UNIVERSITI PUTRA MALAYSIA

EFFECTS OF GLAZES ON THE KEEPING QUALITY OF BREAD

ROHAIZA ABDULLAH

EFFECTS OF GLAZES ON THE KEEPING QUALITY OF BREAD

ROHAIZA ABDULLAH

MASTER OF SCIENCE
UNIVERSITI PUTRA MALAYSIA

2010

EFFECTS OF GLAZES ON THE KEEPING QUALITY OF BREAD

By

ROHAIZA ABDULLAH

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

May 2010

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

EFFECTS OF GLAZES ON THE KEEPING QUALITY OF BREAD

By

ROHAIZA ABDULLAH

May 2010

Chairman : Chin Nyuk Ling, PhD

Faculty : Engineering

This work describes a study on the effects of different glazes on the keeping quality of bread in term of its crumb and crust properties. Four types of glazes which are corn starch, egg white, skim milk and shortening with four concentrations, i.e., 20%, 30%, 50% and 70% were applied on sweet bun surfaces to determine their effect on staling during six days of storage.

The bread staling was measured in term of firmness, moisture content and water activity of crumb and crust. The corn starch, egg white and skim milk were found significantly reducing crumb firmness with no effect by the concentrations used. The egg white and skim milk is moderately retaining moisture content of the crumb while egg white showed the lowest crumb water activity compared to other glazed bread. The effect of varying concentrations of glaze materials shows that only shortening showed significant ($p<0.05$) different effects on crumb firmness. Bread glazed with corn starch ($p<0.05$)

affected crumb moisture content whereas all the glaze materials except corn starch significantly ($p<0.05$) affected crumb water activity.

For the crust, shortening gave poor effect to the crust firmness since they have lower firmness compared to other glazes and unglazed bread. As glazes, corn starch and egg white probably able to prevent the growth of mold because they have lower water activity value compared to control bread. All the glaze materials give significant ($p<0.05$) effect on crust firmness and water activity when used at different concentrations while for the moisture content the effect is contradictory. The firming rate of crust is generally lower than the crumb despite the record of highest crumb firming rate detected when using 30% concentration of glazes.

In the two-way ANOVA, concentrations of glazes was found to be not significant to both crumb and crust firmness although the types of glazes displayed significant ($p<0.05$) effects to crumb and crust firmness. While for moisture content and water activities it is contradictory. In conclusion, the results show that application of glaze materials was able to slow down bread staling as well as improve the bread quality. The corn starch, egg white and skim milk were significant as glaze materials due to their capability in reducing crumb firmness and increase crust hardness. The effect on the moisture content and water activity of crumb and crust was not as clear as those to firmness when evaluating the glazing effects by comparing with the unglazed breads. Effectiveness of glazes in reducing staling rate of bread is within 5 – 49% compared to control.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KESAN BAHAN-BAHAN PENGILAT TERHADAP KUALITI PENYIMPANAN ROTI

Oleh

ROHAIZA ABDULLAH

Mei 2010

Pengerusi : Chin Nyuk Ling, PhD

Fakulti : Kejuruteraan

Penyelidikan ini menggambarkan kajian terhadap kesan bahan-bahan pengilat yang berbeza terhadap sifat-sifat semasa penyimpanan dan kualiti roti dari segi sifat isi dan kerak. Empat jenis bahan pengilat iaitu tepung jagung, telur putih, susu tanpa lemak dan lemak sayuran dengan empat kepekatan iaitu 20%, 30%, 50% dan 70% disapu pada permukaan roti manis untuk menentukan kesan mereka ke atas kerosakan semasa enam hari tempoh penyimpanan.

