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Comparative Analysis of Efficiency of Balloon Whisk and Wooden Spoon in Preparing Cakes in Schools and Colleges in Ghana

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Abstract

This study compared the efficiency of balloon whisk and wooden spoon in preparation of queen and ginger cakes in food laboratories in schools and Colleges in Ghana. Experimental design was employed for the study. Ten (10) experimenters were purposively sampled to use the two tools for queen and ginger cakes alternatively whiles being timed. Ten trained panelists were involved in the study. A questionnaire was used to collect data prepared samples. Data was analyzed using Mean, Standard Deviation, and Independent. Findings indicate among others, that less time was expended in the preparation of the experimental products: ginger cake balloon whisk (*GCBW*) (= 2.911 Minutes) and queen cake balloon whisk (*QCBW)* (= 46.89 Minutes) as compared to the control: ginger cake wooden spoon (*GCWS)* (= 4.811) and queen cake wooden spoon (*QCWS)* (= 57.92). With a P- value of 0.00 there was a statistically significant difference in time expended when using the wooden spoon and the balloon whisk for making queen and ginger cakes. Consequently, the average P value obtained for the three texture attributes (springiness, softness and cohesiveness) was 0.03 for *GCBW* and *GCWS* and 0.02 for QCBW and *QCWS* indicating significant difference in the texture of both products. Balloon whisk can therefore be conveniently used as an efficient alternative tool to wooden spoon in preparation of queen and ginger cakes. It is therefore recommended that it be accepted as a correct tool for creaming and mixing in flour cookery for both internal and external practical for Food and Nutrition examinations.

Keywords: Batters, Cohesiveness, Creaming, Softness, Springiness, Whisking, Efficiency.

Introduction

The advent of science and technology has resulted in development of various labour-saving devices including robotic cooking (Junge, Hughes, Thuruthel & Iida, 2020). One may assume that the advent of labour-saving devices in the kitchen will make certain manual tools remain redundant and subsequently go extinct. On the contrary, tools like balloon whisk and wooden spoon are still popular in almost every kitchen (domestic and commercial) globally possibly due to their efficiency which

cannot be over emphasized (Buettner, 2020; Bittman, 2011).These two simple manual tools have been widely used by almost all households, commercial confectioners, Catering and Home Economics students.

The wooden spoon is an inexpensive, simple and heat resistant tool usually used to combine dry ingredients, liquid ingredients, or a combination of dry and liquid ingredients in the preparation of variety of dishes especially cakes and batter products. The wooden spoon is naturally strong and poor conductor of heat and the shape of its head determines the effectiveness of its use. The use of a wide round wooden spoon helps trap air into creamed mixture in the form of tiny bubbles which act as a raising agent (Adigbo & Madah 2011). Its firm strong handle makes stirring easier and more effective. Wooden spoons are useful for a variety of tasks, such as mixing stiff doughs for cakes, pastries and cookies, creaming fat and sugar, etc. In the preparation of cakes by creaming method and making of batters on a small scale, wooden spoon is an indispensable tool but one is also sure of the fatigue and discomfort that accompanies its use (Adigbo &Madah, 2011; Foskett & Paskins 2012).

The balloon whisk has been another useful manual tool in the food laboratory. The balloon whisk is designed to efficiently beat or blend ingredients together; that is, either to aerate a mixture or thoroughly blend ingredients together thus making it so versatile (Cheng, 2015). The tool is designed with steel wires which are flexible with lessened resistance reducing the degree of wrist action needed and has the shape like a wide teardrop which enables creaming and mixing in round mixing bowls much easier (Kapoor, 2018). In the preparation of cakes and batters, the additional motion is very effective for bringing extra air into the mixture due to the loose teardrop shape which allows air to flow through during creaming and mixing. The balloon whisk creates more movement when mixing ingredients together because of the springy nature of it wires and a broad, rounded end. This movement is especially useful for incorporating more air into the mixture which is a prerequisite for a perfect texture in cakes and batters. Despite the fact that balloon whisk is light in weight compared to wooden spoon and can aerate mixtures better, it seems to be reserved just for beating or whisking eggs during cooking. The selection and use of the right kitchen tools minimize the time needed for a task and whittle away fatigue

