Effect of Some Selected Coagulants on the Proximate and Microbiological Quality of Cheese Produced from Soy Milk

Ibrahim A.K¹, Ukeyima M², Ikya J.K³

¹²Department of Food Science and Technonoly, Federal University of Agriculture. Makurdi, Nigeria
³Department of Nutrition, Primary Health Center, Shellenl G.A. Adamawa State. Nigeria

Abstract: This research highlight the production of cheese from soymilk using five different types of coagulants (soursop, passion fruit, baobab pulp, pineapple and tamarind pulp) were used to assess the effect of these coagulants on the proximate, microbiological, antioxidants and sensory properties of soychese. The proximate results, the protein, moisture, crude fat, ash, fibre and carbohydrates ranged from 13.93-16.78 %, 38.88-42.92 %, 20.22-23.34 %, 1.31-1.74 %, 4.34-5.64 % and 12.72-17.10 % respectively. The total viable counts ranged from 1.1x10⁴-1.2x10⁵ CFU/ml and 2.9x10⁶-6.6x10⁶ CFU/ml in their total viable counts and fungi counts respectively. The results of the antioxidants indicated that the baobab coagulated soychese was significantly different (p<0.05) from other soychese in their DPPH, FRAP, ABTS and ORAC values. The result obtained from sensory evaluation showed that the soychese coagulated with different coagulants showed no significant (p<0.05) different in their taste and textural properties. The products are highly generally accepted but the soursop (8.25%) coagulated soychese was the most generally accepted product and the least was the passion fruit (7.30%) coagulated soychese.

Keywords: antioxidant, coagulants, tamarind, microbiological and proximate

1. Introduction

Cheese has been defined as a product made from the curd obtained from milk by coagulating the casein with the help of rennet or similar enzymes in the presence of lactic acid produced by added microorganism, from which part of the moisture has been removed by cutting, cooking and/or pressing, which has been shaped in a mould, and then ripened by holding it for some time at suitable temperature and humidity (Adetunji et al., 2008). The essential ingredients of cheese are milk, coagulants (coagulants cause liquid to thicken or transforms liquid into a soft semi-solid mass), bacterial cultures and salt. The coagulant causes the milk protein to aggregate and ultimately transform fluid milk to a semi-firm gel. When this gel is cut into small pieces (curds), the whey (mostly water and lactose) begins to separate from the curds. Cheese is a concentrated source of many of the nutrients in milk. The use of vegetable extracts as milk coagulants in soft cheese processing has been known traditionally in some parts of West Africa like Nigeria and the Republic of Benin (Agustine et al., 2014).

Soymilk, a dairy milk substitute easily prepared from mature dry beans is fast becoming a household food in developing countries including Nigeria because of its diet improving capabilities (Obiegbuna et al., 2014). Like animal milk, soymilk is used in the manufacture of other food products due to its functional properties and nutritive value. Despite its intrinsic beany flavor, it has gained wild acceptances. However, utilization is limited due to short shelf-life. Local processors of soymilk in Nigeria, rather than discarding the unsold milk at the end of the day due to lack of refrigeration facilities, coagulate it into curd using lime juice. This coagulated product known as tofu, has found acceptances as a high protein food for human consumption and has been used as a protein source in the orient for many centuries.

Tofu or soybean curd is most important and valued soy food throughout the world especially in Eastern and South Eastern Asian countries due to their inexpensive and high quality protein (Birthal et al., 2010). It is cholesterol free and contains high quality protein that can be easily digested (Guan, 2009).

Traditionally, in the northern part of Nigeria, it is produced by curdling fresh hot soymilk either with CaCl₂, MgSO₄, Alum or steep water (effluence from pap produced from maize) (Yakubu and Amuzat, 2012).

