



การประชุมวิชาการและนำเสนอผลงานวิจัยระดับชาติและนานาชาติ ครั้งที่ 10
"Global Goals, Local Actions: Looking Back and Moving Forward"

Effect of using Tilapia bone powder on quality of Keang-Leang paste

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Abstract

The aim of the research is to study about an adequate amount of an additional tilapia bone powder in kaeng-leang paste by separated the amount of tilapia bone powder to 4 levels 0, 5, 10 and 15 percent respectively. 4 recipes of kaeng-leang paste are calculated by using RCBD experiment. Duncan's multiple rang test initiated by ANOVA at 95% confidence level is used to measure the physical quality of kaeng-leang paste by their viscosity, color level, acidity and alkalinity. The results represent that kaeng-leang with 10 percent of tilapia bone powder is accepted by the consumers because of their greatest rate of texture that affected to the tasting sense of the consumers with 8.25 ± 1.41 points. The difference of tilapia bone powder is result in decreasing of L value (Brightness), however a^* and b^* are tend to increased. Although, the viscosity of kaeng-leang is varing according to the amount of tilapia bone powder. On the other hand, acidity and alkalinity are inversely vary to the amount of tilapia bone powder.

Keywords: chili paste, kaeng-leang paste, fish bone powder, tilapia

บทคัดย่อ

ผลของการใช้ก้างปลาในผงต่อคุณภาพของน้ำพริกแกงเผ็ดมีวัตถุประสงค์เพื่อศึกษาปริมาณที่เหมาะสมในการเสริมก้างปลาในน้ำพริกแกงเผ็ด โดยปัจจัยที่ศึกษาคือปริมาณก้างปลาในน้ำพริกแกงเผ็ดโดยแปรเป็น 4 ระดับคือ 0, 5, 10 และ 15 ตามลำดับ ทำการทดลองวางแผนแบบ RCBD จะได้สูตรทั้ง 4 สูตร นำน้ำพริกแกงเผ็ดทั้ง 4 สูตรมาวิเคราะห์คุณภาพทางประสาทสัมผัส ทางกายภาพโดยวัดความหนืด ค่าสี ทางเคมีโดยวัดค่าความเป็นกรด-ด่างวิเคราะห์ความแปรปรวนโดยใช้ ANOVA ใช้วิธี



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Duncan's multiple rang test ใช้ระดับความเชื่อมั่นร้อยละ 95 พบว่าผู้บริโภคให้การยอมรับการเสริม ก้างปลานิลปนที่ระดับร้อยละ 10 เนื่องจากมีการยอมรับทางประสาทสัมผัสสูงที่สุดที่ คือ 8.25 ± 1.41 คะแนน โดยการเสริมก้างปลานิลผงที่ระดับต่างกัน มีผลทำให้ค่า L (ค่าความสว่าง) มีแนวโน้มลดลง ส่วนค่า a^* และ b^* มีแนวโน้มสูงขึ้น ด้านค่าความหนืดของน้ำพริกแกงเลียง โดยยังมีปริมาณก้างปลานิลผงมากขึ้นส่งผลให้ ค่าความหนืดเพิ่มขึ้น ด้านค่าความเป็นกรด - ด่าง มีแนวโน้มลดลงเมื่อมีปริมาณของก้างปลานิลผงที่เพิ่มขึ้น

คำสำคัญ: น้ำพริก, แกงเลียง, ก้างปลา, ปลานิล

Introduction

Thai foods are well-known as tasty and nutritious. Some Thai foods provide high energy and iron with low amount of fat to consumer body, for example, Thai rice noodles with spicy pork sauce, spicy mixed vegetables soup (keang-leang) with rice, sour soup with rice and steamed fish curried with *Morinda citrifolia* leaves. In addition, Thai food still provide high calcium such as rice seasoned with shrimp paste, stir fried rice noodle, Thai shrimp paste fried rice with fried mackerel. Apart from their nutrition, the original Thai foods are consisting of synthetic substances from various kind of vegetable from their main ingredient which are herbs and spices. Numerous researches were represent that Thai foods have high potential to be nutrition food (Somsri *et al.*, 2002).

Spicy mixed vegetables soup (keang-leang) is a food with special identity. Kaneg-leang is a soup that can be simply consume, but may not simply to some people who cannot consume spicy foods, especially from Thai chilli. Kaneng-leang is consisted of various kinds of vegetable and that is the reason that Kaneg-leang is highly interesting. Institute of Food Nutrition is interestd in Kaeng-leang because its provide low energy but still provide high fiber, vitamins, mineral and various bioactive compounds such as beta-carotene or flavonoid which can prevent consumer from sickness (Somsri *et al.*, 2002).

