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Research Paper

Process optimization for the preparation of date syrup blended yoghurt

Yashaswini.N.N[1] and Arunkumar.H[2]
[1]*Correspondence Author: Department Of Dairy Technology, Dairy Science College, Bangalore India.*
[2]*Faculties: Department Of Dairy Technology, Dairy Science College, Bangalore-24. India*

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ABSTRACT: *In this study an attempt has been made to incorporate date syrup at 8, 10 and 12 per cent levels into yoghurt. Among these levels 10 per cent blended product was found to have better sensory characteristics. Higher sensory score of 8.70 out of 9.00 for overall acceptability of yoghurt was obtained. On further addition of date syrup at above 10 per cent, significant reduction in the sensory scores was observed. The total solids content of yoghurt increased with increased level of date syrup addition. The total solids content increased from 15.0 per cent in plain yoghurt to 23.10 per cent when date syrup was added at 10 per cent level.*

Keywords: *Date syrup, yoghurt, flavour, total solids*

I. INTRODUCTION

The annual milk production in India as per the estimation of [1] was found to be as 146.3 million tones. About 55 per cent of the milk produced in the country is being utilized for preparation of various indigenous dairy products like khoa and khoa based sweets, chhana and chhana based sweets, paneer, etc. It is estimated that about 7 per cent of milk produced in India is converted into fermented milks. Among various fermented milks, curd occupies an important place in the diet.

Fermented milks are popular in view of organoleptic and other properties such as the characteristic flavour, refreshing taste, improved digestibility and therapeutic value. The composition of fermented milks can be easily tailored to meet various dietary requirements.

Yoghurt is the most popular milk product owing to its particular physical, nutritional, probiotic and organoleptic properties. Yoghurt starter culture consists of a blend of *Streptococcus thermophilus* and *Lactobacillus delbrueckii* var- *bulgaricus*. Recently, the use of natural food additives and the incorporation of health promoting substances into the flavoured yoghurts have been attracting increased attention. These yoghurts are prepared by adding flavoured syrups or fruit concentrates to cultured milk before or after incubation in order to develop novel formulations for babies and children as well as for adults [2]. [3] reported that the addition of fruit or vegetable mixtures to yoghurt formulations improves the nutrition functions and sensory characteristics for consumer acceptability.

Date palm (*Phoenix dactylifera*) is among the most important species in the palm family (Arecaceae). Dates are a major food source and income source for local populations in the Arabian Peninsula, Middle East and North Africa and play significant roles in the socio-economy and environment in these areas. In addition to serving directly as a food source, dates are packed and processed in a number of ways. These dates and date based products are being used in various foods as it contains different nutrients which are not present in other nuts.

Dates or date products provide unique functionality when used with other products including sweetening, flavoring, and increasing nutritional quality. Date syrup as a natural and nutritional additive is one of the best choices for milk flavoring and a safe alternative to added sugar to produce dairy products. Moreover, most of the carbohydrates in this product are in the form of fructose and glucose, which are easily absorbed by the human body [4].

The enrichment of yoghurt by addition of date syrup will increase the total amount of nutrients in the yoghurt and thus enhances the quality and overall acceptability of the product. Therefore, an attempt has been made to manufacture the yoghurt by blending with date syrup.

II. MATERIALS AND METHODS

Whole milk: Pasteurized and homogenized cow milk was procured from the local market. Date syrup: "Lion Date Syrup" brand manufactured by Lion Dates Impex Pvt. Ltd., Trichy, India, was procured from the local market. Starter cultures: Yoghurt cultures such as *Streptococcus thermophilus* and *Lactobacillus delbrueckii* var- *bulgaricus* in the form of freeze dried direct Vat set (FD-DVS) was obtained from Chr. Hansehs Laboratories.

Method of manufacture of date syrup blended yoghurt: Yoghurt samples were prepared by adding date syrup into the cow's milk at the rate of 8, 10 and 12 per cent levels and the control yoghurt was prepared by using cow milk with no addition of date syrup. The yoghurt was manufactured as described by [5]. The resultant yoghurt was subjected for various chemical analysis and served to a panel of judges along with the control to judge the sensory characteristics and overall acceptability. Based on sensory evaluation the best combination was selected.

