

## ORIGINAL ARTICLE

## Sensory test evaluation of new developed catfish fish ball

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## Abstract:

Catfish fish ball is still new in the Malaysia market. People's acceptance towards new product is important before the product can be marketed. The aim of this research is to determine the people acceptance towards catfish fish ball as well to determine its shelf life stored at -2 to -4°C. The fish ball has been developed from *Clarias batrachus* (catfish) with three different kinds of vegetables such *Solanum lycopersicum* (tomatoes), *Brassica oleracea* (broccoli) and *Spinachia oleracea* (spinach). The determination of people acceptance and shelf life were obtained through sensory evaluation. The sensory evaluation was scored according to the 7-point hedonic scale for flavor, color, texture, odor, appearance and overall acceptance by the 25 panelists among the students UiTM Selangor Puncak Alam Campus. The results for first and third sensory evaluation for all attributes between catfish fish ball with commercialized fish ball has significant difference at  $p < 0.05$ . However, there were no significant difference between the samples at  $p > 0.05$  during second sensory evaluation for color and appearance attributes. For the shelf life, the catfish fish ball is not significantly difference between after the production and after 3 months of production as the p-value was 0.610 ( $p > 0.05$ ). The mean value shown this catfish fish ball accepted as most of the sensory attribute scored more than 4 which is the cut-off point of acceptance. On the other hand, people more likely to accept the commercialized fish ball as scored obtained is 5 in almost attributes during first, second and third sensory evaluation. Meanwhile, the shelf life of this catfish fish ball can be stored at -2 °C up to 3 months.

**Keywords:** Catfish, fish ball, people acceptance, shelf life, sensory evaluation

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## 1. INTRODUCTION

Fish is a good source of protein from animal and very important for human [1]. It became a significant source of protein that important in our health. In addition, fish has high nutritional value where it rich in polyunsaturated fatty acids (PUFA's), minerals, protein and vitamin [2].

Other than fish being freshly consumed, there are also fish products that being popular in market such as fish cracker and fish ball. Fish ball is the second largest product of fish production in Malaysia. Fish ball is the fish based industry product that commonly in Southeast Asia such as Taiwan, Philippines and China. Common fish products have been produce from fish flesh. In China, the raw materials are from fresh fish [3].

Surimi is another fish based product that people consume in their daily meals [1]. However, it less common compare to fish ball. The number of fish ball consumers arise along with the other snack products in market [4].

Most common fish species that being used in fish ball production are wolf-herring (*Chirocentrus sp.*), lizardfish (*Saurida tumbil*), treadfin beam (*Nemipterus japonicus*), purple-spotted bigeye (*Priacanthus teyenus*) [5]. All these type of fish are saltwater species. The preparation of protein in the food products do not mainly come from the real fish flesh. Fish muscle becomes a raw material of protein. Fish protein isolate (FPI) is widely use as the source of protein in food products such as surimi and minced fish [3].

The selections of fresh water fish in preparing fish ball is rare compare to saltwater fish. The example of fresh water fish like Catfish (*Clarias batrachus*) usually been consume directly by frying or steaming. Like any other fish, catfish contain high protein, fat and ash concentration. Unfortunately, most consumers do not like this fish because it has strong fishy odor even though it is actually contain high Omega 3 fatty acid. The type of omega 3 fatty acid such eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in catfish is higher compared to other fresh water fish [6-7].

Therefore, the selection of catfish as a raw material in fish ball production is seen to be interesting to promote more consumer to consume nutritious food in their daily meal. This new developed fish ball product must be tested before it readily penetrate into the market. Acceptance test is one of the test before the product can be marketed. Acceptance is the changes in mood and person perception which indicate acknowledgement and identification. [8]. The longer the storage period, the sensory testing result in decrease likeliness. Sensory descriptors intensity decrease as storage period increase with exception of stale odor, sour odor and consistency [9].

Shelf life of food is an important thing that must have known. Changes in sensory attribution, microbial and chemical degradation become a measurement of shelf life of food. Suitable methods of packaging can extent shelf life of food. Vacuum packaging can extend the shelf life of fish ball [10]. Besides, freezing storage also can extent shelf life because the microorganisms stop growth at extreme cold temperature.

