawless and Haymann (1998). Samples of food were uniform in size/volume and of the same temperature at serving. They were coded by random three-digit numbers and presented in clean odour-free containers. In the cases where more than one sample had to be assessed, the assessors did not receive the samples in the same order, since this could introduce a bias. Assessors were provided with a glass of water to rinse their mouths out with between each sample to remove all traces of the previous sample. Assessors were also seated in a room which was free of distractions, had good lighting and ventilation and were also seated in a manner so that they could not communicate with each other.

Selection of Sensory Test and Statistical Evaluation

This will be discussed in depth for each of the individual Case Studies presented in the report; however, Table 1 has information on how the type of sensory evaluation method was chosen. The students decided on what questions they wanted answered and used the corresponding evaluation method(s) guided by literature from Institute of Food Technologist and the book Basic Sensory Methods for Food Evaluation by Watts, Ylimaki and Jeffry (1989).

Table 1. Matching the right Sensory Evaluation Method with the Right Question.

Questions	Sensory Evaluation Method	Basic Setup
Are products different? Which sample has greater intensity of an attribute? E.g. which is sweeter?	Discrimination/ Difference Tests	• 20-50 panelists • Screened for acuity (keenness or sharpness of perception, i.e. can they smell and taste well?) • Analysis is done using statistical tables which compare results to chance – this analysis ensures that the difference was real and not because people chose the correct sample by luck/chance. • One-tailed binomial test, two-tailed binomial test and Chi Square test
If products are different, how are they different? What is the magnitude of these differences?	Descriptive Analysis	• 8-12 panelists or 6 to 10 panelist • Screened for acuity, Trained • Asked to rate intensity for all sensory attributes • Analysis is done using a t-test or ANOVA to determine if means are statistically different.
What is the acceptability of a product? Is the product liked? Is one product preferred over another?	Affective/ Preference Hedonic Tests	• 75-150 consumers per test • Min of 20 for pilot testing • Screened for product use (Do they buy the product? And how often?) • Asked degree of liking (how much do they like it) and/or preference questions • Friedman test, t-test, 2 tailed binomial, ANOVA

Selection of Panel Members

Students, staff and children of staff were recruited from the University with the use of fliers and class announcements to conduct sensory evaluation tests. Persons who indicated that they were interested in volunteered were then screened to determine if they were already biased to any food product, if they had any dietary restrictions, if they were allergic to any food products and also if they were free from any virus and sinus and nasal congestion. Persons who were healthy, had no allergies, no dietary restrictions and who did not have any great aversions to any specific food product were selected as panel members.

Discussion

Case Study 1

The first case study is a student's attempt at developing a unique nutritious, delicious and fun drink for kids between the ages of 4 and 10 and also for teenagers. They called this unique drink ABC punch. The student first did their research into what type of ingredients can be used and also the proportions and combinations of ingredients that would be complimentary. After the primary ingredients were chosen, a recipe was developed and sensory evaluation tests were performed.

Students, staff and children of staff were recruited from the University with the use of fliers and class announcements to conduct sensory evaluation tests. The sensory evaluation was carried out in three phases. The first phase involved a hedonic rating test for adults and teenagers and a questionnaire. These were designed to get the test subjects acceptance on certain product attributes; appearance, aroma, taste, sweetness and mouth-feel/texture, and also to determine if they normally like the taste of apples, bananas and carrots. The questionnaire was designed to get the panelist's comments and recommendations on how the product can be improved. The Second phase was a facial hedonic rating test for children; this test was also used to determine which of the product's characteristics were liked the most or least and to determine which of the fruits and vegetables used in the product they liked and didn't like. The final phase used a food action/attitude rating test to determine the attitudes of panelists to the modified punch.

Sensory tests were carried out in a classroom, with white light and away from the preparation room. In all phases participants signed an informed consent form and 20 participants were chosen for the pilot testing.

Sensory Evaluation for ABC Punch

Hedonic Rating Test and Questionnaire for First Phase, see Figure 1 for sample of scorecard that was presented.

Scorecard - Hedonic Rating Scale

Tray number ..... Name .....

In front of you is one sample. Taste the sample and tick ✓ how much you like or dislike each of the characteristics. You can taste the sample more than once.

	Appearance	Aroma	Taste	Sweetness	Texture/mouth-feel
Like a lot	_____	_____	_____	_____	_____
Like a little	_____	_____	_____	_____	_____
Neither like nor dislike	_____	_____	_____	_____	_____
Dislike a little	_____	_____	_____	_____	_____
Dislike a lot	_____	_____	_____	_____	_____

Figure 1. Scorecard used for Hedonic Rating Test given to the adults for the evaluation of ABC Punch.

