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Proximate, Antinutritional and Pasting Properties of Fufu Made from White Flesh Sweet Potato and Cocoyam (colocassia esculentum) Flour Blends.

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ABSTRACT

Proximate, Antinutritional and Pasting Properties of fufu made from white flesh sweet potato and cocoyam flour blends were evaluated using standard procedures. The result of proximate composition for moisture ranged from 7.50 to 9.80 %, ash, 3.0 to 7.80 %, protein, 2.70 to 8.70 %, fibre, 3.50-5.10 %, fat, 0.70-1.90 %, Carbohydrate, 69.80 % to 79.10 %, energy, 1385.4-1420.2KJ/100g respectively. Blending white flesh sweet potato and cocoyam flour improve the ash, fibre and protein content of the fufu. Antinutritional composition of the samples for oxalate, Phytate and Tannin were 15.10-27.7%, 18.20-26.80mg/g and 2.02-7.10% respectively. The pasting properties for Peak viscosity varied from 2826- 3648 RVU, Trough viscosity, 1680-2036RVU, Break down, 1082-1621RVU, final viscosity, 2517-3082RVU, Setback, 832-1052RVU, peak time, 4.80-4.93min and pasting temperature from 81.55-82.44°C. The flour blends showed a high pasting property, which could be taken as predictors of final dough quality. The study shows the possibility of developing a high nutritional quality fufu from blends of white flesh sweet potato and cocoyam flour.

Keyword: White Flesh Sweet Potato, Cocoyam, Fufu, Pasting, Proximate, Antinutrient

I. INTRODUCTION

Fufu is a Twi word meaning "mash or mix" for a soft doughy and swallow food staple of the Akan ethnic groups in Ghana. While native to Ghana, fufu now commonly features in many countries in West Africa and Central Africa (Obadina et al., 2006). In Nigeria, fufu is a fermented food product familiar in the southern, western and eastern part of Nigeria and some other parts of West Africa. It is mainly prepared from the combination of plantain and cassava, plantain and cocoyam or yam alone. (Obadina et al., 2006).

Sweet potato of the generic name, Ipomea batatas is a dicotyledonous plant that belongs to the family of convolvulacea (Senanayake et al., 2013). It constitutes a large segment of the population, especially in the tropics where the bulk of the crop are cultivated and consumed. It is highly nutritive and outranks most carbohydrate foods in vitamins, minerals, proteins and in energy content (Onu et al., 2004). Sweet potato is rich in complex carbohydrates, vitamin C and B, calcium and iron. Sweet potato (Ipomoea batatas) is believed to be a super-food with excellent sources of vitamins, manganese, copper, potassium, and pantothenic acid (Buri, 2011). Aditionally, it is also rich in dietary fiber, niacin, and phosphorus.

Cocoyam (colocassia esculentum) is aroids grown mainly for their edible corms and other traditional uses and it belongs to the family “Araceae”. Cocoyam grows from the fleshy tuber which is used mainly for food and it supplies digestible starch with various types of nutrients (Ndabikunze et al. 2011). It is rich in fiber, carbohydrates and protein. The leaves of sweet potato are rich source of folic acid, riboflavin, vitamin A and C, calcium and phosphorous, minerals and vitamins essential for healthy living (Duru and Uma, 2002). Compared to cassava and yam, Cocoyam contains reasonable amount of potassium, vitamin C and zinc, thiamin and folate (Hunter, 2012). It is adjudged a veritable source of fibre which could help control blood sugar in diabetics and can also reduce blood lipids which are a risk factor for heart disease (Kumaran, 2012). Globally, diabetes has become a general health problem that is ravishing humanity with its prevalence being at an alarming increase (Alloulou, et al., 2012). Generally, in Nigeria people consume fufu made from several starchy root tubers which are not recommended for diabetic patients. Therefore, this study was aimed at providing an alternative source of fufu flour which will be made from blends of sweet potato and cocoyam

II. MATERIALS AND METHODS

Cocoyam corms (colocassia esculentum) and white flesh Sweet Potato (Ipomea batatas) were purchased at Eke market in Afikpo North Local Government L. G. A, Ebonyi State, Nigeria.

