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CONSUMER TEST AND FOOD PAIRING OF DEVELOPED CASHEW NUT BUTTER

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บทคัดย่อ

งานวิจัยฉบับนี้มีวัตถุประสงค์ในการศึกษาการยอมรับของผู้บริโภคและการเข้ากันได้ของอาหารต่อผลิตภัณฑ์เนยชนิดใหม่ที่พัฒนาขึ้น ซึ่งผลิตจากเศษเม็ดมะม่วงหิมพานต์ น้ำมันพืชปราศจากไขมันทรานส์ เกลือและน้ำตาล จากการศึกษาการยอมรับของผู้บริโภคจำนวน 100 คนพบว่า ผู้บริโภค 94% ยอมรับผลิตภัณฑ์ที่พัฒนาดังกล่าว และมีค่าความชอบโดยรวมเฉลี่ยเท่ากับ 6.9 ± 1.3 สำหรับผลิตภัณฑ์เนยเม็ดมะม่วงหิมพานต์และ 7.5 ± 1.1 สำหรับขนมปังแ่งกรอบเคลือบเนยเม็ดมะม่วงหิมพานต์ เมื่อทำการศึกษาการเข้ากันได้ของอาหารระหว่างผลิตภัณฑ์เนยเม็ดมะม่วงหิมพานต์กับอาหารจำนวน 8 ชนิด ทดสอบโดยผู้บริโภคจำนวน 75 คน เพื่อต้องการศึกษาความเข้ากันได้ของผลิตภัณฑ์ทำการทดสอบแต่ละคู่ของชนิดอาหารโดยใช้สเกลการเข้าคู่ระดับ 10 คะแนน (0 หมายถึง ไม่เข้าคู่กัน และ 15 หมายถึง เข้าคู่กันตามอุดมคติ) และให้ผู้ทดสอบทำการเรียงลำดับชนิดอาหารที่เข้าคู่กันน้อยที่สุด (ลำดับที่ 1) ไปถึงชนิดอาหารที่เข้าคู่กันมากที่สุด (ลำดับที่ 8) ในการศึกษาการเข้าคู่กันของอาหารนี้ ทำการแบ่งกลุ่มอาหารเป็น 2 กลุ่ม คือ กลุ่มแรก ได้แก่ แยมสับปะรด แยมสตอเบอรี่ ผงโกโก้และครีมชีส นำมาผสมรวมกับเนยเม็ดมะม่วงหิมพานต์ รับประทานร่วมกับขนมปังแผ่น กลุ่มที่สอง ได้แก่ แคนเบอร์รี่อบแห้งและสับปะรดอบแห้งหั่นละเอียด วิทยุพีชอบกรอบและน้ำผึ้ง นำมาผสมรวมกับเนยเม็ดมะม่วงหิมพานต์และเคลือบบนขนมปังแ่งกรอบ จากผลการทดสอบพบว่า แคนเบอร์รี่อบแห้งได้รับคะแนนการเข้าคู่กันสูงที่สุด ตามมาด้วยวิทยุพีชอบกรอบและสับปะรดอบแห้ง ด้วยคะแนน 8.7, 8.0 และ 7.7 ตามลำดับ ซึ่งให้ผลที่สอดคล้องกับผลการเรียงลำดับการเข้าคู่กัน โดยการเข้าคู่กันสูงที่สุดอันดับแรกคือ แคนเบอร์รี่อบแห้ง และอันดับที่สองคือ วิทยุพีชอบกรอบและสับปะรดอบแห้งที่ความเชื่อมั่นทางสถิติ 95%

คำสำคัญ : การเข้าคู่กันของอาหาร เม็ดมะม่วงหิมพานต์ เนย

Abstract

The purpose of this research was to conduct a consumer test and food pairing test on a new developed butter product. Butter was produced from roasted broken cashew nut blended with trans-fat free hydrogenated vegetable oil, salt and sugar. A consumer test was conducted by a hundred consumers. 94% of consumers accept the developed product with the overall liking score of 6.9 ± 1.3 for cashew nut butter and 7.5 ± 1.1 for bread sticks coated with cashew nut butter. Product pairing between the developed cashew nut



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butter with eight different types of food was evaluated by seventy-five panelists. This was to identify product harmony by evaluating each pair of product on a 10-point matching score (0 refers to no match and 10 refers to ideal match) and then ranking them from least match (1st rank) to best match (8th rank). Product pairing was carried out by dividing into two groups. First group of product (pineapple jam, strawberry jam, cocoa and cream cheese) was tested by mixing with cashew nut butter and spreading on white milk bread. A second group of product, cashew nut butter was coated on the bread stick with four different types of food (chopped dried cranberry, chopped dried pineapple, cereal and honey). The results showed that the highest score of matching level belonged to dried cranberry, cereal and dried pineapple (8.7, 8.0, and 7.7, respectively). This is also compliance with the ranking sum results. Best match to the developed cashew nut butter product was chopped dried cranberry coated on bread sticks, following by dried pineapple and cereal ($P < 0.05$).

