



IJFANS

International Journal of Food
And Nutritional Sciences

Volume 3 Issue 3 Apr-Jun-2014, www.ijfans.com e-ISSN: 2320-7876

INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES



Official Journal of IIFANS

QUALITY CHARACTERISTICS AND ACCEPTABILITY OF PAPAYA PULP INCORPORATED YOGHURT

P.Nazni* and K.Komathi

Department of Food Science and Nutrition, Periyar University, Salem, Tamilnadu, India.

*Corresponding Author: naznip@gmail.com

ABSTRACT

Yoghurt is a coagulated milk product that results from the fermentation of lactose in milk by *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. Buffalo Milk yoghurt is live natural thick set yoghurt made with 100% pure fresh buffalo milk produced on our farm, 35 miles south of Birmingham. Buffalo milk yoghurt has a most luxurious taste. Cow's milk is rich in protein, fat, lactose and minerals such as calcium, magnesium and phosphate. Fruit yoghurt, a popular type of yoghurt is like by masses and is known as fruit stirred yoghurt. Yoghurt prepared by adding seasonal fruits are very attractive. Addition of fruit makes the yoghurt more delicious. Thus, the present study was designed to prepare different levels of papaya and banana pulp yoghurt and assess the nutritional, physiological, microbiological and organoleptic characteristics of yoghurt. The yoghurt was manufactured according to international standards of yoghurt manufacture (IDF 1987 standards). The milk is homogenized and heated 90°C for 3min for pasteurization, then cooled to 45°C. It is then inoculated with 5% of *Lactobacillus bulgaricus*. Yoghurt was prepared using various fruit pulp. Yoghurt were cooled at 6°C and stored at the same temperature during all period of post-acidification. Owing to the various nutritive advantages the cow's milk and two different types of fruits were used in the preparation of yoghurt using various combinations with buffalo milk. All the developed products (total=10 variations) were analyzed organoleptically, the best variations (3 variations) will be selected and analysed for nutrients, microbial load and physico chemical properties. The result obtained compared between selected variable and control and also with commercial products. "T" test and analysis of variance (ANOVA), Duncan's multiple range tests were used for comparing the means to find the significance of acceptability of developed yoghurt product by the consumer on the basis of gender, age, family size, income, educational level and purchase frequency. Fruit pulp added yoghurt BP3 (Buffalo milk + papaya pulp) 3rd variation has got 1st rank followed by BB3 (Buffalo milk + Banana pulp) 3rd variation. On comparing all criteria for all developed yoghurts, buffalo milk with incorporation of papaya pulp yoghurt have high acceptability.

Keywords: Yoghurt, Buffalo, *Bulgaricus*, Pulp.

INTRODUCTION

Yoghurt is a coagulated milk product that results from the fermentation of lactose in milk by *Lactobacillus bulgaricus* and *Streptococcus thermophilus* (Bourlioux and Pochart, 1988). Other lactic acid bacteria (LAB) are also frequently used to produce yoghurt with unique characteristics (Adolfsson *et al.*, 2004). Yoghurt is a sour milk product and is one of the oldest and popular foods in Africa, Asia, Europe and USA because of its nutritive and therapeutic value (Deeth, 1984). It is nutritionally beneficial product generally considered as safe with taste and is like by many people. Yoghurt or yogurt is a dairy product by bacterial fermentation of milk. Fermentation of lactose produces lactic acid, which falls on milk protein to give yoghurt its texture and its characteristics tang (<http://en.wikipedia.org> assessed on 13.08.09). Yoghurt ranks as a popular food in many parts of the world. People in Turkey and some other countries of the Middle East have eaten yoghurt for thousands of years. Yoghurt is part of the diet in south eastern Europe and middle east for millennia and is now part of the dairy counters even in smallest

grocery stores in many countries (Kalab, M., 2000 yoghurt).