2.1 Sample Preparation

2.2 Preparation of Cocoyam Flour

Cocoyam flour was processed according to the method described by Obiegbuna et al. (2013) with slight modification. Cocoyam sample with no blemishes or injury were carefully selected. The selected samples were washed using running tap water, then hand peeled using stainless steel knife, rewashed and sliced to uniform thickness (~5 mm) and soaked for 48hrs, with the water changed at 7hr intervals. The slices were blanched in hot water (80°C) for 5 min followed by immediate cooling in cold water in order to inactivate enzymes that may cause browning. The slices were placed on a stainless-steel tray and sundried. The dried sample was then grinded using a grinding mill to convert into flour. Then, the flour was filled into an air tight polyethylene bag and stored until needed for preparation of fufu which was further analyzed for contents of proximate, anti-nutritional factors and pasting properties.

2.3 Preparation of Orange Fleshed Sweet Potato Flour

Sweet potato flour was processed according to the method described by Hung et al., (2015). Orange fleshed sweet potatoes of good quality attributes were carefully selected washed and peeled mechanically with a hand knife and rewashed with running water. The clean tubers were then sliced into 5 mm thickness and soaked for 48 hrs, with the water changed at 7hrs intervals. This was followed by blanching at 80 °C in hot water for 10 min to inactivate enzymes responsible for browning before being sundried. The dried chips were then dry milled in a hammer mill and screened through a sieve of 0.8 mm aperture to get the flour. The flour obtained was then packaged in a low density polyethylene bag and stored until

2.4 Proximate Analysis

The samples were analyzed for proximate composition which includes moisture, ash, crude protein, crude fibre and carbohydrate using the method described by AOAC, (2010).

2.5 Determination of Energy Content

The value of energy in the samples was estimated in kilojoule per hundred gram and calculated by adding up the values for carbohydrate, crude lipid and crude protein using the factors; 16.736 KJ,37.656 KJ and 16.736 KJ respectively as shown below

Energy value (K J/100g) = (%Crude protein × 16.736) + (%crude f at × 37.656) + (%carbohydrate × 16.736)

2.6 Antinutritional Analysis

The phytate was determined using the method described by Onwuka (2005), Tannin determination was determined according to the method of Jaffe, (2003) and oxalate and saponin content were determined by titration method as described by Onwuka (2005).

2.7 Determination of Pasting Properties

The sample was analyzed in a rapid analyser (RVA) according to the method of Shuey and Tipples, (1982). The sample was turned into slurry by mixing 3g with 25ml of distilled water inside the RVA can and inserted into the tower, which was then lowered into the system. The slurry was heated from 50 °C to 95°C and cooled back to 50°C within 12min, rotating the can at a speed of 160r/min with continuous stirring of the content with a plastic paddle. Parameters that were estimated included peak viscosity, setback viscosity, final viscosity, and pasting temperature and time to reach peak viscosity.

2.8 Statistical Analysis

Analyses were determined in triplicates and the Data analyzed using the Analysis of Variance (ANOVA) statistical method (Statistical Analysis System version 9.2 program, SAS Inc., (2008), USA.). Means was separated using Duncan's multiple range tests. Significant differences were established at $p \leq 0.05$.

III. RESULTS AND DISCUSSIONS

3.1 Proximate Composition of Fufu Flour made from White Fleshed Sweet Potato and Cocoyam flour blends.

The moisture content of the samples as presented in Table 2 ranged from 7.50 to 9.80% with Sample D (100WFSPF:0CYF) having the highest mean value and Sample A (80WFSPF:20CYF) the lowest value. The samples differed significantly at p<0.05. The important of moisture can be related to the keeping quality of food products and help to prolong the shelf life of food against microbial attack (Elleuch et al., 2011). Moisture content of flour is an indication of dry matter of the flour. The recorded moisture content in the samples are within the acceptable limit of not more than 10% suggested for long term storage of flour (Onimawo and Akubor, 2012). The low moisture content of WFSP-CYF blends observed in this study will enhance its storage stability by minimizing mould growth and other biochemical reactions (Onimawo and Akubor, 2012).

