FORMULATION OF CHOCO-PEANUT BUTTER SPREAD

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Abstract

This study aimed the formulation of Choco-peanut butter spread. It employed four treatments in terms of aroma, taste, appearance and texture; nutritional properties through proximate analysis and aflatoxin analysis. The four treatments of spread vary in their composition as follows. Treatment 1 is made from 49.14% peanut (Archais hypogea); 24.57% cacao (Theobroma cacao) butter; 6.12% muscovado sugar; 19.66% salted butter; and 0.49% salt, while treatment 2 is prepared from 49.14% peanut (Archais hypogea); 18.43% cacao (Theobroma cacao) butter; 12.29% muscovado sugar; 19.66 % salted butter; and 0.49% salt. Besides, treatment 3 is produced from 49.14% peanut (Archais hypogea); 12.29% cacao (Theobroma cacao) butter; 18.43% muscovado sugar; 19.66 % salted butter; and 0.49% salt and treatment 4 is formulated from 49.14% peanut (Archais hypogea); 6.14% cacao (Theobroma cacao) butter; 24.57% muscovado sugar; 19.66% salted butter; and 0.49% salt, respectively. Its preparation comprises of three major processes namely making the cacao liquor, making the peanut butter and finally, homogenizing ingredients which involves, mise-en-place, measuring ingredients, mixing, packaging, weighing, and storing the cacao (Theobroma cacao)-peanut (Archais hypogea) butter spread. The study used the Experimental Research Design using descriptive statistics such as percentage and weighted mean. The 30 randomly selected evaluators assessed the acceptability of the Choco-peanut butter spread in terms of taste, texture, aroma and appearance. And treatments samples were brought to the Regional Food Technology and Incubation Center for proximate and aflatoxin analysis. On the evaluation of the acceptability of the choco-peanut butter spread treatments it was found out that T2 is very much acceptable in terms of taste, texture, aroma and appearance. and aflatoxin-free. Thus, the formulated cocoa- peanut better spread is recommended for reproduction for home consumption and to further undergo shelf life testing and protocols..

Keywords: Choco-Peanut Butter, Spread, Nutritional Properties, Aroma, Taste, Appearance And Texture.

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1. Introduction

Spreads are added to food to enhance the flavor or texture of the food, which may be considered bland without it. Spread food products are prepared in a paste, syrup, or liquid style, often from ground foods such fruits and nuts. (https://en.wikipedia.org/wiki/List_of_spreads) .Peanut *(Arachis hypogea linn)* is a small annual dicotyledon herb growing up to a foot above the ground. It is thought to have originated in the Central Americas and from where it spread to rest of the world through Spanish explorers. Today, it is one of the widely cultivated oil seeds and established principal commercial crop in China, India, African nations, and the United States of America. (Industry GOV. PH)

As cited by Atli R. Narson in www.healthline 2015, Peanuts are rich in energy (567 calories per 100g) and contain health benefiting nutrients, minerals, antioxidants and vitamins that are essential for optimum health. They compose sufficient levels of monounsaturated fatty acids (MUFA), especially oleic acid. MUFA helps lower LDL or "bad cholesterol" level and increases HDL or "good cholesterol" level in the blood. Peanuts contain high concentration high concentration of polyphenolic antioxidants, primarily p-coumaric acid, this compound reduce the risk of stomach cancer. Peanuts are an excellent source of resveratrol, another polyphenolic antioxidant. Resveratrol has been found to have a protective function against cancers, heart disease, degenerative nerve disease, Alzheimer's disease, and viral/fungal infections.

Moreover, Peanut butter is a semi-perishable product that is subject to a number of microbial, chemical and physical deteriorative changes, which affect the final quality of the finished product. The shelf life is greatly dependent on the quality of peanuts used and the conditions of the peanuts used for making the peanut butter. Deterioration of peanut butter arises from putrefaction of protein fraction caused by bacterial metabolism; darkening, which results from an interaction between sugar and protein in the product and; oxidative rancidity that develops in the unsaturated portion of oil when it is exposed to air (Woodroof, 1983) in United States Agency for International Development Peanut Collaborative Research Support Program

Cocoa is rich in polyphenols, which have significant health benefits, including reduced inflammation and improved cholesterol levels. However, processing cocoa into chocolate or other products can substantially decrease the polyphenol content. Additionally, flavanols influence the production of nitric oxide, which relaxes the muscles of the blood vessels, improving blood flow and blood supply to the brain. The study indicate a positive role of cocoa on brain health and possible positive effects on neurodegenerative diseases like alzheimer's and parkingson's. (Elise Manndl, BSc.APD, 2018)

