IJFANS

International Journal of Food And Nutritional Sciences

Volume 2, Issue 2, Apr-Jun-2013, www.ijfans.com e-ISSN: 2320-7876

Official Journal of IIFANS

INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

e-ISSN 2320 –7876 *www.ijfans.com*
Vol.2, Iss.2, Apr-Jun 2013

Research Paper *Open Access*

PREPARATION OF PROCESSED CHEESE SPREAD USING TOFU, MOZZARELLA AND CHEDDAR CHEESE

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ABSTRACT

The present investigation was made with an attempt to develop a processed cheese spread by partial addition of different levels of tofu, mozzarella and cheddar cheese. For control, was prepared by adding cheddar cheese, stabilizer (Sodium Citrate), emulsifier (Glycerol Monostearate) salt and required amount of water, to obtain more than 40% total solids and treatment was prepared with tofu, mozzarella and cheddar cheese in the ratio of 20:70:10, 30:60:10 and 40:50:10 for T_1, T_2, T_3 respectively with the addition of permitted amount of emulsifier, stabilizer and salt and each treatment was processed at 65˚C for 3 to 5 minutes. The different treatments and control sample were analysed for physico-chemical analysis (fat, moisture, protein, carbohydrates and ash), microbiological analysis (SPC, Y/M count and Coli-form count) and organoleptic characteristics like (flavour and taste, body and texture, colour and appearance). The treatment containing 20% level of tofu was liked most by the sensory panellists in comparison to other treatments. Microbiological analysis was carried out to assess the shelf life of the treatments. The results revealed less than 100/g (standard value) yeast and mould and negative coli form test.

Keywords: Tofu, cheese spread, soy cheese processed cheese spread.

INTRODUCTION

Cheese is a generic term for a diverse group of milk-based food products. Cheese is produced throughout the world in wide-ranging flavors, textures, and forms. Processed cheese is produced by blending natural cheese of different ages and degrees of maturity in the presence of emulsifying salts and other dairy and nondairy ingredients followed by heating and continuous mixing to form a homogeneous product with an extended shelf life. The origin of processed cheese dates back to the early 20th century (Meyer 1973).

Contrary to the present status of processed cheese, the initial idea of processed cheese was to increase the shelf life of natural cheese and alternative uses for natural cheese that was difficult to sell. Cheese analogues are being used increasingly due to their cost-effectiveness, attributable to the simplicity of their manufacture and the replacement of selected milk ingredients by cheaper vegetable products (Eymery *et al.*, 1988).

Cheddar cheese has sharp and mild flavor characteristics, its role in cheese spread is very important from the flavors and texture point of view. Flavour development in cheese is the result of a complex series of microbiological, biochemical and chemical processes that occur during ripening. Flavor is an important factor in consumer selection of cheese (Drake *et al.*, 2008).

Mozzarella has been the ubiquitous increase in the popularity of pizza, in which Mozzarella is the main cheese used. The functional attributes of importance for pizza include the desired degrees of flow and stringiness on baking. The cheeses best endowed with these characteristics, especially stretch-ability, are members of the pasta-filata group and include Mozzarella, Provolone, and Kashkaval (Fox *et al*., 2000).

Soybean (Glycine max) is often called the “golden miracle bean” and is the world’s foremost provider of protein and of used for health food, feed sources and industrial products. Manufacturing tofu using low-fat milk with soy milk can open new avenues for the utilization of soy milk, and can also help in reducing raw material costs. Health benefits of Tofu and stretching characteristics of mozzarella and pleasant taste of cheddar cheese can be incorporated into a single product i.e. processed cheese with better acceptability. Keeping in mind the above statement it was planned to manufacture processed cheese spread by

adding Tofu, Mozzarella cheese & Cheddar cheese at different level.

MATERIALS AND METHOD

THE MATERIAL AND METHODS TO BE ADOPTED DURING THIS INVESTIGATION ARE GIVEN BELOW

Procurement and collection of Fresh Cream (Amul), Mozzarella (Amul), Cheddar cheese (Britannia) from local market. Tofu manufactured by self. Salt and soybean were collected from nearest market. Calcium sulphate, Citric acid, Stabilizer and Emulsifier were collected from Scientific Corporation, Allahabad.