Coagulation is the most important step in soybean curd making process (Jianming et al., 2013). Various coagulants used in curdling or coagulating soymilk have been listed. The most commonly used coagulants are calcium and magnesium salts and glucono-δ-lactone depending on tofu type (Panyathitipong and Puechkamut, 2008). Usually, CaSO₄ and glucono-δ-lactone are used more than other coagulants on the industrial scale for tofu making (Obiegbuna et al., 2014). Factors such as variety of soybean (Sarani et al., 2014), processing method and type and concentration of coagulant (Sarani et al., 2014), have been reported to influence the yield, quality and texture of tofu. It has been demonstrated that the rheological properties of winged bean and pea curds; and soybean curd were affected by the coagulant used in their preparations. Soybean varieties influenced the qualities of soymilk and also affected the functional properties of tofu powder (Panyathitipong and Puechkamut 2008). It has also been reported Shokunbi et al., (2011) that coagulants influence the yield and micronutrients contents of tofu. The effects of the coagulants on the functional properties of soybean curds have not or have rarely been investigated. The most common coagulant available to the local processor in Nigeria is lime juice (Obiegbuna et al., 2014).
The objective of the study is to evaluate the effect of coagulants on the proximate and microbiological quality of cheese produced from soymilk.

2. Materials and Methods

2.1 Source of Materials and Preparation

The soybean (Glycine max) was purchased from Northbank Market, Makurdi Benue State. Fruits (soursop, passion fruit, baobab, pineapple and tamarind) were purchased from fruit market, Makurdi Benue State and were taken to the Department of Food Science and Technology, Federal University of Agriculture Makurdi. The raw materials were properly cleaned by removing extraneous matter prior to their subjection to different processing treatments.

2.2 Processing Methods

2.2.1 Preparation of coagulants

Soursop (Annona muricata), passion fruit (Passiflora edulis), baobab (Adansonia digitata), pineapple (Ananas comosus) and tamarind (Tamarindus indica L.) coagulants were prepared as shown below.

Figure 1: Flow Chart Showing the Production of Soursop Coagulant
Source: (Omotosho et al., 2011).

Figure 2: Flow chart for the production of passion fruit coagulant.
Source: (Omotosho et al., 2011 with modification).

Figure 3: Flow chart for the production of baobab coagulant.
Source: (Augustine et al., 2014 with modification).

Figure 4: Flow chart for the production of pineapple coagulant
Source: (Augustine et al., 2014 with modification).

Figure 5: Flow chart for the production of tamarind coagulant.
Source: (Augustine et al., 2014 with modification).

2.3 Preparation of Soy Cheese

Soy cheese was prepared according to the method of Oboh and Omotosho (2012) based on formulation on Table 1. Soybeans were washed, soaked in water for 6hrs, drained, milled and sieved after which lactose (15% w/v) was added. The soymilk was heated to about 110°C for about 5 minutes with constant stirring. Coagulant solutions (30 ml of soursop, passion fruit, baobab, pineapple and tamarind) were added in 3000 ml of soymilk each and were allowed to solidify forming curds. The curds were removed from heat and further compressed to remove whey to make firm curds, which were then cut into desirable shapes and fried.
6% anhydrous sodium sulphate, 3.5% copper sulphate and 0.5% selenium dioxide) catalyst mixture weighing 0.88g (9.6LB). A grams of sample was weighed into a Kjeldahl digestion flask before drying, W2 and dried to a fairly constant weight. The loss in weight from the original sample (before heating) was reported as percentage moisture. The dish with its content was then put in the oven at 105°C for 30min. It was cooled in desiccators and weighed. Two (2) grams of sample was then weighed into the dish. The AOAC (2012) method for determining ash content was used. Two (2) gram of sample was weighed into a thimble and ignited at 550°C for 2 h, cooled and weighed. The residue was then transferred into a muffle furnace at 130 ± 2°C for 1 h to remove the residual moisture and to evaporate the solvent. It was later transferred into desiccator to cool for 15 min before weighing. Percentage fat content was calculated as

\[
\text{% Crude Fat} = \left( \frac{\text{weight of extracted fat}}{\text{weight of sample}} \right) \times 100 \ldots \ (3)
\]

2.4.3 Crude Fat Determination
Fat was determined using Soxhlet method as described by AOAC (2012). Samples were weighed into a thimble and loose plug fat free cotton wool was fitted into the top of the thimble with its content inserted into the bottom extractor of the Soxhlet apparatus. Flat bottom flask (250ml) of known weight containing 150 – 200ml of 40 – 60°C hexane was fitted to the extractor. The apparatus was heated and fat extracted for 8h. The solvent was recovered and the flask (containing oil and solvent mixture) was transferred into a hot air oven (GENLAB, England B6S, serial no: 85K054) at 105°C for 1 h to remove the residual moisture and to evaporate the solvent. It was later transferred into desiccator to cool for 15 min before weighing. Percentage fat content was calculated as

\[
\text{% Crude Fat} = \left( \frac{\text{weight of extracted fat}}{\text{weight of sample}} \right) \times 100 \ldots \ (3)
\]

