

EFFECTS OF HYDROCOLLOIDS ON THE PHYSICAL PROPERTIES AND
SENSORY ACCEPTANCE OF FROZEN GLUTINOUS RICE BALL

By

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ENDORSEMENT

The project report entitled **Effects of Hydrocolloids on the Physical Properties and Sensory Acceptance of Frozen Glutinous Rice Ball** by **Siti Noor Shazlina Binti Mohd Nor** Matric No **UK17672** 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, 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

The main objective of this research was to evaluate the effects of hydrocolloids on the properties of frozen glutinous rice ball. Three types of hydrocolloids being studied were carboxymethylcellulose (CMC), xanthan gum and gelatin. The concentrations of hydrocolloids being used were 0.5%, 1.0% and 1.5% based on the weight of glutinous rice flour. Moisture content, physical properties (texture, colour), microstructural study and acceptability of glutinous rice ball through seven days of storage were analyzed. All analyses were carried out on day 0, 1, 3 and 7 of storage except for sensory evaluation which was performed on day 0 and 7 only. For moisture content, formulation with 1% of xanthan gum addition contained the significant highest of moisture after boiling since it is composed with larger cell size compared to others. Physical analysis indicated that addition of the gelatin 0.5%, CMC 0.5% and CMC 1.0% had the same characteristic in texture analysis with the control sample (0% hydrocolloid). While, there were significant different ($p < 0.05$) in the means of L^* value (lightness) and b^* value (yellowness) with the addition of different types of hydrocolloids and the days of frozen samples. However, the a^* value (greenness) of glutinous rice ball showed significant difference among the samples but there were no significant different occur among days of storage. Then, four selected formulation for sensory evaluation which were formulation with low hardness ($< 500g$) and chewiness ($< 400g$) properties were from glutinous rice ball with 0.5% gelatin, 0.5% CMC, 1.0% CMC and control (0% hydrocolloid). Sensory evaluation showed only cell size attribute differed in mean score values between formulations at 0 and after 7 days of storage. The rest of the attributes including color, surface smoothness, stickiness, chewiness and overall acceptance obtained similar mean score values between samples. As the conclusion, experimental analysis showed that formulation of glutinous rice ball with 1% of CMC showed the lowest hardness and chewiness properties. However, this formulation showed similar acceptability with other formulations in sensory evaluation.

Keyword: hydrocolloids, carboxymethylcellulose, xanthan gum, gelatin, glutinous rice ball

ABSTRAK

Objektif utama kajian ini adalah untuk mengkaji kesan hidrokoloid terhadap ciri-ciri bebola tepung beras pulut yang telah dibeku. Tiga jenis hidrokoloid digunakan dalam kajian ini termasuk karboksilmetilselulosa (CMC), gam xanthan dan gelatin. Kepekatan hidrokoloid yang digunakan adalah 0.5, 1.0 dan 1.5% berdasarkan berat tepung beras pulut. Kandungan kelembapan, ciri-ciri fizikal (tekstur dan warna), kajian mikrostruktur dan penerimaan bebola tepung beras pulut telah dikaji sepanjang 7 hari penyimpanan. Semua analisis dijalankan pada hari 0, 1, 3 dan 7 penyimpanan kecuali penilaian sensori yang hanya dijalankan pada hari 0 dan 7 sahaja. Kandungan lembapan bagi formulasi yang ditambah dengan 1% gam xanthan mengandungi kandungan lembapan yang tertinggi selepas direbus kerana ia mempunyai saiz sel yang besar berbanding dengan sampel lain. Analisis fizikal menunjukkan bahawa penambahan 0.5% gelatin, 0.5% CMC dan 1.0% CMC mempunyai ciri-ciri tekstur yang sama dengan sampel kawalan (0% hidrokoloid). Disamping itu, terdapat perbezaan yang bererti bagi nilai L^* (kecerahan) dan b^* (kekuningan) kesan daripada penambahan jenis hidrokoloid yang berlainan dan tempoh penyimpanan sejuk beku. Namun begitu, nilai warna a^* (kehijauan) menunjukkan tiada perbezaan yang bererti terhadap tempoh penyimpanan. Empat formulasi bebola tepung beras pulut yang mempunyai nilai kekerasan ($< 500\text{g}$) dan kekenyalan ($< 400\text{g}$) yang rendah dipilih untuk penilaian sensori iaitu sampel dengan 0.5% gelatin, 0.5% CMC, 1.0% CMC dan sampel kawalan (0% hidrokoloid). Keputusan penilaian sensori menunjukkan hanya ciri saiz sel yang menyumbang kepada perbezaan nilai skor min diantara sampel hari pertama dan selepas hari ketujuh tempoh penyimpanan. Semua ciri-ciri lain termasuk warna, kelicinan permukaan, kelekatan, kekenyalan dan kadar penerimaan menyeluruh terhadap sampel menunjukkan nilai min skor yang sama untuk setiap sampel. Kesimpulannya, eksperimen menunjukkan bahawa formulasi bebola tepung beras pulut yang ditambah dengan 1.0% CMC menunjukkan nilai kekerasan dan kekenyalan yang terendah. Walau bagaimanapun, kadar penerimaan formulasi ini dari segi sensori adalah sama dengan semua formulasi lain.

Kata Kunci: hidrokoloid, karboksilmetilselulosa, gam xanthan, gelatin, bebola tepung pulut