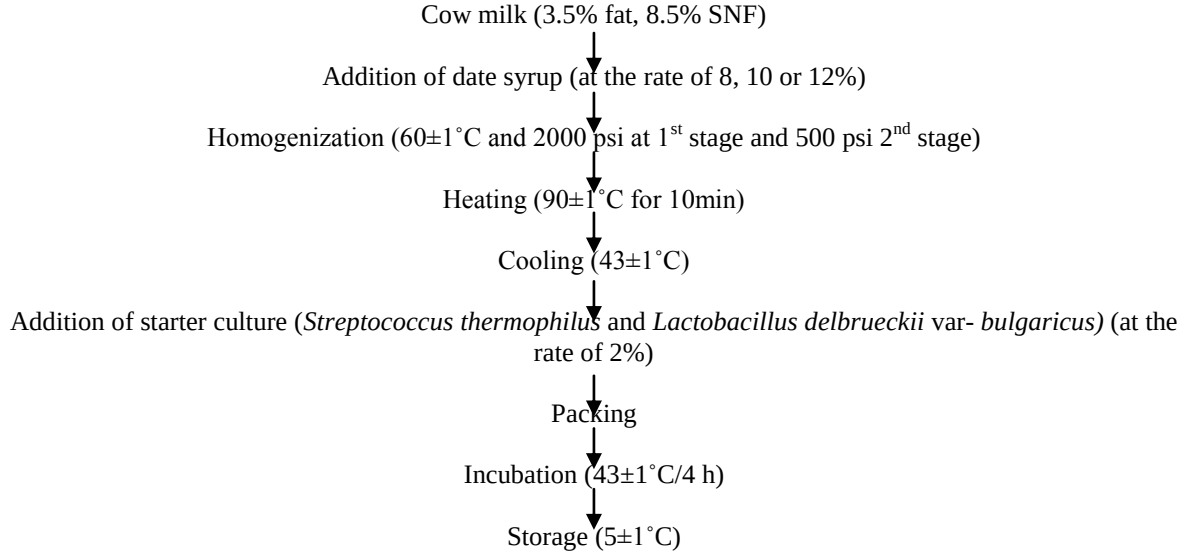

Figure 1: Flow diagram for preparation of date syrup blended yoghurt

Analytical Procedure: The fat content was determined by Gerber method. The protein total solids and titratable acidity of the samples were determined as per [6].

III. RESULTS AND DISCUSSION

The effect of addition of different levels of date syrup on the sensory characteristics of yoghurt as presented in table 1: Date syrup when added upto 10 per cent level increased the sensory scores for colour and appearance, body and texture, flavour and overall acceptability of yoghurt. But addition at higher levels (above 10 per cent) showed significant difference in sensory scores of the yoghurt. Table (1) reveals that addition of date syrup in the yoghurt production significantly influenced the colour and appearance. The highest colour and appearance score of 8.50 out of 9.00 was awarded to 10 per cent date syrup blended yoghurt as against control (8.30). Further addition lowers the sensory scores for colour and appearance of yoghurt. The reduction in score could be due to the intense brown colour due to degradation of reducing sugars, melanoidines and iron polyphenolic complexes. Similar observations were reported by [7] and [3] for incorporating sunflower honey and carrot juice into set-type yoghurts.

Yoghurt sample with 10 per cent date syrup level secured the higher sensory scores for flavour of 8.20. Further increase in addition of date syrup significantly decreased the flavour score to 7.00. The reduction in flavour score above 10 per cent level could be attributed due to the enhanced characteristic sweet flavour of date syrup.

The mean sensory scores for sourness of the yoghurt increased significantly from 8.30 to 8.80 with increase in date syrup level addition from 8 to 10 per cent. On further addition of date syrup the score reduced to 8.30 per cent level due to higher amounts of date syrup which will mask the characteristic flavour of the yoghurt. The findings are in correlating with [8].

The maximum body and texture and flavour score of 7.60 and 8.20 was awarded to the yoghurt prepared by blending date syrup at 10 per cent level. Further addition of date syrup at above 10 per cent showed significant difference in the sensory scores. This may be due to disrupting effect of fiber in the gel, when the

fiber dose is increased, thus reducing the consistency of the product with increased whey separation. Similarly, [9] reported that the rheological properties of the yoghurt were modified by the addition of dietary fiber.

The effect of addition of date syrup on the composition of yoghurt as presented in table 2**:** Addition of date syrup showed no significant effect on protein and fat content of the yoghurt.The total solids content of yoghurt increased with increased level of date syrup addition. The total solids content of 23.10 per cent was recorded when date syrup was added at 10 per cent level. This may be due to higher levels of carbohydrates (75-80 per cent) in the form of reducing sugar such as glucose and fructose. The pertaining results of present investigation are in agreement with the observations made by [10].

A progressive increase in the acidity from 1.04 to 1.09 per cent lactic acid was observed in the experimental yoghurt samples with the increase in addition of date syrup levels. This could be due to the presence of higher content of reducing sugar in the date syrup which are more readily utilized by starter organisms and produce higher acidity. Similar results were observed by [11], when date paste was used in the preparation of Ethiopian curd.

Table 1: The effect of addition of date syrup on the sensory characteristics of yoghurt

Levels of date syrup(Per cent)	Color and Appearance	Body and Texture	Flavour	Sourness	Overall Acceptability
Control (0)	8.30[a]	7.70[a]	7.00[a]	8.00[a]	8.20[a]
8	8.20[a]	7.50[a]	7.50[a]	8.30[a]	8.30[a]
10	8.50[a]	7.60[a]	8.20[b]	8.80[b]	8.70[b]
12	7.50[b]	7.10[b]	7.00[a]	8.30[a]	7.50[c]
CD(P≤0.05)	0.65	0.23	0.52	0.31	0.32

Table 2: The effect of addition of date syrup on the composition of yoghurt

Levels of date syrup (Per cent)	Protein (%)	Fat (%)	TS (%)	Acidity (% LA)
Control (0)	3.30[a]	3.50[a]	15.00[a]	0.85[a]
8	3.40[a]	3.49[a]	21.40[b]	1.04[b]
10	3.42[a]	3.48[a]	23.10[c]	1.07[b]
12	3.44[a]	3.48[a]	24.70[d]	1.09[b]
CD(P≤0.05)	NS	NS	0.39	0.15

IV. CONCLUSION

The consumption of fermented dairy products is increasing in recent years, mainly due to its excellent nutritional and therapeutic properties. Date syrup as a natural and nutritional additive is one of the best choices for milk flavouring and a safe alternative to added sugar to produce dairy products. From this investigation it was concluded that the yoghurt can be prepared by incorporation of 10 per cent date syrup with improved physico-chemical, sensory and nutritional aspects of the product. Consumption of this enriched yoghurt not only improves the nutritional status but also improves the therapeutic properties.

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