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Studies on quality parameters of soya spread incorporated with soy protein isolate

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Abstract
The present investigation was made with an attempt to develop a soya spread with incorporation of different level of soya protein isolate (7% and 9%) and dietary Fiber (4% and 6%). Lecithin (0.6%) was added as emulsifier. sunfiber was added as a source for dietary fiber. Soya spread was prepared and analyses of different treatments were conducted for protein, fat, carbohydrate, ash moisture and dietary fiber. Organoleptic evaluation for parameters such as body and texture, flavor, colour and appearance, spreadability and overall acceptability was also conducted. It was found that soya spread T2 containing 9 %Soya Protein isolate, 0.6% lecithin and 4% dietery fiber was most accepted by the sensory panelist.

Keywords: Soya spread, Lecithin, Sunfiber, Soya protein isolate

1. Introduction

The wide acceptance of bread in regular diet among urban consumers (75% of all household) reflects around 8% rate of growth in bread consumption (Deshpande and Thompkinson, 2000) [2]. With this increase, the requirement of a suitable spread to complement has also increased. Table spreads include a variety of spreadable semi-solid products such as fat spreads, cheese spread, peanut butter etc. The demand for butter as table spread has declined. Butter have been considered to increase the risk of cardiovascular disease in humans because, in comparison to other lipid sources. They contain a high proportion of unsaturated fatty acids. The interest in developing functional foods is thriving, driven largely by the market potential for food that can improve the health and well being of consumers. Successful types of functional products that have been designed to reduce high blood pressure, cholesterol, blood sugar and osteoporosis have been introduced into the market.

According to FSSAI (2011) Fat spread means a product in the form of water in oil emulsion, of an aqueous phase and a fat phase of edible oils and fats excluding animal body fats. It should have fat not more than 80 per cent and not less than 40 per cent by weight. Moisture not more than 56 per cent and not less than 16 per cent by weight. Melting point of extracted fat not more than 37 ^{o}C (capillary slip method) in case of vegetable fat spread, Unsaponifiable matter of extracted fat in case of vegetable fat spread not more than 1.5 per cent. Acid value of extracted fat not more than 0.5. Accordingly, a range of spreadable fat products varying widely in their fat content are identified under the EU guidelines. In general terminology, products with 11-60% are known as “reduced fat spreads”, those with 40% or less as “low fat spread”, product containing 5-15% and even less fat as “very low fat spreads” and spreads with extremely low fat content are sometimes called “ultra-low-fat spreads” (Dostalva, 2003) [3].

Till date no spread made by soya protein is available in market. Soya protein has various health benifits such as it prevent breast cancer, it also prevents prostrate cancer, aid in natural harmone replacement therapy, reduces LDL Cholestrol, increases T –cell activity (increased immunity) and also acts as powerful antioxidant against trans fatty acids. Isoflavones found in soy protein produce antioxidant effect.

According to NOPA, soyabean contain 19% oil, protein is 36%, insoluble carbohydrates (fiber) is 19%,soluble carbohydrate is 9%, Ash is 4% and moisture is 13%..

Dietary fiber is the indigestible portion of food derived from plants. It is classified as soluble which dissolves in water to form gel like material and insoluble which caanot be dissolved in water. there are many benifits of dietery fiber such as it normalizes bowel movements, it helps in lowering the cholesterol level and it also helps to control blood sugar level. There are many dietary fiber such as inulin and sunfiber which are added to foods for there exceptional properties.

Sunfiber is a galactomannan based soluble dietary fiber made from hydrolyzed Guar gum. It is a versatile powder that can be easily added to a wide variety of foods, beverages and supplements. Sunfiber does not impact the flavor, color, texture, or aroma of the products to which it is added. It offers an easy way to increase fiber in the diet using consumers favorite foods and beverages.

Materials and methods

The experimental work was carried out in the research laboratory of department of Dairy, Technology, Warner college of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad. Soya flour, refined soyabean oil and salt was procured from local market. Spread was prepared by soya flour in prescribed level of protein Sunfiber as dietary fibre at different levels was mixed with aqueous phase. A fat blend consisting of milk fat and vegetable oil blend was prepared separately. Calculated amount of fat blend was mixed with aqueous phase for emulsification. Different type and levels of emulsifiers were used to provide an stable emulsion. The pH of prepared emulsion was adjusted to 5.2 using lactic acid as acidifying agent The emulsion was then pasteurized, cooled and packed in suitable containers. Type and level of additives will be selected through sensory characterstics. The table spread prepared using selected level of ingredients was used further for selection of level of salt and flavouring material. The level of salt and flavouring material was selected based on sensory evaluation of the product. The final product was subjected to gross composition and sensory analysis. Number of treatments were four which were replicated five times.