The ash content of the samples as presented in Table 2, varied from 3.0 to 7.80% with Sample C (50WFSPF:50 CYF) recording the highest mean value and Sample D (100WFSPF:0CYFF) the lowest value which is the control sample. Statistically, there were significant differences (p<0.05) among the samples. Ash content of a food material is a measure of the total mineral content present in a food material, knowing the mineral content of a food during processing is often important as it affects the physicochemical properties of foods. From, the samples it can be deduced, that the incorporation of cocoyam flour (CYF) into the sweet potato flour (WFSPF) blends will enhance the ash content of the fufu flour blends, also the amount of minerals in food products. Thus, the higher the Cocoyam flour incorporated in the samples, the richer will the flour be in terms of mineral content. Boakye et al. (2018) observed cocoyam to be rich in minerals than most other roots and tubers. The ash values gotten in this study is similar to the range of values 1.84-4.01% reported by Oluwaseun et al. (2015) on the ash content of fufu analog flour produced from cassava and cocoyam flour blends.

The protein content of the samples ranged from 2.70 to 8.70%, with Sample C (50WFSPF:50CYF) having the highest value and Sample D (100WFSPF:0CYF) the lowest value. Statistically, there was a significant difference (p<0.05) among the samples. It can be observed that the protein content increased with the incorporation of Cocoyam flour(CYF),this trend may be due to the fact that cocoyam are richer sources of protein when compared with other root and tuber crops (Boakye et al., 2018). The values obtained in this study is similar to the values (1.68-10.10%) reported by Olugbenga et al. (2020)on the study of the quality evaluation of fufu flour produced from blends of sweet cassava and guinea corn flour, but lower than 1.7-41.80 % obtained by Peter, (2019) on instant fufu flour prepared from corn, cassava and soybean flour blends.

The fibre content of the samples ranged from 3.50-5.10% with Sample D (100%WFSPF:0%CYF) having the highest value and sample C (50WFSPF:50CYF) the lowest value. Statistically, there was a significance difference (p<0.05) among the samples. It was observed from the result that the fibre content increased with more inclusion of sweet potato flour. Fibre aid digestion, lower plasma cholesterol level in the body, soften stools and prevent several diseases such as irritable colon, cancer and diabetes (Elleuch et al., 2011).The fibre content of the various samples are relatively similar to the values (1.30-5.99%) reported by Olugbenga et al. (2020) on fufu flour produced from Sweet cassava and Guinea corn flour.

The fat content of the samples ranged from 0.70-1.90%, with Sample C (50% WFSPF: 50%CYF) recording the highest value and Sample D (100%WFSPF:0% CYF) the lowest value . Statistically, there was a significant difference (p<0.05) among the samples. The lower fat content observed in this study may be attributed to the oxidation of fat during drying process of the samples. This could also mean that much fat was broken to other substances during the drying process and that the final flour would be suitable for the control of diabetes. The low fat content will also enhance the storage life of the flour due to the lower chance of rancid flavour development. This study is similar to the values (1.20-1.21%) (5.06-5.34%) reported by Oluwaseun et al. (2015) and Olugbenga et al. (2020) on the fat content of fufu flour produced from cassava and cocoyam flour blends and fufu flour produced from sweet cassava and Guinea corn. The flour blends would serve the special dietary needs for people who are diabetic as it contains low fat.

The Carbohydrate content of the Samples ranged from 69.80% to 79.10% with sample A (80%WFSPF: 20%CYF) recording the highest value (79.10%) and Sample C (50%WFSPF: 50%CYF) the lowest value. Statistically, significant differences (p<0.05) existed among the samples. The result revealed decrease in carbohydrate with increase in the substitution of

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cocoyam flour. Carbohydrate supplies energy to cells such as brains, muscles and blood, contributes to fat mechanism, acts as mild natural laxative, and spares proteins as an energy source (Gordon, 2000). The carbohydrate content obtained in this study is similar to the values (64.5-85.20%) reported by Peter, (2019) on instant fufu flour produced from corn, cassava and Soybean flour blends.

