

Sensory Evaluation And Analysis Of Physico-Chemical Parameters Of Some Plain Set Yoghurt Brands Sold In Matara Municipal Area Of Sri Lanka

K.K.G.U Hemamali, S.M. Amarathunge

Abstract: Production, selling, consumption and concern of plain set yoghurt show incitement in the last few time periods in Sri Lanka. New plain set yoghurt brands are coming to the Sri Lankan market very quickly too. The aim of this study was an attempt to do sensory evaluation and compare the physical and chemical parameters of some selected plain set yoghurt brands sold in Matara municipal area of Sri Lanka. Five different brands of plain set yoghurt samples were selected on the basis of preliminary survey done. Then all the selected plain set yoghurt samples were test for organoleptic characters such as color, aroma, appearance, thickness, taste, sourness, sweetness and over all acceptability. After that all the selected plain set yoghurt samples were analyzed with their physical and chemical parameters such as syneresis effect, pH, titratable acidity, total protein content. By doing analysis of sensory evaluation, the brand 12 was the least acceptable product while brand 15 was the most acceptable product by thirty untrained panelists. It also revealed that the thickness with appearance and taste had significant influence ($p < 0.05$) on over all acceptability of the plain set yoghurt brand. According to the results obtained, all physico-chemical parameters significantly differ ($p < 0.05$) between the plain set yoghurt brands too. Hence, plain set yoghurt manufacturers must give attention on improvement of thickness, taste and appearance for better consumer acceptance and for better production. Overall plain set yoghurt quality assessment needs good care on quality control during processing.

Index Terms: chemical parameters, consumer acceptance, physical parameter, plain set yoghurt, sensory evaluation, yoghurt brands, yoghurt quality.

1 INTRODUCTION

Plain set yoghurt is a healthy and nutritional food. Assessment of physical and chemical quality of commercialized plain set yoghurt is a current neediness in the present Sri Lankan market because of Lack of data on those quality parameters of different plain set yoghurt brands, because it is very important for health of plain set yoghurt consumers very much [8]. The main role of plain set yoghurt is to provide sufficient and valuable nutrients to consumers. Hence, there is an incitement in the consumption of plain set yoghurt in last years in Sri Lanka due to demand on the nutritional requirements from plain set yoghurt [10]. Plain set yoghurt is made by fermentation of milk with symbiotic culture of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* which gains by lactic acid [9], [2].

1.1 Benefits and consumer acceptance of plain set yoghurt

Plain set yoghurt is a rich source of calcium. That calcium can bind cancer causing bile acids which can keeps them away from irritable colon wall in consumers. Lactic acid in yoghurt help in the absorption of both calcium and phosphorous from the intestine too [4], [11]. Also plain set yoghurt is a rich source of proteins. Most of the protein in plain set yoghurt is in the digested form.

Hence, those proteins are easier to digest by the consumers [1]. Hence, people are becoming very concern about the quality of plain set yoghurt products [2]. Because now plain set yoghurt consumers tend to be more concern on their health and so demand more on functional foods such as plain set yoghurt. According to their observations, there is an incensement of demand and trend for taste, quality, stability and shelf life of the plain set yoghurt by customers very much.

1.2 Quality of plain set yoghurt and consumer acceptance

The quality of plain set yoghurt is affected by different factors such as the use of different starter cultures, quality of type of milk, different unhygienic conditions and microbiological condition. Milk supplements can effect on the chemical and physical properties of plain set yoghurt directly because of their huge effects on fermentation time, starter culture metabolism and interaction with milk proteins. Because it helps to form the major initial step for the plain set yoghurt gel like network [5]. There is an incensement of popularity and demand of plain set yoghurt produced and sold in present Sri Lanka from different plain set yoghurt manufacturers. Samples of plain set yoghurt collected from different super markets show either inadequate, no or lack of display of the nutritional composition of the products on labels of the different plain set yoghurt brands produced. This study was therefore carried out to determine and compare the physico-chemical and sensory qualities of plain set yoghurt brands sold within Matara municipal area of Sri Lanka.

