FST Lunchtime Seminars

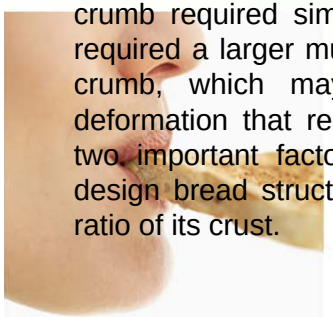
Effect of Food Structure on Digestion: Bread Disintegration during Oral Processing

By **Ms. Gao Jing**
FST PhD student; B.Appl.Sc. (Hons) in Food Science and Technology from National University of Singapore, Singapore

Abstract

There is a significant increase in the awareness of important role of food structure in human digestion and nutrient absorption. Bread, one of the most commonly consumed staple foods, is a good example of food with complex pore structure but high glycemic index (GI). Product development of low GI bread has been focused on substituting normal wheat flour with low GI ingredients. Limited attention has been drawn on the impact of bread structure on its digestion. As a starting point, the current study aimed to understand the link between bread structure and human oral processing which is the first interaction stage between food and human digestive tract. Three types of bread, namely baked bread, steamed bread, and baguette, were developed by varying processing conditions. 2D image analysis and 3D micro-tomography analysis showed that baguette had the most porous crumb with the largest pore size among the three. A good correlation was observed between crumb grain structure and bread texture.

Oral processing of 14 trained panelists was monitored using surface electromyography (sEMG). All panelists adapted their chewing behavior according to bread type. Despite of its most porous and softest crumb, baguette required the highest muscle activity and longest masticatory cycles. The greater chewing effort resulted in a higher level of saliva impregnation and smaller particle size in baguette bolus as compared to baked and steamed bread. This may be explained by the large portion of dry and hard crust of baguette sample. A further study was conducted to separating the impact of crust by serving bread without crust/skin. Results of this study showed that all three types of bread crumb required similar numbers of chewing cycles. Baguette crumb required a larger muscle effort than that of baked crumb and steamed crumb, which may be contributed by its higher resistance to deformation that resulted from its crumb grain structures. Therefore, two important factors should be taken into consideration when we design bread structure, i.e. the porosity of its crumb and the relative ratio of its crust.



Characterization of Volatile and Non-Volatile Profiles of Green and Roasted Coffee Fermented by Rhizopus Oligosporus

By **Mr. Lee Liang Wei Wilson**
FST PhD Student; B.Sc. in Chemistry and Biological Chemistry from Nanyang Technological University of Singapore

Abstract

Modulation of coffee aroma at the post-harvest end remains sparingly explored despite studies showing the impacts of these processes on the characteristics of green coffee beans which affect aroma profile. Sensory effects of coffee fermentation are usually neglected since it is primarily employed for mucilage removal. However, with optimized parameters, fermentation has been found to impart desirable aroma attributes to green coffee beans, which highlights the feasibility of fermentation as a biotechnological avenue for coffee aroma modulation. Therefore, this is a first study to characterize the volatile and non-volatile profiles of green and roasted coffee beans fermented with a common food-grade fungus Rhizopus oligosporus with an aim to modulate roasted coffee aroma via biotechnological means. The fermentation of green coffee beans with R. oligosporus resulted in the decrease in sugar concentrations and increase in individual amino acid concentrations in green coffee, both of which are important aroma precursors in Maillard reaction. Volatile compounds of fermentation origin such as 2-phenylethyl alcohol and 2,3-butanediol were detected from the volatile profiles of green coffee. The green coffees samples were roasted to three different roast degrees and the effects of fermentation were evaluated. After roasting, there was increase in the concentration of pyrazines and decrease in the concentration of volatiles derived from caramelization. Therefore, this study suggests that changes to the composition of aroma precursors brought about by R. oligosporus fermentation resulted in changes to the volatile profile of roasted coffee. Thus it could serve as a novel and feasible biotechnological means of modulating aroma profile of roasted coffee.

Host: Dr. Huang Dejian
Date: 17th Sep 2014, Wednesday
Time: 1 to 2 pm
Venue: Seminar Room S14-06-20