

QUALITY AND ACCEPTABILITY OF DOUGHNUT INCORPORATED  
WITH BREADFRUIT (*Artocarpus altilis*) FLOUR

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BREADFRUIT (*Artocarpus altilis*) FLOUR

By  
Siti Balqis binti Ismail

Research Report submitted in partial fulfillment of  
the requirements for the degree of  
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DEPARTMENT OF FOOD SCIENCE  
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## ENDORSEMENT

The project report entitled **Quality and Acceptability of Doughnut Incorporated with Breadfruit (*Artocarpus altilis*) Flour** by Siti Balqis binti Ismail, Matric No **UK16579** has been reviewed and corrections have been made according to the recommendations by examiners. This report is submitted to the Department of Food Science in partial fulfilment of the requirement of the degree of Bachelor of Science in Food Science (Foodservice and Nutrition), Faculty of Agrotechnology and Food Science, Universiti Malaysia Terengganu.



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## DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged.

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## ABSTRACT

Breadfruit is spread widely in Malaysia and has been an underutilized crop with a little attention to it. Even though wheat is not produced in Malaysia, however it is widely used in the baking industry. Therefore, this study was conducted to develop doughnut with breadfruit flour incorporation with aimed to study its effects on the physical (colour and texture), chemical properties (moisture, oil absorption, fat, protein and calorie content) as well as to determine the acceptability of final product via sensory evaluation. Microstructural study was also carried out using Tabletop Microscope. The percentages of breadfruit flour to wheat flour used were 0%:100%, 10%:90%, 20%:80%, 30%:70%, 40%:60% and 50%:50%, respectively. Result showed no differences of texture properties (hardness and springiness) for all formulations. For colour, no trends of lightness and yellowness values were shown, however significant differences were exhibited among the samples. This study also showed that the increase in the percentage of breadfruit flour in doughnut formulation resulted in the increase in moisture content ( $p < 0.05$ ). There was no trend showing higher or lower of fat, oil absorption, protein and calorie content with the increase of breadfruit flour incorporation. However, those compositions showed significant differences ( $p < 0.05$ ) as compared to control (0% breadfruit flour). Microstructural study showed the more of breadfruit flour incorporation contributed to the more compact structural of doughnut after frying. However, these did not significantly relate to the measured textural properties (hardness and springiness). The doughnut with 10 and 20% of breadfruit flour incorporation showed similar acceptance levels for all sensorial attributes with control (0% breadfruit flour). Therefore, the incorporation of breadfruit flour is acceptable to be incorporated in the doughnut up to 20%.

## ABSTRAK

Buah sukun tumbuh secara meluas di Malaysia namun jarang digunakan dan kurang mendapat perhatian. Walaupun gandum tidak dihasilkan di Malaysia, namun ia digunakan secara meluas dalam industri bakeri. Oleh itu, kajian ini dijalankan bagi menghasilkan donat dengan percampuran tepung buah sukun dengan tujuan mengkaji kesan ke atas fizikal (warna dan tekstur), kimia (kelembapan, penyerapan minyak, lemak, protein dan kandungan kalori) dan juga untuk menentukan kebolehpenerimaan produk akhir melalui penilaian deria. Kajian mikrostruktur juga dijalankan dengan menggunakan '*Tabletop Microscope*'. Peratusan tepung buah sukun kepada tepung gandum yang digunakan adalah masing-masingnya 0%: 100%, 10%: 90%, 20%: 80%, 30%: 70%, 40%: 60% dan 50%: 50%. Keputusan menunjukkan tiada perbezaan bagi ciri tekstur (kekerasan dan kekenyalan) untuk semua formulasi. Untuk warna, tiada tren ditunjukkan bagi nilai kecerahan dan nilai kekuningan. Namun, perbezaan yang signifikan telah dipamerkan di antara sampel. Kajian ini juga mendapati bahawa peningkatan dalam peratusan tepung buah sukun dalam donat menyebabkan peningkatan dalam kandungan kelembapan ( $p < 0.05$ ). Tiada tren yang menunjukkan lebih tinggi atau lebih rendah kandungan lemak, penyerapan minyak, protein dan kalori dengan pertambahan peratusan tepung buah sukun. Walau bagaimanapun, kedua-dua komposisi ini menunjukkan perbezaan yang signifikan ( $p < 0.05$ ) berbanding kawalan (0% tepung buah sukun). Kajian mikrostruktur menunjukkan percampuran tepung buah sukun menyumbang kepada struktur donat yang lebih padat selepas digoreng. Walau bagaimanapun, ia tiada kaitan dengan ciri-ciri tekstur donat (kekerasan dan kekenyalan) yang dianalisis di dalam eksperimen. Donat dengan peratusan 10 dan 20 percampuran tepung buah sukun menunjukkan tahap penerimaan yang sama bagi semua atribut sensori dengan kawalan (0% tepung buah sukun). Oleh itu, percampuran tepung buah sukun ke dalam donut boleh diterima sehingga 20%.