From the studies of the effect of Kaneg-leang to inflammation and other reactions by Institute of Food Nutrition in cells levels and guinea pig. The results present that Kaeng-leang can decrease inflammation rate in cells, Thus, consuming Kaeng-leang can decrease free radical, environmental hazards or even toxicity effect. Kaeng-leang is one of Thai traditional food which is recommended to regularly consume because of their moderate energy to human body and high amount of fiber, vitamins and minerals (Somsri and Atitda, 2011).

Fish bone is known as a portion from fish slice. Fish bone can be transformed to high quality organic fertilizer with low cost. High quality organic fertilizer production procedures are consisted of temperature control process, decomposition process and drying process. Firstly, temperature control process is to mix fish bone with bran with 35 – 70 Degree Celsius



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and 35 -70 percent of moisture level. Secondly, decomposition process is to decompose organic waste under stir condition and the temperature as mentioned above. Lastly, drying process is to stir the organic waste with 80 - 110 Degree Celsius with air flow to release the moisture level with average of 20 percent or more (Takahashi, 2003). Due to the normally fish transformation process, fish bone will become waste portion, to reduce waste portion from fish and increase value of those fish waste portion, fish bone which has high nutritious will be transformed. The transformation procedure of fish bone is to washing fish bone, drying fish bone until the moisture level is between 10 – 30 percent, roasting the ingredients until its dry, soak all ingredients in garnish solution with in specified time and envelop in its package by using vacuum process, seal their package, let the transformed fish bone package pass compression procedure, high temperature and cooling then the transformed fish bone is ready to be consumed (Nishimura, 2001). There are some researches that study about using tilapia fish bone powder to compare with some additional calcium product in the market. The studies indicate that tilapia fish bone powder is a productive calcium with low squeamish symptom while the osteoporosis resistance potential is satisfying. According to Sayan Sawassri, 2013, there is no different between fish bone and additional calcium product in term of curing patients with osteoporosis, patients had no squeamish symptom which is commonly found in a group of patients who use additional calcium product that extract from ore.

Therefore, with the reasons that mentioned in above paragraphs, researcher is appreciated to its benefits to develop the nutrition of kaeng-leang paste and to use portion of fish bone to enhance the kaeng-leang paste for more nutrition such as additional calcium from fish bone to cure osteoporosis or any other chronic diseases and to produce productive value of kaeng-leang and fish bone in other solution. In addition, to be another alternative food for health-conscious consumers.

Objectives

To study and appropriate amount of additional tilapia bone in kaeng-leang paste

Limitation

1. Sample sizes
2. Number of variables
3. Amount of time



Methodology and data collection

1. Study of the appropriate amount of fish bone powder in kaeng-leang soup by using the recipe of kaeng-leang paste with pepper seeds, chilli paste, dried shrimp, red onion for 1.44, 10.07, 30.94 and 57.55 percent respectively (Arpassara, 2014) as a base in this study and use tilapia bone from Rangsit market. After the preparation process is completed, steam tilapia bone for 30 minutes and wash it then, bake it for 60 Degree Celsius in a hot air oven for 3 hours. Baked tilapia bone will be blended until it is fine with blend Mara blending machine and screen by using flour sifter then, add it in 4 samples of Kaeng-leang paste for 0, 5, 10, 15 percent respectively and analyze.

- Acceptance from consumer's sensation from 30 samples (Food and nutrition students) by using Hedonic 9point scale

-Physical qualities analysis, for instance, kaeng-leang viscosity or color level (L a* b*) by using Brookfield Digital Rheometer (Model DV-III, USA) and Hunter Lab (Gurnard et al., 1997)

- Chemical qualities analysis for example, alkalinity and acidity by using pH meter (AOAC, 2000)

2. Statistical data analysis, physical and chemical qualities analysis will be performed under Completely Randomized Design (CRD). Randomized Completed Block Design (RCBD) will be performed for acceptances of consumers. An Analysis of Variance (ANOVA) with 95% confidence level of New Multiple Range Test by SPSS16 will be used to compare the differences of each average value.

Results

1. The study of an appropriate proportion of tilapia bone powder in kaeng-leang paste

1.1 Sensational Analysis

According to the experiment, It is clear that color, smell, taste, intensity and overall inclination are accepted by the consumers; moreover, there are significantly different in terms of all factors that mentioned above. Consumers are accepting the recipe with 5 and 10 percent of tilapia bone powder without significant difference; nevertheless, 5 and 10 percent of the amount of tilapia bone powder in kaeng-leang paste are still accepted by the consumer with significantly difference ($p < 0.05$) compare to baseline condition. In addition, 10% of tilapia bone powder is accepted in terms smell, taste, intensity and overall inclination with significantly difference when compare to baseline (0%), 5% and 15%.