To calculate the score for each product each descriptor was assigned a score value: like a lot = 5, like a little = 4, neither like nor dislike = 3, dislike a little = 2, dislike a lot = 1. Figure 2 below gives some of the calculations that was done using the data collected.

Record Sheet - Hedonic Rating Scale

Food Characteristic – Appearance, Aroma, Taste, Sweetness, Texture/Mouth-feel

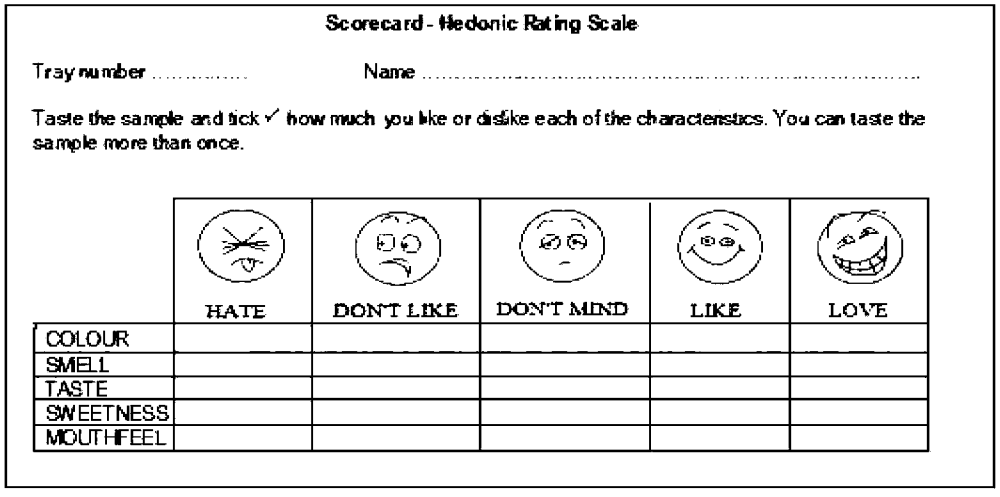
Score Value Assigned:
like a lot = 5 like a little = 4 neither like nor dislike = 3 dislike a little = 2 dislike a lot = 1

	Tester					Total Score	Average Score (total score ÷ number of testers)
	1	2	3	4	20		
Appearance	5 pts	4 pts	4 pts	4 pts	4 pts	84	4.2
Aroma	4 pts	4 pts	5 pts	5 pts	5 pts	92	4.6
Taste	4 pt	5 pt	5 pts	5 pts	5pt	96	4.8
Sweetness	2 pt	2 pt	4 pt	4 pt	4 pt	64	3.2
Texture/ Mouth-feel	3 pt	3 pt	2 pt	2 pt	3 pt	52	2.6

Figure 2. Summary of results from Hedonic Rating Test taken by the adults and teenagers for Funky ABC Punch.

The results from phase one, showed that the appearance, aroma and taste were accepted and well liked by the panelists; however, improvements were needed to

reduce the level of sweetness and to make the punch less thick and grainy. The adults who normally do not like the flavour of banana and carrots enjoyed the overall flavour of the punch.



