

## Effect of storage temperature on fat migration in dark chocolate filled with local fillings]

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**Key words:** temperature, fat migration, palm mid-fraction (PMF), palm kernel stearin(PKS)

### Introduction

Fat migration occurred apparently in confectionery products which containing two dissimilar fat component adjacent to each other, especially in products overlaid with chocolate, were stored at elevated temperature (25-32°C). This can cause the chocolate to become soft and sticky, the crystal structure of the chocolate to change causing "fat bloom", the enrobed material to become "dry", and the product to undergo a flavor change. These physical deleterious will jeopardise the total performance of the end product specifically the commercial value and storage quality of the product. Therefore, the objectives of the current project were to determine the causes of fat migration in chocolates containing local confectionery filling or center; to increase the shelf life of chocolates which have the fat migration problem; and to identify the methods to prevent or minimize fat migration in the chocolates.

### Materials and Methods

Palm mid-fraction (PMF) and palm kernel stearin (PKS) were used respectively as the non-lauric and lauric filling fats sources in desiccated coconut and peanut butter filling formulation. The fat migration was stimulated in real product by using layer of cream filling and dark chocolates approximately 90 g each in a plastic container (10 x 5 x 5 cm length x width x height, respectively). All samples were held for 2 months at 18, 28 and 35°C. Physicochemical properties in combination with sensory evaluation were evaluated to monitor the extent and effect of fat migration. Physical properties were encompassing of texture analysis, solid fat content, bloom test, thermal and crystallography analysis. Whereas, total fat content, triacylglycerol and fatty acid composition were performed in chemical analysis. Preference test was conducted in sensory evaluation to attain the organoleptic properties of filled chocolates in term of texture, color, flavour and overall acceptability after the storage.]

### Results and Discussion

Storage of dark chocolate with local fillings at low temperature (18°C) can reduce the PMF and PKS migration from the filling center into the chocolate coating to negligible extent and increased at higher storage temperatures (30, 35 °C). An increase rate of change of C36 and C50 for PMF as well as C36 and C38 for PKS were observed in coating at 30 °C. Besides these triacylglycerols, C54 (OOLn) was increased in coating layer of peanut paste filling. As a consequence, the coating texture of PMF and PKS-filling decrease, melting point shifted from 33.2°C to 30°C (PMF) and two distinct peaks (PKS) which were lower than the cocoa butter, and the polymorph structure in the coating changed to  $\beta$  and  $\beta'$  polymorphs result the chocolates bloomed in the third week of storage (2 cycles). Sensory evaluation indicated that chocolates stored at 18 °C were more preferable than 30 °C in term of sensory attributes of texture, color, flavour and overall acceptability. As summary, fat migration results in fatty acid composition, triacylglycerol composition, hardness, solid fat content, melting point and polymorphic structure change, leading to bloom formation. Therefore, storage at 18 °C can prolong the shelf life of PMF and PKS-filled chocolate.

### Benefits from the study

Technique used to prolong the shelf life of local chocolates which have fat migration problem

### Project Publications

- S. Jinap, A. Ali, Y. B. Che Man, A. M. Suria. (2000) Use of palm mid-fraction in dark chocolate as base filling centre at different storage temperatures. *International Journal of Food Sciences and Nutrition*. 51:489-499
- A. Ali, S. Jinap, Y. B. Che Man, A. M. Suria (2001) Effect of storage temperature on texture, polymorphic structure, bloom formation and sensory attributes of filled dark chocolate. *Food Chemistry*. 72:491-497
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- A. Ali, S. Jinap, Y. B. Che Man, A. M. Suria (2000) Chemical and physical characteristics of dark chocolate as affected by migration of lauric filling fat at different storage temperatures. Accepted for publication at *International Journal of Food Science and Technology*. In press

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**Project number: 01-02-04-0268**

**UPM Research Cluster :AFF**

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