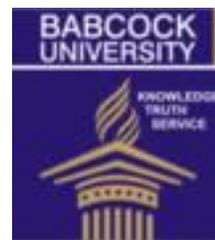




Available online @ www.actasatech.com



actaSATECH 5(2): 1 - 6 (2014)

Research

Evaluation of Bread Blends Using Pure Honey Substitute for Sugar in Bread Baking Quality

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Abstract

This study was under taken to find an alternative for sugar as a sweetener in bread baking quality. Data collection on sensory evaluation of pure honey bread was done through a structured questionnaire in line with the objectives of the study. Forty five (45) untrained panel members scored the pure honey bread on: bread texture, aroma, bread volume, taste, top crumb color subjectively. Data collected were subjected to descriptive analysis that involved the use of variables, frequency and percentage scores. Also simple correlation analysis of Pearson Multiple range test was done to indicate the relationship that may exist among the variables. Majority (75%) respondents were males while minority (25%) respondents were female that evaluated the pure honey bread. Majority (85%) respondents rated the appearance and color of pure honey bread as excellent while minority indicated that the bread loaf possess a fairly good texture with acceptable appearance. There was a positive and highly significance ($P < 0.05$) correlation (0.469^) between bread volume and bread taste. This positive correlation indicated that pure honey bread dough with appreciable rise in bread volume would likely have an excellent taste appeal. Finally majority (70%) respondents indicated that pure honey would be a suitable replacement sweetener for sugar since pure honey is a natural sweetener with a low glycemic index than sugar and is safe to use for bakery products.*

KEY WORDS: Pure honey syrup, gluten baking flour, oven baking temperature, bread scores.

INTRODUCTION

Bread is a loaf that results from the baking of starch dough as obtained from the mixture of grain flour, sugar, yeast, salt and water. Other baking ingredients like: shortening, milk solids eggs and antioxidant preservatives may be added (Ocheme, et. al., 2010). Bread has been one of the principal forms of foods for man from time in memorial (Botham, 1949). During the stone age people made solid cakes and stiff bread from stone crushed barley wheat grain and loaves of bread were found in ancient Egyptian's tombs which were baked over 5,000 years ago (Botham, 1949). However, bread and bread rolls continued to be a major wheat bread product round the world (Barett, 1975). It is one of the least expensive baked food products round the world (Hoover, 1984). Though originally bread was not a staple diet of Nigerians but it has gained tremendous popularity in recent years as a result of increasing population and industrialization that call for a ready to eat food (Eggleston, 1992). Also the strategic uses of inexpensive high protein food sources are needed to complement the amino acid profile of a diet with enhanced nutritive value (Sanni, et. al., 1998). Wheat flour is an indispensable ingredient in leavened pastry products of flour milled from many cereal grains and is frequently used for the purpose of enhancing the flavor, color, and the aroma characteristics that meet the taste of consumers (Samuel, 1992). According to Anderson (1989), sugar is included in bread baking for sweetening quality and to produce colour with acceptable tenderness to meet the commercial demand (Samuel, 1992). Over the years there is an increasing use of excessive sugar in pastry products all over the world despite the fact that certain health condition in some consumers that cannot tolerate high sugar content in foods. USDA, (1998) studies provided strong evidence that foods high in sugars are displacing natural nutrient rich foods in most Africa American homes. Excessive refined sugars and calorie intake are known to promote tooth decay, diabetes, overweight, osteoporosis and heart diseases in people who are insulin resistant (Hu and Malik, 2010). Bakery products are now modified to include diet sugar free pastry purposely for growing number of people with diabetes and to help other to avoid the risk inherent in excessive intake of sugar calories. Hence this study was undertaken to find a

suitable replacement (pure honey) for sugar in Bakery products. Pure honey is a natural sweetener with lower glycemic index when compare to refined sugar. Also pure honey is known to possess the same level of sweetness as sugar and a suitable substitute for refined sugar. Also pure honey has therapeutic effects against certain infections like: heartburn, acid reflux, wound healer, cure for gum disease and skin ulcers, a vision improvement therapy and cures for insomnia condition in human.

