Production of Cookies Using Palm Oil

Nur Haqim Ismail*

INTRODUCTION

Chocolate chip cookies, peanut butter cookies and chocolate sandwich biscuits are some of the popular cookies available in Malaysian supermarkets. Kids just love to eat these cookies. Cookies is the term used in America to describe cereal-based baked products that have a low moisture content of 1%-5%, excluding any moisture from the fillings or icing. Cookies have a longer shelf life and higher fat content than other baked products, as well as higher energy density. In New Zealand, Australia, the United Kingdom and South Africa, the term for this product is biscuit (http://www.bakeinfo.co.nz).

Cookies are classified into two categories based on the type of dough used, namely, hard dough and short dough. Hard dough is similar to bread dough, requiring a gluten network to be developed during the mixing process. Gluten makes the dough elastic, helping it to rise and keep its shape, and providing the final products with a chewy texture. These cookies are normally low in fat and sugar content. Examples for this category are semi-sweet, unsweetened and savoury biscuits such as cream crackers and Marie biscuits. Usually, this category of cookies is favoured by adults. Short dough on the other hand is more similar to a cake mixture. It has high levels of fat and sugar. The dough is mixed slightly to keep the gluten network to a minimum level. Examples for this category are chocolate chip cookies, shortbread and sandwich biscuits (http://www.bakeinfo.co.nz).

Typically, cookies are made of flour, fat (which is normally margarine, shortening or butter) and sugar together with optional ingredients such as salt, milk powder, vanilla extract, eggs and sodium bicarbonate to enhance the taste. Other optional ingredients such as dried fruits, fruit extracts, pieces of nuts and chocolate (chips or drops) may be added depending on the demand and consumer preference. These ingredients are mixed, followed by sheeting, cutting or shaping as required. The cookies are then baked in the oven at a certain temperature and for a specific time. After baking, the cookies are cooled at room temperature before they are served or packed.

ROLE OF FAT IN THE PRODUCTION OF COOKIES

Fats such as margarine, shortening, butter, tallow or lard are important ingredients in cookies. They give structure, improved eating quality and flavour to the product. One of the key functions of fat in biscuits is to 'shorten' the dough which results in a typical 'melt-in-the-mouth' and crumbly texture (Atkinson, 2011). Fat interacts with other ingredients to develop mouthfeel and give a sensation of lubricity to the product (Giese, 1996; Stauffer, 1998). It also influences the rheological properties and texture of the cookie dough. Fat in cookies can be derived from many sources. In the early years, refined animal fats were an important source of fat for the cookie

* Malaysian Palm Oil Board (MPOB)
6, Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor, Malaysia.
E-mail: nurhaqim.ismail@mpob.gov.my

industry. They have melting characteristics which give excellent performance and provide flavour to the cookies. However, animal fats are less commonly used as an ingredient in cookies now because they can create some issues during processing arising from the quality related to the origin of these materials (Atkinson, 2011), and also *halal* requirements in certain countries. Hydrogenated fats with a high melting point have been used for a long time to replace those fats of animal origin in the bakery products. However, these hydrogenated fats are high in *trans* fatty acids (TFA) which is associated with an undesirable effect on serum lipid profiles, and thus increases the risk of getting cardiovascular diseases (Aranceta and Pe´rez-Rodrigo, 2012). The demand for margarines with low TFA is increasing as consumers become increasingly aware of the harmful effects of consuming TFA. As margarine and shortening are considered as the main contributors of TFA in foods (Mat Sahri and Mat Dian, 2011), the food industry has made tremendous efforts to reduce TFA levels in food; the application of fractionation, interesterification and blending are alternatives to hydrogenation. The use of palm oil in bakery products such as cookies has become very popular as it possesses desirable physical properties and is free from TFA (Li *et al*., 2011).

Palm oil and palm products such as shortening and margarine have become imperative as raw materials in the food industry. Palm oil has unique fatty acids in its triacylglycerol (TAG) composition which comprises an equal amount of unsaturated and saturated fatty acids. It can be physically modified by fractionation while hydrogenation and interesterification will modify its chemical characteristics. The distribution of the fatty acids is 39% monounsaturated (18:1), 10.5% polyunsaturated (10.1% 18:2 and 0.4% 18:3) and about 50% saturated (44% 16:0 and 4.5% 18:0). Palm oil contains not only a low amount of polyunsaturated fatty acids but also natural anti-oxidants, namely, tocopherols and tocotrienols, which render palm oil very impervious to oxidation. Hence, palm oil provides oxidative stability to margarines and shortenings (Idris and Miskandar, 2007).

Palm oil provides consistency, texture and structure to products such as margarines and shortenings without the need for hydrogenation. In making cookies, the shortening phase results in entrapped air bubbles which serve as nuclei for leavening gas during baking. The liquid component in shortenings lubricates the dough during the extrusion process. It also helps to release the dough from rotary cookie moulds and from baking trays or pans. The solid fraction helps to maintain the shape of the product during moulding and baking. Palm oil is also an ideal ingredient for making fillings for sandwich cookies and wafers, or icings for cakes which contain mainly fat and sugar (Idris and Miskandar, 2007).