In schools and colleges in Ghana, wooden spoon is the only recommended tool for manual creaming and mixing of batters in flour cookery for both practical class and examinations, Food and Nutrition work and examinations at both pre-tertiary and tertiary levels of education. The balloon whisk on the other hand is reserved solely for whisking eggs. Observation of students over many years, show that the use of the wooden spoon in creaming fat and sugar when preparing cakes and biscuits is energy sapping and time consuming. In the preparation of batter mixtures, the same wooden spoon is employed and one has to be cautious otherwise the mixture becomes lumpy. When this occurs any attempt to get rid of the lumps causes gluten in the flour to develop and the product quality is compromised. For this reason, most confectioners resort to the use of labour-saving equipment like the

food processors. However, Home Economics and Catering students are not permitted to use these tools during practical lessons and examinations but are to strictly use the manual tools aforementioned in order to earn their marks for the use of the right tools and exhibition of required skills. Users of these tools are wondering about the efficiency of the wooden spoon and the possibility of using balloon whisk for creaming fat and sugar as in creamed cakes or prepare batters as an alternative to the wooden spoon. This has necessitated the study to experiment and explore the efficiency of the balloon whisk as an alternative tool to the wooden spoon in the preparation of creamed cakes and batter mixtures.

The findings of this study are expected to be of immense benefit to Home Economics teachers, tutors and lecturers in the area of study during their practical demonstration lessons. Study findings would enable them to select most efficient and result-oriented tool. All Home Economics and Catering students would also stand to benefit by having an alternative tool and further saving themselves some time and energy. The West African Examination Council (WAEC) would review their marking schemes and accept tools on the merit of their efficiency in task performance.

Objectives of the study: The general objective of the study was to compare the efficiency of balloon whisk and wooden spoon in preparation of creamed cakes and batters. Specifically, the study compared:

1. time efficiency of balloon whisk and wooden spoon in preparation of queen and ginger cakes.
2. Texture of creamed cakes and batters made with wooden spoon and balloon whisk.

Hypotheses (H_0)

H_{01}: There is no significant difference between the means of time used in the preparation of queen and ginger cakes using wooden spoon and balloon whisk at 0.05 level of significance.

H_{02}: There is no significant difference between means of texture of queen and ginger cakes made with wooden spoon and the balloon whisk at 0.05 level of significance.

Materials and Methods

Design of the study: The study employed experimental design.

Materials (Ingredients): The materials used included wheat flour (100%) (Takoradi flour mill), margarine (Cook brand), granulated sugar, double-action baking powder (Pearce duff), baking soda (Danes foods), treacle, vanilla essence, and fresh ginger. These were bought from the Winneba local market, in the Central Region of Ghana. The fresh exotic chicken' eggs were bought from the University farms (University of Education, Winneba).

***Preparation of Materials*:**

Ginger: Fresh ginger was washed, peeled, rewashed and then grounded. The recipe of Campbell et al, (2008) was adapted for the preparation of the treacle as indicated below.

Caramel: place three-quarters of water (250ml) in a thick-based pan, add sugar (200g) and allow to boil gently, without shaking or stirring the pan, add the remaining quarter of the water, reboil until the sugar and water mix.

Cake batter preparation: A queen and ginger cake batters were prepared using a wooden spoon and a balloon whisk alternatively. The recipes for the preparation of the cakes were adopted from Adigbo and Madah (2011).

Recipe for Queen and Ginger Cakes

Ingredients	Creamed cake Quantity	Ginger bread cake Quantity
Soft wheat flour	200g	200g
Margarine	200g	50g
Sugar	200g	50g
Baking powder	2g	2g
Eggs	4 medium sizes	1 medium size
Treacle		100ml
Milk		125ml
Bicarbonate of soda		2g
Salt		3g
Essence (optional)	1tsp	
Ginger (grinded)		3tsp

Queen cakes

1. Grease cake tins
2. Cream margarine and sugar together till light and fluffy.
3. Whisk egg and add in bits to creamed mixture creaming between additions.
4. Add essence
5. Sift flour and baking powder together and fold into the creamed mixture.
6. Spoon into cake tins and bake in a preheated at 180°C (gas mark 4) for 15 to 20 minutes

Ginger cake

1. Grease cake tins
2. Sift flour, bicarbonate of soda, baking powder and salt together into a bowl.
3. Make a well in the middle drop in the egg.
4. Melt the margarine and allow to cool slightly; add to sugar and treacle.
5. Add grinded ginger and mix well without forming lumps.
6. Spoon into greased cake tins and bake in a preheated at 160°C (gas mark 3) for 35 to 40 minutes