PREPARATION OF TOFU

Tofu was prepared by using soy milk and cream using the ratio of 9:1(Soymilk : Cream). Soybeans (100g) were cooked at the temperature of 100ºC for 6-8 minutes using 1% by weight sodium bicarbonate in the boiled water, after cooking; soybeans were soaked in water for 12-14 hours. The water was decanted and the pulses were washed with fresh water, and again soybean was cooked at 100ºC for 4-5 minutes. 100g of pulses per 600ml of water was used for grinding i.e. 1:6 (w/v). The resulting suspension was filtered through double–layered cheese cloth and the soymilk was collected and mixed with cream (9:1) until cream gets dissolve and boiled for 15-20 minutes with continuous stirring to prevent sticking of solids and scorching. For coagulation of the soymilk (soymilk + cream) blended calcium sulphate and citric acid of 2% by weight (1%+1%) concentration were used. Blended milk was heated to coagulation temperatures of 82^0C/5 min, and the coagulants were added slowly with gentle and continuous stirring at 80^0C. After complete curdled, stirring was stopped curd ware left undisturbed at room temperature for 15 min. Whey were removed by straining through cheese cloth. The coagulum thus obtained will be pressed in a small wooden hoop with a pressure of 2.5 kg/cm^2 for 30 min.

PREPARATION OF PROCESSED CHEESE SPREAD

Processed Cheese Spread samples were prepared by using Tofu, Mozzarella and Cheddar cheese. The natural cheese was tempered at 21˚C temperature, after tempering, cleaning was done to remove outer surface of paraffin layer from cheese and natural cheese and tofu were blended in the proper amount until the all the material gets melt and mixed properly.

According to PFA, processed cheese spread means the product obtained by heating cheese with permitted emulsifiers and stabilizer namely Glycerol Monostearate *($C_{17}H_{35}$ .COO.CH_2 .CHOH.CH_2OH)* and Sodium Citrate and acidifying agents namely vinegar, lactic acid, acetic acid, citric acid and phosphoric acid. Processed cheese spread may contains not more than 4.0% of anhydrous permitted emulsifiers and stabilizer, provided that the content of anhydrous inorganic, agents shall in no case exceed 3% of finished product. After mixing, blended mix was process at the temperature of 65˚C for 3-5 minutes with the addition of stabilizer, emulsifier, salt and water. After mixing hot packaging were done and cooled to room temperature and store @ 4ºC in to the refrigerated condition.

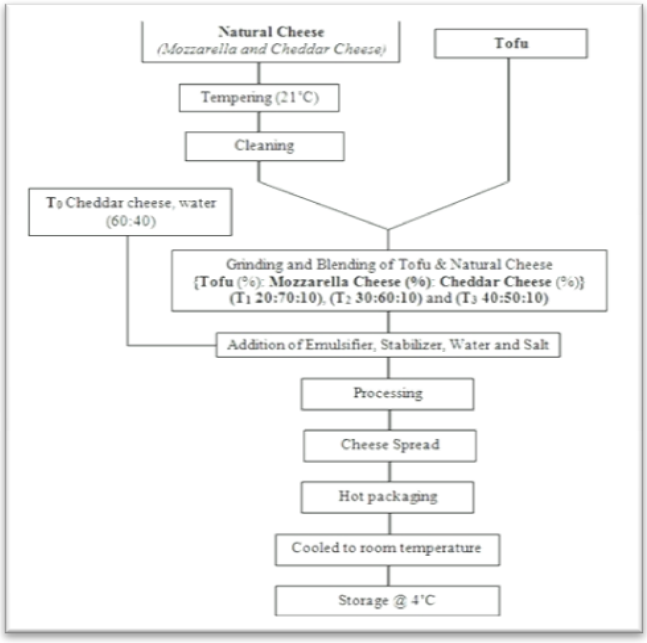

Fig-1 Flow diagram adopted for manufacture of processed cheese spread

PHYSICO-CHEMICAL ANALYSIS

DETERMINATION OF FAT

Fat percentage of processed cheese spread was determined by Gerber method as per adopting the procedure as laid down in manual in dairy chemistry I.C.A.R (1972).

