UTILIZATION OF COCONUT WATER FOR THE PREPARATION OF YOGHURT

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ABSTRACT

A study was conducted to assess the microbiological and sensory properties of yoghurt incorporated with condensed coconut water by partial replacement of MSNF with or without a stabiliser gelatin. The treatments were divided in to Control, T2 (addition of condensed coconut water by replacing MSNF at 25 per cent), T3 (addition of condensed coconut water by replacing MSNF at 25 per cent with gelatin), T4 (addition of condensed coconut water by replacing MSNF at 50 per cent) and T5 (addition of condensed coconut water by replacing MSNF at 50 per cent with gelatin). The yoghurt mixes for different treatments were formulated by using computer linear programming model. No significant difference between control and treatments with regard to appearance score and body and texture scores. A significant difference (P<0.01) was noticed for the flavour score as well as total sensory scores. Condensed coconut water incorporated at 25 per cent level in partial replacement of milk solids not fat (MSNF) with or without stabiliser gelatin in yoghurt preparation had a similar sensory properties as compared to control.

Keywords: *Condensed coconut water, filled type yoghurt, Sensory properties*

INTRODUCTION

Among the fermented milk products, yoghurt is highly nutritious and characterised by the typical aroma, flavour and semi-solid consistency. Coconut water contains varoius minerals such as 247 mg per cent potassium, 48 mg per cent sodium, 40 mg per cent phosphorus, 26µg per cent copper and major vitamins such as 0.64 µg/ml nicotinic acid, 0.52 µg/ml pantothenic acid, 0.02 µg/ml biotin, 0.01 µg/ml ribiflavin and 0.003 µg/ml folic acid (Baisya and Bose, 1974). In India, most of the coconut water is being wasted. Coconut water is utilised to a lessser extend in the production dairy foods. Yoghurt is priced high as compared to milk since it contains higher solids. Usually skim milk powder is used to increase total solids content of the yoghurt. Compare to the cost of skim milk powder, the coconut water costs less besides it has nutritional value (Ulpalakshan, 1994). If the cost of the product is reduced, the nutritious yoghurt can be made cheaper and available to all section of the consumers. This is achieved by replacing a part of the skim milk powder by condensed coconut water. The study was designed to replace MSNF (Milk solids not fat) with condensed coconut water as a source of total soilds in the preparation of filled yoghurt with sensory properties.

MATERIALS AND METHODS

Fresh pooled cow milk was collected from the Kerala Agricultural University Dairy Plant, Mannuthy, Thrissur, Kerala. Spray dried skim powder (Anikspray-Brooke Bond Lipton (I) Ltd, Calcutta) was used to adjust the MSNF in yoghurt. Fat percentage of the yoghurt was adjusted with fresh cream collected from the Kerala Agricultural University Dairy Plant. Freeze dried cultures of *Streptococcus salvarious subsp. thermophilus* NDRI-YH-S and *Lactobacillus delbrueckii subsp. bulgaricus* YH.L were obtained from the National Collection of Dairy Cultures, National Dairy Research Institute, Karnal, Haryana. Fresh coconut was collected from nearby copra manufacturers and brought to the Dairy Science laboratory which was filtered using a musin cloth to remove the extraneous matter. The coconut water was condensed to approximately 20 per cent total solids by Anhydro type Lab. E.W.O. 1688 vaccum evaporator at a temperature of 45°C maintaining a vacuum of 70cm mercury. The condensed coconut water was immediately cooled to 5 °C and later stored at -20°C

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and was used within a week after preparation. Other non-dairy ingredients such as sugar, stabiliser gelatin (Cocktail brand, Sheth enterprises, Madras) were purchased from the local market. Yoghurt was prepared to contain 14 percent milk solids not fat, 3 per cent fat, 6 per cent sugar using *Streptococcus salvarious subsp. thermophilus and Lactobacillus delbrueckii subsp. bulgaricus* at the ratio of 1:1 (Tamine and Robinson 1985).

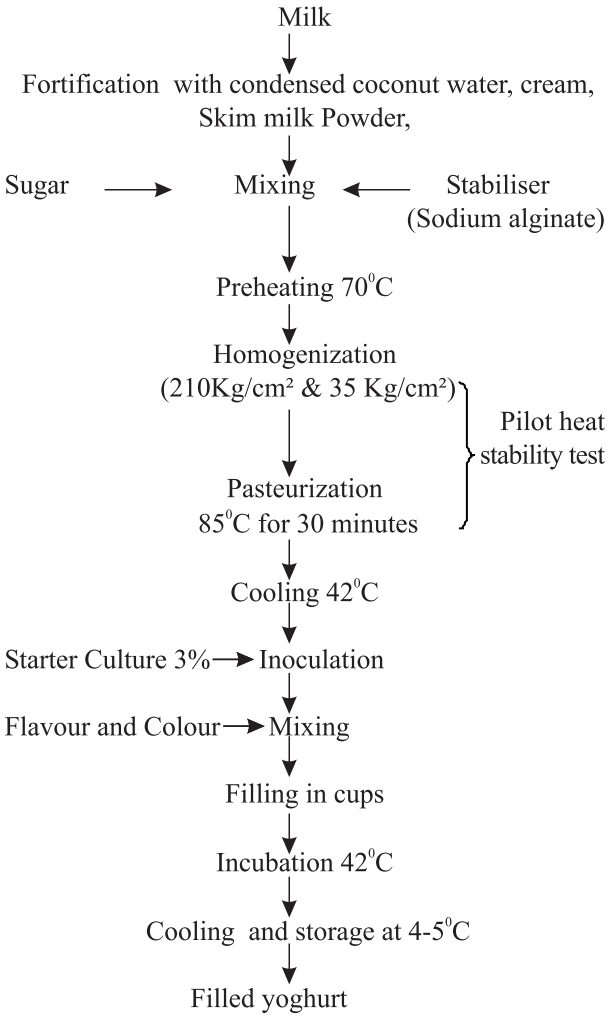
The quantity of ingredients for 100 g of yoghurt mix was derived by linear programming model (table 1). The ingredients such as skim milk powder, cream were added to the milk so as to increase the total solids 17 per cent and to this cane sugar was added at the rate of 6 per cent to have total solids content of 23 per cent. The mix thus prepared was preheated to 70 °C and homogenised in a two stage homogeniser, at 2500 psi and 500 psi respectively. Pilot heat stability test was carried out by adding one per cent solution of trisodium citrate (0.1 to 1 ml) in a series of test tubes. 5 ml of the particular treatment yoghurt mix was added to each tube and subjected to clot on boiling test, from which the least amount of trisodium citrate required to provide sufficient heat stability was found out. This mix was pasteurised at 85 °C for 30 minutes in a double jacketed vat and was subsequently cooled to 42 °C. It was inoculated with 4 per cent yoghurt culture and stirred to ensure proper mixing. The inoculated yoghurt mix was then incubated at 42 ±1°C and was monitored periodically for pH. When the desired pH of 4.6 was attained, the cups were transfered to refrigerator (4-5 °C) and kept for 18-24 hours before evaluation.