The energy content of the fufu ranged from 1385.4-1420.2KJ/100g with Sample B (70WFSPF:30CYF) having the highest value and Sample C (50WFSPF:50CYF) the lowest mean value. The results obtained showed that all the samples showed no significant difference at ($p<0.05$) but were higher than the values reported by Oluwaseun et al. (2015) and Peter, (2019) on the fufu analog flour produced from cassava and cocoyam and instant fufu flour produced from corn, cassava and soybean flour blends.

3.2 Antinutritional Composition of Fufu Flour made from White Fleshed Sweet Potato and Cocoyam Flour blends.

From Table 3, the oxalate content of the samples ranged from 15.10-27.7%, with sample C (50WFSPF:50CYF) recording the highest value and Sample D (100WFSPF:0CYF) the lowest value. Statistically, there were significant differences ($p<0.05$) among the samples. From this reported, soaking influences the reduction of anti-nutritional factors present in food. Higher value of oxalate in human diet can increase the risk of renal calcium absorption and source of kidney stones (Chai and Liebman, 2004). The values obtained in this present study is slightly higher than 0.45-1.49% and 0.00-0.04% reported by Oluwaseun et al. (2015) and Olugbenga et al. (2020) on fufu analog flour produced from Cassava and Cocoyam and fufu flour produced from sweet cassava and guinea corn flour blends.

Phytate content of the samples ranged from 18.20-26.80mg/g with sample D (100WFSPF:0CYF) having the highest mean value and sample C (50WFSPF:50CYF) having the lowest value. Significant difference ($p<0.05$) existed among the samples. Phytate has the ability to impair the bioavailability of iron, calcium, magnesium and zinc in the diets of people dependent on cassava as a staple food. However, phytate may play a role of an antioxidant by sequestering iron and thus hinder the formation of free radicals (Manano and Byarugaba-Bazirake, 2017). Comparatively, the values obtained in this study is similar to the values (14.83-27.19mg/g) reported by Olugbenga et al., 2020 on fufu flour produced from sweet cassava and guinea corn flour blends.

Tannin content of the samples ranged from 2.02-7.10% with sample D (100WFSPF:0CYF) recording the highest value and sample C (50WFSPF:50CYF) the lowest value. Significant differences ($p<0.05$) existed among the samples. Tannins are astringent, bitter tasting plant polyphenols that binds and precipitate proteins, applied to any large polyphenolic compounds containing sufficient hydroxyls and other suitable groups to form strong complexes with proteins and other macro molecules (Archana and kadam, 2010). The values obtained in this study were lower than value 30mg/kg reported by Oyetayo (2006) on the nutrient and antinutrient contents of cassava steeped in different types of water for pupuru (fufu) flour production and were within the (<100mg/kg) safe limit recommendation (FAO/WHO 1995).

3.3 Pasting Properties of Fufu made from White Fleshed Sweet Potato and Cocoyam Flour blends.

Peak viscosity, is an index of the ability of starch-based foods to swell freely before their breakdown physical (Sanni et al., 2006), and is the maximum viscosity development during the heating portion of the sweet potato-cocoyam composite flour ranged from 2826- 3648 RVU. There were significant differences ($p<0.05$) among the samples. Sample C (50WFSPF:50CYF) had the highest value and Sample A (80WFSPF:20CYF) the lowest value as shown in Table 4. The differences observed in the peak viscosity may be associated to different rates of water absorption, swelling capacity and ability of the starch granules present in the experimental food samples to swell freely before breakdown physical (Osungbaro, 2015). The values obtained from the present study is similar to the values reported by Bolaji et al. (2021) and Abiodun et al. (2014) which ranged from 1629-4453RVU and 1492-7783RVU respectively on fermented cassava flour (lafun) and pigeon pea flour and fufu flour supplemented with bambara nut flour.