The wooden spoon was used for creaming of queen's cake and mixing of the ginger cake batter for the control products code-named Queen Cake Wooden *Spoon* ***(QCWS)*** and Ginger Cake Wooden Spoon ***(GCWS)*** while balloon whisk was used for experimental products code-named Queen Cake Balloon Whisk ***(QCBW)*** and Ginger Cake Balloon Whisk ***(GCBW).***

Measurement of Time Efficiency: In determining the time efficiency of the tools, 10 experimenters who were Food and Nutrition teachers and two assessors who were experts in cake preparation were involved. For the queen cake, all the experimenters were given the same quantity of ingredients (sugar and margarine) which were measured into same sized bowls and with the same type and size of wooden spoon and whisk. The starting time for creaming was

recorded and assessors went around to check for paleness and fluffiness of the mixtures after which the clock was stopped immediately. The experimenter with the fluffy mixture was given green light to go ahead with the other procedures. The other experimenters followed the same procedure once their mixtures were assessed. The stop watch was used to time, record and calculate period of preparation.

In determining the time expended in making the ginger cake, all 10 experimenters were given the same quantity of ingredients aforementioned in the recipe. The tools (wooden spoon and whisk) were used to mix the ingredients in making the batter alternatively. Time used by each experimenter was recorded from commencement of mixing of ingredients to point where a lump-free consistency was attained as determined by assessors. All the determinations were done in triplicates and averages recorded for analysis.

***Selection of panelists*:** Fifteen Panelists aged 25-45 years were purposively selected for the experiment. The panelists were recruited from the students, staff, and lecturers of the Faculty of Home Economics Education at the University of Education, Winneba. The panelists were taken through a training session. A mock texture profile analysis was conducted. After which, five (5) of the panelists were dropped remaining 10 (three males and seven females) for the final texture analysis.

***Instrument for Data Collection*:** Questionnaire was used to collect data on the texture acceptability of the samples. It was validated by three experts. Reliability of the texture profile analysis questionnaire was measured by Cronbach's alpha coefficient. Which yielded 0.80.

Data Collection Procedure

Texture Profile Analysis: Indicator (attributes) of texture are springiness, softness and cohesiveness. The testing for texture of the samples were adapted from Chueamchaitrakun et al., (2011). The panelists after a discussion came to a consensus on the definition of each indicator (descriptive term) that were used for the texture attribute or indicator of the samples Queen Cake Wooden Spoon *(QCWS)* and Ginger Cake Wooden Spoon *(GCWS)*as the control while Queen Cake Balloon Whisk *(QCBW)* and Ginger Cake Balloon Whisk *(GCBW)*.

The Texture Profile Analysis (TPA) evaluation session was carried out in the Food Laboratory of the Department of Food and Nutrition Education. Each panelist was seated at individual tables. The samples were made ready an hour before the analysis and kept at room temperature. They were served the cake samples in coded plates covered with cling film to prevent it from drying out. The intensity of texture attribute was recorded on an unstructured 10 cm long linear scale anchored with "weak" (0) and "strong" (10) (Curica et al., 2008). The panelists made a mark on the line to show degree of intensity. Numerical values were attributed by measuring the distance in centimeters between the marks made by panelists after the exercise and recorded for analysis, discussion and conclusions to be drawn. The coded samples were given at the same time and evaluated in random order among the panelists. Soap and water were provided to the panelists to wash their hands after testing each sample before moving to the next sample. Each cake sample was evaluated thrice

then the average mean was calculated for analysis.

***Data Analysis Techniques*:** Mean and standard deviation were used to analyze the data. One-way ANOVA was used to compare the significant differences between the samples.

Findings of the Study:

Mean (scores on the time expenditure of queen and ginger cakes are presented on Table 1.

Table 1: Mean (Scores on Time Efficiency of Balloon Whisk and Wooden Spoon in Preparation of Queen and Ginger Cakes

S/N	Indicators of Time	Queen Cake		Ginger Cake	
		BW	**WS**	**BW**	**WS**
1	EXPERIMENTOR	45.00	50.03	3.00	5.00
2	EXPERIMENTOR	48.30	58.35	3.00	5.59
3	EXPERIMENTOR	46.45	56.00	3.00	5.30
4	EXPERIMENTOR	48.25	60.00	3.00	4.56
5	EXPERIMENTOR	49.00	60.00	2.58	4.40
6	EXPERIMENTOR	50.00	59.25	3.05	4.30
7	EXPERIMENTOR	45.00	58.08	3.02	5.25
8	EXPERIMENTOR	45.35	60.00	3.01	5.21
9	EXPERIMENTOR	47.25	59.00	3.00	4.50
10	EXPERIMENTOR	44.30	58.45	2.45	4.00
	Mean	46.89	57.916	2.911	4.811

Values are averages of triplicate determinations. Data is represented as mean**(** and standard deviation.The mean difference is significant at the 0.05 level. Samples are represented in codes BW=Mean **(** of Balloon Whisk; WS=Means**(** of Wooden Spoon.