2 MATERIALS AND METHOD

Preliminary survey was done by giving an questionnaire to the plain set yoghurt customers in different super markets in Matara municipal area. According to those results the popularity of the commercialized plain set yoghurt brands in Matara municipal area of Sri Lanka was in a decreasing order as in following fig.1; Brand 1, Brand 15, Brand 7, Brand 12,

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Brand 10. Those brands were selected for the present study.

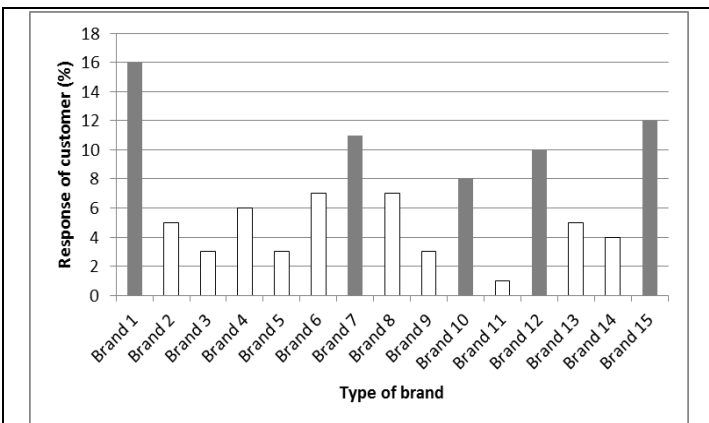


Fig 1. The graph of percentage of response of customer versus different types of plain set yoghurt brands

2.1 Sample collection

Samples of freshly prepared selected plain set yoghurt brands were collected within Matara municipal area of Sri Lanka and transported in an ice box at 4 °C to laboratory of Department of Botany, Faculty of Science, University of Ruhuna, Matara for analyses. The samples were labeled as Brand 1, Brand 15, Brand 7, Brand 12 and Brand 10.

2.2 Sensory evaluation

Thirty untrained panelists were evaluated the sensory characters such as color, aroma, appearance, thickness, taste sourness, sweetness, and over all acceptability of the plain set yoghurt brands. They were evaluated those selected plain set yoghurt brands on nine-point hedonic scale ranging from excellent (score=9) to very poor (score=0).

2.3 Physico-chemical analysis

Determination of syneresis effect - 15.00 g of plain set yoghurt sample was filtered through a muslin cloth about for about 20 minutes. The volume of drained whey was measured [4]. Determination of pH - 10.00 g of plain set yoghurt sample was dissolved in 200.00 ml of distilled water. pH of the solution was measured by a calibrated pH meter by using pH=4, pH=7 and pH=9 buffer solutions. Determination of Titratable acidity as a percentage of lactic acid - 10.00 g of plain set yoghurt sample was dissolved in 200.00 ml of distilled water. Three drops phenolphthalein was added to 10 ml of that sample and it was titrated with 0.100N NaOH until the color change from colorless to pale pink [13]. Titratable acidity was calculated by below equation.

$$\% \text{ Titratable acidity} = (L \times N \times 90 \times 100) / (V \times 1000)$$

L=ml volume of 0.1N NaOH required

N=Normality of 0.1N NaOH

V=L volume of the sample used.

(CH₃-CHOH-COOH, Molecular Weight= 90.00 g)

Determination of total protein content - 1.00 g of plain set yoghurt sample, 5.00 g of powdered Pottassium Sulphate and 5.00 g of small crystals of Copper (II) Sulphate-5-hydrate were added to kjeldhal flask and it was digested for about three hours. Then it was cooled and dissolved it in 100.00 ml of distilled water and filtered. 50.00 ml of filtrate was added to the distillation flask. Then 25.00 ml of 40% NaOH was added to it and it was distilled until it fills the blue color solution in the

empty titration flask. It was titrated with 0.0100 M HCl until the color changes from greenish blue to orange [11]. Total protein content was calculated by below equation.

