

Original Research Article

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Low Cost Technology of Soy-Paneer (Tofu) Health Food from Soymilk Blended with Buffalo Milk

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ABSTRACT

Soybean (*Glycine max*), otherwise known as a ‘miracle crop’ with over 40 per cent protein and 20 per cent oil, minerals and vitamins for human food originated in China. Soy foods are nutritious, economical and provide many health benefits. A number of processed soya products are available in the market. They include Soya milk, Soya flour, Soya curd and Tofu (Soya Paneer). Besides its nutritive quality, functional properties of Soy Protein have opened avenues for producing new products and improving the quality of existing standard food products. Research trial was conducted in Mandsaur district of Madhya Pradesh (M.P.), under the Front Line Demonstration (FLD) programme, thirteen farm women were selected randomly and questionnaire was developed to study demographic parameters and extensive review of the value addition training of respondent of village. Soybean paneer (tofu) fortified by blending 70:30 ratio of soy milk and with buffalo milk then blended milk was coagulated with 2% acetic acid. After draining of whey coagulum was set as soy paneer and some was analyzed for organoleptic parameters. The result findings show that the benefit cost ratio was (1.64) found in improved method and (1.31) in traditional method, where income was increased 64.67 % compare to traditional method. Farm women earn the money by value added product of fortified soy-paneer. It was found that overall acceptability increased with 30 % addition of buffalo milk used for preparing soy-paneer (Tofu) that increased the quality of product and also increased the income of farm women.

Keywords

Soy-paneer (Tofu),
Buffalo milk, Income,
Farm women, Sensory
parameter

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Introduction

Soymilk is used in various food products such as tofu, fruit flavored puddings, calcium and protein rich soymilk. A stable emulsion of oil, water, and protein, it is produced by soaking dry soybeans and grinding them with water. Soy milk contains about the same proportion of protein as cow’s milk: around 3.5%; also 2% fat, 2.9% carbohydrate, and 0.5% ash

besides being rich in protein, vitamins and minerals. Soy milk is an intermediate product in the manufacture of soy paneer. Soy paneer prepared from soymilk and toned milk is a rich source of high quality proteins and vitamins, Jain & Mittal (1992). When the milk was heated at 121 °C, inactivation of almost 90% of anti-nutritional factor as trypsin inhibitor can be achieved (Chauhan and Tomer, 1998; Chauhan *et al.*, 1998). Soybean

consumption directly lowers the elevated cholesterol levels, due to presence of saponin, fatty acid compounds that bind cholesterol in the blood. Soymilk is free from lactose and good choice for people who are lactose intolerant. In this study an effort has been made to prepare good quality paneer by blending toned milk with soymilk using the technique of manufacture as recommended by Babje and Rathore (1989). Soymilk has a flat taste which is mostly not preferred in India, that's why blending of buffalo milk for of 10% to 50% can be added to improve the quality of Tofu. Vijayananda *et al.*, (1989) reported that acid coagulated curds exhibited greater hardness, sponginess, gumminess, chewiness as compared to the salt coagulated curds. Arora and Mittal (1991) reported that addition of skim milk to soymilk increased the shear strength of the product and improved the texture. The soymilk-skim milk in 80:20 ratio was found suitable for preparation of tofu. Looking to the very strong cultural heritage of cow/ buffalo milk based dietary system in India; it is unlikely to replace milk paneer by soy Paneer. The taste, flavor and texture improved with increase in part of buffalo milk in blended milk. The overall acceptability improves with increase in part of buffalo milk in blended milk. At 30:70 per cent blend the soy paneer was not only acceptable to consumer, but it also maintained the identity as soy paneer Singh *et al.*, (2016) and Tripathi *et al.*, (2017). Therefore, a blend of soymilk and buffalo milk can be identified, which will suppress the beany flavor and taste of soymilk to a limit such that it is acceptable to the consumers. The purpose of the study was to determine the impact of value addition of soya-tofu for income generation as well as nutritional food security of farm family

Materials and Methods

The study was conducted in Mandsaur district of Madhya Pradesh (M.P.), Village

Gurjarbarardiya was selected for conducting the Front Line Demonstration (FLD). The 13 farm women were selected randomly with good health appearance, interviewed schedule and questionnaire was developed to study demographic parameters and extensive review of the value addition training of respondent of village. Product was evaluated for organoleptic sensory parameters viz., taste, colour, texture, flavour and overall acceptability.

The samples were analyzed for organoleptic examination as per the procedure laid down by ICAR manual in Dairy Chemistry and Dairy Microbiology (1972). The production of tofu consists of preparation of soymilk and then the coagulation of soymilk to form curds which are pressed to form tofu cakes. Raw materials: Soybean was collected from the local house hold level.

