PRODUCTION AND EVALUATION OF
PHYSICO-CHEMICAL PARAMETERS OF PEANUT
MILK YOGHURT FORTIFIED WITH SKIMMED MILK
POWDER

W.A. KAVINDI NAYANATHARA

FACULTY OF AGRICULTURE
EASTERN UNIVERSITY
SRI LANKA
2019
ABSTRACT

Peanut is used as an oil crop, as a snack and in confectionaries in Sri Lanka. There is more value addition and novel products from peanut but most of them are not commercially available in Sri Lankan market. Peanut milk and its products have nutritional benefits for young and old people because of richness in protein, minerals and essential fatty acids such as linoleic and oleic acids. The production of non-dairy based yoghurts has been pointed out as a novel trend in the creation of functional foods. A growing number of consumers opt to plant based milk substitutes for medical reasons or as a lifestyle choice. Therefore, this research study was conducted with an aim to produce peanut milk based yoghurt by utilizing the functional properties of peanut milk to evaluate physico-chemical and organoleptic characteristics of peanut milk based yoghurt. Yoghurt samples were produced from blends of peanuts milk and skimmed milk powder together with the starter culture of *Lactobacillus bulgaricus*, and *Streptococcus thermophilus*. The skimmed milk powder was added to peanuts milk at the concentration of 0% (T1), 5% (T2), 10 % (T3), and 15% (T4). The physico-chemical (moisture, ash, fat, pH, titratable acidity, protein, total soluble solids, and total solids) and sensory characteristics (colour, taste, texture, aroma and overall acceptability) of freshly made yoghurts were analyzed according to AOAC (2002) methods.

Moisture, ash, fat, pH, titratable acidity, protein, total soluble solids, and total solids were significantly difference (p<0.05) among the treatments at day one. The results of this study revealed that with increased of skimmed milk powder concentration; the moisture content was ranged from 83.29 to 62.87%, total solid varied from 16.71 to 37.13%, ash content was increased from 1.06 to 2.16%, pH value decreased from 4.76 to 4.39, while titratable acidity was increased from 0.73 to 1.74%. And TSS in peanut
yoghurt was increased from 14.53 to 18.80% while fat content varied from 5.44 to 7.36% and protein content ranged from 11.52 to 20.64% with increased of skimmed milk powder concentration of peanut milk yoghurt. Organoleptic properties were evaluated though the panel of 20 members. Results of organoleptic characteristics revealed that, among all types of peanut yoghurts, peanuts milk based yoghurt fortified with 10% skimmed milk powder represented highest (P≤0.05) mean score of overall acceptability.

The above four treatments were kept in a refrigerator at 4 °C for two weeks in order to assess their shelf life. Physico-chemical characteristics were analyzed at one week intervals and sensory characteristics were analyzed at the end of 2nd week during refrigerated storage. During storage periods, the moisture content was significantly (p<0.05) increased and total solids, ash content, total soluble solids, fat content, protein content were significantly (p<0.05) decreased with increased of skimmed milk powder concentration. pH content was significantly (p<0.05) decreased while titratable acidity was increasing with increased of skimmed milk powder concentration of peanut yoghurt. Peanuts milk based yoghurt fortified with 10% skimmed milk powder (T3) represented highest (P≤0.05) mean score of overall acceptability for stored peanut yoghurt at the end of 2 weeks period. Finally, it could be concluded that the peanut yoghurt fortified with 10% skimmed milk powder (T3) can be kept in refrigerator for 2 weeks without spoilage and with good nutrient composition.
TABLE OF CONTENT

Title. ............................................. Page No.
ABSTRACT ............................................. I
ACKNOWLEDGMENT .................................... III
TABLE OF CONTENT .................................. IV
LIST OF TABLES ..................................... X
LIST OF FIGURES .................................. XI
CHAPTER 01 ........................................... 1
1.0 Introduction .................................... 1
CHAPTER 02 ........................................... 4
2.0 Literature Review ................................ 4
2.1 Peanut ........................................... 4
  2.1.1. Introduction to Peanut ..................... 4
  2.1.2. Scientific Classification .................... 5
  2.1.3. Common Names of Peanuts in Different Languages 5
  2.1.4. History .................................... 5
2.2. Plant Description ............................... 7
  2.2.1. Leaves .................................... 8
  2.2.2. Flowers ................................... 8
  2.2.3. Pods ...................................... 8
  2.2.4. Seeds .................................... 9
  2.2.4. Peanut Parts ............................... 9
2.3. Cultivation of Peanuts ......................... 9
  2.3.1. Land Preparation ........................... 9
  2.3.2. Fertilizer Application .................... 10
  2.3.3. Irrigation ................................ 10
  2.3.4. Weed Control ............................ 10
  2.3.5. Crop Rotation ............................ 10
  2.3.6. Insect Pest and Disease in Peanut .......... 11
  2.3.7. Harvesting ............................... 11
3.6. Physico-chemical Analysis of Peanut Milk Yoghurt Fortified with Different Concentrations of Skimmed Milk Powder ................................................. 35

3.6.1. Determination of Moisture Content ..................................................... 35
  3.6.1.1. Principle ..................................................................................... 35
  3.6.1.2. Materials .................................................................................. 35
  3.6.1.3. Procedure ................................................................................ 36
  3.6.1.4. Calculation .............................................................................. 36