Table 1 presents the time expenditure by the ten (10) experimenters for the four (4) samples: Queen Cake Balloon Whisk *(QCBW)*; Queen Cakes Wooden Spoon (*QCWS)*and Ginger Cake Balloon Whisk *(GCBW*); Ginger Cake Wooden Spoon (*GCWS).* In the preparation of sample *GCBW* the time expenditure ranged between 2:45 and 3:05 minutes with a mean duration of 2:91 minutes while sample *QCBW* recorded a time expenditure ranging from 44:30 to 50:00 minutes with a mean duration of 46:89 minutes. On the other hand, sample *GCWS* recorded a mean duration of 4:81 minutes (4:00 – 5:59 minutes) while sample *QCWS* had a mean duration of 57:92 minutes (50:03 – 60:00).

Table 2: ANOVA Results on Time Efficiency of Balloon Whisk and Wooden Spoon

	Queen Cakes		**Ginger Cakes**	
	BW	**WS**	**BW**	**WS**
Mean	46.89	57.916	2.911	4.811
Variance	3.83433	9.14936	0.04474	0.27568
Observation	10	10	10	10
P(T<=t) two-tail	0.00		0.00	

Table 2 presents the ANOVA results on time efficiency of balloon and wooden spoon in the preparation of queen and ginger cakes. The results indicate that there was a statistically significance difference (P=0.00<0.05)between the time expenditure in the use of the wooden spoon and balloon whisk. Hence, it was revealed that, using the balloon whisk for creaming or making the batter for ginger cakes was time efficient than using the wooden spoon for the same products.

Mean (X) Scores on Texture

Three attributes (springiness, softness and cohesiveness) were evaluated in the Texture Profile Analysis. The results of the springiness are shown in Table 3.

Table 3: Mean (Score on Springiness Attributes of Ginger and Queen Cakes

Texture Attributes	Ginger Cake		Queen Cake	
	BW	**WS**	**BW**	**WS**
Springiness	7.90	7.00	8.60	7.90
	9.50	8.10	9.60	4.40
	9.00	8.90	8.00	7.60
	7.30	7.50	9.40	9.00
	9.50	7.00	6.60	3.10
	8.00	6.50	8.60	8.60
	9.50	7.00	6.60	5.90
	9.70	7.40	8.40	4.50
	9.90	7.30	6.60	4.40
	9.60	7.70	7.60	7.20
Mean	**8.99**	**7.44**	**8.00**	**6.29**

Values are averages of triplicate determinations. Data is represented as mean (and standard deviation.The mean difference is significant at the 0.05 level. Samples are represented in codes BW=Mean (of Balloon Whisk; WS=Means (of Wooden Spoon.

Springiness measures elasticity by determining the extent of recovery between the first and second compressions. Table 3 shows springiness was observed to be low amongst two of the four samples *GCWS* and *QCWS*. However, higher values were noted in samples *GCBW*) and *QCBW* with mean values ranging between 8.00 and 8.99.

Table 4: ANOVA Results on Springiness Attributes of Ginger and Queen Cakes

	Ginger Cake		Queen Cake	
Texture Attributes	**BW**	**WS**	**BW**	**WS**
Mean	8.99	7.44	8.00	6.29
Variance	0.83433	0.45822	1.27111	4.161
Observations	10	10	10	10
P(T<=t) two-tail		0.00091		0.01408

Table 4 indicates that there was a significance difference (P=0.00) in the mean results on the springiness. The magnitude of the springiness was significantly higher in comparison to the samples.