## 2. MATERIALS AND METHODS

### 2.1 Sensory evaluation method

Catfish ball were used consumer analysis method. The catfish ball samples were evaluated by a random group panellist (n=50) that are willing to participated in food testing according to the following criteria which were people without food allergies and people who consumed catfish. The fried and steamed catfish ball and the commercialized fish balls samples were served and presented for acceptability to panellist in random order during test day. The acceptability evaluated by using 5-point hedonic scale ranging from 1=dislike very much, 2=dislike, 3=like slightly, 4=like and 5=like very much. These five scale used to evaluate the acceptance of samples for five attributes which are flavour, smell, colour, texture and overall acceptance [11].

### 2.2 Statistical analysis

All the data were analyse by using Statistical Package for Social Science (SPSS) 12. For the physicochemical analysis study was prepared four to three sample replicated measurement of each experimental unit. The replication of the sample measurement were collected for analytical data. Hence, the analytical data programme analysed by One sample T-test and expressed as a mean and standard deviation and statistical significance was determined at  $P < 0.05$  by comparing with others study. Sensory data also were analysed by One sample T-test for the acceptability test.

## 3. RESULT AND DISCUSSION

### 3.1 Sensory evaluation

The acceptability of people was based on the result of sensory evaluation. The mean score for the flavor attribute

of fried catfish fish ball was 4.64 whereas fried commercial fish ball was 5.28, steamed catfish fish ball was 4.24 and steamed commercial fish ball was 5.20. The mean value of flavor for commercial fish balls was high for both fried and steamed. P-value of flavor between the samples was 0.027 ( $p < 0.05$ ) which statistically significant difference.

The panelists' acceptance on color for commercial fish ball is higher than catfish fish ball where the mean score for both fried and steamed commercial fish ball is 5.32 as compared to fried and steamed catfish fish ball, 4.72 and 4.16 respectively.

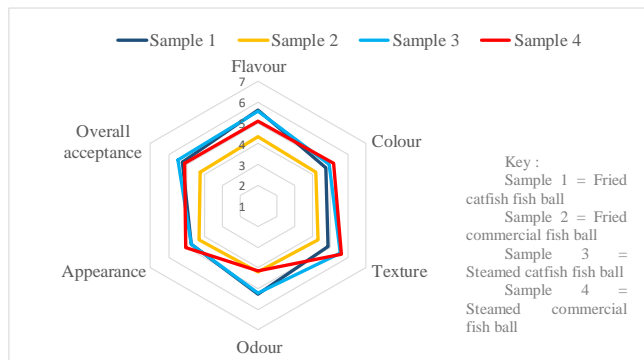


Figure 1: 1<sup>st</sup> Sensory evaluation

As for odor, the mean score for fried catfish fish ball was 4.84, fried commercial fish ball was 5.24, steamed catfish fish ball was 4.04 and steamed commercial fish ball was 4.32. All samples accepted by people however the most prefer odor was fried fish. These samples were statistically significant difference as p-value less than 0.05 which was 0.021.

Furthermore, the mean score for the appearance of fried and steamed fish ball were both score 5.44 whereas mean score for fried catfish fish ball was 4.48 and steamed catfish fish ball was 4.24. The commercial fish balls have higher acceptance in term of appearance for both fried and steamed. All of samples were accepted but statistically, they were significant difference as p-value was 0.001 ( $p < 0.05$ ).

The overall acceptance has mean score of 4.60 for fried catfish fish ball, 5.24 for fried fish ball, 4.08 for steamed catfish fish ball and 5.28 for steamed fish ball. The commercial fish balls is more accepted by people overall whether frying or steaming method of preparation. P-value for overall acceptance was 0.002, made the samples significantly difference between each other. This catfish fish ball was accepted as the mean score were above 4 point.

Figure 2 had shown the result of sensory evaluation between catfish fish ball and commercial fish ball after 1.5 month production. The most accepted flavor is fried catfish fish ball (mean score = 5.56), followed by steamed catfish fish ball (5.60) then steamed commercial fish ball (5.08) and fried commercial fish ball (4.32). Catfish fish ball is more

accepted than commercial fish ball for both fry and steam method. However, p-value was 0.002 meant that was statistically significant difference between the samples.