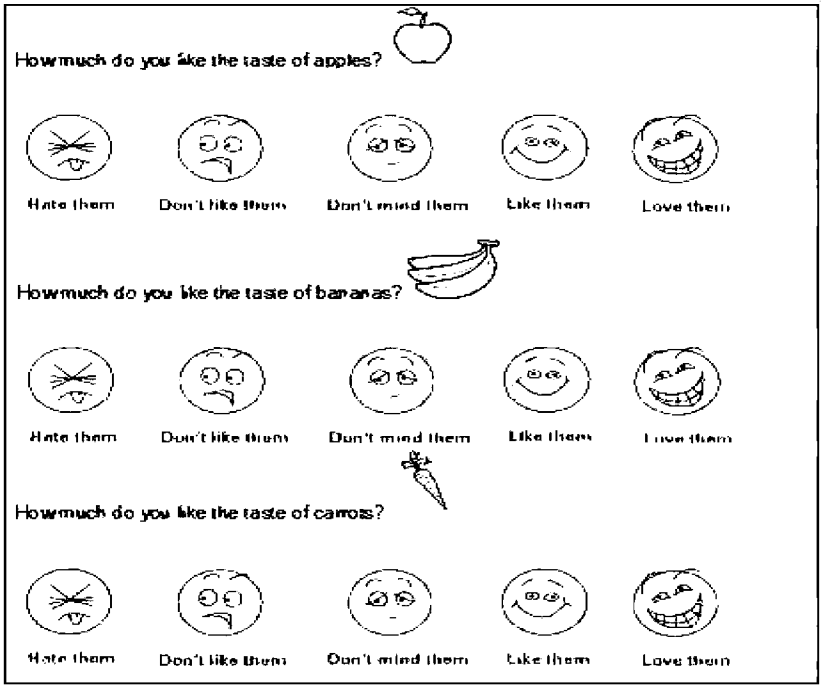
Scorecard - Hedonic Rating Scale

Tray number ..... Name .....

Taste the sample and tick ✓ how much you like or dislike each of the characteristics. You can taste the sample more than once.

	HATE	DON'T LIKE	DON'T MIND	LIKE	LOVE
COLOUR					
SMELL					
TASTE					
SWEETNESS					
MOUTHFEEL					

(a)



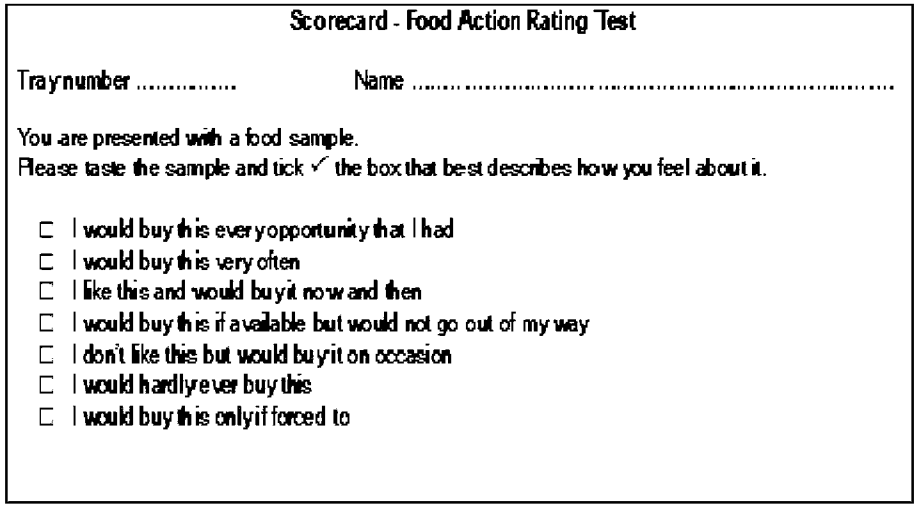
(b)

Figures 3(a) and (b). Hedonic Rating Test given to the children (4-10 years) for the evaluation of Funky ABC Punch.

These results were similar to those from the phase one, the children loved the colour, smell, taste and sweetness of the punch. They did not like the consistency of the punch, it was too thick in their opinion. Also, children who indicated that they hated or did not

like the taste of any one of the main ingredients, the apple, banana and carrots, indicated that they loved or liked the taste of the punch.

For the Third Phase a Food Action/Attitude Rating test was done (see Figure 4 for sample of scorecard that was presented). A seven point scale (ranging from 'I would buy this every opportunity that I had', to 'I would buy this only if forced to') was used to determine the attitudes of panelists to the drink. Assessors were asked to evaluate a sample of the modified punch and indicate which action best described their feelings.



Scorecard - Food Action Rating Test

Tray number ..... Name .....

You are presented with a food sample.
Please taste the sample and tick ✓ the box that best describes how you feel about it.

- ☐ I would buy this every opportunity that I had
- ☐ I would buy this very often
- ☐ I like this and would buy it now and then
- ☐ I would buy this if available but would not go out of my way
- ☐ I don't like this but would buy it on occasion
- ☐ I would hardly ever buy this
- ☐ I would buy this only if forced to

Figure 4. Scorecard used for Food Action Rating Test for Funky ABC Punch.

After all the scorecards were tabulated, the results showed that 55% of the assessors agreed that they would purchase the product very often, 20% said they would buy the product now and then while 25% indicated that they would hardly ever buy the product.

Case Study 2

The second case study is a student's attempt at developing a healthy granola bar snack, TCL's Fruity Nutritional Bar. The student first did their research on the cost of the different raw materials and ingredients that can be used in product and also the cost of the equipment that will be needed to produce the granola bar. After the primary ingredients were chosen, a recipe was developed and after the first sample was made, sensory evaluation tests were performed.