Treatment one (T1) contains 7 percent Soya Protein along with 0.6 percent lecithin and 4 percent dietery fiber. Similarly treatment two (T2) contains 9 percent Soya Protein along with 0.6 percent lecithin and 4 per cent dietery fiber. Likewise treatment three (T3) contains 7 percent Soya Protein along with 0.6 percent lecithin and 6 percent dietery fiber. Lastly treatment four (T4) contains 9 percent Soya Protein with 0.6 percent lecithin and 6 percent dietery fiber

The schematic diagram for preparation is given in Fig. 1

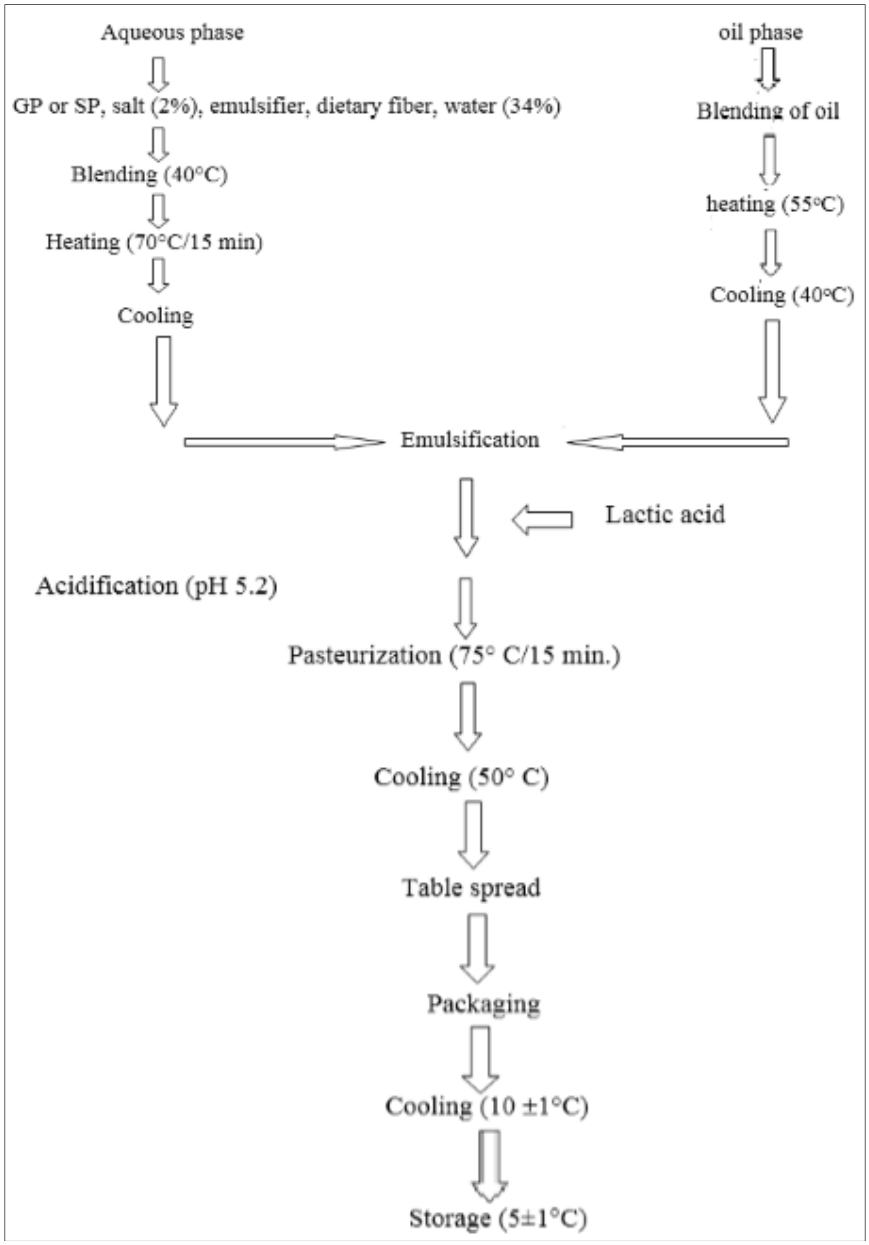

Fig 1: Schematic diagram for preaparation of functional table spread

Physico-Chemical Properties

Determination of Protein: The protein content of soya spread determined by kjeldahl method described in AOAC (1980) [1].