2.4.4 Crude Fibre Determination
The method described by AOAC (2012) was used for fibre determination. Two (2) grams of the sample was extracted using Diethyl ether. This was digested and filtered through the california Buchner system. The resulting residue was dried at 130 ± 2°C for 2 h, cooled in a desicator and weighed. The residue was then transferred in to a muffle furnace (Shanghai box type resistance furnace, No.:SX2-4-10N) and ignited at 550°C for 30 min, cooled and weighed. The percentage crude fibre content was calculated as:

\[
\text{% Crude fibre} = \left( \frac{\text{weight of original sample} - \text{weight of ash}}{\text{weight of original sample}} \right) \times 100 \ldots \ (4)
\]

2.4.5 Ash Determination
The AOAC (2012) method for determining ash content was used. Two (2) gram of sample was weighed into an ashing dish which had been pre-heated, cooled in a desicator and weighed soon after reaching room temperature. The crucible and content was then heated in a muffle furnace at 550°C for 6-7 h. The dish was cooled in a desicator and weighed soon after reaching room temperature. The total ash was calculated as percentage of the original sample weight.

\[
\text{% Ash} = \left( \frac{W2- W1}{W2- W1} \right) \times 100 \ldots \ (5)
\]

### Table 1: Formulation for Soycheese and Coagulants

<table>
<thead>
<tr>
<th>Sample</th>
<th>Coagulant Quantity (ml)</th>
<th>Soymilk Quantity (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>30</td>
<td>3000</td>
</tr>
<tr>
<td>B</td>
<td>30</td>
<td>3000</td>
</tr>
<tr>
<td>C</td>
<td>30</td>
<td>3000</td>
</tr>
<tr>
<td>D</td>
<td>30</td>
<td>3000</td>
</tr>
<tr>
<td>E</td>
<td>30</td>
<td>3000</td>
</tr>
</tbody>
</table>

### Key
A = Soursop Coagulated Soycheese, B= Passion Fruit Coagulated Soycheese, C= Baobab Coagulated Soycheese, D= Pineapple coagulated Soycheese, E= Tamarind Coagulated soycheese.
Where:

\[
W_1 = \text{Weight of empty crucible,} \\
W_2 = \text{Weight of crucible + sample before ashing,} \\
W_3 = \text{Weight of crucible + content after ashing.}
\]

### 2.4.6 Carbohydrate Determination

Carbohydrate content was determined by difference according to Ihekoronye and Ngoddy (1985) as follows:

\[
\% \text{ Carbohydrate} = \frac{100}{W_3-W_2} - \left( \frac{\% \text{ moisture} + \% \text{ Protein} + \% \text{ Fat} + \% \text{ Ash} + \% \text{ Fibre}}{100} \right) \ldots 6
\]

### 2.4.7 Calorific Content Determination

The values obtained for protein, fat and carbohydrate were used to calculate the calorific content value of the sample as expressed below.

Protein content (\%) = \( p \)

Fat content (\%) = \( F \)

Carbohydrate content (\%) = \( C \)

Caloric value (Kcal/100g) = \( P \times 4.0 + F \times 9.0 + C \times 3.75 \ldots \ldots 7 \)

### 2.5 Microbiological Analysis

Microbiological analysis was done according to Guan, (2009). Isolation and enumeration of bacteria were done by observing growth in selective media. For Standard Plate Count, portion of cheese were diluted as 1:10 using sterile phosphate buffer which were subsequently diluted with the same as needed and then enumerated for total viable count using nutrient agar. Since this is a one time study, 3-6 samples were taken and surface plates were made in triplicates in appropriate selective media. Bacterial isolation was performed by pour plate method and fungal isolation was performed by spread plate method. Both bacterial and fungal enumerations were expressed as colony forming units (cfu) per ml. In all the cases counts were made up to 48 hours.

