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Preparation of cow milk yoghurt blended with soymilk

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ABSTRACT : Yoghurt was prepared from cow milk blended with soymilk in the Dairy Technology laboratory of Department of Animal Husbandry and Dairy science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.). Yoghurt prepared with different combinations of cow milk and soymilk as 100:00 (T_1), 75:25 (T_2), 50:50 (T_3), 25:75 (T_4) and 00:100 (T_5) was evaluated for various sensory attributes and the results revealed that overall acceptability scores obtained were 96.03, 91.34, 87.58, 83.33 and 80.33 for the treatment T_1, T_2, T_3, T_4 and T_5, respectively. Fat, SNF, acidity and TS of yoghurt samples were decreased normally while protein and moisture increased with increase in levels of soymilk. The per kilogram production cost of yoghurt was decreased with increase in soymilk percentage *i.e.* Rs. 37.63 for (100 % cow milk yoghurt), Rs. 21.38 (50:50 cow milk and soymilk) and Rs. 15.25 for 100 per cent soymilk. It was found that yoghurt prepared from various combinations upto 50 per cent cow milk and 50 per cent soymilk was most acceptable.

KEY WORDS : Yoghurt, Cow milk, Soymilk

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INTRODUCTION

The word "yoghurt" is derived from Turkish "jugurt", used to describe any fermented food with an acidic taste. Yoghurt is a coagulated milk product obtained by lactic acid fermentation through the action of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* from pasteurized or concentrated milk with or without optional additions (milk powder, skim milk powder, whey powder, etc.) (FAO, 1976).

Yoghurt having high nutritional and therapeutic properties, being highly consumed and produced. The reduced content of lactose in yoghurt as and the presence of beta galactosidase, favourably influence the yoghurt tolerance by lactose deficient people and thus, can solve the problem of lactose intolerance to some extent. The digestibility of protein and fat increased due to lactic acid. The utilization of minerals like calcium, phosphorus and iron also improved (Rajor, 1990).

Soybean contains about 30-40 per cent proteins, 18-20 per cent fat, 5 per cent minerals and 4 per cent fibre. Soymilk proteins are alkaline in nature and increase alkalinity of the blood which is very important from the health point of view. It is good source of phosphorus and lecithin thus, it can be used for cure of nerve diseases. The soybean oil is rich in fatty acids, which is best for diabetic patients, due to alkaline nature; it reduces activity in blood (Gupta and Patel, 1984).

Hence, present study was undertaken to prepare of different combinations of yoghurt and soymilk and its effect on sensory properties of yoghurt.

MATERIAL AND METHODS

Yoghurt was prepared as per the procedure described by Gupta and Prasad (2000). Milk was filtered

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through muslin cloth and heated at 85°C for 15 minutes. Then it was cooled at 37-42 °C and soymilk was added to the milk as per treatment. This combination of milk and soymilk was then inoculated with yoghurt culture @ 1 per cent (1:1 ratio v/v) (*S. thermiphillus* and *L. bulgaricus*). The product was filled in contaners and incubated at 37-42°C for 6-8 hours. The final product was stred at 6±2°C.

Yoghurt was analyzed for sensory evaluation as per procedure described by Pal and Gupta (1985) with 100 point evaluation score card. Yoghurt was analyzed for fat, protein, solids not fat (SNF) total solids, moisture, titratable acidity. Fat, protein and titratable acidity were determined as per the procedure recommended in I.S.I. (1980). Total solids content of samples was determined by as per IS: 4079 (1967). Moisture and solids not fat (SNF) were determined as per the standard procedure of IS: 1479 (1960).

Cost structure of yoghurt was calculated by considering market cost of ingredients used for yoghurt making.

Statistical analysis :

Data obtained from all four treatments and four replications were statistically analyzed by using Completely Randomized Design (CRD) suggested by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

The results of the present study as well as relevant discussions have been presented under following sub heads :

Sensory evaluation of yoghurt :

Colour and appearance :

The average colour and appearance score was 18.41, 16.71, 15.49, 14.50 and 13.33 for T_1, T_2, T_3, T_4 and T_5, respectively. The score was decreased due to addition of soymilk but it was noticed that treatment T_3 scored satisfactory score for its acceptability. This change in natural colour of yoghurt may be due to blending of soymilk. These results are in agreement with Bire (1995) and Yadav (2003) who recorded the decreasing trend in the score of yoghurt for colour and appearance attribute due to increase in blending of soymilk.