Keywords: food pairing, cashew nut, butter

Introduction

The cashew nut is a usually marketable as meal snacks (The World's healthiest foods, 2011), also in Thailand. Raw cashew nut in the market which are full complete seed, half seed, broken and milled seed (or seed crumble), where the broken and milled seed considered as a lot cheaper than complete and half seed cashew nut. The value added products from broken and milled seed are challenging among researchers. A development of butter made from broken cashew nut was successfully formulated by blending with trans-fat free hydrogenated vegetable oil, salt and sugar. The addition of trans-fat free hydrogenated vegetable oil helps to improve a smooth texture of the final product.

There are numbers of theories in culinary literature on food pairing with beverages, however, most approaches stated a difficulty in test objectively (Paulsen et al., 2015). The importance in balancing the product combination is sweet-sour balance as well as the harmony of aroma and flavor. Terms of "Best match" or "Harmony" was mostly used to describe the matching perception among food pairing in literature (Paulsen et al., 2015; Nygren et al., 2001, 2002). This is showed how well the tastes and flavors go together when sensory evaluation was conducted. Most studies have been done pairing food with wine or beer (Nygren et al., 2001, 2002; Madrigal-Galan and Heymann, 2006; King and Cliff, 2005). Previous pairing studies have demonstrated that untrained panels may provide pairing results with equally performance to experts or trained panels (Bastian et al., 2009; Donadini et al., 2008; King and Cliff, 2005; Koones et al., 2014; Chollet and Valentin, 2001). The pairing method was also applied to test overall perception in peanut butter. The combinations of peanut butter with food such as jam, cheese or fruit purees were tested and be accepted by consumers (MacWatters et al., 2006; Muego-Gnanasekharan et al., 1993, Swanson and Munsayac, 1999). Also, peanut butter was commercially produced by a combination with cocoa and cheese. It is also long-known that peanut butter is usually harmony when eaten with jam and dried fruit. Food pairing method would however be a good benefit for a new developed or an innovative product.



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Objectives

1. To conduct a consumer acceptance test of new developed cashew nut butter products
2. To conduct a food pairing test between food and developed cashew nut butter

Methods

Sample preparation

Cashew nut butter was produced from 86% broken cashew nut, 1% salt, 7% sugar and 6% of trans-fat free hydrogenated vegetable oil (The J.M. Smucker Company, USA). Cashew nut was firstly roasted in an oven at 130°C for 15 min before milling it for 4 min using high speed food processor. Salt, sugar and vegetable oil were respectively blended to the milled nuts. Freshly prepared cashew nut butter was then used for sensory evaluation and food pairing test.

Consumer test

15 grams of cashew nut butter were packed in a disposable polypropylene plastic cup with lid. This was used to test with 1.5" x 1.5" white milk bread. Bread sticks (Pretz, Glico®, Thailand) was coated with approximately 2-3 grams of cashew nut butter (40-45°C) and left to cool and dry in a tray before packing in polypropylene plastic food bags prior testing. 100 consumers including students, business owners, employees and others were screened to obtain the consumers who do not have an allergy to nuts. Central Location Test was used in this study. Two samples were served with 3-digit code with questionnaire at room temperature. The questions include demographic data, peanut butter product consumed behavior, important attributes and cashew nut butter products' acceptance. The 9-point hedonic scale was applied in order to obtain liking score for given attributes (appearance, aroma, flavor, texture and taste) and overall liking. Water was used as a palate cleanser. The sample order was randomized and balanced.

Product pairing

The samples used in this study were pairings food with cashew nut butter. A total of 8 pairs were evaluated by 75 consumers. Our previous trial was done on testing different types of food to match with cashew nut butter by interviewing three experts and by preference test. The preference test with 25 panelists provided the information of 8 types of food would be well matched with cashew nut butter (data not shown). In this research, the panels were instructed to evaluate in 2 sessions. The first session was pairing cashew nut butter with pineapple jam, strawberry jam, cocoa and cream cheese. The food was mixed with cashew nut butter (1:2) before spreading on white milk bread. The second session was a cashew nut butter coated on the bread stick pairing with other 4 different types of food. They were chopped dried cranberry, chopped dried pineapple, cereal and honey with a ratio of 1:2 (food : cashew nut butter). The identification of product harmony was done by evaluating each pair of product on a 10-point matching score (0 refers to no match and 15 refers to ideal match) and then ranking them from least match (1st rank) to best match (8th rank).



