Formulation and physico-chemical analysis of whey-soymilk dahi

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Abstract The present investigation was undertaken to use whey for the production of nutritious whey-soya milk dahi. Neutralized whey (pH 7.0 ± 0.2) was used to extract soya milk from cleaned, dried, dehulled and steamed soybean in soya milk extraction plant. Whey-soya milk was extracted having whey to soybean ratio of 5:1. It was further diluted with whey to get different whey to soybean ratios i.e. 9:1, 8:1, 7:1 and 6:1. To set dahi, skim milk powder was added to whey-soya milk so as to make the final total solid concentration of 16, 18 and 20 %. Dahi was prepared by inoculating different whey-soya milk ratios with vita brand of dahi. Results revealed that whey-soya milk having whey to soybean ratio of 5:1 and 20 % total solids was found to be most appropriate for preparation of dahi on the basis of time taken for firmly setting of dahi (5 h) and sensory evaluation scores (7.7 on 9 point hedonic scale). Whey-soya milk dahi was found to be at par with milk dahi (control) based on the sensory scores. Whey-soya milk dahi and milk dahi samples were stored at refrigeration temperature and evaluated for changes in physico-chemical (fat, protein, total sugar, total solids, pH, viscosity and syneresis)

and sensory (color and appearance, flavor, consistency and overall acceptability) properties at an interval of 2 days up to 10 days. The results of the study revealed that whey-soya milk dahi could be stored up to 10 days with good sensory quality.

Keywords Soybean · Whey · Milk · Dahi · Syneresis · Physico-chemical parameters

Introduction

Soybean [*Glycine max* (L.) Merrill] is one of the nature's wonderful gifts. Soybean represents an excellent source of high quality protein; it has a low content in saturated fat, it contains a great amount of dietary fiber and its isoflavone content makes it singular among other legumes (Asif and Achaya 2013). On an average, dry soybean contains 40 % protein, 20 % oil, 35 % soluble and insoluble (dietary fiber) carbohydrate and 5 % ash (Jooyandeh 2011). Soybean oil is low in saturated fat, rich in the essential fatty acids and is an excellent source of vitamin E. The ratio of polyunsaturated fatty acid to saturated fatty acid is 82:18, which is highly conducive to lower the blood cholesterol (Tripathi and Misra 2005). Soybean and soy foods have been used as beneficial dietary and nutritive materials in several Asian countries due to their high quality proteins and many other functional substances like omega-3, omega-6, phenolic acids and isoflavones (Zhang et al. 2003; Chung et al. 2011).

Whey is a valuable dairy by-product obtained during cheese/paneer and casein manufacture. It is presently being drained off as such due to the absence of economically viable methods for its utilization, which not only causes loss of precious nutrients but also creates environmental problems due to its high Biological Oxygen Demand (38,000 to 46,000 ppm). These amounts are 100 times higher than the effluent load from an average household. Further, the treatment of whey before disposal is a very costly affair (Shendurse et al. 2009). There is

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an increased awareness all over the world on the potential utilization of whey, primarily because of pollution prevention regulations, economic conditions and future needs to ease world food shortage (Horton 1995). It is highly nutritious containing more than half the solids present in the whole milk, including 20 % of the protein called whey protein, having Biological Value of 104, and most of the lactose, minerals and water soluble vitamins (Puranik and Rao 1996).

The main objections to soybean products (e.g. soymilk) by some consumers are the associated intrinsic flavor which has been described as beany/grassy or astringent. Furthermore, soybeans are high in phytate and oxalate, substances that can block the uptake of essential minerals such as calcium, magnesium, iron, copper and zinc, in the intestinal tract. Fermented and curdled products from soymilk are common and highly popular (Cruz et al. 2009). Indeed, the first benefit of soy fermentation is the reduction of its beany flavor and chalkiness. Lactic acid fermentation has been reported as a means to reduce beany flavor and anti-nutritional factors (Buono et al. 1990). Lactose is fermented by the bacteria to lactic acid, which causes the characteristic curd to form; this acid also restricts the growth of food poisoning bacteria (Rani et al. 2007).

