



Effect of Inclusion of Cocoa Powder on Proximate Composition, Chemical, Mineral, Microbial And Sensory Evaluation Of Unripened Cheese Made from Soyabean Milk

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INTRODUCTION

Cheese, a concentrated dairy commodity, either of animal origin or plant origin, is produced by a combination of activities including acid or rennet coagulation or curdling milk, stirring and heating the curd, draining off the whey, collecting and pressing the curd. The cheese is ripened, cured, or aged to develop the flavour and texture.

Warankashi' is consumed in its fresh unripened state, fried or used as a meat-analogue in stews and soups. 'Warankashi' is an excellent source of protein, fats and minerals such as calcium, iron and phosphorus, vitamins and essential amino acids, thus making it an important food in the diet of both old and young. When it is of plant origin, such as soya beans, it also has a very rich nutritional profile.

Cocoa, Theobroma cacao, has been widely used in varying applications. Chocolate has been consumed as confection, aphrodisiac, and folk medicine for many years before science proved its potential health benefits. It's a rich source of dietary polyphenols.

Due to effect of processing, milk of plant origin lack capacity to provide adequate mineral content and antioxidants need of the populace.

OBJECTIVES

The objective, therefore, is utilization of cocoa (cocoa powder) in cheese making, to improve presentation and nutritional composition of choco-soy cheese, an unripened cheese.

MATERIALS AND METHODS

Dried and clean soyabeans, cocoa powder Cleaned, soaked and softened soyabeans was wet-milled and manually filtered. The emulsion obtained was pasteurized and temporarily stored at 30°C prior utilization in cheese making.

Portions of soya milk and cocoa powder were blended (CoP:SoM) in ratio as follows: 0: 100, 2.5: 97.5, 5: 95 and 7.5: 92.5.

Alum solution (20 mL of the 5% w/v) was added to each of the milk blends.

Soyabean milk with cocoa powder blend was transferred into a metal pot and heated over a slow burning fire till it starts boiling.

The milk was kept at the boiling point and the alum solution (coagulant) introduced until it coagulated and there was a visible separation of curds and whey.

The curds and whey were then poured into a clean muslin cloth and the whey was allowed to drain.

Formed curd was placed in a clean container and cut to desired shapes and fried in hot vegetable oil (light frying).

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Fried choco-soy cheese were allowed to cool and packed in clean air permeable wrappers prior storage on a shelf at room temperature.

Proximate analysis was carried out following the standard method of the AOAC 2002

Antioxidants analysis was done according to the method reported by Arabbi et al, 2004

FRAP was determined by the method reported by Re et al. 1999

Vitamin C content was determined by the method described by Khan-Rahman et al, 2006. *Mineral content was determined by wet oxidation method reported in SSSA 1996.

Sensory evaluation was done as reported by Iwe, 2007 using a 9- point hedonic scale.

Data obtained were statistically analysed using SPSS version 20.0 and means were separated using Duncan test.

RESULTS

Table 1: Proximate composition of unripened choco-soy-cheese

Sample	Moisture (%)	Protein (%)	Fat (%)	Fibre (%)	Ash (%)	CHO (%)
A	18.00 ^c	16.76 ^d	16.15 ^b	0.00	4.34 ^c	44.75 ^a
B	26.48 ^a	21.48 ^c	17.37 ^a	0.00	5.10 ^b	29.57 ^b
C	25.69 ^a	23.87 ^b	17.28 ^a	0.00	5.39 ^a	27.77 ^c
D	23.15 ^b	26.90 ^a	17.44 ^a	0.00	5.47 ^a	27.04 ^c

Values are means of triplicate determination, ^{abc}Values in the same column bearing different superscripts are significantly different (p<0.05)

Legend: A (0 : 100), B (2.5 : 97.5), C (5 : 95), D (7.5 : 92.5)

Table 2: DPPH, FRSA and Vitamin C content of unripened choco-soy-cheese

Sample	DPPH (%)	FRSA (%)	Vit. C (mg/100 g)
A	51.50 ^d	20.78 ^d	11.69 ^d
B	64.21 ^c	31.74 ^c	21.43 ^a
C	66.54 ^b	35.35 ^b	18.22 ^b
D	68.14 ^a	37.14 ^a	16.02 ^c

Values are means of triplicate determination, ^{abc}Values in the same column bearing different superscripts are significantly different (p<0.05).

Legend: A (0 : 100), B (2.5 : 97.5), C (5 : 95), D (7.5 : 92.5)

Table 3: Calcium, Iron and Magnesium content of unripened choco-soy-cheese

Sample	Calcium (mg/100 g)	Iron (mg/100 g)	Magnesium (mg/100 g)
A	56.25 ^c	10.13 ^d	35.10 ^d
B	80.06 ^b	20.90 ^c	46.93 ^c
C	81.03 ^b	22.18 ^b	48.92 ^b
D	83.01 ^a	24.07 ^a	60.96 ^a

Values are means of triplicate determination, ^{abc}Values in the same column bearing different superscripts are significantly different (p<0.05).

Table 4: Sensory evaluation of unripened cheese made from cocoa powder soy-milk blend

Sample	Colour	Taste	Flavour	Toughness	Overall acceptability
A	7.80 ^a	5.35 ^b	6.60 ^a	7.50 ^a	7.55 ^a
B	6.75 ^{ab}	6.05 ^{ab}	6.70 ^a	7.10 ^a	6.70 ^b
C	6.45 ^{ab}	5.65 ^{ab}	6.95 ^a	6.85 ^a	7.05 ^{ab}
D	7.30 ^a	6.95 ^a	7.20 ^a	6.35 ^a	7.75 ^a

Values are means of triplicate determination, ^{abc}Values in the same column bearing different superscripts are significantly different (p<0.05).

Figure 1



DISCUSSION

Increase in moisture content (Table 1) was observed across all substitution levels.

Crude protein, crude fat, and ash content increased as cocoa powder inclusion level increased (Table 1). *Total carbohydrates decreased as cocoa powder inclusion increased

The antioxidants level (Table 2) showed significant increase. Compared with the control, DPPH and FRSA content increased as inclusion of cocoa powder increased.

Vitamin C decreased as inclusion level increased except in control sample

Calcium, Iron and Magnesium, as presented on Table 3, increased as cocoa powder inclusion levels increased.

Choco-soy cheese can be recommended for growing children and old folks as it is capable of supplying needed mineral requirement.

Choco-soy cheese appeared like a meat analogue. Colour of sample D (Table 4) as well as control was accepted.

In terms of toughness, no significant differences exist between all the samples

CONCLUSION

Choco-soy cheese, a new product, was produced for the populace.

The nutritional value obtained by inclusion of cocoa in soya milk blends will improve the well being of the people living in areas where food shortage exists.

This venture will impart positively, the income of cocoa farmers and everyone in the cocoa chain industry.

Cocoa can be utilized in making functional cheese for categories of people regulating their carbohydrate intake. This can be served as a snack food or component of a meal.