### 2.6 Antioxidant Properties

#### 2.6.1 DPPH Scavenging Activity

The scavenging activity of HPH and its fractions against the SPPH radical was determined using a previously described method (AOAC, 2012) with slight modification for a 96-well clear flat-bottom plate. Peptide samples were dissolved in 0.2 M sodium phosphate buffer at pH 6.6 or double distilled water (control) was mixed with 250 uL of buffer and 250 uL of 1% potassium ferricyanide solution. The final peptide concentration in the assay mixture was 1 mg/mL. The resulting mixture was heated to 50°C and incubated for 20 min. After incubation, 250 uL of peptide/TCA mixture was combined with 50 uL of 0.1 % ferric chloride and 200 uL of water and allowed to stand at room temperature for 10 min. The solution was centrifuged at 1000g and 200 uL of the supernatant transferred to a clear bottom 96-well plate. The absorbance of the supernatant was measured at 700 nm.

#### 2.6.2 Ferric Reducing Antioxidant Power

The reducing power of peptide samples was measured according to a previously reported method (AOAC, 2012) modified as follows. Peptide samples (250 uL) dissolved in 0.2 M sodium phosphate buffer at pH 6.6 or double distilled water (control) was mixed with 250 uL of buffer and 250 uL of 1% potassium ferricyanide solution. The final peptide concentration in the assay mixture was 1 mg/mL. The resulting mixture was heated to 50°C and incubated for 20 min. After incubation, 250 uL of 10 % aqueous TCA was added. Thereafter, 250 uL of peptide/TCA mixture was combined with 50 uL of 0.1 % ferric chloride and 200 uL of water and allowed to stand at room temperature for 10 min. The solution was centrifuged at 1000g and 200 uL of the supernatant transferred to a clear bottom 96-well plate. The absorbance of the supernatant was measured at 700 nm.

### 2.6.3 Chelation of metal ions

The metal chelating activity was measured using a modified method described by AOAC (2012). Peptide sample solution or GSH (Final assay concentration of 1 mg/mL) was combined with 0.05 mL of 2 mM FeCl₃ and 1.85 mL double distilled water in a reaction tube. Ferrozine solution was added and mixed thoroughly. The mixture was allowed to stand at room temperature for 10 min from which an aliquot of 200 uL was removed and added to a clear bottom 96-well plate. A control was conducted by replacing the sample with 1 mL of double distilled water. The absorbance values of (Ac) and (As) at 562 nm was measured using a spectrophotometer and the metal chelating effect (%) was calculated using the following:

Metal chelating effect (%) = \([\frac{Ac-As}{Ac}] \times 100\)

### 2.6.4 Lipid Peroxidation Activity

Linoleic acid oxidation was measured using the method described by (AOAC, 2012) Peptide samples was dissolved in 1.5 mL of 0.1 M sodium phosphate buffer (pH 7.0) and the mixture added to 1 mL of 0.1 M of 50 mL linoleic acid dissolved in 99.5% ethanol. For the control assay, 1.5 mL of buffer was added to the ethanolic linoleic acid solution. The mixtures were kept at 60°C in the dark for 7 days. At 24 h intervals, 100 uL of the assay solution was mixed with 4.7 mL of 75% aqueous ethanol, 0.1 mL of ammonia thioycanate (30% w/v) and 0.1 mL of 0.02 M ferrous chloride dissolved in 1 M HCl. This solution (200 uL) was added to a clear bottom 96-well plate and the degree of color development was measured using the spectrophotometer at 500 nm after 3 min incubation at room temperature. An increased absorbance was simply an increase in the level of linoleic acid oxidation.

### 2.7 Sensory Evaluation of the soycheese

Sensory evaluation of the soycheese coagulated with the four different coagulants was carried out according to the method described by (Ihekoronye and Ngoddy, 1985).

### 2.8 Statistical Analysis

The Experimental data were subjected to analysis of variance (ANOVA) and means separated by Fisher’s least significance difference test using Genstat statistical package, version 17.0.
3. Results and Discussion