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Data Analysis

The consumer test data were analyzed using R-Program (R version 2.13.0, 2011) in order to obtain p-value. The data from food pairing test were analyzed using Friedman-Type Statistics with rank sum and least square method to obtained significant rank of product order.

Results and Discussion

Consumer test

Table 1 shows mean ratings for sensory quality and acceptability of developed cashew nut butter and bread sticks coated with cashew nut butter evaluated by consumers (n = 100). After evaluating the cashew nut butter product, consumers were asked either accepting or unaccepting the product. 94% of consumers accepted developed cashew nut butter with like slightly to like very much. Sensory showed there was no significant difference between cashew nut butter spreading on white milk bread and when coated on bread sticks ($p \leq 0.05$) in appearance and aroma. However, bread sticks coated with cashew nut butter received significantly higher ratings for flavor, taste and texture and overall liking (7.5 out of 9) than cashew nut butter spreading on white milk bread.

Table 1 Mean ratings for sensory quality and acceptability of the developed cashew but butter and bread sticks coated with cashew nut butter evaluated by consumers ^a

Sample	Sensory attributes ^b					Overall liking*
	Appearance ^{ns}	Aroma ^{ns}	Flavor*	Taste*	Texture*	
Cashew nut butter	6.5±1.3	7.0±1.3	6.7±1.6	6.7±1.5	6.5±1.5	6.9±1.3
Bread sticks coated with cashew nut butter	6.8±1.3	7.1±1.2	7.3±1.2	7.5±1.3	7.1±1.3	7.5±1.1

^a Mean values ± standard deviation in a column with ns are non-significantly different at P>0.05.

^b on 9-point hedonic scale (1 = dislike extremely, 5 = neither like nor dislike, and 9 = like extremely)

* means there is significantly different between samples in the same column at P≤0.05

In order to avoid sensory fatigue, eight pairings were conducted by dividing into two sessions. Table 2 showed a result over food pairings by 75 consumers. The choices of food used in this study were selected based on a good pair to related product, e.g. peanut butter. As a result, cashew nut butter paired with chopped dried cranberry received the highest matching score, following with cereal and dried pineapple. The cocoa and cream cheese seems to receive lowest matching score with cashew nut butter.



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Table 2 Matching score and rank sum score of paired samples

Food combination with cashew nut butter	Average score of matching level ^a	Ranking results	
		Rank sum score ^b	Ranking order ^c
<i>Spreading on white milk bread</i>			
Pineapple jam	7.47	314d	6
Strawberry jam	6.20	333cd	4
Cocoa	4.73	236e	8
Cream cheese	5.67	245e	7
<i>Coated on bread sticks</i>			
Dried cranberry	8.67	473a	1
Dried pineapple	7.73	399b	2
Cereal	8.07	380bc	3
Honey	7.53	320cd	5

^a mean values out of 10-point matching level (0 = no match, 10 = synergistic or ideal match)

^b Friedman-Type statistics with Chi-square distribution level of χ^2 0.05

^c Ranking order from best match (1st rank) to least match (8th rank)

The panelists were then requested to rank the best liked pairing from least match to best match. Table 2 showed that the best liked pairing between cashew nut butter spreading on white milk bread and foods were strawberry jam, following by pineapple jam. When coated cashew nut butter on bread stick, best liked pairings were chopped dried cranberry, following by dried pineapple and cereal. The latter group shows higher rank sum score which means by coating cashew nut butter on the bread stick increased the liked pairing rank. This is also compliance to the consumer test results. The reason, however, has not been clearly stated by the method used in this study. The pairing harmonic scale rating would be further used to explain how the food match to the product on each attribute, e.g. appearance, aroma, texture, or flavor. This would be well explained why the dried cranberry gave a best match to the cashew nut butter. Further studies should be done and discussed.

Conclusion

Developed cashew nut butter received highly preferred by consumers when coated on bread stick. The overall liking score increase from 6.9 (spreading on white milk bread) to 7.5 (coated on bread stick). This is also significantly affected to increase acceptability when pairing with other foods. The first three ranks for best liked match of cashew nut butter were obtained when coated on bread stick. The best liked match was dried cranberry when chopped, mixed and coated on bread stick.



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