Body and texture :

The average body and texture score was 33.44, 32.32, 30.67, 29.43 and 28.42 for T_1, T_2, T_3, T_4 and T_5, respectively, showing significant reduction in body and texture score of yoghurt. Treatments T_1 and T_2, T_2 and T_3, T_3 and T_4 were at par with each other while there was significant difference between treatment T_4 and T_5. Yadav (2003) observed the decreasing trend in the body and texture score of yoghurt prepared from cow milk

Table 1 : Effect of blending soymilk with cow milk on sensory evaluation of yoghurt

Treatments	Sensory properties			
	Colour and appearance	Body and texture	Flavour	Overall acceptability
T_1	18.41	33.44	44.19	96.03
T_2	16.71	32.32	42.31	91.34
T_3	15.49	30.67	41.42	87.58
T_4	14.40	29.43	39.50	83.33
T_5	13.33	28.42	38.58	80.33
SE ±	0.075	0.10	0.087	0.17
C.D. (P=0.05)	0.22	0.30	0.26	0.51

Table 2 : Effect of blending soymilk with cow milk on chemical composition of yoghurt

Treatments	Chemical composition (%)					
	Fat	Protein	Total solids	Moisture	SNF	Titratable acidity
T_1	3.98	3.58	13.02	86.79	9.22	0.88
T_2	3.35	3.65	11.51	88.49	8.16	0.87
T_3	2.68	3.84	9.83	90.16	7.16	0.84
T_4	2.04	4.03	8.12	91.88	6.08	0.82
T_5	1.40	4.21	7.08	92.91	5.69	0.78
S E ±	0.016	0.0036	0.01	0.012	0.02	0.0037
C.D. (P=0.05)	0.046	0.011	0.03	0.036	0.06	0.011

blended with soymilk. The results are in agreement with Ranganatham and Gupta (1987) who concluded that weak body is may be due to low total solids content in milk, which is used for preparation of yoghurt.

Flavour :

The average values were found as 86.79, 88.49, 90.16, 91.88 and 92.91 for treatment T_1, T_2, T_3, T_4 and T_5, respectively. The flavour score was decreased due to addition of soymilk. The results are in agreement with results showed by Rajor (1990) that as proportion of soymilk increased there was decrease in flavour score of yoghurt. Krupal (2003) also observed that proportion of soymilk increased there was decrease in flavour score of yoghurt.

Overall acceptability :

The overall acceptability score was 96.03, 91.34, 87.58, 83.33 and 80.33 for treatment T_1, T_2, T_3, T_4 and T_5, respectively. Treatments T_1, T_2, T_3, T_4 and T_5 differ significantly. As proportion of soymilk increased from 25 to 100 per cent with cow milk, there was significantly decrease in overall acceptability score of yoghurt. The treatment T_1 recorded highest score for overall acceptability (96.03), then score was decreased due to addition of soymilk but it was noticed upto 50 per cent level of soymilk (T_3) was acceptable. Treatment T_4 and T_5 scored very less score which is significantly less in term of statistics. Changade and Tambat (1992) reported that addition of soy milk in cow milk / buffalo milk reduced the acceptability of curd. These results are in agreement with the results of Krupal (2003) and Yadav (2003).

Chemical composition of yoghurt :

Fat :

The average fat content of yoghurt prepared from various combinations of cow milk and soymilk was 3.98, 3.35, 2.68, 2.04 and 1.40 per cent for treatment T_1, T_2, T_3, T_4 and T_5, respectively. It means the effect of soymilk blending in cow milk was statistically significant for fat content of yoghurt. Fat content decreased with the increasing levels of soymilk, showing negative correlation. This may be due to less fat content of soymilk as compare to cow milk. The results were in agreement with the results recorded by Krupal (2003).

Protein :

The average protein content of yoghurt prepared from various blends of soymilk in cow milk were recorded as 3.58, 3.65, 3.84, 4.03 and 4.21 per cent for treatment T_1, T_2, T_3, T_4 and T_5, respectively. Protein content of yoghurt was increased with increase in rate of addition of soymilk. These results are supported by Krupal (2003) who reported that soymilk blending positively affect the protein content of yoghurt.

Total solids :

Total solids (TS) content of yoghurt were found as 13.20, 11.51, 9.83, 8.12 and 7.08 cent for treatment T_1, T_2, T_3, T_4 and T_5, respectively. The addition of soymilk showed significant decrease in TS content of yoghurt prepared from cow milk blended with soymilk. Above results are in agreement with the results of Krupal (2003) who observed that increasing levels of soymilk decreases the total solids contents of yoghurt.