Students, staff and children of staff were recruited from the University with the use of fliers and class announcements to conduct sensory evaluation tests. The sensory evaluation was carried out in three phases. The first phase involved a hedonic rating test and a questionnaire which were used to get the subjects acceptance on certain product attributes; appearance (colour and shape), taste/flavour, smell/odour and mouth-feel/texture, and also to get recommendations on how the granola bar can be

improved. The Second phase was another hedonic rating test for the modified product. The final phase used a food action/attitude rating test to determine the attitudes of panelists to the modified granola bar.

Sensory tests were carried out in a classroom, with white light and away from the preparation room. In all phases participants signed an informed consent form and 20 participants were chosen for the pilot testing.

Sensory Evaluation for TCL's Fruity Granola Bar

Hedonic Rating Test and Questionnaire for First Phase, see Figure 5 for sample of scorecard that was presented.

Scorecard - Hedonic Rating Scale

Tray number ..... Name .....

In front of you is a coded sample. Taste the sample and tick ✓ how much you like or dislike it. You can taste the sample more than once.

	Appearance/colour	Taste/Flavour	Smell/Odour	Texture/Mouthfeel
like extremely				
like very much				
like moderately				
like slightly				
neither like nor dislike				
dislike slightly				
dislike moderately				
dislike very much				
dislike extremely				

Figure 5. Scorecard used for Hedonic Rating Test given to the adults for the evaluation of TCL's Fruity Granola Bar.

To calculate the score for each product, each descriptor was assigned a score value: Liked extremely = 9, like very much = 8, like moderately = 7, like slightly = 6, neither like nor dislike = 5, dislike slightly = 4, dislike moderately = 3, dislike very much = 2, dislike extremely = 1.

Record Sheet
Hedonic Rating Scale

Food Characteristics - Appearance/colour, Taste/Flavour, Smell/Odour, Texture/Mouthfeel, Sweetness

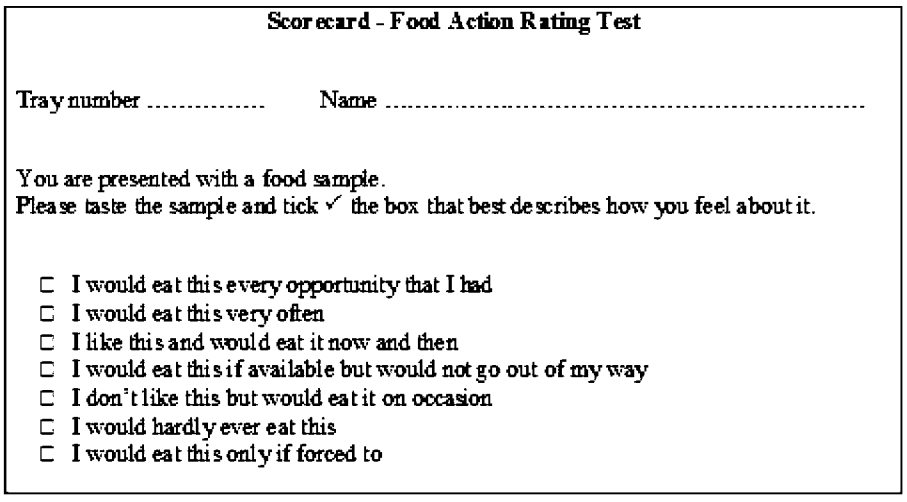
Score Value Assigned:
Liked extremely = 9, like very much = 8, like moderately = 7, like slightly = 6, neither like nor dislike = 5, dislike slightly = 4, dislike moderately = 3, dislike very much = 2, dislike extremely = 1

	Tester					Total Score	Average Score (total score ÷ number of testers)
	1	2	3	4	20		
Appearance (colour, shape)	9	9	9	8	7	165	8.3
Taste/Flavour	9	8	7	5	4	148	7.4
Smell/Odour	9	7	8	6	6	152	7.6
Texture/ Mouthfeel	4	7	7	5	6	124	6.2
Sweetness	7	7	8	8	6	150	7.5

Figure 6. Summary of results from Hedonic Rating Test taken for TCL's Fruity Granola Bar.

The results showed that the panelists thought that the texture could be improved, they thought that it was too brittle or crumbly. Some of the suggestions on the questionnaire were to use marshmallows to help the product bind better. A few persons also recommended that the almonds be replaced with sun flower seeds so that persons who are allergic to nuts can safely consume the product.