DETERMINATION OF PROTEIN

The protein content of processed cheese spread determined by kjeldahl method described in AOAC (1980).

DETERMINATION OF CARBOHYDRATES

Carbohydrates percentage of processed cheese spread was determined by Phenol-Sulphuric acid method as per adopting the procedure as lay down in manual of food analysis laboratory manual 2nd edition *(2010).*

DETERMINATION OF MOISTURE

The moisture content of paneer was determined as per the procedure given manual in dairy chemistry, I.C.A.R (1972).

DETERMINATION OF ASH

Ash percentage of processed cheese spread was determined from the procedure as laid down in manual in dairy chemistry I.C.A.R (1972).

MICROBIOLOGICAL ANALYSIS

- Preparation of ringer solution and dilution blank were done according to the procedure laid in I.S. 1479, Part III, (1962) and manual in dairy bacteriology I.C.A.R. publication.
- Preparation of Medias: Mac conkey's broth, Nutrient agar, and Potato dextrose agar were prepared according to the procedure laid in I.S. 1479, part –III (1962) and manual dairy bacteriology, I.C.A.R. publication.
- The microbiological analysis i.e. yeast and mould count, SPC count and presumptive coli form estimated by using. Standardized procedure laid down in I.S. (1479) part III (1962) and manual in Dairy bacteriology I.C.A.R. publication (1972).

ORGANOLEPTIC EVALUATION

Five experienced staff members of the Dairy Technology Department was serve as a judging team and was evaluate the samples of control and experimental processed cheese spread. Numerical scores was be allocated for Colour and appearance, flavour and taste and body & texture of the processed cheese spread. The numerical score was used as an indication of the quality. The Judges was also identifying qualities and they were considering to unsatisfactory or satisfactory.

RESULTS AND DISCUSSION

The present study was based to evolve "***Preparation of Processed cheese spread using Tofu, Mozzarella and Cheddar Cheese***". The data collected on different aspects were tabulated & analyzed statistically using the methods of analysis of variance & critical difference. The significant & non-significant differences observed have been analyzed critically within & between the treatment combinations.

The results obtained from the analysis are presented in this chapter under the following headings:

- Physico chemical characteristics processed cheese spread.
- Organoleptic characteristics of processed cheese spread.
- Microbiological characteristics processed cheese spread.

The results (Table 1.) on the basis of physico-chemical, organoleptic and microbiological properties revealed that treatment T_1 was the best keeping in the view of above mentioned properties. Treatment T_1 was found to be the best combination of Tofu, Mozzarella and Cheddar cheese to prepare processed cheese spread. Treatment T_3 was found highest fat (20.83), carbohydrate (5.49) and moisture (56.83) percentage but protein as compared to the treatment T_2 (19.76) & T_1 (20.76) was less respectively. In treatment T_2 & T_3, as per the increasing level of tofu and decreeing level of mozzarella and cheddar cheese, found that T_2 has good body and texture and T_3 has little crumbly body and flavor and aroma has little beany characteristics respectively.