Table 5: Mean (Scores on Softness Attributes of Ginger and Queen Cakes

Texture Attributes		GCWS	QCBW	QCWS
Softness	8.00	7.10	9.00	7.50
	9.60	8.00	8.00	9.00
	6.50	7.40	9.20	8.50
	8.20	7.00	9.00	7.60
	7.60	8.10	7.80	7.30
	5.50	4.50	8.10	9.00
	9.00	7.00	7.60	5.50
	9.40	7.30	8.70	7.30
	8.80	7.70	8.10	5.50
	9.50	7.90	8.50	7.60
Mean	**8.21**	**7.2**	**8.4**	**7.48**

Values are averages of triplicate determinations. Data is represented as mean(and standard deviation.The mean difference is significant at the 0.05 level. Samples are represented in codes BW=Mean(of Balloon Whisk; WS=Means(of Wooden Spoon.

Table 5 summarizes the results of the softness attribute present in the descriptive texture profile of the four samples *(GCBW, GCWS, QCBW, QCWS).* The results show that sample *GCBW* recorded a mean range of 5.50-9.60 with an average mean *(* 8.21whereas sample *GCWS* had the means ranging from 4.50-8.10 with an average mean *(* . Sample *QCBW* recorded a mean range between 7.60-9.20 with an average mean of 8.4 with sample *QCWS* recording 5.50- and an average mean of 7.48.

Table 6: ANOVA Results on Softness Attributes of Ginger and Queen Cakes

	Ginger Cake		Queen Cake	
Texture Attributes	**BW**	**WS**	**BW**	**WS**
Mean	8.21	7.2	8.4	7.48
Variance	1.85211	1.06889	0.31111	1.51067
Observations	10		10	10
P(T<+t) two-tail	0.01047		0.03413	

Table 6 indicates a statistically significant difference between the samples at P-value < 0.05.

Table 7: Mean (Scores on Cohesiveness Attributes of Ginger and Queen Cakes

	Ginger Cake		Queen Cake	
Texture Attributes	**BW**	**WS**	**BW**	**WS**
Cohesiveness	7.00	5.50	7.00	6.80
	9.40	9.00	7.60	7.30
	5.90	7.10	8.00	9.60
	8.30	6.60	8.00	9.60
	8.20	8.00	7.50	9.10

	8.20	3.00	6.60	8.30
	7.90	7.00	6.00	7.90
	9.50	7.70	6.90	8.90
	9.00	7.80	8.50	8.60
	8.70	9.60	7.30	8.10
Mean	**8.21**	**7.13**	**7.34**	**8.42**

Values are averages of triplicate determinations. Data is represented as mean ± and standard deviation. The mean difference is significant at the 0.05 level. Samples are represented in codes BW=Mean (±) of Balloon Whisk; WS=Means (of Wooden Spoon.

Table 7 indicates that the cohesiveness of samples measured showed that sample *GCWS* had the least cohesiveness mean value of 7.13 followed by sample *QCBW* with 7.34.On the contrary, sample GCBW had 8.21 cohesiveness mean value while sample *QCWS* recorded the highest cohesiveness mean value of 8.42

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Table 8: ANOVA Results on Cohesiveness Attributes of Ginger and Queen Cakes

	Ginger Cake		**Queen Cake**	
Texture Attributes	**BW**	**WS**	**BW**	**WS**
Mean	8.21	7.13	7.34	8.42
Variance	1.20544	3.46011	0.55156	0.864
Observations	10	10	10	10
P(T<=t) two-tail		0.08696		0.00426

Table 8 shows statistically significant difference in cohesiveness (*P<0.08*) of the samples *(GCBW*) and *GCWS*. Meanwhile, sample*(GCBW*) and *QCWS* hadno statistically significant difference in cohesiveness as indicated by the value of *P=0.00<0.05.*

Discussion of Findings

The study was conducted to firstly compare the time efficiency of the balloon whisk and wooden spoon in the preparation of queen and ginger cakes. Data were collected and analysed to find out the efficiency of balloon whisk and wooden spoon. The findings indicated that, the balloon whisk was more time efficient in comparison to the wooden spoon in the manual creaming and mixing of the batters on small scale. In this light, an assertion that, tools that are time efficient are also efficient in reducing fatigue would not be far from right (Janusz, 2016; Halson, 2014). Singh and Khan, (2021) concludes that the choice and use of efficient tools correlates significantly with physical fatigue to corroborate the above discourse. Similarly, El-Amir and Omar (2019) also discovered significant relationship between ergonomics dimensions (including the design and ease of use of tools) and the work efficiency of users.