$$\text{Total protein content \%} = (1.4 \times V \times M \times 6.25) / W$$

V= Volume of hydrochloric acid required (ml)

M= Normality of hydrochloric acid (moldm⁻³)

W= Weight of the sample (g)

Those parameters were checked for each and every selected plain set yoghurt brand. The overall mean scores of characters of sensory evaluation of plain set yoghurt brands were determined by computing the averages. The data of all physico-chemical parameters were analyzed statistically using analysis of variance (ANOVA) by calculating data with mean values and standard deviations using SPSS (Version 17.0). Significant differences were determined at p-value = 0.05.

3 RESULTS

3.1 Physico-chemical parameters of selected plain set yoghurt brands

TABLE 1.

PHYSICO-CHEMICAL COMPOSITIONAL QUALITY OF PLAIN SET YOGHURT SAMPLES COLLECTED FROM MATARA MUNICIPAL AREA OF SRI LANAKA

Brand	Parameters			
	pH value	Titrateable acidity (%)	Total protein content (%)	Syneresis effect (mL)
Brand 1	4.50(±0.05) ^a	0.42 (±0.01) ^a	2.48 (±0.01) ^a	3.32(±0.00) ^a
Brand 15	3.64(±0.01) ^b	0.31(±0.01) ^b	2.37 (±0.00) ^b	3.63(±0.02) ^b
Brand 7	4.41(±0.02) ^c	0.3(±0.00) ^c	2.26(±0.00) ^c	4.48(±0.01) ^c
Brand 12	4.58(±0.04) ^d	0.5(±0.01) ^d	2.52(±0.01) ^d	2.74(±0.03) ^d
Brand 10	3.89(±0.03) ^e	0.33 (±0.02) ^e	2.2(±0.04) ^e	2.15(±0.01) ^e

abcde means in the same column followed by the same letter(s) do not differ significantly at (p-value > 0.05) (mean + SD)

From the Table 1, it shows that pH value, titrateable acidity percentage, syneresis effect and total protein content significantly (p-value < 0.05) differ within the plain set yoghurt brands.

3.2 SENSORY EVALUATION

TABLE 2.
MEAN SCORES OF SENSORY ATTRIBUTES OF PLAIN SET YOGHURT BRANDS

Brands	Color	Taste	Thickness	Appearance	Aroma	Sourness	Sweetness	Over all acceptability
1	7.43(±0.29) ^b	7.54(±0.29) ^d	7.95(±0.38) ^a	7.43(±0.29) ^b	6.54(±0.72) ^c	5.65(±3.57) ^a	8.32(±0.86) ^a	7.42(±0.42) ^b
15	9.01(±0.94) ^a	8.89(±0.58) ^b	9.90(±0.45) ^c	9.45(±0.73) ^c	7.34(±1.03) ^d	5.98(±0.53) ^b	8.65(±1.03) ^c	8.46(±0.53) ^a
7	8.53(±1.73) ^b	7.87(±0.83) ^b	6.68(±0.83) ^d	8.54(±0.23) ^a	6.43(±1.72) ^c	6.21(±0.53) ^d	8.45(±0.47) ^b	7.53(±0.35) ^a
12	7.06(±0.28) ^a	5.09(±0.27) ^d	5.69(±0.63) ^b	4.58(±2.45) ^a	5.55(±1.82) ^c	5.35(±0.53) ^d	7.21(±0.37) ^c	5.79(±0.86) ^c
10	8.54(±0.23) ^d	7.43(±0.44) ^b	6.32(±1.03) ^d	6.54(±1.03) ^a	7.32(±0.56) ^c	6.71(±1.03) ^c	9.53(±0.43) ^b	7.48(±0.48) ^b

Mean values with different superscripts in the same column show significant differences ($p < 0.05$).