According to various studies (Anderson et al. 1999; Anthony et al. 1997), an intake of soybean or soy foods may be effective to reduce the risk of heart diseases and various cancers. Furthermore, an intake of soy proteins or soy isoflavones has been reported in decreasing diastolic blood pressure, serum total cholesterol, LDL-cholesterol in the subject groups with high or normal cholesterol level (Anderson et al. 1995; Hooper et al. 2008; Taku et al. 2007). Several studies have reported the use of soymilk for the production of yogurt-like products (Trindade et al. 2001; Kovalenko and Briggs 2002; Denkova and Murgov 2005; Nande et al. 2008; Li et al. 2010; Ghosh et al. 2011), soy cheese and also soy curd used for preparing tofu (Obatolu 2008; Joo et al. 2011).

Various soy products are readily available in market e.g. soymilk, tofu, sufu, soy paneer, etc. but there is no literature available on the preparation of soy curd utilizing whey as a major ingredient for extracting soymilk instead of water. Considering the above mentioned beneficial effects of whey and soybean, it is believed that development of strategy to harvest and conserve whey solids in most economical and convenient form is need of the day and that these low cost ingredients could be found suitable for developing nutritious fermented product i.e. whey-soya milk dahi, combining the nutritional properties of both whey and soybean.

Materials and methods

Paneer whey, prepared from Standardized milk [fat (%) 4.5 ± 0.1 and SNF (%) 8.5 ± 0.1], was procured from Department of

Livestock Products Technology, Chaudhary Charan Singh Haryana Agricultural University (CCS HAU), Hisar, Haryana, India. PK 416 variety of soybean was procured from the Department of Plant Breeding, College of Agriculture, CCS HAU, Hisar. Skim milk powder (SMP) (having total solids 96 %, total sugar 58 % and protein 37 %) (Nova brand) and Vita brand Dahi (used as starter culture) were procured from the local market of Hisar. Polystyrene cups of 200 ml capacity were used as packaging material for dahi.

Chemicals

All chemicals used in investigation were of laboratory grade purchased from standard suppliers S.D. Fine Chemicals, Sisco Research lab, Merck, India.

Preparation of paneer whey

Paneer whey was prepared during the manufacture of paneer using standardized milk in the Department of Livestock Products Technology, CCS HAU, Hisar. Milk was heated in a stainless steel vessel to 90 °C and cooled to 80 °C followed by acidification with citric acid (2 %) and continuous stirring that resulted in the coagulation of milk protein (casein) for the preparation of paneer. The whey obtained was passed through muslin cloth to remove suspended particles. The pH of the strained whey was adjusted to 7.0 ± 0.2 using calcium hydroxide. The neutralized whey was used for the extraction of soymilk.

Extraction of whey-soymilk

Whey-soymilk was prepared by adopting single stage extraction technique standardized by Upadhyay et al. (2011) with slight modifications. Whey-soymilk having whey to soybean ratio 5:1 was prepared by first adding 1 kg pre-processed/treated soybean with 2 L of neutralized whey in the grinder section of soya milk extraction plant, manufactured by Pristine Plants India (Pvt.) Ltd., Faridabad, Haryana, grinding soybean for at least 10 min followed by addition of remaining 3 L of whey and steaming of mixture was carried out by releasing steam from boiler to raise the temperature of mixture to 100 ± 5 °C and pressure to 1.5 ± 0.1 kg/cm². Grinding was then stopped and whey-soymilk was collected by filtering through nylon net. The yield of whey-soymilk and amount of okara (residues) were noted. Extracted whey-soymilk was further diluted using neutralized- whey for obtaining whey to soybean ratio of 9:1, 8:1, 7:1 and 6:1.

Preparation of milk dahi (control)

The standardized milk was taken, heated to 85 °C and then cooled to 40 °C. Milk was inoculated with vita brand dahi @ 2 % and then 100 ml of it was transferred to each cup. The

Fig. 1 Flow chart for preparation of whey-soymilk dahi

samples were incubated at 40 °C in biological oxygen demand (BOD) incubator till dahi was set.

Preparation of whey-soymilk dahi

Whey-soymilk (9:1, 8:1, 7:1, 6:1 and 5:1) was heated to 85 °C. Total solids of whey-soymilk was adjusted to 16 %, 18 % and 20 % by using SMP and then cooled to 40 °C. Then, all whey-soymilk ratio combinations were inoculated with vita brand of dahi @ 2 % and then 100 ml of it (each ratio) was transferred to cups. The samples were incubated at 40 °C in BOD incubator till the setting of dahi (Fig. 1).

