

NUTRITIONAL EVALUATION OF SOY CHEESE PRODUCED USING DIFFERENT TYPES OF COAGULANT

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Abstract

The study evaluated the nutritional contents of soybean cheese produced using four (4) different coagulants: moringa seeds, sodium apple, alum and lime. The cheese were prepared using simple techniques in which soybeans were soaked, grounded, sieved and boiled. Coagulants (moringa seed, sodium apple, alum and lime) was added to each sample at the point of boiling. The four different samples were produced in which sensory evaluation and chemical analysis of the products were carried out on each sample. The result of sensory evaluation showed that sample B Moringa seed product was generally accepted in all parameters. The chemical analysis results of the samples showed that sample D has the highest value of Vitamin B₁, B₂, A, protein and crude fibre. It was observed that the sample coagulated with alum was rich in most of the nutrients analyzed. The Vitamin B₁ contents of the samples A (cheese with Sodium Apple), B, C, D range from 1.43, 1.36, 1.36, 1.32 respectively. Sample A has the highest value, 1.43 while sample D has the lowest value of 1.32. Vitamin B₂ result shows that A 3.037 has the highest value while sample D, 2.07 has the lowest value. The study showed that there was no significant difference in Vitamin C of sample B, C and D. The highest Vitamin C contents found with sample C, which had 3.48mg/100g. The study recommended that the government should encourage local producers who hope to carry out research on the use of soybeans by approving grants for these purposes.

Keywords: Production, chemical analysis, coagulants, soybean cheese

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Introduction

Soybean (*Glycine max* L) is a leguminous plant, which is a rich source of good quality protein (James, 2016). It provides several therapeutic benefits because of its essential amino acids in the amounts needed for human health. It is also rich in phenolic compounds, isoflavones and antioxidants (Craig *et al.*, 2022). Besides, soy products offer a considerable appeal for a growing segment of consumers with certain dietary and health concerns (Craig *et al.*, 2022). Tofu (soy

cheese), a protein-rich food derived from soybeans, has been a dietary staple in many Asian cultures for centuries and has gained widespread popularity worldwide due to its nutritional value, versatility, and suitability for various dietary preferences, including vegetarian and vegan diets (Dilawari *et al.*, 2022). As a plant-based protein source, tofu is highly regarded for its ability to provide essential amino acids, vitamins, and minerals while being low in saturated fats and free from cholesterol (Thomas, 2024; Obayomi *et al.*,

2024a). Tofu contains essential amino acids, which are the building blocks of protein that the body cannot synthesize on its own and must be obtained from the diet. This makes tofu a complete protein source, comparable to animal-based proteins like meat, eggs, and dairy (Kumar *et al.*, 2016). Tofu is also a source of iron, which is crucial for the production of haemoglobin for the transport of oxygen throughout the body. While the iron in tofu is non-haeme iron (the type found in plant foods), its absorption can be enhanced by consuming it alongside vitamin C-rich foods (Pal *et al.*, 2019). Tofu, a minimally processed soybean product, supports gut health by retaining natural nutrients like fibre and isoflavones. Its simple preparation preserves its nutritional integrity, making it a gut-friendly and wholesome plant-based protein choice (Obayomi *et al.*, 2024b). Given the growing interest in plant-based diets and the increasing demand for high-quality, minimally processed food products, the methods used in the production and processing of tofu are of significant interest, particularly regarding their impact on the product's microstructure, nutritional content, and microbiological safety (Zhu *et al.* 2024). Processing techniques, both thermal and non-thermal, play a crucial role in determining the final quality of tofu (Li *et al.*, 2021). Traditional thermal treatments, such as boiling and microwaving, have long been employed in production and are well-known for their effectiveness in improving texture and ensuring microbial safety (Inanoglu, 2021). However, these methods can also lead to undesirable changes in the product's nutritional profile. For instance, thermal treatments can cause tofu the denaturation of proteins, loss of heat-sensitive vitamins, and alterations in the structural integrity of tofu, potentially affecting its sensory qualities and consumer acceptance (Mazumder *et al.*, 2023). Boiling is a common thermal treatment for tofu, cooking it in water at high temperatures to eliminate harmful microorganisms. However, it can degrade certain nutrients and

alter the texture of tofu, making it less appealing to consumers (Raji *et al.*, 2023). Microwave treatment, another popular thermal method, uses electromagnetic radiation to heat food rapidly and uniformly, but it can also impact the nutritional quality of tofu, particularly in terms of the retention of antioxidants and bioactive compounds (Zhang *et al.*, 2018).