Trough viscosity of the flour blends samples ranged from 1680-2036RVU. There were significant differences ($p<0.05$) among the samples. Sample A (80WFSP:20CYF) had the highest value and Sample D (100WFSPF:0CYF) the lowest value. Oluwaseun et al. (2015) reported that trough viscosity indicates the minimum viscosity value which helps in measuring the ability of the paste to withstand breakdown during cooling. From the study, it can be observed that Sample B (70WFSPF:30CYF) and C (50WFSPF:50%CYF) are not significantly different at (p<0.05) as revealed in the study while sample 301(80WFSPF:20CYF) and 304(100WFSPF:0CYF) which is the control are statistically different at (p<0.05). High trough viscosity is an indication of high ability of the paste to withstand breakdown during cooling. It therefore follows that the higher the level of cocyam flour, the lower the ability of the pastes (obtained from the blends) to withstand breakdown during cooling. The results indicated increase in the trough viscosity with increase in WFSPF of the flour blends. The results obtained in this study is similar to the values 1524-2509RVU reported by Bolaji et al. (2021) on of fufu flour produced from blends of fermented cassava and pigeon pea flours.

Break down of the samples ranged from 1082-1621RVU. The samples showed a significant difference at (p<0.05). Sample A (80WFSPF:20CYF) had the highest value and Sample C (50WFSPF:50CYF) the lowest value. Breakdown viscosity according to Oluwaseun et al. (2015) can be defined as a measure of resistance to heat and shear stress of the samples. The inclusion of cocoyam flour (CYF) may lead to reduced stability of pastes obtained from white fleshed sweet potato (WFSPF), as a reduction in the breakdown viscosity occurred with increased CYF. The variations may be attributed to the ability of the fufu flour samples to withstand heating at high temperature and shear stress during processing operation (Bolade et al., 2009). Starch with low paste stability or breakdown shows weak cross linking among the granules, therefore sample C (50WFSPF:50CYF) will retrograde faster than the rest of the samples. The values obtained in this study is similar to the values reported by Bolaji et al. (2021) which ranged from 1050-1944RVU on fufu flour supplemented with blends of fermented cassava and pigeon pea flours, but differed greatly in the values (157-768RVU) reported by Olugbenga et al. (2020) of fufu flour produced from sweet cassava and guinea corn flour.

The final viscosity is the pasting parameter most commonly used to determine the quality of a starch-based sample as it indicates the ability of the material to form a gel after cooking (Sanni et al., 2006). Final Viscosity ranged from 2517-3082RVU. Statistically, there was a significant difference (p<0.05) among the samples. Sample A (80WFSPF:20CYF) had the highest value while sample D (100WFSPF:0CYF) the lowest value. The obtained results showed increase in the final viscosity with increase in the substitution of white fleshed sweet potato flour in the samples with Sample A (80WFSPF:20CYF) being able to form a better gel when compared to other samples followed by Sample B (70WFSP:30CYF), this is an indication that the food substance will form a viscous paste or gel after cooking and cooling, and will be resistant to shear stress during stirring and the high final viscosity of sample A (80WFSPF:20CYF) might be due to the higher degree of re-association between the starch molecules on cooling. Values obtained in this study is similar to the values (2326-3004RVU) reported by Bolaji et al. (2021) on fufu flour produced from fermented cassava and pigeon pea flour blends but were higher than the values (191-301.71RVU) reported for Cassava flour (fufu) fortified with pigeon pea flour.

