Abstract Submission Number - ABD26

# FORMULATION OF NON-ANIMAL BASED STABILIZER COMBINATION TO REPLACE GELATIN IN SET-YOGURT

**Kuruppu KAYR , Abeysundara PDA**

**Department of Food Science & Technology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Sri Lanka**

## ABSTRACT

Gelatin is frequently used as a stabilizer in set-yoghurt nowadays. However, consumers concern about the source of gelatin due to various dietary habits, religious belief like reasons. The main objective of this study was to develop a gelatin free set-yoghurt by using non-animal based stabilizer/s. First, Agar-Agar and κ-Carrageenan were separately used at 0.05%, 0.5% or 1% (w/w) concentration to produce set-yoghurt and the best concentrations (0.05% for both stabilizers) were selected based on organoleptic properties and pH of yoghurts. Then, the selected stabilizer concentrations were combined with Guar Gum (GG), Xanthum Gum (XG), or Locust Bean Gum (LBG) at 0.005%, 0.01% or 0.02% concentrations to produce set-yoghurt. Sensory analysis revealed that the yoghurt containing Agar + GG or LBG have acceptable organoleptic properties. Selected yoghurts were then subjected to descriptive sensory, physiochemical, proximate and microbiological analysis for 21 days at 4 ºC using Gelatin 0.5% (w/w) added yogurt as the control. In all yoghurts, the microbial quality remained acceptable, the pH decreased and the titratable acidity increased (P<0.05) during the storage period. The water holding capacity of LBG containing yoghurt was significantly lesser than the GG containing or control yoghurt samples. No significant difference in proximate composition among yoghurt samples observed. According to the descriptive sensory analysis, Agar + GG resulted greater taste, mouth feel and texture compared to Agar + LBG in yoghurt. Finally this study suggested that Agar + Guar Gum stabilizer combination is a good non-animal based option to replace gelatin in set-yoghurt with sufficient overall properties.

Key words: Gelatin, Non-animal, Set-Yoghurt, Stabilizer,

## Introduction

Gelatin is the most commonly used stabilizer type in yoghurt industry. Gelatin is extracted through the thermal denaturation of collagen from different sources such as cattle bones, pig skin, fish, insects, porcine and equines (Alakali *et al*., 2008). Consumers are greatly concerned about the origin or the source of gelatin based on their religious believes and dietary choices. The main objective of this study was to develop a non animal based stabilizer combination that provide high physiochemical and sensory characteristics in set yogurt. In this study effect of addition of Agar-agar or κ - Carrageenan in combination with Guar gum, Xanthum gum & Locust Bean gum on yogurts' physicochemical characteristics, sensory attributes and microbial count were evaluated during cold storage at 4ºC for 21 days.

## Materials & Methods

### Experimental Procedure

All the stabilizers (Gelatin, Agar-agar, κ - Carrageenan. Xanthum Gum, Guar Gum and Locust Beam Gum) were added after properly mixing with the dry ingredients during preparation of set yogurts. First, Agar-Agar and κ-Carrageenan were separately used at 0.05%, 0.5% or 1% (w/w) concentration to produce set-yoghurt and the best concentrations (0.05% for both stabilizers) were selected based on organoleptic properties and pH of yoghurts. Then, the selected stabilizer concentrations were combined with Guar Gum (GG), Xanthum Gum (XG), or Locust Bean Gum (LBG) to produce set-yoghurt. Sensory analysis revealed that the yoghurt containing Agar + GG or LBG have acceptable organoleptic properties. Selected yoghurts were then subjected to physiochemical analysis to determine the pH, titratable acidity, water holding capacity and the texture profile differences. Proximate analysis was carried out to all the three yogurt samples to calculate the moisture, crude protein, crude fat and ash contents. Finally microbiological analysis of the selected yogurt types was done to determine the yeast and mould count and coliform count during the storage period.

## Results and Discussion

### Physiochemical Analysis and Descriptive Sensory analysis.

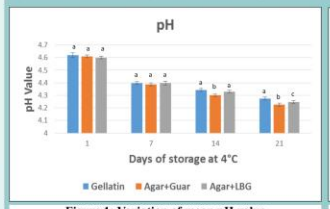


Figure 1: Variation of mean pH value

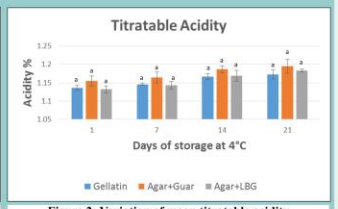


Figure 2: Variation of mean titratable acidity

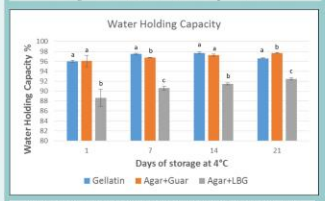


Figure 3: Variation of mean water holding capacity

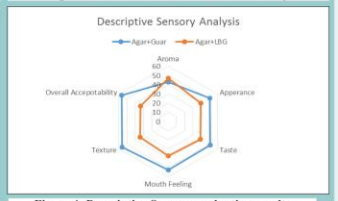


Figure 4: Descriptive Sensory evaluation results

Means with the same letters are not significantly different (P>0.05) for the particular day of storage

