DEVELOPMENT OF SOFT DOUGH BISCUITS WITH HIGH UNSATURATED FATTY ACIDS

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DECLARATION

The work describe in this thesis was carried by me (P.G.P. Chandana), under the supervision of Dr.(Mr.) S.B. Navaratne and Mr. D.M.A.V. Senaratne and the report on this thesis has not been submitted in whole or in part of any university or any other institution for another Degree/Diploma.

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ABSTRACT

The food industry is primarily driven by consumer health trends. A present day dietary concern is the consumption of a large amount of fat and sugar. This study was conducted to select high unsaturated edible grade fat type for development of soft dough biscuits. Four types of different oils i.e. Sunflower oil, soybean oil, corn oil and peanut oil were used for study as treatments and palm oil was used as the standard/ control.

Chemical and physical parameters of oil samples were determined for its initial characterization. The all the parameters tested were within the acceptable range. Only deviation was found in saturated fatty acid content in tested oils and control.

Soft dough biscuits were developed using above oil types of edible grade unsaturated fatty acids and in process chemical and physical characters of the prepared soft dough biscuits were within the optimum ranges.

Nutritional analysis of the prepared soft dough biscuits revealed that there are no differences between the treatments. However, saturated fat content analysis of the prepared soft dough biscuits revealed that all the tested oils gave comparatively less saturated fat content and high unsaturated fat content compared to control.

Results of the sensory evaluation revealed that the acceptance of the all the parameters except the texture. Further, Accelerated shelf life analysis gave better results in terms of free fatty acid levels and Sensory properties.

After the accelerated shelf life period, changes in saturated and unsaturated fat content and fatty acid composition of the biscuits were not different between the treatments.

Hence, sunflower oil, soybean oil, corn oil and Peanut oil can be used for the soft dough biscuit production. Amongst the tested treatments, sunflower oil identified as the best, in terms of high unsaturated fatty acid content.

The above results shown that unsaturated fat content is higher than 70% of sunflower oil, soybean oil, corn oil and peanut oil. Even unsaturated fat provide more than 20% of the energy requirement fulfill the sunflower oil, corn oil and peanut oil. Amongst, sunflower oil seems superior in terms of lowest saturated fat content and 70% of the unsaturated fat and more than 20% energy provided from unsaturated fat. Therefore, draft food labeling and advertising regulation in Sri Lanka, with this product can go for **'Nutrition and health claims'**, which describes **High in unsaturated fat in food item.**

Key words: Soft dough biscuits, Sunflower oil, Soybean oil, Corn oil and Peanut oil, unsaturated fatty acids

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1.1 General Description

Biscuits are small baked products made principally from flour, sugar and fat. They typically have a less moisture content and when packaged in moisture proof containers has a long shelf life, perhaps six months or more. The appeal to consumers is determined by the appearance and eating qualities. Biscuits are made in many shapes and sizes and after baking they may be coated with chocolate, sandwiched with a fat-based filling or have other pleasantly flavoured additions. Saturated fat raises total blood cholesterol levels and low-density lipoprotein (LDL) cholesterol levels, which can increase the risk of cardiovascular disease. Saturated fat may also increase the risk of type 2 diabetes.

The food industry is primarily driven by consumer health trends. A present day dietary concern is the consumption of a large amount of fat and sugar. With the growing incidence of obesity and diabetes, low calorie foods have gained immense popularity. Most well-maintained strategies in terms of fat reduction diets involve either the use of low-fat foods or fat substitutes or modifications such as trimming of fat from foods.

Consumers continue to purchase a variety of foods which are low in fat and sugar in an attempt to improve the quality of their diet. Many reduced-in-fat and reduced-in-sugar products, however, are not acceptable to consumers. Therefore, health-conscious individuals may turn to non-modified items that contain more fat and sugar and are associated with a better taste and texture. Further, the currently available modified products often equal or exceed the traditional formulations in calories.

Availability of reduced-in-fat and reduced-in-sugar products that are acceptable can better assist consumers in choosing healthier foods and improving their overall health.

Fat is an essential component of a product because of the many functional and sensory roles that it plays. Fat provides creaminess, lubricity, and a good appearance to a product. Structure and volume are two other critical roles of fat, particularly in baked goods. During the creaming of fat and sugar, leavening gases are evenly distributed and air cells are created. The leavening gases cause the cells to expand during baking, which results in a product with increased volume (Penfield and Campbell, 1990). Because fat is insoluble in water, it is also responsible for tenderizing a product by interfering with gluten development. During mixing, it becomes impossible for gluten to form because fat adsorbs onto the gluten protein surfaces and interferes with hydration and the subsequent development of gluten (Penfield and Campbell, 1990). Fat is an important contributor to the sensory qualities of a food. Although the fat itself may not have a strong or distinctive flavor, it is able to distribute, release, enhance, and affect the intensity of other ingredient s' flavors (Bennett, 1992; Giese, 1996). Flavor sensation is reduced in the absence of fat because fat-soluble flavors are released all at one time (Plug and Haring, 1993). Although fat-soluble volatiles are perceived through the nose or mouth when fat is first consumed, textural qualities and fat-soluble flavors are gradually perceived in the mouth upon chewing and warming of the food (Drewnowski 1992). Therefore, the flavor profile of a reduced-in-fat product may be altered due to the decreased amount of fat available to contribute to these sensations.

Flour, sugar, fat, water, and salt are the main components in a biscuits formulation. Changes made to these principal components have significant effects on final biscuits

quality. Fat level and type have a significant effect on the rheological characteristics of biscuit dough and on the properties of the baked biscuits.

Therefore this study was planned to develop high unsaturated fat biscuits using four types of oils as Corn oil, Sunflower oil, Soybean oil and Peanut oil. Moreover, to produce acceptable quality low-fat biscuits/ high in unsaturated, the level of other ingredients, namely, sugar, flour, and water, was varied to take into account the synergetic effect on the physical and sensory parameters.