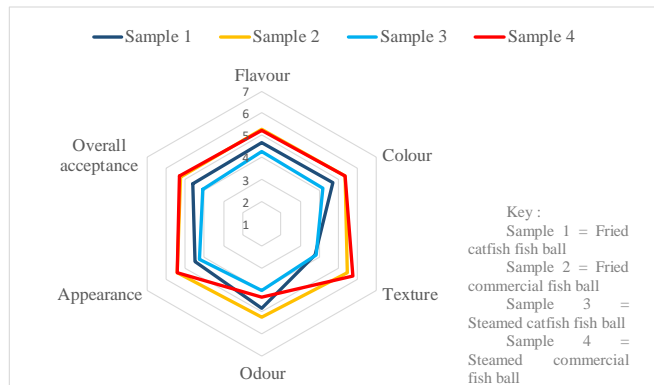


Figure 2: 2<sup>nd</sup> Sensory evaluation (After 1.5 month production)

People more accept steamed commercial fish ball than others as the mean score was 5.16 compare to steam catfish fish ball (4.96), fried catfish fish ball (4.72) and fried commercial fish ball (4.20). People more accept the steam method for both fish ball and catfish fish ball than fry method. Statistically, there was no significant difference between the samples as p-value was 0.075 ( $p > 0.05$ ).

For texture attribute, the steam method is more favorable than fry method for the both product as the mean score for steamed commercial fish ball was 5.64 and steam catfish fish ball was 5.52 compared to mean score for fried catfish fish ball was 4.88 and fried commercial fish ball was 4.32. P-value for texture was 0.002 ( $p < 0.05$ ), so there was statistically significant difference between samples.

The mean score of odor for fried catfish fish ball was 5.28, whereas mean score for fried commercial fish ball was 4.20, steamed catfish fish ball was 5.20 and steamed commercial fish ball was 4.12. People more prefer the odor of catfish fish ball than commercial fish ball. There was statistically significant difference as p-value was less than 0.05 ( $p = 0.003$ ).

People more accept the appearance of steam method for both products as the highest acceptance was towards steamed commercial fish ball with 5.04 mean score and followed by steamed catfish fish ball with 4.76 mean score compared to fry method. As stated in previous study, steaming method is the best way to maintain the nutritional quality [12]. The mean score for fried catfish fish ball is 4.72 and for fried commercial fish ball is 4.28. P-value for this attribute was 0.268 which was more than 0.05. There was no significantly difference.

For overall acceptance after 1.5 month production, people more prefer steamed catfish fish ball with the mean score of 5.48 followed by fried catfish fish ball with the mean score of 5.20. The mean score for steamed and fried commercial fish ball is 5.08 and 4.24 respectively. The significant difference for overall acceptance was significantly difference as  $p < 0.05$  ( $p = 0.004$ ).

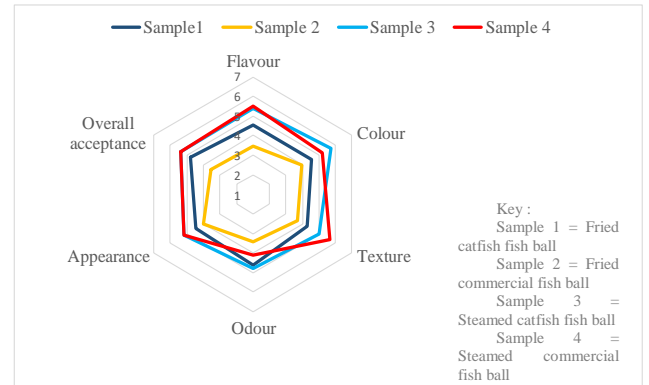


Figure 3: 3<sup>rd</sup> Sensory evaluation (After 3 month production)

Results for sensory evaluation of catfish fish ball and commercial fish ball after 3 month production were shown in Figure 3. The highest mean score for flavor was steamed commercial fish ball with 5.48 score, followed by steamed catfish fish ball with 5.40 score, fried catfish fish ball with 4.56 score and the lowest mean score is fried commercial fish ball with 3.44 score. Steaming method is more favorable for both products.