### Table 2: Effect of Different Coagulants on the Proximate Composition of Soycheese (%)

<table>
<thead>
<tr>
<th>Samples</th>
<th>Moisture (%)</th>
<th>Crude protein (%)</th>
<th>Crude fat (%)</th>
<th>Ash (%)</th>
<th>Fibre (%)</th>
<th>Carbohydrate (%)</th>
<th>Energy (Cal/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>39.16±0.09</td>
<td>13.93±0.09</td>
<td>23.34±0.16</td>
<td>1.34±0.02</td>
<td>5.13±0.05</td>
<td>17.10±0.08</td>
<td>329.88±0.71</td>
</tr>
<tr>
<td>B</td>
<td>41.08±0.01</td>
<td>15.36±0.70</td>
<td>20.22±0.04</td>
<td>1.38±0.01</td>
<td>4.62±0.01</td>
<td>16.32±0.04</td>
<td>322.62±0.62</td>
</tr>
<tr>
<td>C</td>
<td>38.88±0.01</td>
<td>16.78±0.04</td>
<td>21.35±0.04</td>
<td>1.74±0.00</td>
<td>4.34±0.02</td>
<td>16.88±0.10</td>
<td>326.2±0.32</td>
</tr>
<tr>
<td>D</td>
<td>42.92±0.08</td>
<td>15.33±0.01</td>
<td>22.37±0.01</td>
<td>1.31±0.11</td>
<td>5.52±0.22</td>
<td>12.72±0.19</td>
<td>310.32±0.81</td>
</tr>
<tr>
<td>E</td>
<td>39.78±0.11</td>
<td>16.27±0.01</td>
<td>21.38±0.04</td>
<td>1.31±0.03</td>
<td>5.30±0.02</td>
<td>16.24±0.21</td>
<td>318.45±0.13</td>
</tr>
</tbody>
</table>

Values are means ±S.D of triplicate determinations. Values on the same column with different superscripts are significantly different (p < 0.05)

KEY: A= Soursop Coagulated Soycheese, B= Passion Fruit Coagulated Soycheese C= Baobab Coagulated Soycheese, D= Pineapple coagulated Soycheese, E= Tamarind Coagulated Soycheese

#### 3.1 Proximate Composition (%) of Soy Cheese

The results of the proximate composition of soy cheese produced from different coagulants are presented in table 3. There was significant different (p<0.05) in the moisture content among the samples. Maijalo et al., (2016), Omotosho et al., (2011), Oboh and Omotosho (2005), Shokunbi et al., (2011) reported higher moisture contents but Orhevba and Taiwo (2016) reported a similar range of moisture content. The variation in the moisture content of tofu prepared with different coagulants was probably due to the differences in gel network within the tofu particles that was influenced by different anions and its ionic strengths toward the water holding capacity of soy protein gels (Yakubu and Amuzat, 2012). The high protein content of baobab coagulated cheese could possibly be attributed to the high protein content of baobab. (Obizoba and Ameachi, 1993) and (Sena et al., 1998) reported 15.3 g/100g and 17 g/100g baobab protein values respectively. Sample A recorded the highest fat content followed by sample D and sample B recorded the lowest fat content. There was no significant difference between samples B and D in their fat contents and also, there was no significant difference between samples C and E in their fat contents. The highest ash content was found in sample C which was the baobab coagulated soy cheese and the lowest was in samples D and E. there was no significant difference between samples A, B, D and E. samples D and E recorded the same values of ash content. The fibre content of pineapple coagulated soycheese is significantly (p<0.05) higher than other coagulated soy cheese. This is followed by sourpsog coagulated soy cheese which recorded a value of (5.1%). Baobab coagulated soy cheese (4.34%) had the lowest fibre content. There was no significant (p<0.05) difference between the sourpsog and tamarind coagulated soy cheese. The low fibre content could be due to the soybean low fibre content (Obemudia et al., 2018). The energy content of the cheese produced using sourpsog (329.88 Cal/g) was significantly (p<0.05) higher than the energy contents of soycheese produced by passion fruit (308.57 Cal/g), baobab (322.62 Cal/g), pineapple (310.32Cal/g) and tamarind (318.45Cal/g). There was no significant difference (p<0.05) among the samples in their energy contents. The basis for the high energy contents of the soy cheese could not be categorically stated, however, it could be attributed to the fact that soy cheese is very rich in protein and fat (Prestamo et al., 2002), which are energy producing macromolecules.