### Texture Profile analysis

There was no any significant difference in texture profile parameters (hardness, cohesiveness and adhesiveness parameters) measured by the Brookfield Texture Analyzer among the treatments during storage period.

| Days of the Storage | Texture Parameters | Gelatin | Agar + Guar | Agar + LBG |
|---|---|---|---|---|
| 1st Day | Cohesiveness | 0.3450±0.0354$^a$ | 0.3250±0.0212$^a$ | 0.3300±0.0424$^a$ |
| | Hardness | 22.3100±2.7000$^a$ | 23.9100±0.6930$^a$ | 22.7100±0.7210$^a$ |
| | Adhesiveness | 4.2300±0.1560$^a$ | 2.0050±0.2900$^b$ | 4.0050±0.2900$^a$ |
| 7th Day | Cohesiveness | 0.3850±0.0354$^a$ | 0.3700±0.0141$^a$ | 0.3800±0.0283$^a$ |
| | Hardness | 26.2950±0.5870$^a$ | 23.8700±2.0800$^a$ | 25.0500±1.4400$^a$ |
| | Adhesiveness | 3.4800±1.6200$^b$ | 1.7500±0.4530$^b$ | 4.5500±0.2400$^a$ |
| 14th Day | Cohesiveness | 0.4150±0.0071$^a$ | 0.4000±0.0990$^a$ | 0.3850±0.0212$^a$ |
| | Hardness | 29.4400±1.6500$^a$ | 24.0950±0.5160$^a$ | 23.2900±2.6900$^a$ |
| | Adhesiveness | 4.8100±0.1560$^a$ | 2.4050±1.2940$^b$ | 3.7100±0.7070$^b$ |
| 21st Day | Cohesiveness | 0.4300±0.0141$^a$ | 0.3600±0.0141$^a$ | 0.3950±0.0212$^a$ |
| | Hardness | 29.9700±1.6100$^a$ | 26.3800±0.0849$^a$ | 26.7450±0.4310$^a$ |
| | Addhesiveness | 4.3850±1.0820$^a$ | 3.0600±0.3390$^a$ | 3.3850±0.0212$^a$ |

Table 1: Texture Profile Analysis

## Nutritional properties of yogurt samples

| Treatment | Total Solids% | Ash % | Crude Protein % | Crude Fat% |
|---|---|---|---|---|
| **Gellatin** | 25.140±0.563$^a$ | 0.9630±0.1790$^a$ | 4.3486±0.0865$^a$ | 3.3133±0.0577$^a$ |
| **Agar + GG** | 24.673±0.680$^a$ | 0.9133±0.1193$^a$ | 4.1376±0.1731$^a$ | 3.3133±0.1155$^a$ |
| **Agar + LBG** | 24.430±1.870$^a$ | 0.9733±0.1007$^a$ | 4.3394±0.0948$^a$ | 3.0333±0.0577$^a$ |

Table 1: Nutritional and physiochemical properties of yogurt samples
Means with the same letters in the same column are not significantly different (P>0.05)

## Conclusions

Agar based stabilizer combinations were more preferable for set yogurts than carrageenan based stabilizer combinations. Combination of Agar with Guar gum gave better textural properties in yoghurt than Agar alone.

## References

Alakali, J.S., Okonkwo, T.M. and Iordye, E.M., 2008. Effect of stabilizers on the physicochemical and sensory attributes of thermized yoghurt. African Journal of Biotechnology, 7

Mudgil, D., Barak, S. and Khatkar, B.S., 2014. Guar gum: processing, properties and food applications—a review. Journal of food science and technology, 51(3), pp.409-418.

Liu, D., Nikoo, M., Boran, G., Zhou, P. and Regenstein, J.M., 2015. Collagen and gelatin. Annual review of food science and technology, 6, pp.527-557.

Tseng, C.K., 1944. Agar: a valuable seaweed product. The Scientific Monthly, 58(1), pp.24

Imeson, A. ed., 2011. Food stabilisers, thickeners and gelling agents. John Wiley & Sons.

Aswal, P., Priyadarsi, S. and Anubha, S. (2012) 'Yoghurt preparation, characteristic and recent advancements', Cibtech Journal of Bioprotocols, pp.2319-3840.