For the Second Phase a Food Action/Attitude Rating test was done (see Figure 7 for sample of scorecard that was presented). A seven point scale (ranging from 'I would eat this every opportunity that I had' to 'I would eat this only if forced to') was used to determine the attitudes of panelists to the snack. Assessors were asked to evaluate a sample of the modified granola bar and indicate which action best described their feelings.



Scorecard - Food Action Rating Test

Tray number ..... Name .....

You are presented with a food sample.
Please taste the sample and tick ✓ the box that best describes how you feel about it.

- ☐ I would eat this every opportunity that I had
- ☐ I would eat this very often
- ☐ I like this and would eat it now and then
- ☐ I would eat this if available but would not go out of my way
- ☐ I don't like this but would eat it on occasion
- ☐ I would hardly ever eat this
- ☐ I would eat this only if forced to

Figure 7. Scorecard used for Food Action Rating Test for TCL's Fruity Granola Bar.

After all the scorecards were tabulated, the results showed that 58% of the assessors agreed that they would eat the product very often, 17% said they would eat the product if it was available but would not go out of their way to do so, and 25% indicated that they would only eat the product if forced to.

Case Study 3

The development of a unique flavoured ice cream, Corn Flakes N' Kandied Fruit Koconut Ice Cream. The student first developed the attribute profile for what they wanted the ice cream to be. The primary ingredients were chosen and the recipe was then developed. Batches of the product were made and these underwent sensory evaluation.

Students and staff were recruited from the University with the use of fliers and class announcements to conduct sensory evaluation tests. The sensory evaluation was carried out in three phases. The first phase involved a descriptive rating test and questionnaire which were designed to get the test subjects perception on the product's appearance, aroma, texture, sweetness and flavour. The results from the questionnaire and test were used to develop the panelist sensory/attribute profile for the ice cream. The Second phase was a paired preference test, where panelist were given two samples from the original and modified recipes of the product and asked to identify which they preferred. The final phase used a food action/attitude rating test to determine the attitudes of panelists to the modified ice cream.

Sensory tests were carried out in a classroom, with white light and away from the preparation room. In all phases participants signed an informed consent form and 20 participants were chosen for the pilot testing.

Descriptive Rating Test and Questionnaire for First Phase, see Figure 8 for sample of scorecard that was presented.

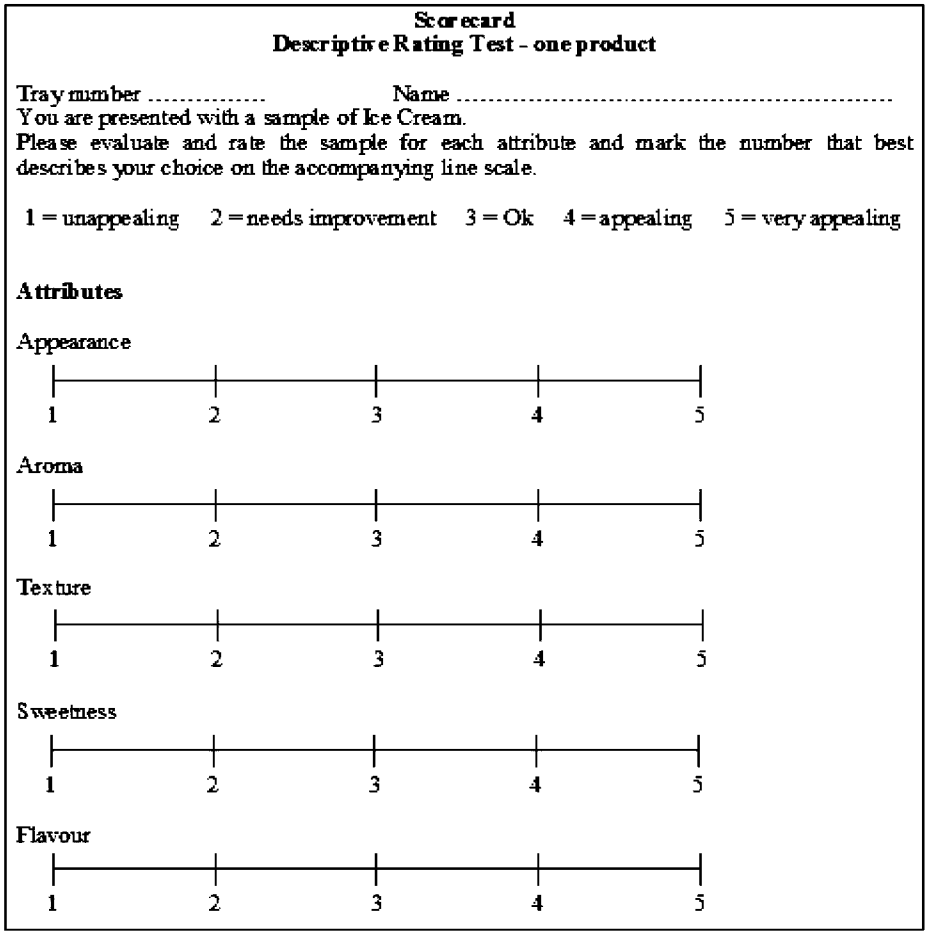
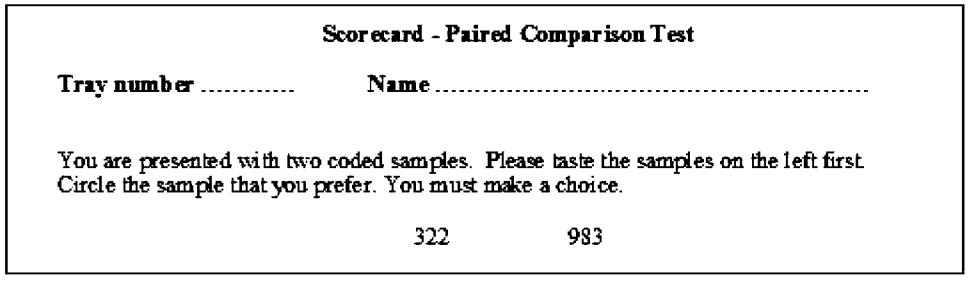