MATERIALS AND METHODS

Experimental location

This experiment was carried out in the Department of Nutrition and Dietetics food laboratory at Babcock University in Illisan, Remo, Ogun State. The food laboratory is equipped with modern medium capacity baking oven (Siemen conventional rotating electric oven), (Toshibar brand) of blender and mixer machine equipped with increasing speed limiting rotors, also aluminum baking pans of small medium and large sizes were acquired from the University commercial Bakery Industry.

Sources of raw materials

Hard wheat flour (Honeywell brand), granulated sugar (Dangote brand), butter (Vitali brand) packets, salt (Chef brand) and yeast (Fermipan brand) packets were purchased at Babcock University supermarket in Illisan, Remo, Ogun State. Pure honey syrups and quantity of brown molasses were purchased at the famous Iyesi Ota farm settlement. Straight dough method of bread baking was done according to Badifu and Akaa, (2001).

Blending of Bread Ingredients

For pure honey bread, gluten starch flour (200g) was first creamed with 50g of pure honey syrups, followed by 50g of solid yellow butter, 5 pieces of beating eggs, 2 table teaspoon of yeast and 250 to 300 ml of water were blended at high speed of 4 for 30 minutes. The stiff dough was cut and weighed

into 200g of aluminum baking pan that was previously greases with pure vegetable oil. The dough proofing time was set for 30 minutes when the dough was expected to ferment, air rated (leavened) to maximum volume. The conventional electric oven was turned on and pre heated to a constant baking temperature of 160°C for 20 minutes run. The stiff pure honey dough was baked in the hot oven for 45 minutes at 160° C. The hot oven baked bread was opened to fresh air ventilation to cool down the bread to ambient room temperatures for 40 minutes. Also sugar bread was blended using 200g gluten starch flour was creamed with 50g of granulated sugar, followed by 50g of solid yellow butter, 5 pieces of beating eggs, 2 table teaspoon of yeast powder and 250 to 300 ml of water were blended at high speed of 4 for 30 minutes. The stiff dough was cut and weighed into 200g of aluminum baking pan and was left in the baking pan to undergo a proofing time of 30 minutes. The stiff sugar blended dough was baked in the hot oven set at 160° C for maximum baking time of 45 minutes. The oven baked bread was exposed to fresh air for 40 minutes at room temperature.

Sensory Panel Evaluation

The bread samples were subjected to sensory evaluation about 1 hour after baking by an untrained thirty member panel that tasted and score the bread using 5 point Hedonic scale according to Ihekoronye and Ngoddy, (1985), with 1 representing poor and unacceptable, 2, being tolerable and 3 being fairly good, 4 being good and 5 excellent. The bread samples were evaluated on the basis of: crust appearance, crumb browning, texture/tenderness, taste, volume, aroma and overall acceptability.

Statistical Analysis

Data collected were analyzed using descriptive statistics of SPSS, (2006). The descriptive statistics involved the use of variables, frequency distribution and percentage score. Simple correlation analysis was carried out on baking parameters to indicate possible relationship that may exist among the variables according to Pearson Multiple Correlation Package, (2004 version).

RESULTS AND DISCUSSIONS

The demographic characteristics of respondents that participated in the study are indicated in **Table 1**. The table categorizes these characteristics under: item, variable, frequency and corresponding percentages. Majority of the respondents (75%) were males while (25%) of were female. Occupational status of panel members showed that (90%) were students, (5%) were staff and (5%) were faculty members.

Table 1: The Demographic characteristics of respondents that participated in the study

ITEM S	VARIABLE	FREQUENCY	PERCENTAGE
SEX	Male	15	75.0
	Female	5	25.0
AGE	Total	20	100.0
	15-20 years	12	60.0
	21 – 39 years	6	30.0
	Above 40 years	2	10.0
	Total	20	100.0
STATUS	Student	18	90.0
	Staff	1	5.0
	Faculty	1	5.0
	Total	20	100.0