#### Table 3: Effects of Different Coagulants on the Microbial Load of Soycheese (Cfu/ml)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Samples</th>
<th>Total Viable Count</th>
<th>Fungi Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.1×10³±0.00</td>
<td>5.3×10²±1.41</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1.6×10³±0.28</td>
<td>6.6×10²±2.82</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1.2×10³±0.28</td>
<td>3.5×10²±1.41</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>9.0×10²±1.41</td>
<td>2.9×10²±1.41</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>1.2×10²±1.41</td>
<td>4.6×10²±0.00</td>
<td></td>
</tr>
<tr>
<td>LSD</td>
<td>2.83</td>
<td>4.30</td>
<td></td>
</tr>
</tbody>
</table>

Values are means ±S.D of triplicate determinations. Values on the same column with different superscripts are significantly different (p < 0.05)

KEY: A= Soursop Coagulated Soycheese, B= Passion Fruit Coagulated Soycheese C= Baobab Coagulated Soycheese, D= Pineapple coagulated Soycheese, E= Tamarind Coagulated Soycheese

#### 3.2 Microbial Load of soycheese

The result of the microbial load of the various cheese produced with various coagulants is shown in Table 3. Among the products coagulated with different coagulants, the baobab (1.2×10² Cfu/ml) and tamarind (1.2×10² Cfu/ml) coagulated soycheese recorded the highest total viable count. This was followed by the pineapple (9.0×10¹ Cfu/ml) coagulated soycheese and the lowest was recorded in the sourpsog (1.1×10¹ Cfu/ml) coagulated soycheese. There was significant difference (p<0.05) in the total viable counts of the soycheese. Yohannes and Alemayehu (2016) reported higher microbial load (2.082×10² - 6.067×10⁴ Cfu/ml) in soycheese. The passion fruit (6.6×10² Cfu/ml) coagulated soycheese recorded the highest fungi count while the pineapple coagulated soycheese recorded the lowest fungi count. There was no significant difference (p<0.05) among the soycheese in their fungi count.

### Table 4: Effects of Different Coagulants on the Anti-Oxidants Properties (µM/L) of Soycheese

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sample</th>
<th>DPPH</th>
<th>FRAP</th>
<th>ABTS</th>
<th>ORAC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>806.66±6.31</td>
<td>435.74±5.09</td>
<td>725.79±8.97</td>
<td>630.26±4.13</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>935.98±4.84</td>
<td>346.70±3.32</td>
<td>1353.50±9.77</td>
<td>794.74±6.49</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>1131.12±1.74</td>
<td>541.08±1.56</td>
<td>1765.60±9.19</td>
<td>1327.44±6.45</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>831.78±0.78</td>
<td>294.34±7.07</td>
<td>596.63±6.70</td>
<td>865.88±3.97</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>741.32±2.07</td>
<td>532.82±2.25</td>
<td>674.18±2.17</td>
<td>713.77±2.34</td>
</tr>
<tr>
<td>LSD</td>
<td>9.91</td>
<td>11.13</td>
<td>10.93</td>
<td>47.21</td>
<td></td>
</tr>
</tbody>
</table>

Values are means ±S.D of triplicate determinations. Values on the same column with different superscripts are significantly different (p < 0.05)

KEY: A= Soursop Coagulated Soycheese, B= Passion Fruit Coagulated Soycheese, C= Baobab Coagulated Soycheese, D= Pineapple coagulated Soycheese, E= Tamarind Coagulated Soycheese

---

**Volume 8 Issue 4, April 2019**

www.ijssr.net

Licensed Under Creative Commons Attribution CC BY

---

Paper ID: ART20197059

10.21275/ART20197059

1035
Values are means ± S.D of triplicate determinations. Values on the same column with different superscripts are significantly different (p < 0.05).

KEY: A= Soursop Coagulated Soycheese, B= Passion Fruit Coagulated Soycheese, C= Baobab Coagulated Soycheese, D= Pineapple coagulated Soycheese, E= Tamarind Coagulated Soycheese

DPPH=radical scavenging antioxidant activity. FRAP=Ferric ion reducing antioxidant power, ABTS=Trolox equivalent antioxidant, ORAC=Oxygen radical absorbance capacity.