Figure 8. Scorecard used for Descriptive Rating Test for Corn Flakes N' Kandied Fruit Koconut Ice Cream.

After the average score for each attribute was calculated, the profile for the ice cream that was generated was: the ice cream had an appealing aroma and flavour; however, the texture was just ok and the sweetness needed improvement. The results from the questionnaire showed that the texture and consistency of the ice cream base was good but panelist thought the ice cream to be too sweet, and that changes should be made to the corn flakes topping so that the natural crunchiness of this is maintained, they also suggested that the cornflakes should be incorporated within the ice cream. The results from this questionnaire was used to modify the recipe by changing the topping from raisins to candied papaya and the corn flake topping was changed to one that was glazed in a fruity syrup.

Paired preference test for Second Phase, see Figure 9 for sample of scorecard that was presented. Panelist were given two coded samples, one from the original recipe (322) and one from the modified recipe (983), simultaneously, and were asked to identify which they preferred. Ten of the trays were prepared with sample 322 on the left and 10 of the trays were prepared with sample 983 on the left, trays were served randomly to each panelist.



Scorecard - Paired Comparison Test

Tray number ..... **Name** .....

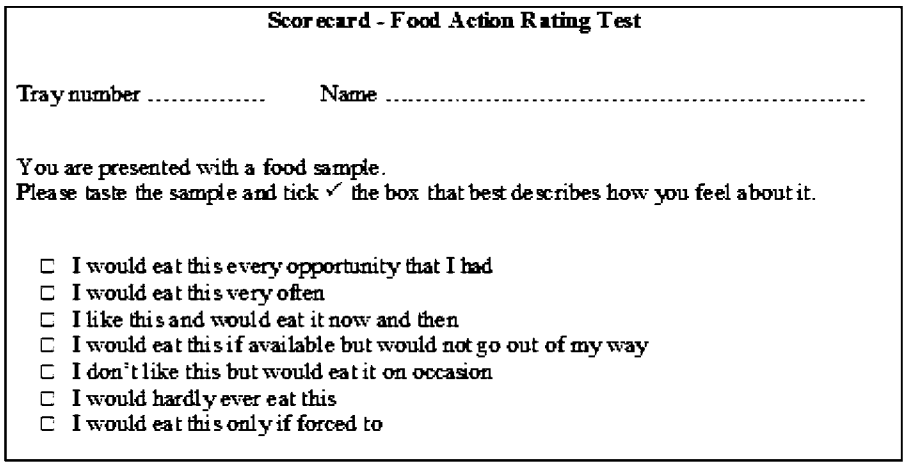
You are presented with two coded samples. Please taste the samples on the left first. Circle the sample that you prefer. You must make a choice.

322 983

Figure 9. Scorecard used for Paired Comparison Test for Corn Flakes N' Kandied Fruit Koconut Ice Cream.