Texture and other organoleptic properties of food still plays a major role in food acceptability despite the fact that other factors such as consumer concerns about ethics, health, and the environment also contribute to changes in consumption habits in the modern food system (McClements et. al, 2021;Tan, et al. 2016; Heiniö et. al 2016). The study therefore sought to find out the differences in texture attributes of the two

different cakes(queen cakes and ginger cakes) prepared by using the two tools (balloon whisk and wooden spoon) alternatively since food texture is one of the most measured quality attributes during processing and consumption of food (Chen &Opara,2013). In determining the quality of cakes, texture attributes such as softness, cohesiveness and springiness are usually the key parameters (Liu, Cao, & Liu,2019). Top quality cakes and batters always have various characteristics such as high softness, cohesiveness and springiness, Lindarte, Artunduaga& Gutiérrez, 2019). Although these attributes depend highly on balanced recipes and the temperature at which the products are baked, the method of preparation and aeration of the cake batters also contributes to a great extent to texture quality.(Campbell, Foskett &Ceserani 2008; Darko 2010).

In order to successfully compare the texture attributes (softness, cohesiveness and springiness) of the samples (*GCBW, GCWS, QCBW*, and *QCWS*) a texture Profile Analysis was conducted whose results revealed that, the samples made with the balloon whisk were springier than those made with the wooden spoon. The amount of recovery between the first and second compressions is how springiness, a measure of elasticity, is calculated (Salehi, et al. 2016; Scheuer, 2016).The result obtained may be as a result of the design of the balloon whisk which makes it possible to trap more air into mixtures than the wooden spoon. This assumption is corroborated by Adigbo and Madah (2011) and Braker, (2003)who postulate that the springiness of flour products is highly dependent on the amount of aeration. In reference to the softness of the cakes, the samples made with the balloon whisk (*QCBW andGCBW*) had softer texture than that of the wooden spoon as indicated by the results from the Texture Profile Analysis. Although ingredients quality, quantity and proportion contribute highly to the softness of a flour product (Hesso et al, 2015; Dewaest, et al, 2018); the contribution of air incorporation towards the same effect cannot be over emphasized (Darko 2010).

In addition to the softness, the cohesiveness of the samples was also assessed. Cohesiveness in cakes is described as the ability of the cake crumbs or particles to stick to each other or otherwise. Thus, a cake with high cohesiveness value does not break apart easily (Salehi, et al. 2016).The wooden spoon gave a more cohesive texture in the creamed sample (*QCWS*) while the balloon whisk rather had a higher value for cohesiveness in the ginger cake product *(GCWS)*.The differences recorded are yet to be explained and supported by literature giving room for more research in that area.

There was a statistically significant difference (P- value =0.00<0.05) in time expended when using the wooden spoon and the balloon whisk for queen and ginger cakes. Meaning that the null hypothesis stated is rejected since the balloon whisk uses less time and is therefore time efficient when used for both creaming and mixing batters on a small scale. According to Mixter, et al. (2021), fatigue and stress levels will rise and even worsen over the course of several repeated physical work sessions. Marando, et al. (2022) corroborate this finding by concluding that time expended at performing a physical activity has been found to be having a strong correlation with fatigue (physical and mental)as extended time on a task

has been found to have the tendency to increase sleepiness and reduce alertness.

Comparing the average P-value obtained for the three texture attributes (springiness, softness and cohesiveness) of 0.03 for GCBW and GCWS and 0.02 for QCBW and QCWS; there are statistically significant difference in the texture of both products. Hence, the null hypothesis is also rejected as the texture quality of the queen and ginger cakes made by the use of the balloon whisk was better than that made with the wooden spoon.

Conclusions

The present study has established that the balloon whisk can be used as an alternative tool to the wooden spoon in the preparation of queen and ginger cakes. In terms of time expenditure, the balloon whisk has been proven to be more efficient as compared to the wooden spoon in the manual creaming and mixing of batters on small scale. The balloon whisk is also more efficient in terms of texture since the samples had softer, springier and more cohesive textures than that made with the wooden spoon.

Recommendations

1. The balloon whisk can be used to cream sugar and fat for all creamed flour products on small scale.
2. The balloon whisk can be used to make batters for all batter products on small scale.
3. Catering and Food and Nutrition teachers can use the whisk as an efficient alternative tool for the wooden spoon for more efficient results in small scale confectionary.
4. The West African Examinations Council may have to consider accepting the balloon whisk as an efficient tool for creaming and mixing batters during practical examinations.

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