3.3 Anti-Oxidants Properties (µMol/L) of Soycheese

The result of the anti-oxidants properties of the soycheese is shown in table 4. The result showed significant difference (p<0.05) in the DPPH contents among the samples. The baobab (1327.44 µMol/L) coagulated soycheese showed the highest value of DPPH while the tamarind (741.32 µMol/L) showed the lowest value of DPPH. There was also significant difference (p<0.05) between the various products in their FRAP contents but the baobab (1541.08 µMol/L) coagulated soycheese recorded the highest value followed by the tamarind (532.82 µMol/L), soursop (435.74 µMol/L), then the passion fruit (346.70 µMol/L) coagulated soycheese while the pineapple (294.34 µMol/L) coagulated soycheese recorded the lowest FRAP value. The baobab (1765.60 µMol/L) coagulated soycheese was significantly (p<0.05) higher than other samples in their ABTS contents and the result showed significant differences in the ABTS value. The least value was recorded in the pineapple (596.63 µMol/L) coagulated soycheese. In the ORAC values, significant differences (p<0.05) existed between the products coagulated with different coagulants. The highest was in baobab (1327.44 µMol/L) coagulated soycheese followed by the pineapple (865.88 µMol/L) coagulated soycheese and the lowest was in the soursop (630.26 µMol/L) coagulated soycheese

Table 5: Effect of Different Coagulants on Sensory Properties of Soycheese

<table>
<thead>
<tr>
<th>SAMPLES</th>
<th>Taste</th>
<th>Appearance</th>
<th>Aroma</th>
<th>Texture</th>
<th>General Acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7.55±0.94</td>
<td>7.80±2.05</td>
<td>8.20±0.77</td>
<td>7.55±0.94</td>
<td>8.25±0.78</td>
</tr>
<tr>
<td>B</td>
<td>7.50±1.03</td>
<td>7.00±1.03</td>
<td>7.10±1.02</td>
<td>7.50±1.04</td>
<td>7.35±0.78</td>
</tr>
<tr>
<td>C</td>
<td>7.60±0.94</td>
<td>7.35±0.76</td>
<td>8.00±0.91</td>
<td>7.55±0.94</td>
<td>7.60±0.78</td>
</tr>
<tr>
<td>D</td>
<td>7.35±0.94</td>
<td>7.35±0.76</td>
<td>7.95±1.05</td>
<td>7.35±0.94</td>
<td>7.60±0.78</td>
</tr>
<tr>
<td>E</td>
<td>7.50±1.10</td>
<td>7.20±0.89</td>
<td>7.30±1.12</td>
<td>7.50±0.94</td>
<td>7.55±0.94</td>
</tr>
<tr>
<td>LSD</td>
<td>0.40</td>
<td>0.52</td>
<td>0.53</td>
<td>0.55</td>
<td>0.46</td>
</tr>
</tbody>
</table>

Values are means ±S.D of triplicate determinations. Values on the same column with different superscripts are significantly different (p < 0.05).

KEY: A= Soursop Coagulated Soycheese, B= Passion Fruit Coagulated Soycheese, C= Baobab Coagulated Soycheese, D= Pineapple coagulated Soycheese, E= Tamarind Coagulated Soycheese

3.4 Sensory Properties of Soycheese.

The sensory result revealed that there was no significant difference (p<0.05) in the taste and textural scores of the samples though the soursop (7.55 and 7.55) coagulated soycheese had the highest contents scores while the pineapple (7.35 and 7.35) coagulated soycheese had the lowest contents, respectively. This showed that the coagulants did not greatly affect the taste of the soymilk used in the processing of the soycheese. The result recorded a significant difference (p<0.05) in the appearance of the soycheese. The highest content was observed in the pineapple (8.05) coagulated soycheese which was significantly (p<0.05) higher than those coagulated with soursop (7.80), passion fruit (7.10), baobab (7.35) and tamarind (7.20). In terms of aroma contents of the soycheese, there was no significant different (p<0.05) between the soursop (8.20), passion fruit (8.10), baobab (8.00) and pineapple (7.95) coagulated soycheese but significant difference existed between these aforementioned samples and the tamarind (7.30) coagulated soycheese. The soursop coagulated soycheese had the highest general acceptability followed by the pineapple coagulated soycheese. The passion fruit coagulated soycheese had the least general acceptability.

4. Conclusion

The results showed that acceptable soycheese produced from locally sourced plant based coagulants seem to have better nutritional quality, proximate, microbiological, antioxidants and sensory qualities of soycheese. It has also been demonstrated that soycheese produced from baobab fruit coagulant had higher protein, and highest antioxidants properties.

References


