

Some Physical and Sensory evaluation of Evaporated Soymilk Using Gel-T Stabilizer

¹Kolawole, F.T; ¹Balogun, M.A. and ²Ojelabi, S.O

Dept of Home Economics and Food Science, University of Ilorin
¹Federal Polytechnic, Offa

ABSTRACT: The study was conducted to evaluate the preparation of evaporated soymilk from soybeans using varying proportions of Gel-T stabilizer in a completely randomized design model. The Gel-T stabilizer was included at 0% (T₁), 0.6% (T₂), 0.7% (T₃) and 0.8% (T₄). Parameters evaluated include the physical parameter and sensory quality and this was carried out for four weeks to determine the level of preference of the samples. The results revealed that the values of colour (6.5-6.6), taste (3.8-4.0) and flavour (4.2-4.4) of the treated samples were higher ($p < 0.05$) than the control (T₁). T₃ with 0.7% Gel-T was found to be the most preferred by the panelists. The pH of the four samples within the period of analysis ranged between 6.80 and 7.85, the temperature was constant while titratable acidity (TTA) ranged between 0.3% and 1.1%. The study concludes that 0.7% Gel-T be incorporated into soymilk during preparation to prevent water separation from the curd.

Corresponding author: bmutiatadebanke@yahoo.com / balogun.ma@unilorin.edu.ng Tel : 234-08055948515

Introduction

Soy beans (*Glycine max*) belongs to the leguminous family and are native to East Asia. It is an important source of protein in the orient for millions of people for over five thousand years (FAO, 1986). Soybeans contain on the average 37% protein and (3%) dietary fiber. It has a complete protein and its uses are numerous. When unprocessed, they have an undesirable flavour and bitterness (Liv, 2000). Moreover, they contain the toxic protein hemagglutinin, antitrypsin as an anti-nutritional property (Rackis *et al.*, 1979). These substances must be destroyed or inactivated to make the beans palatable and digestible for both human and animal assumption. These anti-nutritional properties are mostly destroyed by heat treatment (Liv, 2000).

Soybeans can be processed into a variety by product such as soymilk, soy sauce, tofu (soybeans curd), yoghurt, tempeh (soybeans steak) soy flour and other products. Soymilk is a creamy white liquid extracted from whole soybeans and it is mostly used as a substitute for dairy milk. It contains about the same composition as cow milk 3.5% protein, 2% fat, 2.9% carbohydrate and 0.5% ash (Smith, 1972). It can be made at home with traditional kitchen tools or with soymilk machine (Calvary, 2000).

Soy milk is highly nutritious and its an excellent source of high quality protein,

isoflavones and B – vitamins. It is free from milk sugar (lactose) and is a good choice for people who are lactose intolerant. It also serves as a good alternative to those who are allergic to cow milk (Iwe, 2003).

Gelatin is a pure protein food ingredient obtained by the thermal denaturation of collagen. It helps to reduce the tendency of separation of water from curd, which usually occurs after the production of soymilk. It forms thermally reversible gels with water and the gel melting temperature ($< 35^{\circ}\text{C}$) is below body temperature, which gives its products unique organoleptic properties and flavour release (Ang *et al.*, 1999).

This study therefore was carried out to produce soymilk using different proportions of Gel-T stabilizer, to determine some physical parameters and the acceptability of consumers using sensory evaluation.

Materials and Methods

The materials used for this study were purchased at Owode Market in Offa, Kwara State, Nigeria. They include soybeans, sugar and gelatin.

The method described by Watnebe and Kishi, (1984) was used in the production of evaporated soymilk with little modification. Cleaned soybeans were soaked into boiled water for 20-

25 minutes to soften the hulls. The soybeans were dehulled and the cotyledons washed and boiled in hot water (10 minutes) that contained hydrogen carbonate so as to remove beany flavour and to aid grinding. The soybeans were then ground to produce slurry. The slurry was strained using clean muslin cloth and the milk was simmered for 20 minutes with continuous stirring. 6.25% of sugar was added to the soymilk and the soymilk was then evaporated in an open stainless steel pot until desired viscosity was attained. The soymilk was divided into four portions and the Gel-T stabilizer was added at this stage; first portion contains 0% Gel-T,

second contains 0.6% Gel-T, third portion contains 0.7% Gel-T while the last portion contains 0.8% Gel-T. All the samples were stored in the refrigerator and analysis was done for four weeks.

The pH and titratable acidity of the samples were determined using AOAC, (2006) method. Sensory evaluation was done by trained panelists to assess the samples for some specific characteristics such as colour, taste and flavour. Observations were recorded using a 9-point hedonic scale and the results obtained were analyzed statistically using ANOVA.

Results and Discussion

TABLE 1: SOME PHYSICAL PARAMETERS OF THE SAMPLES

SAMPLE	1 ST WEEK			2 ND WEEK			3 RD WEEK			4 TH WEEK		
	pH	TEMP (°C)	TTA (%)	pH	TEMP (°C)	TTA (%)	pH	TEMP (°C)	TTA (%)	pH	TEMP (°C)	TTA (%)
T ₁	6.80	4.5	0.3	6.95	4.6	0.4	7.22	4.3	0.4	7.85	4.2	0.5
T ₂	6.82	4.5	0.5	7.05	4.6	0.5	6.86	4.3	0.6	7.45	4.2	0.6
T ₃	6.99	4.5	0.4	7.08	4.6	0.4	6.89	4.3	1.0	7.18	4.2	1.1
T ₄	6.77	4.5	0.3	7.39	4.6	0.3	6.07	4.3	0.7	7.36	4.2	0.7
SEM	0.01	0.1	0.1	0.03	0.2	0.1	0.02	0.2	0.2	0.02	0.1	0.1

Sample T₁: 0% Gel-T; Sample T₂: 0.6% Gel-T; Sample T₃: 0.7% Gel-T; Sample T₄: 0.8%

TABLE 2: MEAN SCORES FOR TASTE FOR THE SAMPLES.