Kerosakan roti diukur dari segi kepadatan, kelembapan dan aktiviti air isi dan kerak roti. Tepung jagung, telur putih and susu tanpa lemak adalah signifikan dalam mengurangkan kepadatan isi roti tanpa pengaruh kepekatan yang digunakan. Telur putih dan susu tanpa lemak adalah signifikan dalam mengekalkan kelembapan isi roti sementara telur putih memberi aktiviti air isi roti yang paling rendah dibandingkan dengan roti yang disapu pengilat lain. Kesan daripada mempelbagaikan kepekatan bahan pengilat menunjukkan

hanya lemak sayuran yang telah menunjukkan kesan perbezaan yang signifikan ($p<0.05$) ke atas kepadatan isi roti. Roti yang disapu dengan tepung jagung ($p<0.05$) memberi kesan ke atas kelembapan isi roti sedangkan semua bahan-bahan pengilat kecuali tepung jagung secara signifikan ($p<0.05$) mempengaruhi aktiviti air isi roti.

Bagi kerak roti, lemak sayuran kurang memberi kesan kepada kepadatan kerak kerana mempunyai kepadatan yang lebih rendah dibandingkan dengan kesan bahan-bahan pengilat yang lain dan roti yang tidak disapu pengilat. Sebagai pengilat, tepung jagung dan telur putih mungkin mampu menghalang pertumbuhan kulat kerana mereka memberi kesan aktiviti air yang lebih rendah dibandingkan dengan roti kawalan. Semua bahan pengilat memberi kesan yang signifikan ($p<0.05$) ke atas kepadatan kerak dan aktiviti air apabila digunakan pada kepekatan yang berbeza manakala kesannya terhadap kelembapan adalah berlawanan. Kadar kepadatan kerak umumnya lebih rendah daripada isi walaupun rekod kadar kepadatan isi yang paling tinggi dikesan apabila menggunakan 30% kepekatan pengilat

Dalam analisis ANOVA dua hala, kesan kepekatan bahan-bahan pengilat didapati tidak signifikan terhadap kedua-dua kepadatan isi dan kerak walaupun jenis-jenis bahan pengilat menunjukkan kesan yang signifikan kepada kepadatan isi dan kerak roti ($p<0.05$). Sementara bagi kelembapan dan aktiviti air, kesannya adalah disebaliknya. Sebagai kesimpulannya, keputusan menunjukkan bahawa aplikasi bahan-bahan pengilat mampu memperlahankan kerosakan roti seterusnya meningkatkan kualiti dan jangka hayat roti. Tepung jagung, telur putih dan susu tanpa lemak adalah signifikan sebagai bahan pengilat berikutan kebolehan mereka dalam mengurangkan kepadatan isi roti dan

meningkatkan kepadatan kerak roti. Kesan ke atas kelembapan dan aktiviti air isi dan kerak roti adalah tidak sejelas kepadatan apabila menilai kesan bahan pengilat apabila dibandingkan dengan roti yang tidak disapu pengilat, kelembapan kerak roti dan aktiviti air kerak dan isi roti sementara mengekalkan kepadatan kerak dan kelembapan isi roti. Keefektifan bahan-bahan pengilat dalam mengurangkan kadar kerosakan adalah dalam 5-29% dibandingkan dengan roti kawalan.

ACKNOWLEDGEMENTS

First of all, I would like to thank God for giving strength to finish my research. A sincere and special appreciation goes to my supervisor, Prof Madya Ir Dr Chin Nyuk Ling for her valuable guidance, encouragement, patience, kindness, and advice during the entire study. Appreciation is extended to my supervisory committee member, Dr Yus Aniza Yusof for her suggestions on this project, comments on the thesis, and encouragement on my study.

Special thanks to the staffs from Interflour-Uitm R&D and Commerciallisation Centre, Mr Norizad Abdul Rashid, Mr Nazir Abdul Ghafar, Dr Voon Yit Yang and Mdm Suwaibah Ghaffar for their cooperation and help in baking. Thanks also for allowing me to use their baking equipments. I also want to thanks Mr Raman Morat, Mr Hj Kamarulzaman Dahlin and Mr Badrushah for their cooperation.

A special thanks to all my friends especially Sobah, Firah, Che Rodz, Mai, Alin, Fida, Intan, Wanis and Tipah for their help, opinion and support during this research. Last but not least, a sincere appreciation goes to my family for their help, encouragement and fully support.

