UNIVERSITI TEKNOLOGI MARA

IMPROVED MEASUREMENT OF ULTRASOUND A-MODE VELOCITY FOR USE IN B-MODE IMAGES FOR MEASUREMENT OF FAT USING IMAGE SEGMENTATION TECHNIQUE

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Thesis submitted in fulfillment
of the requirement for the degree of
Master of Science

Faculty of Electrical Engineering

January 2015

CONFIRMATION BY PANEL OF EXAMINERS

I certify that a Panel of Examiners has met on 12th November 2014 to conduct the final examination of Muhamad Hazwan Bin Abdul Halim on his Master of Science thesis entitled "Improved Measurement of Ultrasound A-Mode Velocity for Use In B-Mode Images for Measurement of Fat Using Image Segmentation Technique" in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiners recommends that the student be awarded the relevant degree. The panel of Examiners was as follows:

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledge as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Fat measurement is one of the methods used in meat quality assessments. The need to perform the assessment non-invasively motivates researchers to study the non-invasive methods for fat measurement. For that purpose, ultrasound has the best prospect due to its non-invasive, time saving and relatively low-cost advantages. The improvement in ultrasound method for fat measurement is not only on the advancement of the ultrasound equipment but also the accuracy of data analysis. Two current issues that have arisen are the influence of protective layer on the accuracy of ultrasonic velocity measurement using A-mode analysis and the B-mode image positioning accuracy due to the application of the predetermined ultrasonic velocity in B-mode imaging. This research implemented new approach in performing the measurement of ultrasonic velocity and ultrasound B-mode analysis. To increase the accuracy of ultrasonic velocity measurement, the thickness of the protective layer was first determined used in ultrasonic velocity measurement. To increase the positioning accuracy of B-mode image, the actual determined velocity was used rather than the predetermined velocity. The improvements made were successful in increasing the accuracy of the ultrasonic velocity measurement and the positioning of the B - mode image. Subsequently, this method was then used to measure intramuscular fat content in chicken fillet. Better correlations between the ultrasound properties (velocity, image histogram mean and percentages of fat pixel) and percentage of fat content measured by Soxhlet Method were observed in the improved method. In the conclusion, the accuracy of ultrasound fat measurement improved with the improvement made on ultrasonic velocity measurement used in adapted B-mode imaging.

ACKNOWLEDGEMENT

In the Name of Allah, the Beneficent, the Merciful.

First of all, I am grateful to Allah S.W.T for giving me strength and patience to complete this research study.

I wish to express my sincere gratitude to Assoc. Prof. Ir. Dr. Norlida Buniyamin for her constant guidelines, advices, support and valuable supervision throughout the period of the research and preparation of this thesis.

My sincere thanks to Universiti Teknologi MARA for the monetary support through the Research Intensive Faculty (RIF) Grant (600-RMI/DANA/5/3/RIF (368/2012)).

I also place on records, my sense of gratitude to my parents, family, and others for their full of support and encouragement.