Determination of Fat: Fat percentage of soya spread was determined by Mojonnier method as per Laboratory Manual, 1959

Determination of Carbohydrates: Carbohydrates percentage of soya 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 soya spread was determined as per the procedure given manual in dairy chemistry, I.C.A.R (1972).

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

Determination of Dietary Fiber: Dietary fiber for soya spread was detrmined by manual of AOAC (1980) [1],

Sensory Evaluation

The acceptability of spread was assessed by a panel of 5 judges selected from the faculty of WCDT, SHUATS, Allahabad. The colour and appearance, spreadability, body and texture, flavour and overall acceptability of the product were assessed by using 9-point rating scale (1-disliked extremely; 9- liked extremely) (Sri Lakshmi 2006) [8]. Spreadability was assessed by the panelists using a piece of bread slice to spread the product at uniform experimental temperature 5 ± 1 °C.

The data was analyzed statistically by using mean score

Results and Discussion

The present study was based to evolve "Studies on quality parameters of soya spread incorporated with soy protein isolate". 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 of soya spread.
- Organoleptic characteristics of soya spread.

The results obtained are shown in table 1 and table 2

From table 1 it can be observed that Highest protein content was found to be of T4 (14.04) containing 9 percent Soya Protein with 0.6 percent lecithin and 6 percent dietery fiber. This is due to high percentage of soya protein isolate added into spread at a level of 9 percent. Lowest protein content was found to be in T3 (11.66) containing 7 percent Soya Protein along with 0.6 percent lecithin and 6 percent dietery fiber. Further it is also be observed that T3 containg 7 percent Soya Protein along with 0.6 percent lecithin and 6 percent dietery fiber has the highest value (43.17). This increase in fat may be due to fat in soyabean oil. Lowest fat content was found to be in T4 (42.49) containing 9 percent Soya Protein with 0.6 percent lecithin and 6 percent dietery fiber. Fat is the major ingredient contributing to the viscosity and body of the spread. The rigidity of emulsion depends on the size of the oil droplets and partly on how tightly they are packed. The more the oil dispersed in the emulsion, the stiffer it will be. The major criterion for oil selection is the degree of unsaturation in the constituent fatty acids (Formo *et al.,* 1979) [5]. T3 (13.69) containing 7 percent Soya Protein along with 0.6 percent lecithin and 6 percent dietery fiber was found to be highest in carbohydrate content. Lowest carbohydrate was recorded in T1 (10.71) containg 7 percent Soya Protein along with 0.6 percent lecithin and 4 percent dietery fiber. Ash content was high in T2 (3.08) containing 9 percent Soya Protein along with 0.6 percent lecithin and 4 per cent dietery fiber. Lowest ash percent was observed in T3 (1.55) containg 7 percent Soya Protein along with 0.6 percent lecithin and 6 percent dietery fiber. Dietary fiber was high in T3 (6.94) containing 7 percent Soya Protein along with 0.6 percent lecithin and 6 percent dietery fiber. Lowest value of dietary fiber was found to be in T2 (4.27) containing 9 percent Soya Protein along with 0.6 percent lecithin and 4 per cent dietery fiber. Moisture was highest in T1 (34.52) containg 7 percent Soya Protein along with 0.6 percent lecithin and 4 percent dietery fiber. Lowest value of moisture was recorded in T4 (30.52) containg 9 percent Soya Protein with 0.6 percent lecithin and 6 percent dietery fiber.

The above results are tabulated in table 1 below.

Table 1: Physicochemical parameters for soya spread

Parameters	T1	T2	T3	T4
Protein	11.72	13.84	11.66	14.04
Fat	42.92	42.79	43.17	42.49
Carbohydrate	10.71	11.77	13.69	11.96
Ash	2.98	3.08	1.55	2.62
Dietary fiber	4.54	4.27	6.94	4.29
Moisture content	34.52	32.52	32.52	30.52

Graphical representation of physiochemical parameters for soya spread is shown in Fig 2.