The results were analysed using a 2-tailed binomial test. The number of judges preferring each sample is totaled and the totals tested for significance using statistical table where X represents the number of panelists preferring a sample and n represents the total number of panelists participating in the test. The table contains decimal probabilities for certain combinations of X and n. The result was that 17 out of 20 panelists prefer sample 983, the probability from the statistical table (X = 17, n = 20) would be 0.003. Since a probability of 0.05 or less is usually required for the result to be considered significant, it would be concluded that sample 983 was significantly preferred over sample 322.

For the Third Phase a Food Action/Attitude Rating test was done, see Figure 10 for sample of scorecard that was presented. A seven point scale (ranging from 'I would eat this every opportunity that I had' to 'I would eat this only if forced to') was used to determine the attitudes of panelists to this dessert. Assessors were asked to evaluate a sample of the modified ice cream and indicate which action best described their feelings. After all the scorecards were tabulated, the results showed that 80% of the assessors agreed that they would eat the product very often.



Scorecard - Food Action Rating Test

Tray number ..... Name .....

You are presented with a food sample.
Please taste the sample and tick ✓ the box that best describes how you feel about it.

- ☐ I would eat this every opportunity that I had
- ☐ I would eat this very often
- ☐ I like this and would eat it now and then
- ☐ I would eat this if available but would not go out of my way
- ☐ I don't like this but would eat it on occasion
- ☐ I would hardly ever eat this
- ☐ I would eat this only if forced to

Figure 10. Scorecard used for Food Action Rating Test for Corn Flakes N' Kandied Fruit Koconut Ice Cream

Case Study 4

The final case study looks at a student's attempt at developing a unique ready to eat product that was described as a fusion of a gyro and a Jamaican patty, T-Style Patty. The student first developed the attribute profile for what they wanted the shell and the filling to be. The recipe was then developed and primary ingredients were chosen. After the first batch of the product was made, samples underwent sensory evaluation.

Students and staff were recruited from the University with the use of fliers and class announcements to conduct sensory evaluation tests. The sensory evaluation was carried out in three phases. The first phase involved a descriptive profile and questionnaire which were designed to get the test subjects perception on attributes of both the patty shell and the filling. The attributes that were studied were taste/flavour, smell/odour and texture/mouthfeel. The results from the questionnaire and test were used to develop the panelist sensory/attribute profile for the patty and to make alterations to the recipe. The Second phase was a hedonic rating test, which was designed to get the test subjects acceptance on certain attributes of the shell and the filling; appearance/colour, taste/flavour, aroma and mouth-feel/texture. The final phase used a food action/attitude rating test to determine the attitudes of panelists to eating the patty.

Sensory tests were carried out in a classroom, with white light and away from the preparation room. In all phases participants signed an informed consent form and 20 participants were chosen for the pilot testing

Sensory Evaluation for T-Style Patty

Descriptive Analysis and Questionnaire for First Phase, see Figure 11 for sample of scorecard that was presented.

Scorecard - Descriptive Profiling

Tray number ..... Name .....

You are presented with one coded sample.
Please evaluate the sample and circle the word that best describes each attribute for both the shell and the filling. You may taste the sample more than once.

Attribute	Descriptions for Shell				
Appearance	Appetizing	Dry	Greasy	Crumbly	Flat
Taste/Flavour	Tasty	Salty	Fatty	Burnt	Undercooked
Aroma	Rancid	Aromatic	Musty	Savoury	Mild
Texture	Dry	Chewy	Soft	Hard	Greasy

Attribute	Descriptions for Filling				
Appearance	Appetizing	Dry	Greasy	Moist	Grained
Taste/Flavour	Tasty	Salty	Bland	Savoury	Undercooked
Aroma	Rancid	Aromatic	Musty	Savoury	Mild
Texture	Dry	Chewy	Moist	Tender	Grainy

Figure 11. Scorecard used for Descriptive Test for T-Style Patty.

After the information from the scorecards and questionnaires were collated, the profile description that was generated for the patty. The patty had an appetizing appearance, it was tasty and savoury, the aroma of the shell was mild while that of the filling was both aromatic and savoury and it had moist filling in a soft shell. The results from the questionnaire showed that 67.5% of the panelist found the product to be fantastic with no improvements needed while the remaining percentage thought the product was in need of improvement due to personal presence in salt, but would eat again.

For the Second Phase, see Figure 12 for sample of scorecard that was presented for the hedonic rating test. Panelist were given a coded sample and asked to how much they liked or disliked certain product attributes; appearance, taste, aroma and texture.