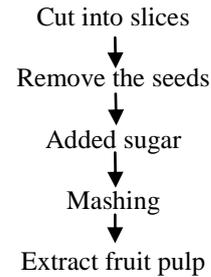
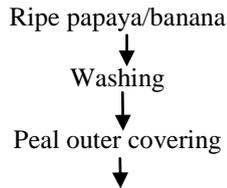
Fruit yoghurt, a popular type of yoghurt is like by masses and is known as fruit stirred yoghurt. Yoghurt prepared by adding seasonal fruits are very attractive. Fruit stirred yoghurt is popular among masses and particularly children who dislike the flavour of plain yoghurt. This modification has made the yoghurt flavour attractive for them. Addition of fruit makes the yoghurt more delicious. Sapodilla is a long-lived evergreen tree native to southern Mexico, central America, and the West Indies. It is grown in high quantities in India. Sapota is high in tanning. So, it is believed that when sapota is boiled with water, the decoction is good for curing diarrhea (<http://India4indians.com/health/2010/01/09>). Coronation grapes are a virtually seedless hybrid variety of table grape developed in Canada. Grapes are rich in energy, vitamin and minerals. The grapes may be eaten as fresh or incorporated into fruit preserves, sauces and desserts (Bain, Jennifer (2007-08-22)). Thus, the present study was

designed to prepare different levels of sapota and grape pulp yoghurt and assess the nutritional, physiological, microbiological and organoleptic characteristics of yoghurt.

MATERIALS AND METHODS

Fresh ripe fruits (papaya and banana) were purchased and after gentle wash under tap water the fruits were subjected to pulp extraction.

Preparation of fruit pulp



Formulation of different combination of buffalo milk based fruit yoghurt

Owing to the various nutritive advantages the two different types of fruits were used in the preparation of yoghurt using various combinations with buffalo milk.

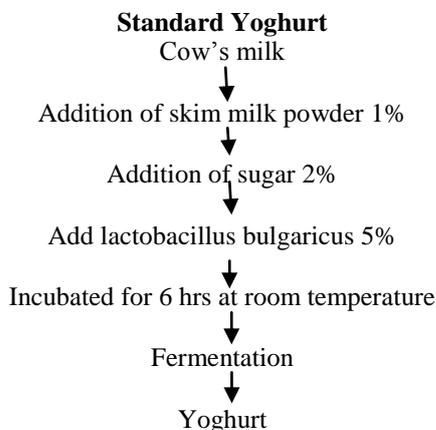
Table-1 Basic formulation of different combination of buffalo milk based fruit yoghurt

Items	Control	PPBY			BPBY		
		V ₁	V ₂	V ₃	V ₁	V ₂	V ₃
Cow 's milk	100	-	-	-	-	-	-
Buffalo milk	-	92	84	76	92	84	76
Respective fruit pulp	-	8	16	24	8	16	24
Skim milk powder %	1	1	1	1	1	1	1
Sugar %	2	2	2	2	2	2	2
Culture	Lacto bacillus bulgaricus 5%						

Note: PPBY – Papaya pulp based yoghurt, BPBY – Banana pulp based yoghurt, V- Variations Table – 1 indicates the various combinations used for the development of fruit based yoghurt.

DEVELOPMENT OF YOGHURT USING BUFFALO MILK WITH INCORPORATION OF VARIOUS FRUIT YOGHURT

The yoghurt was manufactured according to international standards of yoghurt manufacture (IDF 1987 standards). The milk is homogenized ad heated 90°C for 3min for pasteurization, then cooled to 45°C. It is than inculcated with 5% of lactobacillus bulgaricus. Prepared yoghurt using various fruit pulp. Yoghurt were cooled at 6°C and stored at the same temperature during all period of post-acidification (for 21 days).



Using the above standard procedure, development of yoghurt using various fruit pulp with buffalo milk is prepared at different combinations given in table 1.

ANALYZING THE NUTRIENTS IN DEVELOPED YOGHURT

All the developed products (total=7 variations) were analyzed organoleptically and the best variation will be selected based on its nutrient analysis. The developed variations nutrients like carbohydrate, protein, fat, calcium, and vitamin-C were analysed. The results obtained were compared with the selected variable and control and with commercial product also.

ANALYZING THE PHYSICO-CHEMICAL PROPERTIES OF YOGHURT

All the developed products physio-chemical properties like P_H, moisture, acidity, and syneresis were analyzed.