The acceptability of pure honey bread sample result is presented in **Table 2**. Majority (85%) respondents indicated that appearance of bread top crust was excellent while minority (15%) rated the crust colour/appearance as good. Majority (55%) respondents scored the aroma of the pure honey bread samples as excellent with acceptable appeal while (25%) respondents indicated that the aroma was fairly good. The highest number (45%) respondents rated the pure honey bread as having excellent volume while the lower number (30%) indicated that the volume of the bread sample was fairly acceptable. Majority (65%) respondents appreciated the taste of pure honey bread as being

excellent and (25%) respondents indicated the taste of the bread was good while the minority (10%) respondents as fair in taste. The highest number (70%) respondents indicated that the bread samples had excellent texture with acceptable tenderness while the lowest number (10%) respondents that the bread sample texture was fair. Also the highest number (60%) respondents remarked that pure honey could be an excellent replacement for sugar, since pure honey syrup possess the same level of sweetness as sugar while (40%) respondents indicated that pure honey was fairly good and tolerable as alternative sweetener in bread baking properties.

Table 2: Sensory panel evaluation of bread fortified with pure honey and percentage level of acceptability.

Appearance/Colour	Excellent	85.0	85.0
	Good	15.0	15.0
	Total	100.0	100.0
Aroma/Odour	Excellent	11	55.0
	Good	5	25.0
	Fair	4	20.0
	Total	20	100.0
Volume	Excellent	9	45.0
	Good	5	25.0
	Fairly good	6	30.0
	Total	20	100.0
Crumb Browning	Excellent	12	60.0
	Good	7	35.0
	Fair	1	5.0
	Total	20	100.0
Taste	Excellent	13	65.0
	Good	5	25.0
	Fairly good	2	10.0
	Total	20	100.0
Remarks	Excellent	12	60.0
	Good	8	40.0
	Total	20	100.0

Texture/tenderness	Excellent	14	70.0
	Good	3	15.0
	Fairly good	1	5.0
	Fair	2	10.0
	Total	20	100.0

Simple correlation coefficient between baking characteristics and bread qualities are presented in **Table 3**. The table arranged the information on correlation analysis based on baking characteristics such as: appearance, aroma, texture, crust color, crumb texture and overall acceptability. There was a positive and significant ($P < 0.05$) correlation coefficient (0.469^*) between pure honey bread taste and bread volume. This positive correlation (0.469^*) indicated that bread with appreciable volume is likely to possess good and acceptable taste. Also there was a positive and significant ($P < 0.05$) correlation coefficient (0.519^*) between bread overall acceptability remarks and taste development. This positive correlation coefficient (0.519^*) would suggest that evaluation panel members were highly satisfied with the taste sample of the bread. There was a positive and highly significance ($P < 0.05$) correlation coefficient (0.588^{**}) between the volume and aroma of the bread samples. This positive correlation coefficient (0.588^{**}) indicated that bread with increased volume possess good and acceptable aroma development in quality bread baking. Also there was a positive correlation coefficient (0.811) between overall acceptability sensory evaluation remarks. This positive correlation coefficient (0.811) may suggest that evaluation panel members appreciated bread sample for its excellent appearance score.

Table 3: Simple correlation coefficient Between Baking Characteristics and overall panel remarks

Variables	Appearance/Colour	Aroma/Odor	Volume	Top Crumb Browning colour	Texture/Tenderness	Taste	Remarks
Appearance/Colour	1						
Aroma/Odor	0.099	1					
Volume	-0.090	0.588(**)	1				
Top Crumb Browning Color	-0.321	0.230	0.234	1			
Texture/Tenderness	.050	.055	-0.262	0.091	1		
Taste	-0.073	0.392	0.469(*)	0.374	0.150	1	
Remarks	0.811	0.168	0.144	0.242	0.168	0.519(*)	1

CONCLUSIONS

This study revealed that pure honey syrup could be an alternative sweetener to replace refined sugar in bread baking quality since it has the same level of sweetness and is safe to use. Sensory evaluation of pure honey bread sample indicated that acceptable bread can be produced from fifty gram of honey to

sugar ratio. The study also showed that honey bread formula had significant volume, excellent taste, good aroma and texture with appreciable tenderness.

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