

**PRODUCTION AND EVALUATION OF SOME
FUNCTIONAL DAIRY FOODS FORTIFIED
WITH NATURAL SOURCE OF MINERALS
AND ANTIOXIDANTS**

By

ALIAA ALI ABD EL-AZEZ SAID AHMED SALAH

B.Sc.Agric. Sc. (Dairy Sc. & Tech.), Ain shams University, 2012

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ABSTRACT

Aliaa Ali Abdel Aziz, studies on Production and evaluation of some functional dairy foods fortified with natural sources of minerals and antioxidants. Unpublished Master of Science Thesis, Department of Food Science, Faculty of Agriculture, Ain Shams University, 2016.

The goals of this investigation were to improve the functional and sensory properties of some dairy products through fortification with different plant ingredients as source of some bio-active compounds such as minerals and antioxidants. The study was conducted in two parts, in the first part, date powder (as sugar substitute) and pomegranate juice were added in the base formula of frozen yoghurt as a source of bioactive components. Four treatments of frozen yoghurt were made by substituting the sugar added with 2, 4, 6 and 8% of date powder. Another four treatments of flavoured frozen yoghurt mixes were fortified with pomegranate juice at level 10, 20, 30 and 40%. Sucrose sugar was added to the control mix at ratio 15%. Changes in the physical, chemical and organoleptic properties of mixes and frozen products were investigated. Lactic acid bacteria were also examined in frozen products and followed during frozen storage. The proportional increase in the ratio of date powder added to the blend of frozen yoghurt had no significant effect on pH value, total solids and fat contents, while it caused gradual increase in the, ash, crude fibers, antioxidant and minerals (Fe, Mg, K and Cu) contents. Freezing point, overrun and melting resistance of functional frozen yoghurt with date powder were increased, while, specific gravity and weight per gallon values of frozen mix were gradually decreased. Fortification of frozen yoghurt blend with date powder as sugar substitute improved the viability of lactic acid bacteria in frozen product during frozen storage period and increased the acceptability of frozen yoghurt product.

In functional frozen yoghurt with pomegranate juice, increase in the ratio of added pomegranate juice to the blend of frozen yoghurt had no significant effect on total solids and fat contents, while caused a gradual increase in the acidity, antioxidant, mineral contents and overrun,

On the other hand, ash content, pH, specific gravity, weight per gallon, freezing point and melting resistance of frozen mix were gradually decreased. Addition the pomegranate juice in the frozen yoghurt blend caused slight decrease in viability of all lactic acid bacteria in frozen product during frozen storage period. Fortification the frozen yoghurt blend with pomegranate juice up to 30% increased the acceptability of frozen yoghurt product. It could be concluded that, date powder and pomegranate juice could be used as good source of antioxidants, fibers and minerals functional frozen yoghurt products and enhancing sensory, nutritional and functional properties.

In the second part, flavoured functional permeate beverage fortified with different ratio of various plant extracts (lemon, mint and moringa), and compared to control beverage (without extracts) were prepared. Carbonated permeate beverage fortified with mixed extract were also prepared. All type of beverage stored up to 2 weeks at 5oC. Ash, acidity, vitamin C, antioxidants and some minerals contents increased with increasing the rate added of lemon, mint and moringa extracts. All flavoured beverage except moringa beverage were higher in total sensory score compared with control. Permeate beverage fortified with 3% lemon and mint extracts (1:1) ranked higher flavour scores than those of other treatments. Carbonation of flavoured permeate beverage had no significant effect on physiochemical properties of final product. While, sensory evaluation enhanced with carbonation of permeate beverage. It could be concluded that, different plant extract (lemon or mint and moringa) could be used either single or mixed as good source of minerals and vitamins for making new type flavoured permeate beverage for enhancing sensory, nutritional and functional values of this new product.

Key words: Frozen yoghurt, functional beverage, Date powder, pomegranate juice, Lemon, Mint, Moringa, Fortification.

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LIST OF ABBREVIATION

| ABBREVIATION | Mean |
|---------------------|---|
| AOAC | American Official Analysis Chemists |
| AA | Antioxidant Activity |
| AODF | Anti oxidant dietary fiber |
| API | Analytical Profile Index |
| BHT | Butylated hydroxyl toluene |
| BM | Banana Marmalade |
| CFU | Colony forming unit |
| Chem. | Chemistry |
| Clin. | Clinical |
| CMC | Sodium carboxy methyl cellulose |
| CWB | Chakka Whey Beverage |
| CCRD. | Central Composite Rotatable Design |
| DPPH | 1,1-diphenyl-2-picrylhydrazyl |
| DLMO | Dried Leaves of Moringa Oleifera |
| FRAP | Ferric reducing antioxidant capacity |
| FAO | Food and Agriculture Organization |
| Fig. (s) | Figure (s) |
| g. | Gram |
| GLM | General Linear Model |
| GMB | Germany Mannheim Boehringer |
| HPLC | High Performance liquid Chromatography |
| JAP | Jerusalem artichoke powder |
| Kg | Kilo gram |
| LAB | Lactic acid bacterial |
| Lb. | Lactobacillus |
| LDL | Low density lipoprotein cholesterol |
| MSNF | Milk Solids Not Fat |
| Mg | Milligram |
| Min | Minute |
| ml | Milliliter |
| MRS | De man Rogosa and Sharp |
| ME | Mint Extract |
| PJ | Pomegranate juice |
| PC | Poly phenolic compounds content |
| pH | Hydrogen ion concentration, negative log |