

**PHYSICOCHEMICAL PROPERTIES OF CHOCOLATE
PRODUCED FROM DIFFERENT SUBSTITUTION FOR
COCOA BUTTER**

By

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**Research Report submitted in partial fulfillment of the
requirements for the degree of Bachelor of Food Science
(Food Technology)**

**DEPARTMENT OF FOOD SCIENCE
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ENDORSEMENT

The project report entitled **Physicochemical of Chocolate Produced from Different Substitution for Cocoa Butter** by **Sharon Wong Xiang Rong**, Matric No. **UK 17216** 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 the partial fulfillment of the requirement of the degree of Bachelor of Food Science (Food Technology), Faculty of Agrotechnology and Food Science, University 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

Impacts and relationships on physicochemical properties in dark chocolate produced from different substitution for cocoa butter by Xanthan gum (XG) and Guar gum (GG) blends were determined using D-optimal mixture design. This study involved three levels of substitution which are 5%, 10% and 15% with constrained cocoa butter content and random blend of gums. Linear design models were applied to analyze all parameters including calorie content, proximate compositions, texture (hardness) measurement and melting profile of fat crystal. The reduction of cocoa butter content successfully engendered reduction in both calorie and fat content. Changes caused increase in ash, protein and carbohydrate compositions. Products also experienced undesirable raises of moisture content and hardness jointly with the increment of gums incorporation. The significant of difference on variables was determined by one-way ANOVA. Since, there were only two components mix, numerical optimization was utilized. As a result, five solutions of desirable blends were resolved, 3.14XG : 1.86GG, 0.26XG : 4.74GG, 2.29XG : 2.71GG, 5.66XG : 4.34GG and 7.24XG : 2.74GG. However, none of the suggestions involving 15% substitution for cocoa butter indicating complete replacement by hydrocolloids is unsuitable. Overall, the replacement of cocoa butter using hydrocolloids was deemed possible.

ABSTRAK

Impak dan hubungkait pelbagai jenis penggantian daripada campuran-campuran gam Xanthan (XG) dan gam Guar (GG) untuk lemak koko ke atas sifat-sifat fizikokimia ditentukan dengan menggunakan rekabentuk campuran D-optimal. Kajian ini melibatkan tiga jenis tahap peratusan penggantian iaitu: 5%, 10%, dan 15%, dengan kekangan kandungan lemak koko dan campuran gam-gam secara rawak. Rekabentuk modal-modal linear digunakan untuk menganalisis semua parameter termasuk kandungan kalori, komposisi-komposisi terdekat pengukuran teksture (kekerasan) dan profil lebur kristal lemak. Pengurangan kandungan lemak koko berjaya mencapai pengurangan dalam kedua-dua kalori dan kandungan lemak. Perubahan menyebabkan peningkatan dalam komposisi abu, protein dan karbohidrat. Produk juga mengalami perubahan yang tidak diingini yang meningkatkan kandungan kelembapan dan kekerasan berserta dengan kenaikan dalam gabungan gam. Perbezaan yang ketara pada pembolehubah ditentukan dengan menggunakan ANOVA sehala. Oleh sebab terdapat dua jenis komponen campuran sahaja, pengoptimuman berangka digunakan. Kesimpulannya, lima penyelesaian untuk campuran-campuran diingini diperolehi 3.14XG : 1.86GG, 0.26XG : 4.74GG, 2.29XG : 2.71GG, 5.66XG : 4.34GG and 7.24XG : 2.74GG. Walau bagaimanapun, tiada cadangan yang melibatkan penggantian 15% untuk lemak koko. Ini menunjukkan penggantian lengkap daripada hidrokoloid tidak dibenarkan. Secara umumnya, hidrokoloid berkemungkinan boleh digunakan untuk menggantikan lemak koko.