Scorecard - Hedonic Rating Scale

Date.....
Tray number ..... Name .....

In front of you is a coded sample. Examine, smell and taste both the shell and filling of the sample and tick ✓ how much you like or dislike it for each attribute.

	Appearance		Taste		Aroma		Texture	
	Shell	Filling	Shell	Filling	Shell	Filling	Shell	Filling
Like very much								
Like moderately								
Neither like nor dislike								
Dislike moderately								
Dislike very much								

Figure 12. Scorecard used for Hedonic Rating Test given to the panelists for the evaluation of both the shell and filling of the T-Style Patty.

To calculate the score for each product each descriptor was assigned a score value: Like very much = 5, like moderately = 4, neither like nor dislike = 3, dislike moderately = 2, dislike very much = 1.

Record Sheet - Hedonic Rating Scale

Food Product Filling

Score Value Assigned:
Like very much = 5, like moderately = 4, neither like nor dislike = 3, dislike moderately = 2, dislike very much = 1.

Food Product	Tester					Total Score	Average Score (total score ÷ number of testers)
	1	2	3	4	20		
Appearance	5 pts	5 pts	3 pts	5 pts	4 pts	88	4.4 points
Taste	5 pts	5 pts	4 pts	5 pts	5 pts	96	4.8 points
Aroma	5 pt	5 pt	4 pts	4 pts	5 pt	92	4.6 points
Texture	5 pt	3 pt	4 pts	5 pts	5 pts	88	4.4 points

Record Sheet - Hedonic Rating Scale

Food Product Shell

Score Value Assigned:
Like very much = 5, like moderately = 4, neither like nor dislike = 3, dislike moderately = 2, dislike very much = 1.

Food Product	Tester					Total Score	Average Score (total score ÷ number of testers)
	1	2	3	4	20		
Appearance	3 pts	4 pts	3 pts	5 pts	4 pts	76	3.8 points
Taste	5 pts	5 pts	4 pts	5 pts	5 pts	96	4.8 points
Aroma	4 pt	4 pt	4 pts	4 pts	3 pt	76	3.8 points
Texture	5 pt	4 pt	5 pts	4 pts	3 pts	84	4.2 points

Fig 13. Summary of results from Hedonic Rating Test taken for T-Style Patty.

The results showed that the taste of the entire product was very much liked but the aroma and the appearance of the filling did not have much of an impact.

For the Third Phase a Food Action/Attitude Rating test was done, see Figure 14 for sample of scorecard that was presented A seven point scale (ranging from I would eat this every opportunity that I had to I would eat this only if forced to) was used to determine the attitudes of panelists to food product. Assessors were asked to evaluate a sample of the patty and indicate which action best describes their feelings. After all the scorecards were tabulated, the results showed that 85% of the assessors agreed that they would eat the product very often.

Scorecard - Food Action Rating Test

Tray number ..... Name .....

You are presented with a food sample.
Please taste the sample and tick ✓ the box that best describes how you feel about it.

- ☐ I would eat this every opportunity that I had
- ☐ I would eat this very often
- ☐ I like this and would eat it now and then
- ☐ I would eat this if available but would not go out of my way
- ☐ I don't like this but would eat it on occasion
- ☐ I would hardly ever eat this
- ☐ I would eat this only if forced to

Figure 14. Scorecard used for Food Action Rating Test for T-Style Patty.

Conclusion

Sensory analysis is an important tool in food science and is becoming accepted as a necessary part of food quality experiments. The basic procedures outlined earlier, produce effective sensory results that can be used to develop and modify recipes and predict market success of a new product.

While the case studies discussed showed that Sensory analysis is a powerful tool in its own right, coupling sensory analysis with chemical analysis data can provide even more insights than using either technique alone.

Since product flavor quality drives consumer acceptance and demand, the ability to measure sensory attributes characteristic of high-quality products is necessary for the development and production of products that meet consumer expectations. The student's Sensory tests were conducted under controlled conditions to reduce bias (prejudice or influence) on how panelists view the product(s). The test room used was free from distractions (sound, odors) to not influence people's decisions of the product. Samples were also presented in a random order and assigned three-digit product/sample code, to keep food products anonymous and to further reduce influencing the panelists' decision. The students designed and conducted sensory tests that measured if any differences detected were truly significant by analyzing the sensory data for statistical significance. After statistical analysis, the students made a meaningful interpretation from the results of the sensory data.

References

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