I certified that a Thesis Examination Committee has met on 31 May 2010 to conduct the final examination of Rohaiza binti Abdullah on her thesis entitled "Effects of Glazes on the Keeping Quality of Bread" in accordance with the Universities and University College Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The committee recommends that the student be awarded the Master of Science.

Members of the Thesis Examination Committee were as follows:

Siti Mazlina bt Mustapha Kamal, PhD
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Chairman)

Mohd Nordin bin Ibrahim, PhD
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Internal Examiner)

Russly b Abdul Rahman, PhD
Professor
Faculty of Food Science and Technology
Universiti Putra Malaysia
(Internal Examiner)

Ida Idayu bt Muhamad, PhD
Associate Professor
Faculty of Chemical and Natural Resources Engineering
Universiti Technology Malaysia
(External Examiner)

SHAMSUDDIN SULAIMAN, PhD
Professor and Deputy Dean
School Of Graduate Studies
Universiti Putra Malaysia

Date:26 November 2010

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Chin Nyuk Ling, PhD
Associate Professsor
Faculty of Engineering
Universiti Putra Malaysia
(Chairman)

Yus Aniza Yusof, PhD
Lecturer
Faculty of Engineering
Universiti Putra Malaysia
(Member)

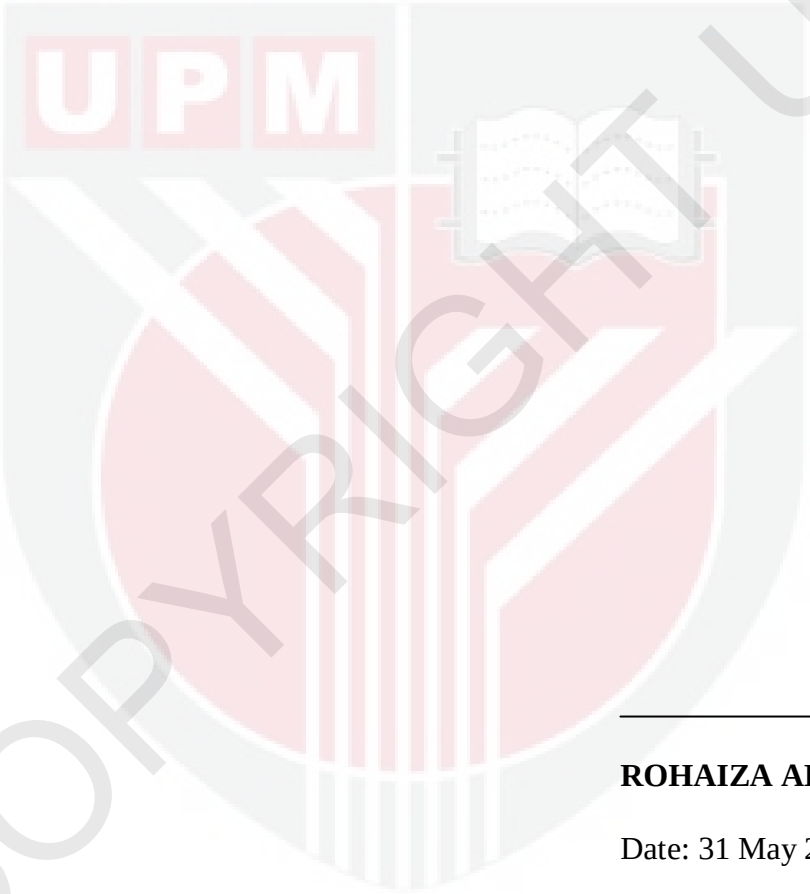
_____

HASANAH MOHD GHAZALI, PhD
Professor and Dean
School Of Graduate Studies
Universiti Putra Malaysia

Date:

DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.



ROHAIZA ABDULLAH

Date: 31 May 2010

TABLE OF CONTENTS