Solids not fat (SNF) :

The average SNF content was 9.22, 8.16, 7.15, 6.07 and 5.70 per cent for treatments T_1, T_2, T_3, T_4 and T_5, respectively. Treatment T_2 was superior over T_3, T_4 and T_5. There was significant different between T_1 and T_2,

Table 3 : Cost of production of 1 lit yoghurt

Sr. No.	Particulars	Treatments				
		T_1	T_2	T_3	T_4	T_5
1.	Quantity of milk used in ml cow milk	1000	750	500	250	-
2.	Cost of milk required as per treatment cost of milk Rs. 34/lit	34	25.50	17.00	8.50	-
3.	Quantity of soymilk used in ml	-	250	500	750	1000
4.	Cost of soymilk Rs. 9.50 per lit	-	2.38	4.75	7.13	9.50
5.	Cost of starter culture	0.75	0.75	0.75	0.75	0.75
6.	Miscellaneous cost (Rs.)	5	5	5	5	5
7.	Cost of paper cups	4.00	4.00	4.00	4.00	4.00
8.	Total cost of production of yoghurt Rs/lit without container	39.75	33.63	27.50	21.38	15.25
9.	Total cost of production of yoghurt Rs/lit with container	43.75	37.63	31.50	25.38	19.25

T_3 and T_4 and T_4 and T_5 treatments, whereas, T_2 at par with treatment T_3. The variation in total solids contents of yoghurt is due to addition of soymilk. The results obtained in this study are in agreement with the result reported by Lee *et al.* (1990) that cow skim milk based yoghurt contains higher SNF than soymilk based yoghurt. Above results are in agreement with the result reported by Bire (1995) that as blending proportion of soymilk increased with cow milk, proportionately reduction in SNF content of curd was recorded.

Moisture :

The average values (%) for moisture content were 86.79, 88.49, 90.16, 91.88 and 92.91 in treatment T_1, T_2, T_3, T_4 and T_5, respectively. The per cent moisture content was significantly increased with increase in rate of addition to soymilk. This may due to more moisture and less TS content of soymilk. Lee *et al.* (1990); Bhutey (1994) and Bire (1995) observed that soymilk blending has positive effect on moisture content of yoghurt, increase in soymilk level also increase the moisture content of yoghurt. This trend supports the results of present investigation.

Titratable acidity :

The titratable acidity was recorded as 0.88, 0.87, 0.84, 0.82 and 0.78 per cent for for treatment T_1, T_2, T_3, T_4 and T_5, respectively. The titratable acidity of yoghurt significantly decreased with increase in the level of soymilk. The results obtained in this study are in agreement with the results of Lee *et al.* (1990) who observed that acidity content of soymilk yoghurt was less than acidity of cow skim milk yoghurt. Bhutey (1994) also reported that increasing level of soymilk with cow milk, proportionally decreases the acidity content of yoghurt.

Cost of production of yoghurt :

Cost of production for 1 lit yoghurt including the cost of container was Rs. 43.75 37.63, 31.50, 25.38 and 19.25 for treatment T_1, T_2, T_3, T_4 and T_5, respectively. While the cost of production of yoghurt excluding the cost of container was Rs. 39.75, 33.63, 27.50, 21.38 and 15.25 for treatment T_1, T_2, T_3, T_4 and T_5, respectively. It was observed that cost of yoghurt was decreased with the increase in the level of soymilk and accordingly the acceptability was also decreased. These results are agreement with results noted by some past workers as Bharad *et al.* (2010) who observed that cost of production of kulfi was decreases as level of soymilk increases. Krupal (2003) also reported that the cost of production of yoghurt decreases as level of soymilk increases.

Conclusion :

On the basis of sensory evaluation and chemical composition, yoghurt prepared from various combinations upto 50 per cent cow milk and 50 per cent soymilk was found acceptable. The per kilogram production cost of yoghurt was decreased with increase in soymilk percentage *i.e.* Rs. 33.63 (T_2), Rs. 27.50 (T_3), Rs. 21.38 (T_4) and Rs. 15.25 (T_5) for 100 per cent soymilk. On the basis of results obtained during comparative evaluation, 100 per cent soymilk can be accepted individually as a soya drink on the basis of its body and texture but not as yoghurt.

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