Table 1 Composition of ingredients used for making whey-soymilk dahi

	Fat (%)	Protein (%)	Total sugar (%)	Total solids (%)	pH
Standardized milk	4.50±0.05	3.40±0.05	4.50±0.03	13.1±0.2	6.8±0.01
Whey	0.35±0.04	0.72±0.05	4.22±0.04	6.03±0.1	5.1±0.01
Whey-soymilk (5:1)	1.71±0.05	2.57±0.04	6.22±0.04	10.50±0.3	6.6±0.01
Skim milk powder	1.30±0.03	37.00±0.03	53.01±0.03	96.00±0.2	6.7±0.01

Each observation is a mean±S.D. of three replicates ($n=3$)

Table 2 Yield of whey-soymilk and okara prepare by using different ratios of whey: Soybean

	Whey: soybean				
	9:1	8:1	7:1	6:1	5:1
Whey-soymilk (l)	13.0	11.0	10.5	9.0	7.0
Okara (g)	472	500	540	585	610

Physico-chemical analysis

Standardized milk, whey, whey-soya milk, milk dahi and whey-soya milk dahi

The standardized milk, whey and whey-soymilk were analyzed for their proximate composition (i.e. protein, fat, total sugar and total solid content), pH and sensory attributes.

Set dahi samples i.e. milk dahi and whey-soya milk dahi, were analyzed for proximate composition (fat, protein, lactose and total solid content), pH, viscosity, syneresis and sensory attributes. The set dahi samples were analyzed at an interval of 2 days for a period of 10 days.

The protein content was estimated by Micro kjeldahl method (AOAC 1995) with slight modifications. Total sugar was estimated by using Lane-Eynon method [I.S. 1166–1973 (1991)]. Total solids content of whey-soymilk was determined by Gravimetric method (BIS 1989a) and that of milk dahi and whey-soymilk dahi was determined by method: Modified I.S 12333 (1997). Fat was determined by Gerber method (BIS 1989b). For milk dahi and whey-soymilk dahi slight modifications were done i.e. 100 g of dahi was taken and 5–6 ml of ammonium hydroxide was added to it followed by mixing the two. Then, the procedure same as whey-soymilk was followed. Results obtained were multiplied by factor of 11/10. The pH was determined by digital pH meter (Elico India Ltd.).

Sensory evaluation

Sensory evaluation of milk, whey, whey-soymilk, milk dahi and whey-soymilk dahi was done by using 9-point Hedonic

Table 3 Sensory attributes of whey-soymilk prepared by using different ratios of whey: Soybean

Sensory attributes	Whey: soybean					C.D. at 5 %
	9:1	8:1	7:1	6:1	5:1	
Color and appearance	7.5±0.32	7.5±0.44	7.6±0.51	7.7±0.41	7.8±0.32	N.S.
Flavor	7.6±0.22	7.7±0.51	7.7±0.42	7.8±0.37	7.8±0.41	N.S.
Consistency	7.6±0.43	7.6±0.32	7.6±0.41	7.7±0.31	7.7±0.50	N.S.
Overall acceptability	7.5±0.32	7.6±0.31	7.6±0.33	7.7±0.47	7.7±0.44	N.S.

Each observation is a mean±S.D. of three replicates ($n=3$)

scale. Color and appearance, flavor and consistency were evaluated by panel of 9 semi-trained judges. Average of scores of all the parameters are expressed as overall acceptability.

Storage study

The samples were stored at refrigeration temperature (4–7 °C) and were drawn at 2 days interval upto 10 days. The samples were analyzed for their physico-chemical changes, pH, viscosity, syneresis and sensory evaluation during storage.

Viscosity

Viscosity was determined using Rheology International Viscometer. Viscometer was auto zeroed in the air after fixing the spindle (ASTM Disk Spindle-3 at room temperature). Dahi samples were poured in tissue homogenizer tube and stirred by 20 up and down movements of the plunger in the tube. The viscosity of stirred dahi samples was measured at 25 rpm, after starting rotation and results being expressed in mPas.

Syneresis (wheying off)

Syneresis was determined by method of Marshall (1982). Dahi in the container (100 g) was cleanly cut crosswise with

a spatula and around the edge with a thin spatula. A stainless steel wire grid (8 mash/cm²) slightly smaller than the inside diameter of container, was placed gently on the surface of dahi. At 30 min interval the volume of whey obtained was poured off into a 10 ml measuring cylinder, keeping wire grid in place with the help of spatula, to prevent the dahi from falling out and volume of whey was noted.