3.6.2. Determination of Ash Content .............................................................. 36
  3.6.2.1. Principle .................................................................................. 36
  3.6.2.2. Material .................................................................................. 37
  3.6.2.3. Procedure ................................................................................ 37
  3.6.2.4. Calculation .............................................................................. 37

3.6.3. Determination of pH ........................................................................... 37
  3.6.3.1. Principle .................................................................................. 37
  3.6.3.2. Materials ................................................................................ 38
  3.6.3.3. Procedure ................................................................................ 38

3.6.4. Determination of Titratable Acidity ....................................................... 38
  3.6.4.1. Principle .................................................................................. 38
  3.6.4.2. Materials ................................................................................ 38
  3.6.4.3. Procedure ................................................................................ 39
  3.6.4.4. Calculation .............................................................................. 39

3.6.5. Determination of Total Soluble Solids ................................................... 39
  3.6.5.1. Principle .................................................................................. 39
  3.6.5.2. Materials ................................................................................ 39
  3.6.5.3. Procedure ................................................................................ 40

3.6.6. Determination of Total Solids ............................................................... 40
  3.6.6.1. Principle .................................................................................. 40
  3.6.6.2. Materials ................................................................................ 40
  3.6.6.3. Procedure ................................................................................ 40
  3.6.6.4. Calculations ............................................................................ 40

3.6.7. Determination of Fat Content (Soxhlet Method) ................................... 41
  3.6.7.1. Principle .................................................................................. 41
3.6.7.3. Procedure ............................................................... 41
3.6.7.2. Materials ............................................................... 41
3.6.7.4. Calculation ............................................................. 42
3.6.8. Determination of Protein Content (Kjeldhal Digestion Method) ........ 42
  3.6.8.1. Principle .............................................................. 42
  3.6.8.2. Materials ............................................................. 42
  3.6.8.3. Procedure ............................................................. 42
  3.6.8.4. Calculation ............................................................. 43
3.7. Sensory Evaluation .......................................................... 44
  3.7.1 Materials for Sensory Evaluation ................................... 45
  3.7.2 Serving of Peanut Yoghurt Samples .................................. 45
3.8. Experiment 2- Storage Study of Peanut Yoghurt Fortified With
    Different Concentrations of Skimmed Milk Powder .................... 45
3.9. Statistical Analysis .......................................................... 45

CHAPTER 04 ........................................................................... 46
4.0 Results and Discussion ......................................................... 46
  4.1. Experiment 1- Analysis of Nutritional and Organoleptic Qualities
      of Freshly Prepared Peanut Milk Yoghurt Fortified With Different
      Concentrations of Skimmed Milk Powder ................................ 46
    4.1.1. Physico-chemical Attributes of Peanut Milk ....................... 46
    4.1.2. Physico-chemical Attributes of Freshly Prepared Peanut Milk
      Yoghurt Fortified with Different Concentrations of Skimmed Milk
      Powder .......... 47
      4.1.2.1. Moisture Content ................................................. 47
      4.1.2.2. Total Solids (TS) ................................................ 48
      4.1.2.3. Ash Content ......................................................... 49
      4.1.2.4. pH ................................................................. 49
      4.1.2.5. Total Soluble Solids (TSS) ..................................... 50
      4.1.2.6. Titratable Acidity .............................................. 51
      4.1.2.7. Fat Content ......................................................... 52
      4.1.2.8. Protein Content ................................................... 52
    4.1.3. Sensory Qualities of Fresh Peanut Milk Yoghurt .................... 53
      4.1.3.1. Colour ............................................................. 53
4.1.3.2. Taste ................................................................................................................. 54
4.1.3.3. Texture................................................................................................................. 54
4.1.3.4. Aroma ................................................................................................................ 54
4.1.3.5. Overall Acceptability ...................................................................................... 55

4.2. Experiment 2- Storage Study of Peanut Yoghurt Fortified with Different Concentrations of Skimmed Milk Powder ............................................................................. 57

4.2.1. Physico-chemical Qualities of Peanut Milk Yoghurt during Storage...57
4.2.1.1. Moisture Content ............................................................................................. 57
4.2.1.2. Total Solids (TS) ............................................................................................. 58
4.2.1.3. Ash Content ....................................................................................................... 59
4.2.1.4. pH ...................................................................................................................... 59
4.2.1.5. Total Soluble Solids (TSS) ............................................................................... 60
4.2.1.6. Titratable Acidity ............................................................................................ 61
4.2.1.7. Fat Content ....................................................................................................... 63
4.2.1.8. Protein Content ............................................................................................... 63

4.2.2. Sensory qualities of Peanut Milk Yoghurt during Storage ..................... 64
4.2.2.1. Colour ............................................................................................................... 65
4.2.2.2. Taste ................................................................................................................ 65
4.2.2.3. Texture ............................................................................................................. 65
4.2.2.4. Aroma .............................................................................................................. 65
4.2.2.5. Overall Acceptability .................................................................................... 66

CHAPTER 05 .................................................................................................................. 68
5.0 Conclusion ............................................................................................................. 68

SUGGESTIONS ........................................................................................................... 71
REFERENCES ............................................................................................................... 72
APPENDIX I .................................................................................................................. 84
APPENDIX II ............................................................................................................... 92