Soy milk preparation

First of all clean healthy soybeans seeds were soaked in clean tap water in 1:5 ratio for 8 -10 hours until the beans split open easily and are flat on the inside. The excess water was drained and the beans were washed thoroughly to remove the outer surface. Beans were then ground in a batch of 2.0 kg after adding small amount of water to it and mixed well to make a pulp. The soy slurry was then brought to 10 liters by mixing hot water and boiled continuously for 25 min with regular stirring to prevent burning. It is important to boil the pulp as this improves both the flavor and nutritional value of the product.

After boiling, any scum and insoluble material that floats to the surface of the milk was removed. Soy slurry was the filtrated through muslin cloth and the un-dissolved residual mass known as 'okra' was removed. The obtained soy milk was further used for making fortified soy-paneer.

Preparation of fortified tofu

Milk samples for preparation of tofu were done by blending 70:30 ratio of soy milk with buffalo milk. The combined milk was then heated with continuous stirring unless the temperature reaches 80°C. First 20 ml (@2 ml/ kg milk) glacial acetic acid was dissolved in 500 ml of warm water, after then glacial acetic acid was used as a coagulant for the curdling of blend soymilk. The mixture was stirred continuously until the milk starts to coagulate. After complete curdling, milk was filtered through a clean sanitized muslin cloth into a suitable mould. To form a block of tofu, the mould is taken under paneer press and a constant pressure is given for 20 min to squeeze the excess water so that approximately 60% water content will reduce. Data were analyzed and simple mean percentage was calculated as formula is given below by Chandel (1991).

BC Ratio = Total benefit (Goss profit) in Rs / Total cost of input (Expenditure) in Rs.

FWP = (Farm Women Practice), IP = (Improved Practice), BCR = (Benefit Cost Ratio)

Income increases (%): $\text{Output} - \text{Input} / \text{Input} \times 100$

Results and Discussion

The results show that the Benefit Cost Ratio (BCR) was found in improved practice (1.64) and (1.33) in traditional practice, where income increased by 64.67 % compared to traditional method (Table 1 and 2).

The data (Table 3) revealed that sensory parameters *viz.*, colour, texture, flavor, taste and overall acceptability were found superior in improved practice as compared to the traditional practice. Similar result is also reported by Mitra *et al.*, (2013), Singh *et al.*, (2016) and Tripathi *et al.*, (2017).

BC Ratio = Gross profit /Cost of input

FWP = $1040/780 = 1.33$

IP = $5780/3510 = 1.64$

Income increases (%) - $(\text{Gross profit} - \text{Cost of input} / \text{Cost of input}) \times 100$

FP - $(1040-780) /780 \times 100 = 33.33\%$

IP - $(5780-3510) /3510 \times 100 = 64.67 \%$

Table.1 Item used for soya-paneer (tofu) fortified with buffalo milk

S. No	Particulars required	Quantity
1.	Soybean	26 kg
2.	Buffalo Milk	39 liter
3.	Glacial acetic acid	250 ml
4.	Muslin cloth	2 Meter
5.	Paneer press	01
6.	Cooking range	01
7.	LPG Stove	01
8.	Mixer grinder	01
9.	Packaging material	800g
10.	Cutting Knife	01
11.	Electronic Balance(5kg capacity)	01

Table.2 Economic parameters for soy-paneer fortified with buffalo milk

Particular	Blended Soya-paneer (70:30)
No. of trials	01.00
No. of farm women involved	13.00
Cost of (30 kg) raw material of in Rs.	3510.00
Output of Production kg/day	34.00
Cost of produce/kg in (Rs.)	103.23
Av. sale cost of produce	170.00
Gross profit of produce Rs.	5780.00
Net Return in Rs.	2270.00
Income increase (%)	64.67
Benefit Cost Ratio (BCR)	01.64

Table.3 Organoleptic test of fortified Soya-paneer blended with buffalo milk

Product	Sensory Attributes				
	Colour	Texture	Flavour	Taste	Overall acceptability
(Control)	5.0	5.1	5.6	5.7	5.5
(Improved Practice)	7.0	7.5	6.5	7.7	7.2

It was concluded that product with 70% soy milk and 30% buffalo milk can be utilized for the production of soy paneer with higher consumer acceptability, benefit cost ratio was (1.64) found in improved practice and (1.33) in traditional practice, where income increased was 64.67 % compare to traditional practice. Soya-Paneer (70:30) fortified blended with buffalo milk was superior in quality with respect to its physical and chemical parameters and increase the income of farm women and it could be a startup for small scale entrepreneur for rural area. Farm women earn the money by value added product of soybean paneer (tofu).

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