Statistical analysis

The data obtained in the present study was analyzed for the significant difference in the treatments ($n=3$) by subjecting to analysis of variance (ANOVA) technique (two factorial completely randomized design) using on-line programme (Sheoran 2010).

Results and discussions

Composition of ingredients used for making whey-soymilk dahi (WSMD)

Standardized milk, whey, whey-soymilk and Skim Milk Powder used for making whey-soymilk dahi were assessed for their composition i.e. fat content, protein content, total

Table 4 Changes in proximate composition of whey-soymilk dahi during storage at refrigeration temperature

Constituents (%)	Treatment	Storage period (days)						C.D. at 5 %		
		0	2	4	6	8	10	S	T	I
Fat	MD	4.5±0.12	4.5±0.22	4.5±0.17	4.5±0.20	4.4±0.11	4.4±0.26	N.S.	0.2	N.S.
	WSMD	2.8±0.22	2.8±0.16	2.8±0.22	2.7±0.21	2.7±0.27	2.7±0.92			
Total Protein	MD	3.6±0.22	3.6±0.14	3.6±0.12	3.5±0.21	3.5±0.11	3.4±0.13	N.S.	0.9	N.S.
	WSMD	6.0±0.12	6.0±0.21	5.9±0.15	5.9±0.16	5.9±0.18	5.8±0.19			
Total sugar	MD	4.5±0.11	4.5±0.23	4.4±0.16	4.3±0.17	4.3±0.11	4.0±0.20	N.S.	2.7	N.S.
	WSMD	10.0±0.20	10.0±0.21	9.9±0.22	9.7±0.19	9.7±0.12	9.6±0.16			
Total solids	MD	13.5±0.26	13.5±0.27	13.4±0.12	13.3±0.21	13.0±0.17	13.0±0.18	N.S.	2.3	N.S.
	WSMD	19.7±0.23	19.7±0.21	19.6±0.28	19.5±0.23	19.4±0.32	19.0±0.20			

Each observation is a mean±S.D. of three replicates ($n=3$)

S storage, T treatment, I interaction, N.S. non significant, MD milk dahi, WSMD whey-soymilk dahi

Fig. 2 Changes in physical properties of whey-soymilk dahi during storage at refrigeration temperature (4–7 °C)

sugar, total solid and pH (Table 1). Results obtained for the composition of whey in the present study are in close agreement with Speer (1998) who observed that composition of acid whey was: dry matter 5–6 %, lactose 3.8–4.3 %, total protein 0.8–1.0 % and pH 4.6–5.0.

Extraction of whey-soymilk

Yield of whey-soymilk and okara

The 9:1 ratio of whey-soybean showed maximum yield of whey-soymilk (13 l) and minimum yield was obtained in whey-soybean ratio 5:1. On the other hand, the amount of

okara obtained showed the reverse trend from yield of whey-soymilk (Table 2). The yield of soymilk prepared by Saxena and Singh (1997) from PK 416 variety (bean to water ratio 1:8) was 8.025 l/kg soybean. In the present study, the possible reason for higher yield than literature may be due to steam injection method adopted during grinding for the extraction of whey-soymilk whereas in the reported method (Grover et al. 1983) the suspension after grinding in a colloidal mill was boiled with continuous stirring. Although, yield of whey soymilk and okara obtained in the present study are in accordance with the results of Upadhyay et al. (2011).

Selection of appropriate level of total solids

There was no significant difference in the sensory scores of whey-soymilk having different ratios of whey and soybean (Table 3). Therefore, ‘setting time’ parameter was selected to optimize the preparation of whey-soymilk dahi. Appropriate level of skim milk powder (SMP) was added to whey-soymilk (WSM) to increase the total solids level to 16 %, 18 % and 20 % and after the adjustment of total solids, samples were inoculated with starter culture and kept in BOD to note down the setting time of dahi.

The whey-soymilk with whey to soya ratio 9:1, 8:1 and 7:1 having total solids 16, 18 and 20 % did not show setting even after 8 h. The whey-soya milk with 6:1 whey to soybean ratio having 18 % and 20 % total solid level was found set after 6 h while whey-soymilk with 16 % total solid levels got set after 8 h. The whey-soymilk with 5:1 whey to soybean ratio having total solid 16 % and 18 % got set after 6 h. On the basis of setting time of dahi, whey to soybean ratio of 5:1 with 20 % total solids was selected for further study as setting of dahi took 5 h.

