

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfillment of the requirements for the Master of Science

**FORMULATION OPTIMISATION, UTILISING POLYOLS
FOR REDUCED-CALORIE PRODUCT OF CHILLI BUDU
DIP**

SITI NUR AMANI BINTI AZAMI

JULY 2024

Main Supervisor : Fisal Bin Haji Ahmad, Ph.D

Co-Supervisor : Rahijan Bin Abdul Wahab

School/Institute : Faculty of Fisheries and Food Sciences

Chilli Budu Dip (CBD) is a condiment that combines chillies, Budu, sugar, lime powder, herbs, and xanthan gum. The flavor profile is hot, sweet, acidic, fragrant, peppery, and subtly fishy characteristics. To enhance the CBD formulation, a Definitive Screening Design (DSD) was utilized to evaluate the effects of Budu, lime powder, red chili, sugar, and xanthan gum on different quality characteristics, such as pH, colour, viscosity, total soluble solids, syneresis, salt content, and water activity. The DSD model, implemented with JMP Pro 17 software, has determined that lime powder, sugar, and xanthan gum are highly significant components ($p < 0.0001$) on the quality of the sauce. The ideal recipe yielded a desirability score of 78%, using 70 g of Budu, 42 g of lime powder, 95 g of red chili, 150 g of sugar, and 1.66 g of xanthan gum. The models undergone t-test analysis to verify their accuracy, confirming their potential for further advancement, such as the production of a low-calorie CBD by replacing sucrose with sugar alcohols. The study also investigated the utilization of polyols, specifically erythritol and sorbitol, in the formulation of CBD. The experiment involved six samples: 100% sucrose (C), a sample containing 50% sucrose and 50% erythritol (CE), a sample containing 100% erythritol (E), a sample containing 50% erythritol and 50% sorbitol (ES), a sample containing 50% sucrose and 50% sorbitol

(CS), and a sample containing 100% sorbitol (S). Sample E was chosen for further examination because it has comparable pH, °Brix, and colour to the control sample. Additionally, it has a lower salt content and demonstrates improved syneresis rates. Significantly, sample E demonstrated a reduced calorie content (67% reduce compared with sample C), which aligns with the study's objective of providing a healthier option. A comparative examination found that sample E had similar pH and colour characteristics as one of the commercial items. Additionally, sample E showed superior protein content and higher levels of free amino acids, including leucine, lysine, glutamic acid, and aspartic acid. This study illustrates that CBD with erythritol can create a low-calorie condiment that is abundant in important amino acids.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu
sebagai memenuhi keperluan untuk Ijazah Sarjana

**PENGOPTIMUMAN FORMULASI, MENGGUNAKAN POLIOL
UNTUK PRODUK RENDAH KALORI *CHILLI BUDU DIP***

SITI NUR AMANI BINTI AZAMI

JULAI 2024

Penyelia : Faisal Bin Haji Ahmad, Ph.D

Penyelia Bersama : Rahijan Bin Abdul Wahab

Fakulti : Fakulti Perikanan dan Sains Makanan

Chilli Budu Dip (CBD) adalah *condiment* yang terdiri daripada Budu, gula, serbuk limau, herba, xanthan gum, dan cili. Rasa CBD ialah pedas, manis, masam, wangi, berlada, dan sedikit ikan. *Definitive Screening Design* (DSD) digunakan untuk menilai kesan budu, serbuk limau, cili merah, gula, dan xanthan gum terhadap pelbagai kualiti, termasuk warna, kelikatan, pepejal terlarut total, sineresis, kandungan garam, dan aktiviti air, dalam usaha untuk meningkatkan formulasi CBD. Dengan menggunakan program JMP Pro 17, model DSD menunjukkan bahawa gula, serbuk limau, dan xanthan gum mempunyai pengaruh yang sangat besar ($p < 0.0001$) terhadap kualiti sos. Menggunakan 70 g Budu, 42 g serbuk limau, 95 g cili merah, 150 g gula, dan 1.66 g xanthan gum, resipi ideal menghasilkan skor keinginan sebanyak 78%. Analisis t-test mengesahkan ketepatan model dan mengesahkan kemungkinan penambahbaikan tambahan, seperti menghasilkan CBD dengan kalori yang rendah

dengan menggantikan sukrosa dengan gula alkohol. Penggunaan poliol dalam formulasi CBD, terutama eritritol dan sorbitol, juga dikaji dalam kajian ini. Terdapat enam sampel yang digunakan dalam eksperimen ini: 100% sukrosa (C), 100% eritritol (E), 50% sukrosa dan 50% eritritol (CE), 50% eritritol dan 50% sorbitol (ES), 50% sukrosa dan 50% sorbitol (CS), dan 100% sorbitol (S). Sampel E mempunyai pH, °Brix, dan warna yang sama dengan sampel kawalan, jadi ia dipilih untuk pemeriksaan lanjut. Ia juga menunjukkan kadar sineresis yang lebih baik dan mempunyai kandungan garam yang lebih rendah. Sangat penting, sampel E menunjukkan kandungan kalori yang lebih rendah (67% berkurangan berbanding dengan sampel C), yang memenuhi matlamat kajian untuk menawarkan pilihan makanan yang lebih sihat. Pemeriksaan perbandingan mendapati bahawa ciri pH dan warna sampel E setanding dengan salah satu produk komersial. Tambahan pula, sampel E menunjukkan kandungan protein yang lebih tinggi dan tahap asid amino bebas yang lebih tinggi, seperti lysine, asid glutamik, asid aspartik, dan leucine. Sebagai tambahan kepada eritritol, kajian ini menunjukkan bahawa CBD dan eritritol boleh menghasilkan makanan yang mengandungi banyak asid amino penting dan rendah kalori.