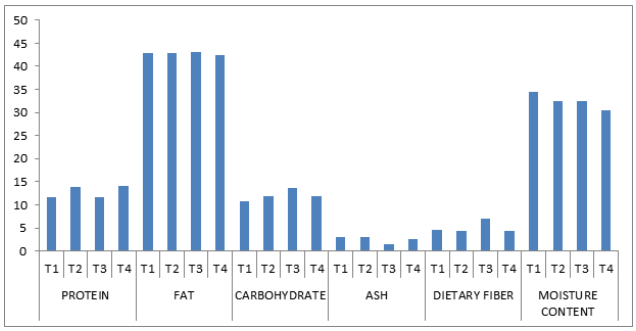

Fig 2: Graphical representation of physiochemical parameters for soya spread

Sensory Analysis

From table 2 it can be observed that T2(7.72) containing 9 percent Soya Protein along with 0.6 percent lecithin and 4 per cent dietery fiber has the highest scores for texture Lowest scores for texture was recorded in T3 (6.22) containg 7 percent Soya Protein along with 0.6 percent lecithin and 6 percent dietery fiber. Increases in the percentage of soya protein isolate contribute to the body and texture of the spread as suggested by (Deshpande and Thompkinson, 2000) [2]. Similarly flavour had highest scores for T2 (8.92) containing 9 percent Soya Protein along with 0.6 percent lecithin and 4 per cent dietery fiber Lowest scores for flavor was found to be

in T4 (7.72) containing 9 percent Soya Protein with 0.6 percent lecithin and 6 percent dietery fiber. Patel and Gupta (1988) suggested that adding of 5% and 10% skim milk powder (SMP) enhanced flavour and texture characteristics of the spread. Scores for Colour and appearence was highest in T2 (7.88) containing 9 percent Soya Protein along with 0.6 percent lecithin and 4 per cent dietery fiber. Lowest scores for colour and appearance was recorded in T4 (6.96) containing 9 percent Soya Protein with 0.6 percent lecithin and 6 percent dietery fiber. Spreadability was highest in T2 (8.42) containg 9 percent Soya Protein along with 0.6 percent lecithin and 4 per cent dietery fiber. Lowest scores for spreadability was found in T3 (6.9) which contain 7 percent Soya Protein along with 0.6 percent lecithin and 6 percent dietery fiber. Developed a recombined butter using fractionation fat; the product exhibited good spreadability at 4 °C and maintained its physical structure at room temperature. Overall acceptability has highest scores for T2 (6.94) containing 9 percent Soya Protein along with 0.6 percent lecithin and 4 per cent dietery fiber and lowest scores for Overall acceptability was found to be in T1 (6.94) containing 7 percent Soya Protein along with 0.6 percent lecithin and 4 percent dietery fiber. Deshpande and Thompkinson, (2000) [2] also suggested that Proteins are added to the spread for their organoleptic, functional and nutritional properties. They impart a creamy taste, thereby improving the consumer acceptability. The above results are tabulated in table 2 below.

Table 2: Sensory scores for soya spread

	T1	T2	T3	T4
Texture	7.02	7.72	6.22	6.72
Flavour	7.82	8.92	7.96	7.72
Colour and Appearance	7.54	7.88	7.2	6.96
Spreadability	7.94	8.42	6.9	7.98
Overall Acceptance	6.94	8.08	7.82	7.74

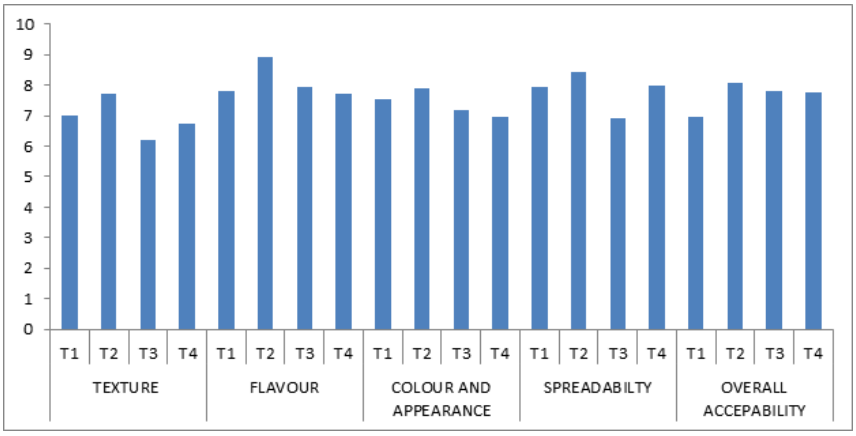

Fig 3: Graphical representation of sensory parameters for soya spread

Conclusion

The results obtained from the statistical analysis revealed that the Soya protein isolate can be used to prepare soya spread. A significant difference was found between all the parameters of experimental soya spread. Treatment T2 which contain 9 percentage Soya Protein along wth 0.6 percent lecithin and 4 percent of dietery fiber was found to be the best ratio to prepare processed soya spread of satisfactory quality. With the addition of sunfiber and soya protein isolate, we can produce a cost effective soya spread and it could be a good source of isoflavones. Since it is also low fat spread it can be useful for people with obesity and heart diseases, hence creating a healthy option for people who want to eat spread like product.

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