Results of the present study are in accordance with Favaro Trindade et al. (2001) who reported that yoghurt with the best sensory quality was obtained using the homogenized soymilk and fermented for 6 h.

Changes in proximate composition of whey-soymilk dahi (WSMD) during storage at refrigeration temperature

The milk dahi and whey-soymilk dahi were analyzed for changes in its proximate composition i.e. fat content, protein content, lactose content and total solids during storage and the data obtained is presented in Table 4.

The fat percent for the treatments ranged from 4.5 (MD) to 2.7 (WSMD). Nande et al. (2008) reported the fat content of soymilk curd as 1.9 % which is lower than the one obtained in the present study which could be due to the difference in the ratio of soybean and extraction medium (whey/water). The protein content ranged from 6.0 (WSMD) to 3.4 (MD), whereas range for lactose content varied from 10 (WSMD) to 4.0 (MD). Total solids virtually were higher in case of WSMD i.e.

Table 5 Changes in physical properties of whey-soymilk dahi during storage at refrigeration temperature

Physico-chemical parameter	Treatment	Storage period (days)						C.D. at 5 %		
		0	2	4	6	8	10	S	T	I
pH	MD	4.31±0.01	4.31±0.01	4.30±0.01	4.22±0.02	4.21±0.01	4.10±0.01	0.04	0.02	N.S.
	WSMD	4.55±0.05	4.55±0.05	4.54±0.04	4.45±0.05	4.45±0.05	4.35±0.05			
Viscosity (mPas)	MD	1900±100	1680±87	1490±95	1420±134	1310±125	1280±59	130	75	N.S.
	WSMD	2323±166	1750±65	1633±120	1541±140	1466±97	1387±76			
Syneresis (ml)	MD	5.2±0.23	6.6±0.31	7.1±0.23	7.9±0.38	8.2±0.32	8.7±0.41	0.4	0.2	N.S.
	WSMD	2.3±0.34	3.1±0.37	4.1±0.52	4.9±0.31	5.4±0.45	6.3±0.51			

Each observation is a mean±S.D. of three replicates ($n=3$)

S storage, T treatment, I interaction, N.S. non significant, MD milk dahi, WSMD whey-soymilk dahi

19.7 and were lower in case of MD i.e. 13.5 as WSM was fortified with SMP before inoculation.

Slight decrease in the values of all physico chemical parameters (fat content, protein content, total sugar and total solids) studied was noticed with the advancement of storage period. But analysis of data revealed that storage had not shown any significant effect on the physico chemical parameters (Table 4) of dahi samples of MD and WSMD while significant difference was observed in the values of these parameters when comparison was made between the MD and WSMD. However, interaction of the two factors showed no significant effect on the physico chemical parameters of MD and WSMD samples. Li et al. (2010) reported a decrease in content of total nitrogen and pH in sufu (fermented product of soybean curd) during storage.

Changes in the physico-chemical properties of milk dahi (MD) and whey-soymilk dahi (WSMD) during storage under refrigeration

Data pertaining to the changes in the physico-chemical properties of whey-soymilk dahi as well as milk dahi during storage period is presented in Fig. 2 and Table 5.

Change in pH

During storage of dahi samples (MD and WSMD) had shown a decreasing trend in pH value. Statistical analysis of pH data revealed that there was significantly lower pH value of MD in comparison to WSMD throughout the storage period. It could be due to presence of various polyphenols (antioxidants) in WSMD. This indicates that the buffering capacity of WSMD is higher. Results of the present study are in accordance with Yadav et al. (2003) who reported that curd prepared from soymilk: milk in 100:0 ratio had higher pH (4.61) than milk curd (4.17). Analysis of data also indicated that there was significant decrease in pH value (Table 5) of MD and WSMD at 6th and 10th day of storage. Statistical study revealed that interaction among the factors was found to be non-significant.