Literature shows that peanut (Arachis hypogea linn) better known worldwide as groundnut and to lesser extent as earthnut, monkey nut and goobers is not a true nut but rather an annual legume much like the bean or pea (Nwokolo;1996: pp.49-63). It can also be defined as an annual herb belonging to the division papilionaceae of the family leguminosal. The peanut plant is unusual because it flowers above ground and pods containing one to five seeds are produced underground. Peanut need a hot climate for development with moderate rainfall or irrigation and ample sunshine during the growing season. It is suitable for tropical, sub–tropical, Mediterranean and warm temperate climates. Peanuts are very high in calories because of their high fat and protein contents. A pound (0.45kg), of peanut brittle, salted peanut or peanut butter contains about 2,800 calories. Cotyledons are the main storage tissues and are concentrated source of protein lipids and dietary energy. Comparatively, the protein content of raw peanut is about 70% of that of raw soybean. Peanuts are generally low in carbohydrate content which is about 21.6g/100% edible portion. These carbohydrates include sugars, starch, crude fiber and pentosans. Peanuts are a reasonable source of dietary minerals especially potassium, phosphorus and magnesium, however they are poor source of fat soluble vitamins like A, D and K. Peanut oil is an excellent source of mono and poly unsaturated fatty acids exceeding the levels of these fatty acids in soybean and corn oil but significantly lower than in sunflower and safflower oil. The oil content of peanut is

between 35% and 54.2% of the seed. (IPL Peanut Literature).

Jiang et al.(2002) have reported reduced risks of diabetes by a quarter when peanuts were incorporated in diet on a daily basis . Magnesium (King et al. 2007) and dietary fibers (Gartside et al. 1998) have been attributed as the main contributory factors for improved health status. Inflammatory factors in the blood like C-reactive proteins (CRP) have been identified as predictors of cardiovascular disease. Dietary factors may play a role in reducing inflammation (Nettleton et al. 2006). Certain fats, antioxidants, dietary fiber, arginine, and magnesium are components that have been showed to help regulate inflammation (Salas-Salvadó 2008). In West Africa, more than half of the world's cocoa butter is produced. It is also produced in other parts of the world. You can find them in places such as Central and South America and in the carribean. For centuries Cacao beans have been harvested to produce cocoa butter. This butter is an emollient that has a mild chocolate aroma and is used as a moisturizer. For this reason, it heals and protects the skin and hair. It protects against dangerous chemicals and the effects of the sun and wind. Some other uses for Cocoa butter has been manufacturing of toiletries pharmaceuticals, culinary purposes. Over time the Cacao fruit was made popular for its medicinal purposes. This includes intestinal infections and diarrhea, regulate thyroid, reduce secretions, and as a stimulant. It was discovered that the leaves on the trees had the ability to disinfect wounds. As a result, the beans were used to remedy diabetes and other ailments which may have affected the bladder and kidneys. The Beans became known as the brown gold in 1502. At this time, Columbus and his crew became the first Europeans to ever come in contact with the cacao beans. The beans were found at the bottom of a canoe which belonged to the aboriginals of New Spain. The aboriginals used the beans as currency. As of today the beans are not used for currency. They have been dismissed because they were mistaken for almonds. The value of the beans could not be predicted.

God's Food

Cocoa was given several nicknames. The most common name being Theobroma which means food of the gods. The word chocolate is derived from the word Xocolatl which has several meanings including black nuts, cacao fruit, and gods food. (https://buttababee.com/cocoa-butter-history).

In terms of health benefits of peanuts, the consumption of either peanuts or processed peanuts has been shown to be beneficial to health, due to their desirable lipid profile, which is higher in unsaturated fatty acids than in saturated fatty acids peanut oil is naturally trans- fat-free, cholesterol-free, and low in saturated fats. It shows many positive biological effects, which are mostly connected with its high oleic acid content. Many studies have revealed that consumption of peanuts or peanut oil is associated with reduced cardiovascular disease (CVD) risk and may improve serum lipid profiles, decrease LDL oxidation, and exert a cardio-protective effect. Frequent intake of peanut and its products may reduce the risk of colorectal cancer. Some people have allergic reactions to peanuts (Woodroof 1983).

Apart from the daily nutrition peanut consumption leads to long term health benefits. Compared to well-known foods like green tea and red wine, peanuts have higher antioxidant capacity (Halvorsen et al. 2006). Peanut skins contain potent rich antioxidants. It has been noted that the when peanuts are consumed with their skins, their antioxidant capacity doubles and roasting can at times actually increase this capacity as well (Craft et al. 2010; Yu et al. 2006). Recent research studies suggest that boiling enhances antioxidant concentration in the peanuts. It has been found that boiled peanuts have two and four fold increase in isoflavone antioxidants biochanin A and genistein content, respectively (Craft et al. 2010).