ORGANOLEPTIC EVALUATION OF DEVELOPED YOGHURT

Organoleptic quality is a combination of different sense of perception coming to play in choosing and eating a food. The entire product developed were evaluated thrice for their acceptability and a panel of judges selected at

random from department of Food Science and Nutrition; Periyar University, Salem. All judges were asked to score the product for appearance, colour, flavor, taste and overall acceptability using a 9 point hedonic scale card, with score ranging from 9 to 11 where score represented like extremely and dislike extremely respectively was used for evaluating developed products.

MICROBIAL ANALYSIS

Yoghurt is produced by fermentation of milk with two bacteria, *L.bylgaricus* and *S.thermophilus*, which act together. Bulgaricus was performed as described by the international dairy federation (IDF standard 306, 1995). The following media were selected as suitable for enumeration: M17 agar and aerobic incubation at 42^oC for 24h for the selective enumeration of *S. thermophilus* while for the enumeration of *L. delbrueckii* ssp. *Bulgaricus*, MRS agar incubated at 42^oC for 24 h was applied. Microbiological count data are expressed as colony

forming units (cfu) per gram of yoghurt. Four dilutions were carried out to determine the number of bacteria during storage.

STATISTICAL ANALYSIS

The experiment and the data collected during entire study are subject for period. “T” test and analysis of variance (ANOVA) (Snedecor and Colobran 1994). Duncan’s multiple range tests were used for comparing the means to find the significance of acceptability of developed yoghurt product by the consumer on the basis of gender, age, family size, income, educational level and purchase frequency.

RESULTS AND DISCUSSION

The results of total product yield, nutrients, physicochemical were listed below

Table – 2 Total product yield of yoghurt from buffalo milk with incorporation of different fruit pulp at various combinations

Parameters	Control	PPBY			BPBY		
		BP ₁	BP ₂	BP ₃	BB ₁	BB ₂	BB ³
Cow ‘s milk	100	-	-	-	-	-	-
Buffalo milk	-	92	84	76	92	84	76
Respective fruit pulp	-	8	16	24	8	16	24
Yield of yoghurt (ml)	83	89	86	85	85	89	90

Note: B – Buffalo milk; P – Papaya pulp; B– Banana pulp, BP₁, BP₂, BP₃ (Buffalo milk + Papaya pulp) variations, BB₁, BB₂, BB₃ (Buffalo milk + Banana pulp) variations.

Table 2 indicates the total yield of yoghurt in (ml) at combination of buffalo milk with different levels of fruit pulp added yoghurt. When compared to control, the different fruit pulp based yoghurt has got good amount of yield.

Table – 3 Nutrients, physicochemical and microbial analysis of yoghurt prepared at various combinations

Criteria		Control	Commercial	PBP ₃	PBB ₃
Nutrients	Carbohydrates (g)	4.9	5.6	8.52	7.1
	Protein (g)	3.5	3.8	3.53	3.60
	Calcium (mg)	121	120	116.19	145
	Vitamin C (mg)	0.7	0.8	1.47	1.54
	Fat (g)	3.3	3.0	3.2	3.70
	Energy (kcal)	63.3	64.6	77	76
Physico Chemical Properties	pH	4.5	4.9	6.3	6.8
	Moisture %	80.97	82.46	83.92	82.49
	Acidity %	0.97	0.14	1.14	1.13
	Syneresis %	60.16	57.36	55.34	56.83
Microbial analysis	Microbial count Cfu/ml	7.14×10 ⁷	7.01×10 ⁷	7.20×10 ⁷	7.15×10 ⁷

Table – 4 Mean organoleptic evaluation of developed yoghurt from buffalo milk with Papaya pulp