Change in viscosity

A significant effect of storage was found on the viscosity of both the samples of dahi (MD and WSMD). The viscosity showed a decreasing trend with storage period. The viscosity decreased significantly on 2nd, 4th and then on 8th day of

Table 6 Changes in sensory scores of whey-soymilk dahi during storage at refrigeration temperature

Sensory parameters	Treat-ment	Storage period (days)						C.D. at 5 %		
		0	2	4	6	8	10	S	T	I
Color and appearance	MD	8.7±0.33	8.7±0.32	8.7±0.21	8.6±0.32	8.5±0.22	8.0±0.41	N.S.	0.2	N.S.
	WSMD	8.0±0.52	7.8±0.41	7.7±0.33	7.7±0.42	7.5±0.42	7.5±0.47			
Flavor	MD	8.7±0.25	8.6±0.31	8.6±0.28	8.5±0.21	8.2±0.40	8.0±0.43	N.S.	0.3	N.S.
	WSMD	7.6±0.38	7.5±0.30	7.5±0.43	7.2±0.40	7.2±0.57	7.2±0.64			
Consistency	MD	8.5±0.31	8.5±0.32	8.5±0.24	8.4±0.23	8.3±0.41	8.3±0.46	N.S.	0.3	N.S.
	WSMD	8.0±0.51	7.8±0.46	7.7±0.54	7.7±0.47	7.5±0.31	7.5±0.38			
Overall acceptability	MD	8.6±0.20	8.6±0.24	8.6±0.31	8.5±0.33	8.3±0.40	8.1±0.41	N.S.	0.3	N.S.
	WSMD	7.8±0.42	7.7±0.32	7.6±0.30	7.5±0.42	7.4±0.45	7.4±0.50			

Each observation is a mean±S.D. of three replicates ($n=3$)

S storage, T treatment, I interaction, N.S. non significant, MD milk dahi, WSMD whey-soymilk dahi

storage in case of MD where as in case of WSMD significant decrease was observed on 2nd, 6th and then on 10th day of storage. There was a significant difference in viscosity values of MD and WSMD during the entire storage period.

Change in syneresis

Storage had shown a significant effect on the syneresis of dahi samples of MD and WSMD. The syneresis showed increasing trend with the advancement of storage period. Significant difference was also observed between the MD and WSMD with respect to syneresis, whereas interaction of factor studied had not shown any significant effect on the samples of MD and WSMD.

Changes in sensory scores of milk dahi (MD) and whey-soymilk dahi (WSMD) during storage under refrigeration

The data for the effect of storage on sensory scores of MD and WSMD is presented in Table 6. Whey-soymilk dahi (whey-soya ratio 5:1 having 20 % total solids adjusted with skim milk powder) was subjected to storage at refrigeration temperature and sensory evaluation on 9-point hedonic scale for sensory parameters. Statistical analysis of sensory parameters data indicated that storage period as well as interaction of storage and treatment did not show any significant effect (Table 6) on the color & appearance, flavour, consistency and overall acceptability when compared within sample of WSMD and MD, which means judges could not perceive any significant different in sensory attributes of dahi samples (WSMD and MD) at zero day and even after 10 days of storage. However, significant difference in sensory data was observed when compared between the dahi samples i.e. WSMD and MD for all the sensory parameters. It is concluded from the sensory data that dahi samples had a shelf life of 10 days.

Yadav et al. (2007) evaluated low-fat probiotic dahi prepared with *Lactococci* starters and 2 adjunct probiotic cultures of *Lactobacillus acidophilus* and *Lactobacillus casei* under refrigerated storage at 7 °C and found that Dahi stored for 8 days may be accepted to consumers. Parseeda and Nanu (2007) investigated changes in quality of curd stored under refrigeration (4–11 °C) for a period of 21 days with respect to acidity, pH and sensory parameters. The results indicated that the product had a shelf life of 9 days under refrigerated storage.

Summary and conclusions

Soybeans provide an alternative source of protein for people who are allergic to milk protein. Combination of the soy proteins and whey proteins could, therefore, yield an exceptionally

nutritional product. Fermentation offers not only a means of preserving any food but also a possibility for modifying or improving its flavor and texture as well as enhancing its beneficial health properties. Soy yogurt always contains natural prebiotics: the two soy sugars, stachyose and raffinose, act as prebiotics and stimulate the growth of Bifidobacterium in the large intestine.

Whey-soymilk with whey: soybean ratio 5:1 having 20 % total solids was selected on basis of time required for setting of dahi (5 h). Non-significant decrease was observed in physico-chemical parameters (fat, protein, total sugar and total solid content) with the advancement of storage. WSMD had significantly higher values of protein, total sugar and milk solids in comparison to MD whereas MD had more fat concentration. No significant difference was observed in sensory attributes of WSMD and MD even after 10th day of storage.

The results of the study reveal that whey and soybean can be used in combination for the formulation of various foods as these when consumed alone lack palatability but when used in combination not only make the food palatable but also have goodness of both whey and soybean.

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