Soy cheese is a lucrative business that can create self-reliant job for people at this economic downturn and afford an unemployed individual of being self-employed. The interest on soy cheese making has been so moderately high nowadays so people are expecting a different taste, nutritive value and additives. Hence, it is necessary to determine how sodium apple, moringa seed, alum and lime can change the production of soy cheese in order to bring a good taste, nutrient, and likeness of consumer acceptability. This study, therefore, aims at producing soy cheese using different types of coagulants and evaluating the nutritional values of the products.

Materials and Methods

Study area: The production was carried out in the Department of Home and Rural Economics Oyo State College of Agriculture and Technology Igboora Oyo State. The institution of learning was established in the year 2007 and is notable for technology advancement. The school comprises of Six Faculties in which Home and Rural is one of the department in one of the faculties. The product was subjected to nutritional evaluation in the Department of Nutrition and Dietetics Laboratory, Federal University of Agriculture, Abeokuta, Ogun State.

Samples and sample preparation: The materials for production of soy cheese were purchased at Towobowo Market, Igboora, Oyo State. The materials used were soybeans, salt, pepper, alum, lime, vegetable oil, onions and

Maggi Moringa seeds and sodium apple seeds were collected from the premises of Oyo State College of Agriculture and Technology, Igboora.

Sodium apple (bomubomu fruit) seeds were dehulled, weighed, put into a pot and toasted for 3 minutes. The seeds were milled into powdered form and the oil was extracted using

manual method. After this process (turning Sodium Apple into powder form), The already produced paste from cheese was pour in a big pot and boiled together with the coagulant produced (Sodium Apple powder). The seed cake and pap water were then used as coagulant with the powder.

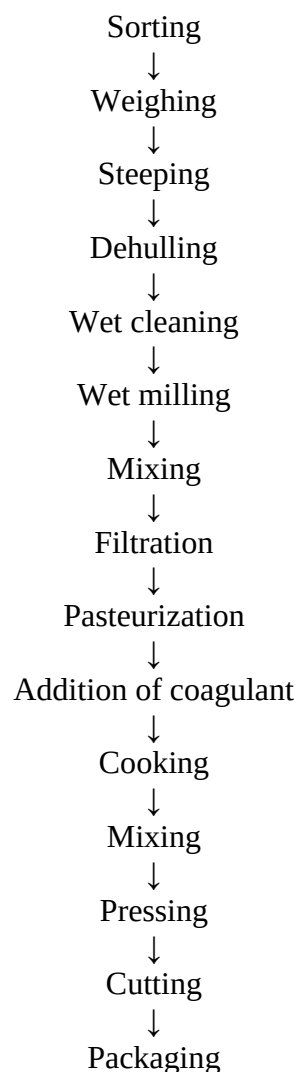


Figure 1: Flow chart of production of soy cheese

Data analysis

Result and discussion

Table 1: Showing the micronutrients composition of soy cheese using different coagulants

Sample	Vitamin B1 (ug)	Vitamin B2 (ug)	Vitamin C (ug)	Vitamin A (ug)	Calcium (mg/100)	Iron (mg/100)	Zinc (mg/100)	Magnesium (mg/100)
CMS	1.43 ± 0.00	3.037 ± 0.2	3.48 ± 0.38	0.54 ± 0.11	47.1 ± 0.79	1.60 ± 0.17	0.98 ± 0.11	258.1 ± 1.1
C L	1.36 ± 0.08	2.74 ± 0.62	2.79 ± 0.59	0.39 ± 0.08	42.48 ± 2.41	1.45 ± 0.45	0.91 ± 0.34	2.3296 ± 5
CSD	1.36 ± 0.11	2.57 ± 0.0	2.77 ± 0.28	0.37 ± 0.08	39.95 ± 0.0	1.36 ± 0.00	0.91 ± 0.00	218.73 ± 0
CA	1.35 ± 0.11	2.07 ± 0.17	2.72 ± 0.43	0.43 ± 0.08	32.14 ± 0.77	1.09 ± 0.77	0.73 ± 0.14	176.29 ± 1