The treatments were divided in to Control, T2 (condensed coconut water was added to replace 25 per cent of MSNF and maintaining total solids level of 23 per cent) , T3 (Gelatin was added at the rate of 0.5 per cent and the rate of replacement of MSNF was 25 per cent by condensed coconut water and maintaining total solids level of 23 per cent), T4 (condensed coconut water was added to replace 50 per cent of MSNF and maintaining total solids level of 23 per cent) and T5 (Gelatin was added at the rate of 0.5 per cent and the rate of replacement of MSNF was 25 per cent by condensed coconut water and maintaining total solids level of 23.5 per cent) respectively. The method described by Chawla and Balachandran (1994) was followed for the preparation of yoghurt.

The samples of yoghurt were subjected to sensory evaluation by a panel of six judges using the score card adopted by Pearce and Heap (1974). The guidelines reported by Shakeel-Ur-Rahman *et al*., (1994) was followed during the sensory evaluation of the resulted products.

These experiments were carried out with six replications. Average sensory scores obtained from six members of the panel for each replication was used for statistical analysis. The generated data from the varoius parameters were analysed by using completely randomized design as described by Snedecor and Cochran (1994).

Flow Chart For The Preparation Of Filled Type Yoghurt



RESULTS & DISCUSSION

The sensory evaluation scores are presented in table 2. The appearance score for control and treatments from T2 to T5 were 4.21 ±0.10, 4.16±0.08, 4.31 ±0.09, 3.91 ±0.14 and 4.15 ±0.08 respectively and showed no significant difference and are in agreement with the reports of Shakeel-Asgar and Thompkison, (1994) and Pandiyan and Geewarghese (2004). Body and texture score for control and treatments showed no significant difference. The data with regard to body and texture score was in agreement with that of Jogdand *et al*., (1991), Chawla and Balachandran, (1994) and Pandiyan and Geewarghese (2004). The minimum flavour score of 6.47 was recorded in T4 and maximum 8.12 in control. A significant difference (P<0.01) was noticed between control and treatments for the flavour score. The results of the present investigation are at par with the results of Mistry and Hassan, (1992) and Baig, (1994). The total scores of the control and treatments were 16.71 , 15.78, 16.02, 13.74 and 14.70 respectively. Addition of condensed coconut water up to 25 per cent level in the partial replacement of MSNF showed no significant difference and at 50 per cent level showed a significant difference (P<0.01) when compared to the control. The results of the total scores of the control and treatments are in close agreement with the reports of Baig, (1994) and Pandiyan and Geewarghese (2004).

CONCLUSION

From the above studies, it can be concluded that yoghurt can be prepared by incorporating condensed coconut water incorporated at 25 per cent level in partial replacement of milk solids not fat (MSNF) with or without stabiliser gelatin and was comparable with the normal yoghurt.

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Table1.Quantity of ingredients for 100 g of yoghurt mixes

Ingredients	Control	T2	T3	T4	T5
Condensed coconut water	0.00	17.50	17.50	35.00	35.00
Milk	74.02	71.90	71.40	55.85	55.35
Skim milk powder	7.87	4.46	4.46	2.14	2.14
Cream	0.00	0.14	0.14	1.01	1.01
Sugar	6.00	6.00	6.00	6.00	6.00
Gelatin	0.00	0.00	0.50	0.00	0.50
Water	12.11	0.00	0.00	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00

Table 2. Sensory properties of filled yoghurt incorporated with condensed coconut water

Parameters	Control	T2	T3	T4	T5
Appearance score	4.21 ± 0.10	4.16±0.08	4.31 ± 0.09	3.91 ± 0.14	4.15 ± 0.08
Body and Texture score	4.38^{a} ± 0.04	3.68^{b} ±0.10	4.18^{a} ± 0.05	3.40^{b} ± 0.17	3.54^{b} ± 0.1
Flavour score	8.12^{a} ± 0.24	7.86^{a} ±0.28	7.79^{a} ± 0.29	6.47^{b} ± 0.22	7.02^{b} ± 0.23
Total score	16.71^{a} ± 0.33	15.78^{a} ± 0.17	16.02^{a} ± 0.40	13.74^{b} ±0.30	14.70^{b} ±0.00

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