3.3 SENSORY EVALUATION COMPARISON OF PHYSICO-CHEMICAL PARAMETERS IN BETWEEN SELECTED PLAIN SET YOGHURT BRANDS

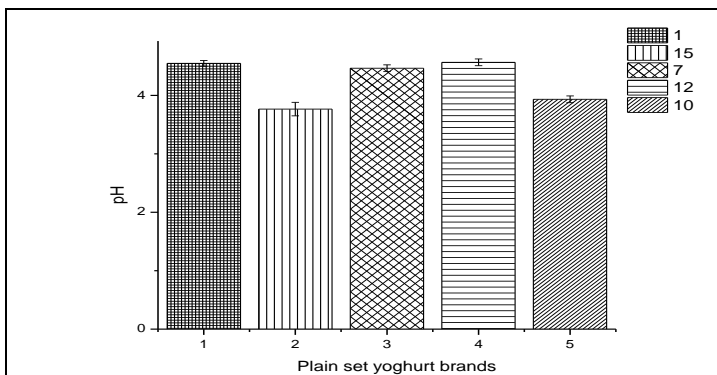


Fig 2. Variation of the pH according to different plain set yoghurt brands

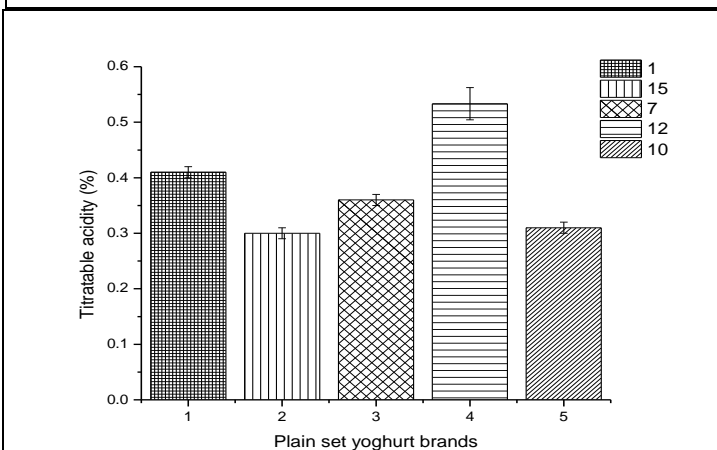


Fig 3. Variation of the titratable acidity according to different plain set yoghurt brands

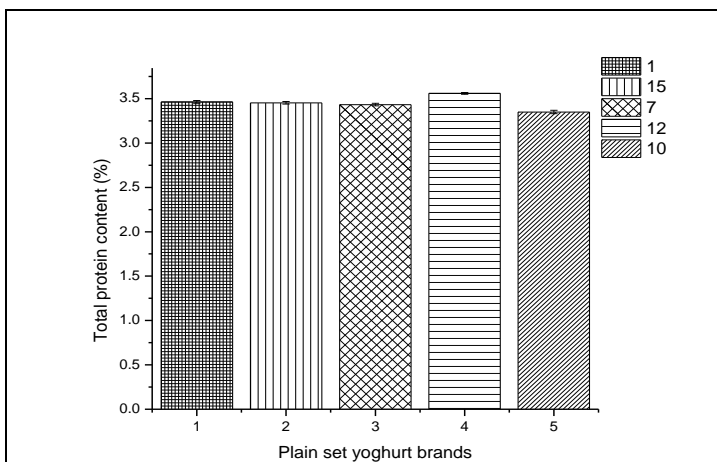


Fig 4. Variation of the total protein content (%) according to different plain set yoghurt brands