Setback region, the phase where after cooling of the mixture a re–association between starch molecules occurs to a greater or lesser degree, affects retrogradation or re-ordering of the starch molecules and texture of the food products. Setback ranged from 832-1052RVU with Sample A (80%WFSPF:20%CYF) having the highest value and Sample D (100%WFSPF) having the lowest value. The results revealed that all the samples showed statistical differences at (p<0.05). This phenomenon is characterized by gelling and increase in firmness and rigidity of pastes, loss of paste clarity and occurs as a result of the reordering of amylose and a reversible crystallization of amylopectin molecules (Eliasson and Gudmundsson, 2006). The higher the setback value, the lower the retrogradation during cooling and the lower the staling rate of the product made from the flour samples. Lower setback viscosity during the cooling of the paste indicates higher resistance to retrogradation (Sanni et al., 2004).Sample D (100WFSPF0CYF) had a lower setback value, therefore this indicates that Sample D (100WFSPF:0CYF) will have the highest tendency to retrograde when compared with other samples. Comparatively, the values obtained in the present study is higher than the values reported by Sunday and Olamide, (2011) which ranged from 82.29-58.21RVU on Cassava flour (fufu) fortified with pigeon pea flour. But was similar to the values reported by Olugbenga et al. (2020) which ranged between (956-1049RVU) on 'Fufu' produced from sweet cassava and Guinea corn flour.

Peak time is the time at which the peak viscosity occurs in minutes and a measure of the cooking time of the flour. The peak time of the fufu ranged from 4.80-4.93min. A significant difference (p<0.05) existed among the samples. Sample B (70WFSPF:30CYF) had the highest value while Sample D (100WFSPF:0CYF) had the lowest value. The results showed that Sample A, B and C showed no statistical difference but are statistically different from the control sample D at ($p<0.05$). The values obtained in this present study is similar to the values reported by Idowu et al. (2017) which ranged between 4.64-5.84min on Fufu flour supplemented with Cocoyam-Cowpea composite flour.

Pasting temperature is one of the pasting properties which provide an indication of the minimum temperature required for sample cooking, energy costs involved and other components' stability. The pasting temperature ranged from 81.55-82.44°C, which shows a significant difference at ($p<0.05$), with Sample C (50WFSPF:50CYF) having the highest value (82.44°C) and sample D (100WFSPF:0CYF) which is the control sample having the lowest value. From the results it can be observed that Sample 301(80WFSPF:20CYF) and Sample 302(70WFSPF:30CYF) are not significantly different. A higher pasting temperature obtained in sample C (50WFSPF:50CYF) implies higher water binding capacity, higher gelatinization tendency, and lower swelling property of starch in the sample (Julanti et al., 2015) and also indicates the minimum temperature required to cook sample C (50WFSPF:50CYF). Dreher (1983) reported that pasting temperature depends on the size of granules with small granules more resistant to rupture and loss of molecular order. This may be the reason for increase in pasting temperature of those samples that contained higher percentage of cocoyam since cocoyam is known to contain small starch granules (Falade and Okafor, 2013). The values in the present study is similar to the values reported by Bolaji et al. (2021) and Idowu et al. (2017)which ranged from 76.27-87.67°C and 79.9-85.2°C on fufu flour produced from fermented cassava and pigeon pea flour blends and cocoyam-cowpea composite flour.

IV. CONCLUSION

The result of this study shows the possibility of developing fufu sample from blends of sweet potato and cocoyam flour, with high nutritional properties. The flour blends showed a high pasting property, which could be taken as predictors of final dough quality; however, all the samples have high resistance to disintegration by shear stress during heating. The antinutritional properties of the flour blends were relatively low, as further processing such as cooking will still reduce the antinutrients to the barest minimal level.

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Table 1: Preparation of the Flour Blend for Fufu Production.

Sample Code	WFSPF	CYF
A	80	20
B	70	30
C	50	50
D	100	0

WFSPF = White fleshed sweet potato flour, CYF = cocoyam flour

Table 2: Proximate Composition of Fufu made from White Fleshed Sweet Potatoes and Cocoyam Flour.