As much as 40 % reduction in mortality due to any factor has been reported when peanuts were included as an integral part of the routine diet (Fraser et al. 1992). Reduction in deaths due to cardio vascular diseases in particular was found in population who consume peanut or peanut butter regularly (Fraser et al. 1992). It has been reported that peanut consumption reduces the risk factors of heart diseases amongst all ages, across both genders and even in patients who have multiple risk factors including diabetes (Fraser et al. 1992). High blood pressure is

associated with greater risks of heart disease and stroke. Scientists have learned that the dietary choices we make can have an impact on the blood pressure. Peanuts and peanut butter contain health monounsaturated fatty acids, plant proteins, magnesium, potassium, fiber arginine , and many bioactive components, each of which could be contributing to lowering blood pressure. Population studies consistently showed the risk of heart disease when peanuts were consumed in small amounts on a daily basis (Sabate and Ang 2009).

The study aims to formulate cocoa- peanut better spread to recommend for reproduction for home consumption and to further undergo shelf life testing and application in the Food and Drug Authority and FDA approved.

2. Procedure and Methodology

The researchers present procedures followed in the conduct of the study:Choco – Peanut Butter Spread is produced from fully fermented cacaobeans, roast to its perfection to achievable chocolate flavor. The process/ formulation of Choco – Peanut Butter Spread is comprised of the following steps: 1. MIS – EN – PLACE: Gathering and preparing the need equipment 2. SORTING: The cacao beans were selected and separated from medium and small in order to achieve even roasting 3. ROASTING: Roast the beans and peanuts to deepen the flavor and loosen the shell of the beans. 4. CRACKING THE BEAN/ WINNOWING: To facilitate the removal of the shell and peanut skin 5. GRINDING: Grind the cacao beans and peanuts to achieve the granular consistency 6. WEIGHING & MEASURING: The ingredients are weighed and measured 7. MIXING: All the weighed and measured ingredients are placed in food processor and even mixing of the ingredients in order to attain the right consistency (spreadable) 8. BOTTLING: The finished product is placed in a jar and sealed 9. LABELLING: The products are being labelled10. STORING: The finished product is stored in a shelf at room temperature 10. STORING: The finished product is stored in a shelf at room temperature.

3. Materials and Methods

Ingredients: Tablea, Peanut, Muscovado Sugar,Vegetable oil, tsp salt, tsp salt

Equipment Tools: Silicon Moulder, Food Processor, Measuring cup, Measuring spoon, Measuring Jar, Preserving jars, Oven, Baking Sheet and Rubber Scraper

Experimental Procedure: Mise-en-place. Gathering and preparing the needed equipment, materials and ingredients. 2. Roast peanut in a 400 deg. F oven for 10 minutes likewise, the cacao beans in 20 minutes to deepen flavor and Remove from oven and cool.3. Grind roasted cacao and roasted peanut separately in the food processor until finely crushed.4. Add 2 tablespoon oil and continue blending until it forms a paste. Pour the cooled chocolate into the blender and process until cocoa liquor and peanuts are well mixed. 5. Add the sugar. Add the remaining oil if the mixture becomes heavy. Continue mixing until the paste is smooth.6. Transfer to a clean container then cover then chill until ready to use.

Research Design

The study used the Experimental Research Design using descriptive statistics. Four treatments are used in the formulation of choco-peanut butter spread. TREATMENT 1: 1 cup cocao liquor + 1 cup peanut butter + 1 cup sugar TREATMENT 2: 1 cup cocao liquor + 1 cup peanut butter + 3/4 cup sugar TREATMENT 3: 1 cup cocao liquor + 1 cup peanut butter + 1/2 cup sugar TREATMENT 4: 1 cup cocao liquor + 1 cup peanut butter + 1/4 cup sugar.

Data Gathered

The taste was determined by evaluating the product if it is delicious and will upgrade the Choco-Peanut Peanut Butter Spread**.** The appearance of the Choco-Peanut Peanut Butter Spread was compared to the original semblance of butter spread. Thereby, this was completed by looking at the color of the product. The texture was assessed if the product is smooth when eaten. The aroma of Choco-Peanut Peanut Butter Spread was determined with the cocoa liquor and peanut.

Statistical Treatment

The study used the Experimental Research Design utilizing descriptive statistics such as percentage, frequency count and weighted mean. It also make use of the 4-Point Likert Scale as follows: 3.26 – 4.00 Very Much Acceptable 2.56 – 3.25 Very Acceptable 2.56 –

3.25 Very Acceptable 2.56 – 3.25 Very Acceptable.

4. Results and Discussion

Formulation of Choco-Peanut Butter Spread
The study used the Experimental Research Design using descriptive statistics. Four treatments was used in the formulation of choco-peanut butter spread as follows:

TREATMENT 1: 1 cup cocao liquor + 1 cup peanut butter + 1 cup sugar
TREATMENT 2: 1 cup cocao liquor + 1 cup peanut butter + 3/4 cup sugar
TREATMENT 3: 1 cup cocao liquor + 1 cup peanut butter + 1/2 cup sugar
TREATMENT 4: 1 cup cocao liquor + 1 cup peanut butter + 1/4 cup sugar

Table 1 shows the acceptability of choco-peanut butter spread in terms of aroma, taste, appearance and texture

Treat-ment	Taste		Texture		Aroma		Appearance	
	WM	**Descriptive Value**	**WM**	**Descriptive Value**	**WM**	**Descriptive Value**	**WM**	**Descriptive Value**
1	3.23	Very Acceptable	3.20	Very Acceptable	3.24	Very Acceptable	2.10	Acceptable
2	**3.78**	**Very Much Acceptable**	**3.47**	**Very Much Acceptable**	**3.35**	**Very Much Acceptable**	**3.43**	**Very Much Acceptable**
3	2.35	Acceptable	2.33	Acceptable	2.36	Acceptable	2.63	Very Acceptable
4	2.11	Acceptable	2.08	Acceptable	2.21	Acceptable	2.61	Very Acceptable

On the evaluation of the product treatments samples, it was found out that T2 is very much acceptable in terms of taste, texture, aroma and appearance; T1, very acceptable in terms of taste, texture, and aroma and acceptable in terms of appearance; while T3 and T4 are very acceptable in terms appearance and acceptable in terms of taste, texture, aroma, respectively.

Table 2 reveals nutritional properties of choco-peanut butter spread treatments thru proximate analysis

Sample Description	Crude Protein %	Crude Fiber %	Crude Fat %	Moisture %	Ash %
Chocolate-Peanut Butter	17.65	16.01	49.91	4.77	2.40

Based from the laboratory result/ analysis of choco-peanut butter spread from Regional food technology and Incubation Center of the Department of Agriculture Tuguegarao City. The choco-peanut butter spread is rich in Crude Protein with 17.65 %, Crude Fiber with 16.01%, Crude Fat with 49.91 %, Moisture with 4.77 %, Ash with 2.40% and Aflatoxin-free. Therefore, the formulated cocoa- peanut better spread is recommended for reproduction for home consumption and to further undergo shelf life testing and registration to the Food and Drug Authority. The choco-peanut butter under go kjedahl method to quantify the crude protein, filter bag technique (ANKOM) to determine the crude fiber and crude fat percentage and gravimetric to determine the moisture and ash %.

Table 3 manifest the aflatoxin analysis

Sample Description	Crude Protein %	Crude Fiber %	Crude Fat %	Moisture %	Ash %
Chocolate-Peanut Butter	17.65	16.01	49.91	4.77	2.40

The food samples are brought to the Regional Food Technology and Incubation Center for Proximate and aflatoxin analysis. It was found out that the Choco-Peanut Butter is rich in Crude Protein with 17.65 %, Crude Fiber with 16.01%, Crude Fat with 49.91 %, Moisture with 4.77 %, Ash with 2.40% and Aflatoxin-free. Therefore, the formulated cocoa- peanut better spread is recommended for reproduction for home consumption and to further undergo shelf life testing and application in the Food and Drug Authority.

5. Conclusion

The study concluded that among 4 treatments, T2 is best formulation of choco-peanut butter in terms Taste, texture, aroma, and appearance. Based on the proximate analysis, choco-peanut butter spread is a good source of fat and protein and it is safe for human consumption.

Recommendations

Based on the findings of the study, the following recommendation was drawn, future researchers may consider to test the shelf-life of choco-peanut butter spread and register it to FDA for future production and distribution

The future researchers may register for Certificate of Product Registration and License-to-Operate at Department of Trade and Industry.

6. References

Craft et al. 2010
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Industry GOV. PH
Nwokolo;1996: pp.49-63
IPL Peanut Literature
Salas-Salvadó 2008
Woodroof 1983
Sabate and Ang 2009

7. MATERIALS AND METHODS:

A. Ingredients
- Tablea
- Peanut

Muscovado Sugar
Vegetable oil
tsp salt
B. Equipment Tools
Silicon Moulder
Food Processor
Measuring cup
Measuring spoon
Measuring Jar
Preserving jars
Oven
Baking Sheet
Rubber Scraper

2. Experimental Procedure:

1. Mise-en-place. Gathering and preparing the needed equipment, materials and ingredients.
2. Roast peanut in a 400 deg. F oven for 10 minutes likewise, the cacao beans in 20 minutes to deepen flavor. Remove from oven and cool.
3. Grind roasted cacao and roasted peanut separately in the food processor until finely crushed.
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5. Add the sugar. Add the remaining oil if the mixture becomes heavy. Continue mixing until the paste is smooth.
6. Transfer to a clean container. Cover then chill until ready to use.