Sample	1 st week	2 nd week	3 rd week	4 th week
T ₁	3.4	2.6	1.8	1.2
T ₂	7.7	6.9	6.9	3.8
T ₃	8.7	7.2	7.1	3.9
T ₄	7.7	7.1	6.9	4.0

TABLE 3: MEAN SCORES FOR COLOUR FOR THE SAMPLES.

Sample	1 st week	2 nd week	3 rd week	4 th week
T ₁	5.1	4.3	3.8	3.1
T ₂	7.8	6.9	6.7	6.5
T ₃	7.8	7.2	6.7	6.6
T ₄	7.7	7.1	6.4	6.5

TABLE 4: MEAN SCORES FOR FLAVOUR FOR THE SAMPLES.

Sample	1 st week	2 nd week	3 rd week	4 th week
T ₁	3.9	3.0	2.7	2.1
T ₂	8.0	7.1	5.4	4.2
T ₃	8.1	7.1	5.4	4.5
T ₄	8.2	7.2	5.2	4.4

Table 1 shows some physical parameters of the samples for a period of 4 weeks. The result from this study revealed that the pH of all the samples increased as the storage period progressed. Sample B had the lowest pH after the 4th week. All the samples had a higher pH than that reported by Jackson, (1997) for soymilk which was between 6.0 and 7.0. Fluctuations in the pH could be attributed to the activity of microorganisms during the storage period.

TTA had values that were consistent. The TTA of the samples varied between 0.3 and 1.1, which showed an increase with increase in the storage period. This may be due to the metabolic activities of lactic acid bacteria present in the samples (Tortora et al., 2007).

Tables 2, 3 and 4 show the mean sensory scores for each parameter measured for the period of storage. The mean scores were compared with the rating used in the test which ranged from 9 for 'like extremely' to 1 for 'dislike extremely'. The closer the mean score is to 9 the better the sample and the closer a sample's value is to 1, the poorer.

Consequently on this basis, sample T₃ was the best in terms of taste at the end of 1st week of storage with a value of 8.7. Generally the samples showed a decrease in the mean scores as the storage period increased. After the 1st week of storage, sample T₃ was most preferred in terms of taste and colour while sample T₃ was preferred for flavour by the panelists. At the end of the fourth week, sample T₄ was most preferred for taste while sample T₃ preferred for colour and flavour. For all the parameters done, the level of acceptability by the panelists was in this order T₃ > T₄ > T₂ > T₁.

From this study, it is obvious that sample T₃ generally with Gel-T-stabilizer of 0.7% was most preferred while the least preferred was sample T₁ (control) with 0% Gel-T stabilizer. The addition of Gel-T stabilizer in soymilk helps in the stabilization of the milk. The stabilizer reacts

with the casein in the milk to reduce its tendency to separate water from the curd. The percentage of Gel-T to be added to the milk depends on how viscous one wants the milk to be but following the four percentages of Gel-T stabilizer used in this work and the perception of the panelists during the analysis, soymilk containing 0.7% of Gel-T stabilizer was preferred. This therefore suggests that soymilk production should be encouraged using Gel-T stabilizer at 0.7% to prevent water from separating out from the curd.

References

- AOAC (2006). Official Methods of Analysis. Washington DC: Association of Official Analytical Chemists
- Ang, T.K., Buttter, H.L, Brooks, J.R., Hardin, J. (1999): Identification and differences in antigens in two commercially available soybeans protein isolates, *J. Food Sci.*, 53, 1456 – 1459
- Calvert, H.E. (2000) Soybeans: The crop in Encyclopedia of Food Science Technology and Nutrition vol.6, Eds . Macrae R, Robinson, R.K and Sadler, M.J. Academic press, London, New York Pg 4215 – 4218.
- FAO, (1986): Technology and Processing of Soyabeans: FAO Agricultural Services Bulletin No. 97
- Iwe, M. O. (2003) The Science and Technology of Soyabean. Rejoint Communication Service Limited, Nigeria
- Jackson, H. W. (1997). Volatile and oil Quality. *J. Am, Oil Chem. Soc.* 54: 458
- Liv, K (2000). Expanding soyabean food utilization *Food Technol.*, 54 (7), 46-47
- Rackis, J.J Hirell, R.F., Juillerat, M.A. (1979) Soybeans trypsin inhibitors; their inactivation during meal processing *J.Food Technol*, 20: 102 – 106.
- Smith, J. (1972). Government Policy and Farm Level Technologies, the Expansion of Soyabean in Nigeria, IITA Research, No. 11: 14-18

Tortora, G. J., Funke, B. R. and Case, C. L. (2007).
Microbiology, An Introduction. Pearson Education
Inc, San Francisco pp 214-217
Watnebe and Kishi, (1984): Food processing
Activities in Japan on the use of twin-screw
extruders. Report of the National Food Research
Institute, Tsukuba, p 40