Product	Appearance	Colour	Flavour	Taste	Texture	Over all acceptability
Control	7.70 ± 0.82 ^b	7.60 ± 0.51 ^{bc}	7.40 ± 1.17 ^{ab}	7.30 ± 0.82 ^{ab}	7.70 ± 0.82 ^{ab}	7.30 ± 0.67 ^{bc}
Commercial	8.20 ± 0.63 ^b	8.40 ± 0.51 ^c	8.20 ± 0.42 ^b	8.10 ± 0.56 ^b	8.10 ± 0.56 ^b	8.00 ± 0.47 ^c
BP ₁	6.50 ± 1.080 ^a	6.20 ± 1.22 ^a	6.30 ± 1.25 ^{ab}	6.00 ± 1.41 ^a	6.90 ± 0.99 ^a	6.50 ± 0.84 ^{ab}
BP ₂	6.40 ± 1.07 ^a	6.40 ± 0.96 ^a	6.40 ± 1.26 ^{ab}	6.40 ± 1.17 ^{bc}	6.90 ± 0.87 ^a	6.30 ± 1.05 ^a
BP ₃	6.20 ± 1.31 ^a	6.30 ± 1.25 ^a	6.00 ± 1.56 ^a	6.10 ± 1.72 ^a	6.90 ± 0.99 ^a	6.60 ± 1.07 ^{ab}
F ratio	7.744	10.474	5.847	6.058	4.273	6.702
P value	0.000 ^{**}	0.000 ^{**}	0.001 ^{**}	0.001 ^{**}	0.005 ^{**}	0.000 ^{**}

Note: * values with difference superscripts difference with each other an application of Duncan multiple range test.

** - significant at 0.01% level, * - significant at 0.05% level, NS – No significant.

Among the 7 variations, the best 2 variations were selected and analysed for nutrient analysis, physico chemical properties and microbial analysis. The results were compared with control and commercially prepared yoghurt. The results were tabulated in table 3. On nutrient analysis, banana pulp added yoghurt (PBB₃) were found to have high amount of calcium and vitamin C. Protein content is high and fat content is low in commercially prepared yoghurt. Energy and carbohydrate is high in PBS₃ when compared to control, commercial and PBB₃. Upon physico chemical properties, the pH, moisture and acidity is higher in developed product when compared to control and commercial. But the syneresis content of the developed product is lower when compared to control and commercial. Upon microbial analysis, the normal desirable range of microbial load in the yoghurt is 7.28×10^7 . But the range of microbial load at all the different levels of developed yoghurts contains lesser range when compared to the normal desirable range.

Duncan's test reveals that there was no significant different between the variation control and commercial and

that there was no significant difference between the variations BP₁, BP₂ and BP₃ for appearance attribute. Regarding colour attribute that there was no significant difference between the variation control and commercial and that there was no significant difference between the variation BP₁, BP₂ and BP₂. Regarding favour attribute that there was significant difference exists for variations control, commercial and BP₃ and that there was no significant difference between the variations BP₁ and BP₂. Regarding taste attribute that there was no significant difference between the variations control and BP₂ and that there was significant difference exists for variations control and commercial and that there was no significant difference between the variation BP₁ and BP₂. Regarding texture attributes that there was no significant difference between the variations BP₁, BP₂ and BP₃ and the significant different exists for variation control and commercial. Regarding over all acceptability that there was no significant difference between the variation BP₁ and BP₃ and there was significant difference exists for variations control, commercial and BP₂.

Table – 5 Mean organoleptic evaluation of developed yoghurt from buffalo milk with grape pulp

Product	Appearance	Colour	Flavour	Taste	Texture	Over all acceptability
Control	7.70 ± 0.82 ^b	7.60 ± 0.51 ^{bc}	7.40 ± 1.17 ^{ab}	7.30 ± 0.82 ^{ab}	7.70 ± 0.82 ^{ab}	7.30 ± 0.67 ^{bc}
Commercial	8.20 ± 0.63 ^b	8.40 ± 0.51 ^c	8.20 ± 0.42 ^b	8.10 ± 0.56 ^b	8.10 ± 0.56 ^b	8.00 ± 0.47 ^c
Bg ₁	6.10 ± 0.73 ^a	6.40 ± 1.26 ^a	6.20 ± 1.54 ^{ab}	6.20 ± 1.03 ^a	6.20 ± 1.03 ^a	6.50 ± 1.17 ^a
Bg ₂	6.20 ± 1.13 ^a	6.20 ± 1.81 ^a	6.60 ± 1.30 ^{ab}	6.20 ± 1.13 ^a	6.90 ± 1.10 ^{ab}	6.40 ± 1.17 ^a
Bg ₃	6.20 ± 1.39 ^a	6.10 ± 1.79 ^a	6.00 ± 1.94 ^a	6.30 ± 1.41 ^a	6.80 ± 1.13 ^a	6.40 ± 1.34 ^a
F ratio	10.140	5.954	4.457	7.593	4.641	4.513
P value	0.000 ^{**}	0.001 ^{**}	0.004 ^{**}	0.000 ^{**}	0.003 ^{**}	0.003 ^{**}

Note: ^{*} values with difference superscripts difference with each other an application of Duncan multiple range test.