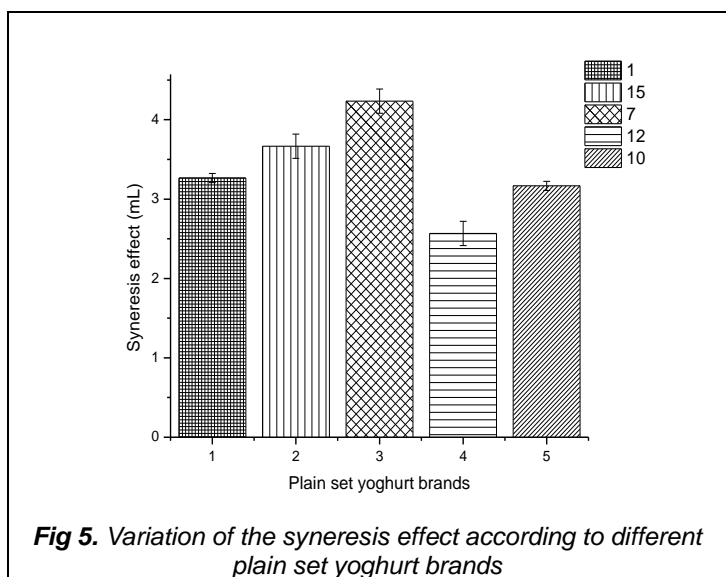
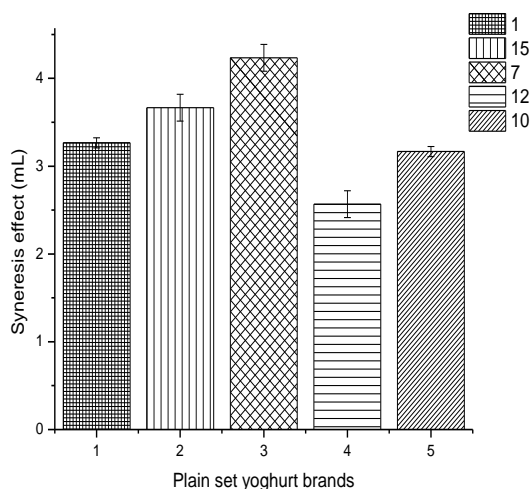


Fig 5. Variation of the syneresis effect according to different plain set yoghurt brands



According to above Fig. 2, Fig. 3, Fig. 4, Fig. 5, different plain set yoghurt brands significantly differ (p -value < 0.05) for the physico-chemical parameters checked.

4 DISCUSSION

The results in table 2 indicate significant differences ($p < 0.05$) in the sensory quality of the plain set yoghurt products. Since all the scores were above 7 color and sweetness of all yoghurt brands were appreciated by most of the panelists. Brand 12 had the lowest score and had the least acceptable plain set yoghurt product. This may be due to high titratable acidity of 0.54% compared to all the other products. The highest overall mean score was scored for brand 15. It had the highest mean scores for color, thickness and appearance. The increasing order of acceptability of the products by the panelists was Brand $12 < 1 < 10 < 7 < 15$. According to the table 1, the pH of plain set yoghurts ranged from 3.64 to 4.58. It may be due to different final pH values which produce different amounts of lactic acid by different amounts of symbiotic cultures in different plain set yoghurt brands during post-acidification period [8]. The protein content of the brands of plain set yoghurt ranged from 2.2% to 2.52%. Normally, low protein content of the plain set yoghurt brands in this study could be due to the use of milk with low protein content and high

content of protein may be due to use of milk with high content of protein for the different plain set yoghurt brand production. Protein content of commercial plain set yoghurt is generally higher than that of fresh milk. It is due to the addition of non fat dry milk during processing by different plain set yoghurt manufactures. Also manufacturers concentrate milk in different amounts to increase the protein content of the final product too [12]. Syneresis effect of plain set yoghurts ranged from 2.15ml – 4.48ml. The differences in pH, titratable acidity, calcium concentration and syneresis effect between plain set yoghurt brands might be due to the use of different milk types and the different conditions of processing by different plain set yoghurt manufacturers [7]. Therefore, in order to further improve the market demand of plain set yoghurt in Sri Lanka, we can improve the quality of those products up to the Sri Lankan standards (SLS) and World Health Organization (WHO) standards too.

5. Conclusion

According to the sensory qualities and acceptability, Brand 15 was the most acceptable product. Some selected physico-chemical quality of plain set yoghurts changed among selected different brands.

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