PALM OIL AS A HEALTHY INGREDIENT IN COOKIES

Choosing a healthy diet is becoming a lifestyle. People are concerned about the increasing cases of coronary heart disease, diabetes and cancer. Cookies are not only eaten for their taste but because they offer acceptably convenient and healthful snacks in place of junk food. There are many recipes for cookies available on the internet, cooking books, cooking shows, and even from social media which is now a more popular source of information. As consumers become more concerned about health issues, they tend to choose food ingredients that can reduce the risk factors of getting the above-mentioned diseases.

Margarine and shortening from palm oil have been found to be a reasonable replacement for partially hydrogenated oils which contain TFA, and for animal fats which contain cholesterol. Palm oil has the highest known concentration of agriculturally derived carotenoids among all the vegetable oils that are widely consumed (Tan, 1989). Indeed, crude palm oil is the world's richest natural plant source for carotenes in terms of retinol equivalent. It contains about 15 to 300 times as much retinol equivalents as carrots, leafy green vegetables, and tomatoes, which are considered to have substantial amounts of provitamin A activity (Tan, 1987). Like other vegetable oils, palm oil is a major source of tocols, but significant amounts of these compounds have also been reported in the other ingredients of bakery products, such as most cereal flours, eggs, milk and dairy products. Tocols, collectively referred to by the term vitamin E, are naturally occurring antioxidants. Vitamin E is an essential lipid-soluble vitamin and is well-known for its bioactivity and antioxidant properties (Packer *et al*., 2001; Tiwari and Cummins, 2009; Laus *et al*., 2012). alm tocols consist of both tocopherols and tocotrienols. Tocotrienols are known for their lipid-lowering, anti-atherogenic, blood pressure-lowering, anti-diabetic, neuroprotective and

anti-inflammatory effects (Wong and Radhakrishnan, 2012). It is estimated that seven in 10 food products on the UK supermarket shelves – from the range of margarines and spreads to cooking oils, and from chocolates and pastries to ice creams and biscuits – contain palm oil (Mignogna *et al*., 2015). The usage of palm oil as the preferred ingredient in the production of cookies is expected to continue and increase further as consumers become more aware of the health benefits it offers. Health is one of the key determining factors when buying indulgence products such as cookies.

CONCLUSION

Margarine or shortening from palm oil can be used to replace the use of animal fats and hydrogenated oils in cookies and other bakery products. Margarine made from palm oil offers good textural properties to the products and at the same time provides a healthier choice without *trans* fat. Furthermore, consumers will have better options when choosing healthy foods.

REFERENCES

ARANCETA, J and PE´REZ-RODRIGO, C (2012). Recommended dietary reference intakes, nutritional goals and dietary guidelines for fat and fatty acids: A systematic review. *British Journal of Nutrition*, *107*: 8-22.

ATKINSON, G (2011). Fats and oils as biscuit ingredients. Manley's Technology of biscuits, crackers, and cookies (Manley, D ed.). Woodhead Publishing Limited, Cambridge. p. 160-161.

GIESE, J (1996). Fats and fat replacers, balancing the health benefits. *Food Technology*, *50*: 76-78.

LAUS, M N; TOZZI, D; SOCCIO, M; FRATIANNI, A; PANFILI, G and PASTORE, D (2012). Dissection of antioxidant activity of durum wheat (Triticum durum Desf.) grains as evaluated by the new LOX/RNO method. *Journal of Cereal Science*, *56*: 214-222.

LI, C, YAO; Y, ZHAO, G; CHENG, W; LIU, H and LIU, C *et al* (2011). Comparison and analysis of fatty acids, sterols, and tocopherols in eight vegetable oils. *Journal of Agricultural and Food Chemistry*, *59*: 12493-12498.

MAT SAHRI, M and MAT DIAN, N H (2011). Formulation of *trans*-free and low saturated margarine. *J. Oil Palm Res. Vol. 23*: 958-967.

MIGNOGNA, R; FRATIANNI, A; NIRO, S and PANFILI, G (2015). Tocopherol and tocotrienol analysis as a tool to discriminate different fat ingredients in bakery products. *Food Control*, *54*: 31-38.

IDRIS, N A and MISKANDAR, M S (2007). Utilization of palm oil and palm products in shortenings and margarines. *European Journal of Lipid Science and Technology*, *109*: 422-432.

PACKER, L; WEBER, S U and RIMBACH, G (2001). Molecular aspects of α-tocotrienol antioxidant action and cell signalling. *Journal of Nutrition*, *131*: 369-373.

STAUFFER, C E (1998). Fats and oils in bakery products. *Cereal Foods World*, *43*: 120-126.

TAN, B (1987). Novel aspects of palm oil carotenoid analytical biochemistry. *International Oil Palm/ Palm Oil Conferences: Technical Progress and Prospects* (Ma, A N; Maycock, J H; Sieh, L M L and Augustine Ong, M A eds.). MPOB, Bangi, Selangor. p. 370-376.

TAN, B (1989). Palm carotenoids, tocopherols and tocotrienols. *J Am Oil Chem Soc.*, *66*: 770-776.

TIWARI, U and CUMMINS, E (2009). Nutritional importance and effect of processing on tocols in cereals. *Trends in Food Science and Technology*, *20*: 511-520.

WONG, R S Y and RADHAKRISHNAN, A K (2012). Tocotrienol research: Past into present. *Nutrition Reviews*, *70*: 483-490.