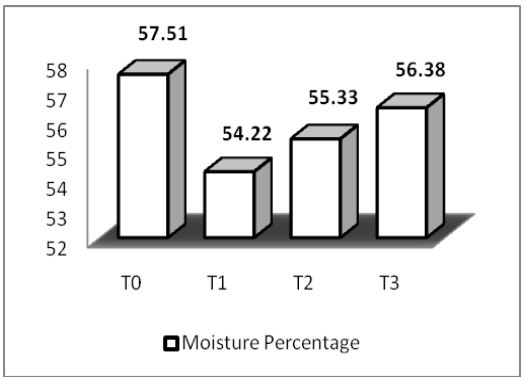

Fig2 moisture percentage in different treatment

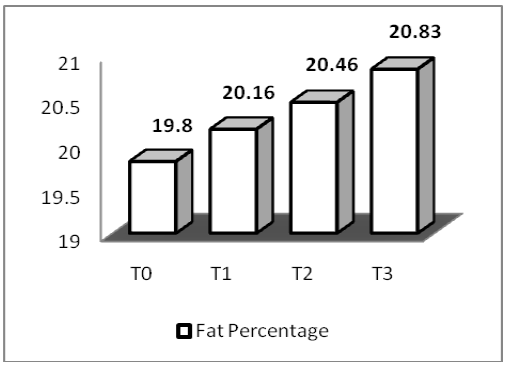

Fig 3 fat percentage in different treatment

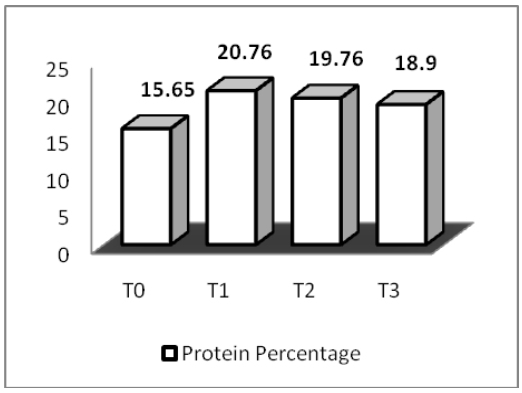

Fig 4 Protein percentage in different percentage

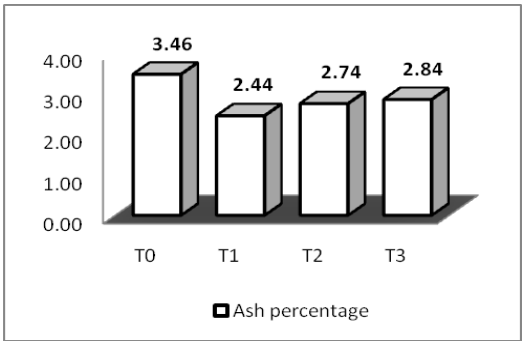

Fig 5 Ash percentage in different treatment

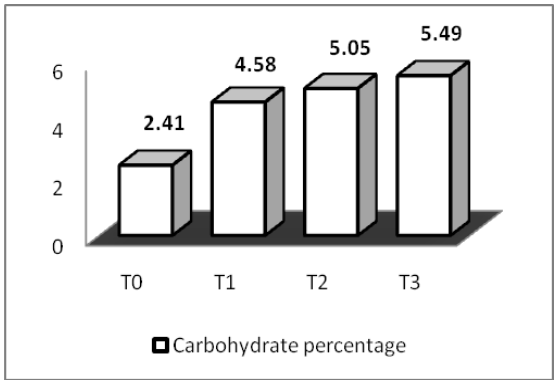

Fig 6 carbohydrate percentage in different treatment

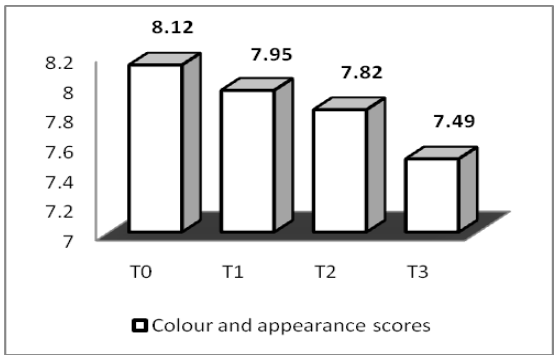

Fig 7. Colour and appearance scores (10 Hedonic Scale)

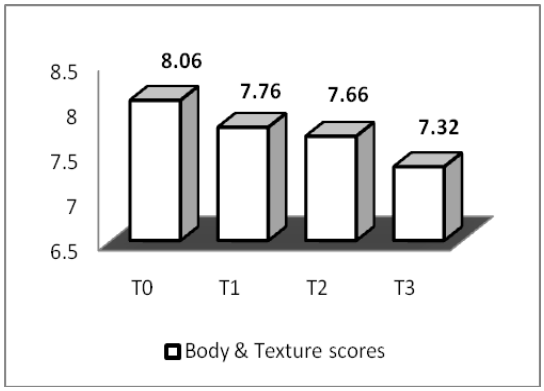

Fig 7 . Body & Texture scores (10 Hedonic Scale)