Table 2: Showing the proximate analysis of soy cheese using different types of coagulants

Sample	Moisture (mg/100)	Protein (mg/100)	Fat (mg/100)	Ash (mg/100)	Crude fibre (mg/100)	Carbohydrates (mg/100)
CMS	62 ± 1.1	13.8 ± 0.36	6.25 ± 0.22	3.04 ± 0.17	0.094 ± 0.1	14.76 ± 1.35
CSA	65.9 ± 0.77	10.0 ± 0.36	4.54 ± 0.22	2.21 ± 0.147	0.068 ± 0.1	17.18 ± 0.75
CL	66.8 ± 0.95	0.7 ± 0.24	4.37 ± 0.2	2.13 ± 0.14	0.067 ± 0.1	16.89 ± 0.94
CA	62.8 ± 0.68	112 ± 0.50	5.06 ± 0.2	2.46 ± 0.14	0.059 ± 0.02	18.34 ± 0.77

CMS = Cheese produced using moringa seeds as coagulant

CSA = Cheese produced using sodium apple fruit as coagulant

CL = Cheese produced using lime as coagulant

CA = Cheese produced using alum as coagulant

Table 1 showed the micronutrients contents of the cheese produced. The vitamin B₁ content of the sample A cheese with moringa seed, B cheese with Sodium Apple, C Cheese with lime and D cheese with alum range from 1.43, 3.36, 1.36 and 1.35 respectively. Sample A (CMS) has the highest value, which is 1.43, while sample D (CA) has the lowest value. Vitamin B₂ result showed that sample A 3.037 has the highest value while sample D, 2.07, has the lowest value.

There is no significant different in vitamin C of sample A, B, C and D. The highest vitamin

C content found with sample B which has 3.48/100g. Vitamin A also known as retinol is needed by humans for proper functioning of the sight and vision. The recommended dietary allowance for Vitamin A is 700ug of retinol activity equivalent (RAE) per day for women and 900ug per day for men (Annette, 2022). The result showed that sample A has the highest vitamin A content of 0.54ug

The calcium content of sample A was found to be significantly high compared to others. The iron content of sample A was found to be significantly high compared to other samples. Similarly, the same trend that found in

calcium, iron was observed in zinc content of sample A. The zinc contents values were as follows: 0.98ml in sample A, 0.91 in sample B, 0.91ml in sample C and 0.73ml in sample D. The sample A has the highest value of magnesium

Table 2 illustrated the results for the proximate analysis of the cheese which included moisture, fat protein, Ash crude fiber and carbohydrates. Moisture content of sample A, B, C and D were 62.0, 65.9, 66.8 and 62.8 respectfully. Moisture content in any food commodity play a key in deciding the shelf life of food. Sample B (CSA) has the highest content which can make it easily spoiled. The protein content of sample A obtained from the analysis was 13.8 acid is higher in amount than other samples. Protein are essential component of diet needed for survival of animal and humans.