For color attribute, the most accepted color was steamed catfish fish ball. The mean score for steamed catfish fish ball was 5.72, whereas the mean score for steam commercial fish ball was 5.20, for fried catfish fish ball was 4.52 and fried commercial fish ball was 3.96. Fried commercial fish ball is below the acceptance range which was 4 score.

Besides, the mean score of texture for fried catfish fish ball, fried fish ball, steamed catfish fish ball, steamed catfish fish ball and steamed fish ball were 4.28, 3.68, 5.00 and 5.64 respectively. The most favorable texture is steamed catfish ball.

Furthermore, the most prefer odor was steamed catfish fish ball followed by fried catfish fish ball, fried fish ball and steamed fish ball. The mean score for fried catfish fish ball is 5.28, steamed catfish fish ball is 5.20, fried fish ball is 4.20 and steamed fish ball is 4.12. P-value for odor was 0.010 ( $p < 0.05$ ) which statistically significant difference.

For appearance, the most favorable appearance was steamed catfish ball and steamed commercial fish ball which shared the same mean score that were 5.16. While, the mean score for fried catfish fish ball was 4.48 and fried commercial fish ball was 4.00. There were statistically significant differences between samples as p-value was 0.002.

Steamed catfish fish ball is the most accepted as it scored the highest for overall acceptance with 5.40. Steamed fish ball scored 4.36 for overall acceptance, followed by fried catfish fish ball (4.76) and fried fish ball (3.56) which the least likely. The significant difference between group for flavor, color, texture and overall acceptance were statistically significantly difference as they had the same p-value ( $p < 0.001$ ).

### 3.2 Determination of shelf life of catfish fish ball

Shelf life of this catfish fish ball was determined by comparing the people acceptance of this catfish fish ball after production and after three months of production. The results of the people acceptance in two sessions of sensory evaluation is shown in Figure 4. There was not statistically significant difference as p-value of all the attributes shown mean score more than 0.05 ( $p > 0.05$ ). The p-value for flavor was 0.795 and the mean of score difference was 0.080. Whereas, p-value for color was 0.503 and the mean of score difference was 0.200. Texture has p-value of 0.287 with -0.440 mean of score difference.

Odor had p-value of 0.543 with 0.240 mean of score difference. The mean score catfish fish ball's appearance was same after production and after three months of production. For overall acceptance, the catfish fish ball got score of 4.60 after production and 4.76 after 3 months of production. The similar results also found by the previous study [13].

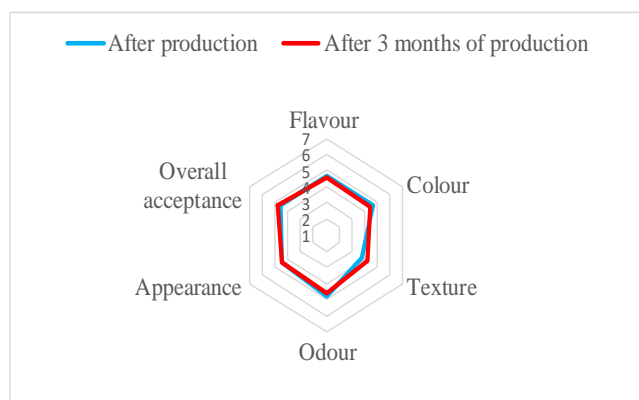


Figure 4: Comparison the people acceptance between after production and after 3 months production.

## 4. CONCLUSION

The mean value shown this catfish fish ball accepted as most of the sensory attribute scored more than 4 which is the cut-off point of acceptance. On the other hand, people more likely to accept the commercialized fish ball as scored obtained is 5 in almost attributes during first, second and third sensory evaluation.

There was no significant difference in sensory attribution between the catfish fish ball after the production and after 3 months of production. Therefore, we can conclude that the shelf life of this catfish fish ball can be stored at -2 °C up to 3 months.

## ACKNOWLEDGEMENTS

We would like to extend our gratitude to the support staff, Mr. Mohd Fathee Buhari and the sensory panelists for their assistance.

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