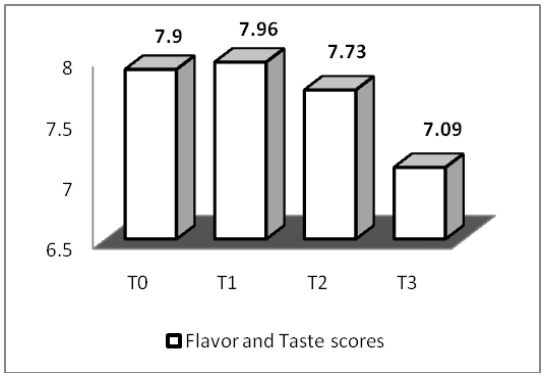

Fig 8. Flavor and Taste scores (10 Hedonic Scale)

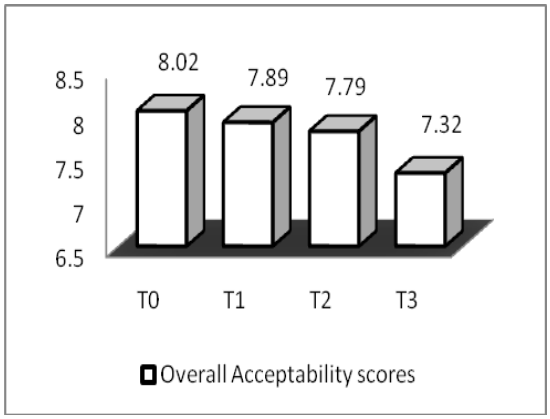

Fig 9. Overall acceptability scores of different treatments (10 Hedonic Scale)

CONCLUSIONS

The results obtained from the statistical analysis revealed that the Tofu, Mozzarella and Cheddar Cheese can be satisfactory blended to prepare processed cheese spread. A significant difference was found between all the parameters of control and experimental processed cheese spread. Treatment T1 (20:70:10) was found to be the best ratio to prepare processed cheese spread of satisfactory quality. With the addition of tofu, we can produce a cost effective processed cheese spread and it could be a good source of isoflavones.

ACKNOWLEDGEMENT

The first author is appreciative to the **Dean,** Warner School of Food and Dairy Technology, Shiats, Allahabad for providing all the amenities in the form of M.Sc Scholar for carrying out this research.

Precious support extended by **Dr. Sangeeta Upadhyay** (Assistant Professor), whose encouragement, guidance and support from the initial to the final level enabled me to develop an understanding of the subject.

REFERENCES

- Ahmad, N.: (2008). Improvement in soy cheese flavor, Food Technol. Biotechnology. 46 (3) 252-261 (2008).
- Ahmed, N.S., Hassan, F.A.M., Salama, F.M.M. & Enb, A.K.M. (1995, published in 1996) Utilization of plant proteins in the manufacture of cheese analogs. *Egyptian Journal of Dairy Science*, 23, 37–45.
- Bachman, H.P. (2001). Cheese analogues-A review. International Dairy Journal 11 (2001) 505–515.
- Casirragh, (1998). Behaviour of mozzarella, cheddar and processed cheese in lubricated and banded unilaxial compression abstr. 206.101.3.
- Chang, J.B, Moon, Balasubramanian W.S.K (2012). Consumer valuation of health attributes for soy-based food: A choice modeling approach. Food Policy Volume 37, Issue 3, June 2012, Pages 335–342.