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Table 1 Sensational test of kaeng-leang paste with additional tilapia bone powder

Characteristics	Proportion of fish bone powder (Mean ± SD.)			
	Baseline (0%)	5%	10%	15%
Physical	6.85 ± 0.93 ^b	7.60 ± 1.19 ^a	8.20 ± 1.06 ^a	6.45 ± 0.95 ^b
Color	6.50 ± 0.95 ^b	7.45 ± 1.10 ^a	8.00 ± 1.03 ^a	6.50 ± 1.05 ^b
Smell (spices)	6.65 ± 0.81 ^b	6.70 ± 0.87 ^b	7.80 ± 1.06 ^a	6.50 ± 1.00 ^b
taste	6.55 ± 0.83 ^b	6.90 ± 0.91 ^b	7.90 ± 1.30 ^a	6.55 ± 1.15 ^b
Intensity (Soup)	6.80 ± 0.95 ^b	6.80 ± 0.95 ^b	8.10 ± 1.33 ^a	6.50 ± 1.57 ^b
Overall acceptances	6.70 ± 0.98 ^b	6.90 ± 1.02 ^b	8.25 ± 1.41 ^a	6.00 ± 1.17 ^c

Remark: a, b, c and d is indicated the significant difference of statistical data (p<0.05)

1.2 Physical Analysis

1.2.1 color level and viscosity analysis

From the experiment of the additional tilapia bone powder of 5, 10 and 15 percent and baseline condition (0 percent) it is found that if the proportion of tilapia bone powder is increased, L (brightness) is tend to decrease within the range of 21.24 which is in contrast to a* and b* that tend to increase by a* and b* are the range of 0.25-0.96 and 0.92-2.13 with respect. Viscosity of kaeng-leang is significantly different with p<0.05 if the proportion of tilapia bone powder is increased, thus the range of viscosity is between 21.43 - 25.05

Table 2 color level of kaeng-leang paste with additional tilapia bone powder

Recipe	Color level			Viscosity
	L	a*	b*	
0% Baseline	21.24 ± 1.38 ^a	0.25 ± 0.24 ^b	0.92 ± 0.46 ^b	21.43 ± 2.43 ^b
5% tilapia Bone powder	19.74 ± 2.68 ^{ab}	0.58 ± 0.61 ^{ab}	0.95 ± 0.76 ^b	22.95 ± 1.47 ^b
10% tilapia Bone powder	19.11 ± 3.49 ^{ab}	0.91 ± 0.93 ^a	1.56 ± 1.11 ^{ab}	23.72 ± 1.47 ^{ab}
15% tilapia Bone powder	17.46 ± 1.14 ^b	0.96 ± 0.83 ^a	2.13 ± 0.64 ^a	25.05 ± 1.74 ^a

Remark: a, b, c and d is indicated the significant difference of statistical data (p<0.05)



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1.3 Chemical Analysis

1.3.1 Acidity – Alkalinity analysis

From the experiment, it is found that the additional tilapia bone powder with baseline condition 5, 10 and 15 percent have affected to acidity and alkalinity of kaeng leang soup with significantly difference ($p < 0.05$). Furthermore, the greater the amount of tilapia bone powder is result in the decrease of acidity and alkalinity.

Table 3 Acidity – Alkalinity of kaeng-leang paste with additional tilapia bone powder

Recipe	Acidity - Alkalinity
0% Baseline	7.93 ± 0.11^a
5% tilapia bone powder	7.85 ± 0.15^b
10% tilapia bone powder	7.70 ± 0.09^c
15% tilapia bone powder	7.62 ± 0.12^d

Remark: a, b, c and d is indicated the significant difference of statistical data ($p < 0.05$)

Conclusion

The appropriate amount of the additional tilapia bone powder in kaeng-leang is 10 percent due to the highest acceptances level of consumer's sensation with the score of 8.25 ± 1.41 . The difference of additional tilapia bone powder proportion in kaeng-leang are resulted in decreasing of L value (brightness) which is in contrast to a^* , b^* and viscosity level. In conclusion, the greater the amount of tilapia bone powder, resulting in a greater viscosity level, however, alkalinity and acidity tend to decrease when the amount of tilapia bone powder proportion is increased.

Suggestion/Further Study

1. To study about the difference kind of fish bone for the greater nutrition of foods.
2. To add the fish bone in any other soups or foods for the greater nutrition.

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