Parameters (%)	A	B	C	D
Moisture	7.5^{b}±1.00	8.0^{ab}±1.00	8.3^{ab}±1.25	9.8^{a}±00.75
Ash	4.25^{b}±0.75	4.9^{b}±0.95	7.8^{a}±0.28	3.0^{c}±0.65
Protein	3.3^{c}±0.30	5.5^{b}±0.30	8.7^{a}±0.93	2.7^{c}±0.10
Fibre	5.0^{a}±0.10	4.5^{b}±0.48	3.5^{c}±0.11	5.1^{a}±0.09
Fat	0.8^{bc}±0.15	1.5^{ab}±0.50	1.9^{a}±0.50	0.7^{c}±0.10
Carbohydrate	79.1^{a}±1.60	75.7^{b}±0.94	69.8^{c}±1.42	78.8^{a}±0.79
Energy(KJ/100g)	1411.4^{a}±16.11	1420.2^{a}±27.27	1385^{a}±26.87	1390.5^{a}±11.15

Values are means ± standard deviation of triplicate analysis. Means with the same superscripts in the same row are not significantly different at ($p<0.05$).KEY: A= White fleshed sweet potatoes flour(WFSPF):Cocoyam flour (CYF) (80:20)%, B=White fleshed sweet potatoes flour (WFSPF):Cocoyam flour(CYF)(70:30)%, C= White fleshed sweet potatoes flour(WFSPF): Cocoyam flour (CYF) (50:50)%, D=White fleshed sweet potato flour (WFSPF) (100)%.

Table 3. Antinutritional composition of Fufu Flour made from White Fleshed Sweet Potato and Cocoyam Flour blends.

Parameters	A	B	C	D
Tannin(mg/g)	5.20^{b}±0.08	4.40^{c}±0.05	2.02^{d}±0.10	7.1^{a}±0.03
Phytate(mg/g)	25.70^{b}±0.05	22.10^{c}±0.10	18.20^{d}±0.05	26.8^{a}±0.09
Oxalate(%)	20.20^{c}±1.01	22.70^{b}±0.04	27.70^{a}±0.04	15.1^{d}±0.07

Values are means ± standard deviation of triplicate analysis. Means with the same superscripts in the same row are not significantly different at ($p<0.05$). KEY: A=White fleshed sweet potato flour(WFSPF):Cocoyam flour(CYF)(80:20)%, B=White fleshed sweet potato flour (WFSPF):Cocoyam flour (CYF)(70:30)%, C= White fleshed sweet potatoe flour (WFSPF):Cocoyam flour (CYF)(50:50)%, D= White fleshed sweet potato flour (WFSPF)(100)%.

Table 4. Pasting properties of Fufu Flour made from White Fleshed Sweet Potato and Cocoyam Flour blends

Parameters. (RVU)	A	B	C	D
Peak viscosity	3648^{a}±3.54	3006^{c}±5.66	2826^{d}±8.49	3129^{b}±2.12
Trough viscosity	2036^{a}±5.66	1754^{b}±6.36	1747^{b}±2.83	1680^{c}±1.41
Break down	1621^{a}±0.71	1254^{c}±5.66	1082^{d}±4.24	1447^{b}±1.41
Final viscosity	3082^{a}±4.24	2757^{b}±2.83	2697^{c}±2.83	2517^{d}±3.54
Setback	1052^{a}±2.12	1006^{b}±3.54	955^{c}±2.12	832^{d}±4.95
Peak time(min)	4.87^{a}±0.03	4.93^{a}±0.04	4.92^{a}±0.01	4.80^{b}±0.01
Pasting temperature(°C)	82.27^{b}+0.05	82.32^{b}±0.01	82.44^{a}±0.01	81.55^{c}±0.04

Values are means±standard deviation of triplicate analysis. Means with the same superscripts in the same row are not significantly different at ($p<0.05$).KEY: A=White fleshed sweet potato flour (WFSPF):Cocoyam flour (CYF) (80:20)%, B=White fleshed sweet potato flour(WFSPF):Cocoyam flour(CYF)(70:30)%, C=White fleshed sweet potato flour (WFSPF):Cocoyam flour(CYF)(50:50)%, D=Sweet potato flour (WFSPF) (100)%