- Chen, A.H. (1979). Textural analysis of cheese, J. of dairy science, vol. 62, issue 6. Page 901-907.
- D, Sukumar, (1980). Outlines of dairy technology, Cheese, Page No. 224-267.
- David J. (2008). 1st ed., Pg. No. 165-188, Technological advances in cheese & fermented milk products. ISBN: 81-225-0473-6.
- Drake S.L., Gerard P.D., Drake M.A. (2008). Consumer Preferences for Mild Cheddar Cheese Flavors, Journal of Food Science Volume 73, Issue 9, pages S449–S455,November/December 2008.
- Emmons DB, Kalab M, Larmond E, Lowrie RJ. (1980). Milk gel structure. X. Texture and microstructure in Cheddar cheese made using whole homogenized low-fatmilk. J Tex Stud 11:15-23.
- Eymery, O., & Pangborn, R. M. (1988). Influence of fat, citric acid and sodium chloride on texture and taste of a cheese analog. Science des Aliments, 8, 15–32.
- Fife, R.L., D.J. McMohon and C.J. Oberg, (1996). Functionality of low fat mozzarella cheese. J. Dairy Sci. 79: 1903-1910.
- Foda FA, Hammond EG, Reinbold GW, Hotchkiss DK. (1974). Role of fat in flavor of Cheddar cheese. J Dairy Sci 57:1137-42.
- Fox, P. F., T. P. Guinee, T. M. Cogan, and P. L. H. McSweeney. 2000. Fundamentals of cheese Science. Aspen Publishers, Inc., Gaithersburg,MD.
- Fox. P.F., (1999). 2nd edi. Processed cheese products. Cheese: Chemistry, Physics and microbiology. 467-505.
- Gangopadhyay, SK and Chakraborti, SR (1992). Technology for preparation of soy paneer. *Indian Journal of Diary Science*. Vol. 45: 598 – 600.
- Glibowski P., Mleko S., Gustaw W., Janas P.(2002), Production and rheological characteristics profile of processed cheese analogues. Pol. J. Natur. Sci., 2002, 11, 207-214.
- Grazier C.L. , Bodyfelt F.W., McDaniel M.R., Torres J.A.(1991). Temperature effects on the development of cheddar cheese flavor and aroma. Journal of Dairy Science, Volume 74, Issue 11, November 1991, Pages 3656–3668.
- Guinee, T.P., Caric, M. & Kal´ab, M. (2004) Pasteurized processed cheese and substitute/imitation cheese products. *Cheese: Chemistry, Physics and Microbiology*, (eds P.F. Fox, P.L.H. McSweeney, T.M. Cogan & T.P. Guinee), 3rd edn, vol. 2, pp. 349–394, Elsevier, London.
- Hou, H.J.; Chang, K.C. and Shih, M.C. (1997). Yield and textural properties of soft tofu as affected by coagulation method. Journal of Food Science. Vol: 62(4): 824-827.
- Jain, A. and Mittal, B.K. (1992). Quality characteristics of paneer prepared from different verities of soybean. Journal of Food Science and Technology. Vol. 29: 298-300.
- Jelen F.M., Puhan, Z., Driessen, P., and Tamime, A.Y. (1994). Fresh products-yoghurts, fermented milks, quarg and fresh cheese. Mljekarstvo, 44(4): 285-298.
- Kindstedt, P.S., J.J. Yun, D.M. Barbano and K.L. Larose, (1955). Mozzarella cheese impact of concentration on chemical composition, proteolysis and functional properties. J. Dairy Sci., 78: 2591-2597.
- McMohon, D.J, M.C. Alleyne, R.L.fife and C.J. Oberg, (1996). Use of fat replacers in low fat cheese. J. Dairy Sci., 79: 1911-1921.
- Sabikhi L. and Thompkinson D.K. (2006). Laboratory manual cheese and fermented milks. NDRI Pub. No. 25/2006.
- Shaw, M. (1984). Cheese substitutes, threat or opportunity? Journal of the Society of Dairy Technology, 37, 27–31.
- Singh, P.: Kumar, R.: Sabapathy, S.N.: and Bawa A.S. (2008), functional and edible uses of soybean protein products, comprehensive reviews in food science and safety, Vol. 7, 2008. © 2008, institute of food technologies.
- Sun, N. and Breene, W.M. (1991). Calcium sulfate concentration influence on yield and quality of tofu from five soybean varieties. . Journal of Food Science. Vol. 56 (6): 1604 – 1610.
- Templeton, Hugh L., and Sommer, H.H. (1932). Cheese spreads; Journal of Dairy Science, Volume 15, page 155, 1932.
- Tseng Y.C, Xiong Y.L,(2009). Effect of inulin on the rheological properties of silken tofucoagulated with glucono-δ-lactone. Journal of Food EngineeringVolume 90, Issue 4, February 2009, Pages 511–516.