^{**} - significant at 0.01% level, ^{*} - significant at 0.05% level, NS – No significant.

Duncan's test reveals that there was no significant difference between the variations control and commercial and that there was no significant difference between the variations BB₁, BB₂ and BB₃ for appearance attributes. Regarding colour attributes that there was no significant difference between the variation control and commercial and that there, was no significant difference between the variation BB₁, BB₂ and BB₃. Regarding flavour attribute that there was no significant difference between the variations control, commercial and there was significant difference exist for variation BG₂ and BG₃. Regarding taste attribute that there was significant difference exist for variations control and BB₃ and that there was no significant difference between the variations BB₁, BB₂, BB₃. Regarding texture attributes that there was no significant difference between the variation control, BB₁ and BG₃ and that there was significant difference exist for variations control, commercial and BB₂. Regarding texture attribute there was no significant difference between the variations BB₁, BB₃ than the commercial BB₂. Regarding

overall acceptability attribute that there was no significant difference between the variation BB₁, BB₂ and BB₃ and that there was significant difference between the variation control and commercial.

CONCLUSION

From this research it was showed that fruit yoghurt samples produced from purely fruit pulp and in combination with milk will compete favourably with yoghurt produced from pure buffalo milk. Nutritionally, yoghurt samples made from the buffalo milk-fruit pulp combination met the dietary requirements of pure yoghurt without significant difference. Fruit pulp added yoghurt BP₃ variation has got 1st rank followed by BB₃. On compared with all criteria for all developed yoghurts, buffalo milk with incorporation of papaya pulp yoghurt has high acceptability. The choice of appropriate flavour or other additive with no side effects would surely enhance greater acceptability rates in yoghurts.

REFERENCES

- Adolfsso, O, T.N. Meydani and R.M. Ressel, 2004, Yoghurt and gut function. *Am. J. Clin Nutr.*80 (2); 245-256.
- Bain, Jennifer (2007-08-22, 4.30(EDT),”Coronation grape rule” Toronto star.
- Bourlioux, P and P. Pochart. 1988, Nutritional and health properties on yoghurt world Rev. Nutr. Diet. 56:217-58.
- Buttriss, J. 1997. Nutritional properties of fermented milk products. *Int. J. Dairy Technol.*, 50:21-27.
- Dassat, P.M., de paolis P., and Sartore, G. 1998, Environmental effects on milks yield in Italian buffalo. *Acto medica veterinaria* 12(6): 587-593.
- Deeth, H.C, 1984, Yoghurt and cultured products. *Australian J. Dairy Tech.* 39(3): 111-113.
- Kalab, M; 2000, Yoghurt: Electron microscopy. *Foods under the microscope scimat.*
- Kim, H.S. 2000, “ L.acidophilus as a dietary adjunct for milk to aid lactose digestion in humans”, *J. Daiyr Sci.* 66.954-966.
- Nite et al., 1987. Bala subramanyam and sathish 1991: Desai et al 1994. Prasad and Geetha 2001.
- Porter, D.R. Eart and J.W. Erdman, 1991. Nutrition labelling. Comparison of proposal for regulatory reform. *Food Tech.*, 45:68-75.
- Saint-Eve A, Levy C, Le moigne M Duauet V, Souchon 1 (2008). Quality changes in yoghurt during storage in different packaging materials food chem.. 110:285-293.
- Sanchez-Segarra.P.J. M. Gracia-Martine.Z.,M.J. Gordillo-Oetero.A. Dioz valverde, M.A. Amaro Lopez and R. Morneo-Rojas-2000. Influence of the addition of fruits of the mineral content of yoghurt nutritional assessment. *Food. Chm.*70:85-89.
- Yale-New Haven Hospital Nutrition advisor – understanding
<http://www.ynhh.com/online/nutrition/advisor/yoghurt.html>.
- <http://en.wikipedia.org/wiki/yoghurt> assessed on 13/8/09
- <http://India4indians.com/health/2010/01/09>