In this study, fat content among the samples varied from 6.25, 4.54, 4.37 to 5.06, the highest value of fat exhibited by sample A. Ash content obtained from the study were 3.04, 2.21, 2.13 and 2.46, while sample A has the highest ash content - followed by sample D. There is no significant different in crude fibre value among the samples, the highest crude fiber content found in sample A (0.094mg/100g) The highest carbohydrates noticed in sample D compared to other samples. The carbohydrates range from 14.76mg/100g, 7.18mg/100, 16.89mg/100 to 18.3mg/100g)

Conclusion

This study was carried out to examine the proximate and micronutrients analysis of soy cheese using different types of coagulants. Increase in protein demand in developing countries led to effort in finding an alternative sources of protein especially from plant origin which will be cheaper than the animal protein and still provide protein close to the animal protein. This was found among the leguminous

crops especially soybeans. Soybeans has been using to produce soy cheese which is highly recommended for developing countries such as Nigeria because of the availability of soybean in commercial quality. From the research finding, it is concluded that the product can increase intake of dietary fibre which has low prevalence of chronic disease. The study helps in the assurance of food security because soybean with moringa seed lime and sodium apple are yearly crops that is always available in all the producing area of the country.

Reference

- Ibrahim, A. K., Ukeyima, M. and Ikya, J. K. (2018). Effect of some selected coagulants on the proximate and microbiological quality of cheese produced from soy milk *IJSR*, 8
- Raji, A. O., Oluwanisola, R. M., Oyeibanji, O. M. and Sunmonu, B. A. (2023). Nutrients composition, sensory properties and storage stability of processed Nigerian soy cheese (Beske)
- Li, J. Wang, K., Gao, Y., Ma, C., Sun, D., Hussain, M. A., Qayum, A., Jiang, Z. and Hou, J. (2021). Effect of thermal treatment and pressure on the characteristics of green soybean tofu and the optimization conditions of tofu processing by TOPSIS analysis, *LWT*, 136 ,
- Mazumder, M. A. R., Panpipat, W., Chaijan, M., Shetty, K. and Rawdkuen, S. (2023). Role of plant protein on the quality and structure of meat analogs: A025 new perspective for vegetarian foods *Future Foods*,
- Pal, M. Devrani, M., Ayele, Y. (2019). Tofu: A popular food with high nutritional and health benefits, *Food and Beverages Processing*, 5 (4); 54-55
- Obayomi, O .V., Olaniran, A. F., Olawoyin, D.C., Falade, O.V., Osemwegie, O. O.

- and Owa,, S. O. (2023). Measurement: *Food*, 10
- Role of enteric dysbiosis in the development of central obesity: A review *Scientific African* (2024), p. e02204, 10.1016/j.sciaf.2024.e02204
- Dilawari, R., Kaur, N., Priyadarshi, N., Prakash, I, Patra, A., Mehta, S., Singh, B., Jain, P. and Islam, M. A., (2022). Soybean: A key player for global food security Soybean improvement: Physiological, molecular and genetic perspectives, *Springer*;. 1-46
- Inanoglu, S. (2021). Impact of microwave-assisted pasteurization system and high pressure processing on microbial safety and quality parameters of green beans Washington State University
- James, S., Nwokocha, L., Tsebam, B.C., Amuga, S.J ., Ibrahim, A. B. and. Audu, Y. (2016). Effects of different coagulants on the physico-chemical, microbial and sensory properties of Wara, a Nigerian soft soy-cheese, *Agro-Science*, 15 (3); 41-45
- Zhang, Q., . Wang, C., Li, B., Li, L., Lin, D., Chen, H Liu, Y., Li, S.. Qin, W. and W. And Liu, J. (2018). Research progress in tofu processing: From raw materials to processing conditions. *Critical Reviews in Food Science and Nutrition*, 58 (9). 1448-1467.
- Thomas, R., (2024). Tofu: A culinary history Reaktion Books
- Adetunji, V.O. and Salawu, O.T. (2018). West African soft cheese ‘wara’ processed with *Calotropisprocera* and *Carica papaya*: a comparative assessment of nutritional values *Int. J. Dairy Sci.*; 58-65.
- Kumar, V.,. Rani, A., Hussain, L. (2016),. Essential amino acids profile of differentially processed soy products and their efficiency in meeting daily requirement. *Nutrition \& Food Science*, 46: (2); 237-245
- Craig, W. J., Mangels, A. R. and Brothers, C. J., (2022). Nutritional profiles of non-dairy plant-based cheese alternatives, *Nutrients*;, 1247.