

Selection of a Suitable Stabilizer Percentage Contributing to Maximum Organoleptic Properties of the Pelwatte Set Yoghurt

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Introduction

Yoghurt is a fermented milk product with a medium acidity obtained by lactic acid fermentation using thermophilic lactic acid bacteria. Stabilizers are sometimes called as hydrocolloids and their mode of action in yoghurt includes two basic functions; binding water and secondly promotion of an increase in viscosity and the molecules of stabilizers are capable of forming a network of linkages between the milk constituents and themselves due to the presence of a negatively charged group or carboxyl radicals (Schrieber, 1976) or to the presence of a salt possessing the power to sequester calcium ions (Salvador and Fiszman, 1988). The use of stabilizers/ hydrocolloids is very important in manufacturing of set yoghurt because, the consumer preference of the set yoghurt depends on overall quality of the product especially on the viscosity, consistency, appearance and mouth-feel (Bassett, 1983). As, FAO/WHO (1976) and the Food Drugs Act (1975, 1980), revealed the permitted stabilizers are, gelatin, pectin, carrageenan, agar, xanthan gum, locust bean gum etc. Thus this investigation was conducted to determine the best percentage of a suitable stabilizer to be added in the yoghurt that contributes to the maximum organoleptic characters.

Methodology

Yoghurts were prepared using the method of Tammime and Robinson (2007) with slight modifications to its stabilizer percentage. Three experiments were conducted to determine suitable stabilizer and the maximum organoleptic properties with respect to incorporated levels of stabilizer. Three food grade stabilizers (gelatin, pectin and carrageenan) were evaluated to select best stabilizer to set yoghurt based on sensory evaluation. There were seven treatments of selected stabilizer levels as 0.50% (w/v), 0.55%(w/v), 0.60%(w/v), 0.65%(w/v), 0.70%(w/v), 0.75%(w/v) and 0.80%(w/v) in the second experiment. During third experiment there were three treatments of selected stabilizer levels as 0.60%(w/v), 0.65%(w/v) and control sample (existing gelatin%) 0.80%(w/v).

Organoleptic properties of yoghurt at 4 °C for day 1 were evaluated using 30 untrained panelists with 7-point hedonic scale from 1-extremely dislike to 7- extremely like. Selected yoghurt samples based on sensory evaluation were stored at 4 °C for shelf life analysis.

Titrateable acidity (TA), pH, Brix value, Total Colony Count (TCC) and detection and enumeration of yeast and molds were determined for 30 days of storage. Crude Fat, Crude Protein, Total Solids and Ash were analyzed for the selected samples and the control sample. Data were analyzed using one way ANOVA and Friedman non parametric test.

Results and Discussion

Yoghurts prepared by incorporating gelatin showed significantly higher preference ($P < 0.05$) with all sensory attributes. Both Pectin and Carrageenan incorporated yoghurts showed “sandy mouthfeel” which is the cause for lack of smoothness of the yoghurt at higher inclusion levels.

Based on sensory evaluation II, two gelatin concentrations 0.60%(w/v), 0.65%(w/v) were selected among seven treatments and showed significantly higher preference ($P < 0.05$) with all sensory attributes except taste, appearance and odour. Treatment 3 and 4, gave the most desirable characters to the yoghurt with respect to highest sum of ranks (5.2857, 5.0842).

According to results given by sensory evaluation III, the best inclusion level of gelatin was 0.65%(w/v) to palwatta set yoghurt. Among three treatments, treatment 2 showed higher preference ($P < 0.05$) with all sensory attributes and gave the most desirable characters to the yoghurt with respect to highest sum of ranks (6.00). Treatment 3 (control sample) showed less preference due to the excessive hardness in texture and strong flavour of gelatin.

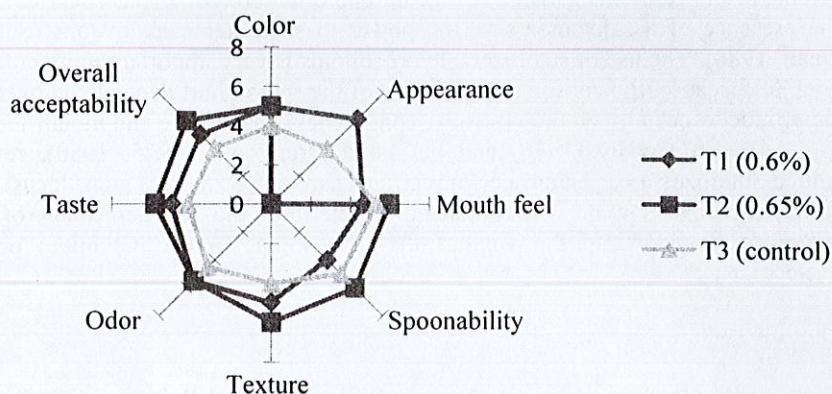


Figure 1: Web diagram for sensory evaluation III

The change of titratable acidity, pH and viscosity of control sample (0.80% (w/v)) treatment 1 and 2 at 4 °C with 30 days of storage were evaluated. There were no significant differences ($P > 0.05$) in lactic acid development during storage between control and other treatments.

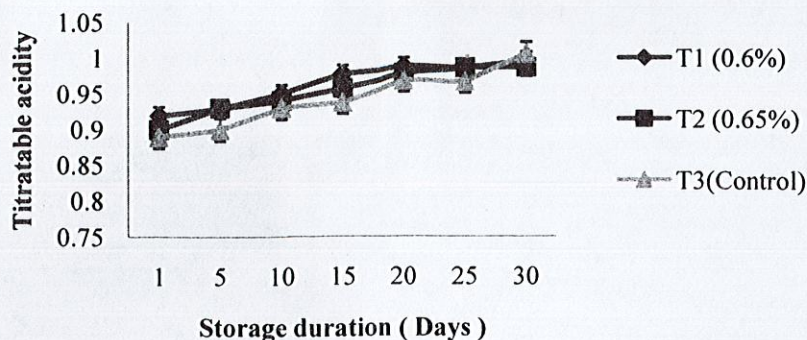


Figure 2: Change in titratable acidity (%) in yoghurts

The figure 1 shows that, titratable acidity slightly increased in all three treatments after the fifth day. This may be due to the production of lactic acid by slight growth in the colony forming units with the time.

During the storage duration Total Colony Count, yeasts and moulds were enumerated for three treatments with the storage duration. With the time yeasts count was slightly increased. This study was in accordance with Sri Lankan Standards specified for set yoghurts (1989) up to 30th day of storage.

The proximate composition of the 0.65%(w/v) gelatin incorporated yoghurt was 3.91% crude protein, 3.08% crude fat 0.82% ash and 22.83% total soluble solid.

The cost of production for 0.65% gelatin incorporated yoghurt is 12.35 LKR and 0.65% gelatin incorporation could be economically feasible to the Palwatta dairies. TCC, yeast and mould counts did not exceed the specifications in Sri Lankan Standards for the yoghurt during 30 days.

Conclusion

Gelatin is the most suitable stabilizer and 0.65% is the most suitable concentration for Palwatta set yoghurt due to low cost and high sensory attributes. The shelf life of set yoghurt is within the specified standards when stored at 14 ± 1 °C for 30 days of time.

References

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