



THE ALCHEMICAL SYMPHONY OF CRAB SHELL POWDER IN ELEVATING CRAB MEATBALLS' SPLENDOR

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Abstract

Meatballs is a mixture of ground meat, spices, and sometimes with other ingredients like crab shells powder. The main thrust of this study was to determine the influence of crab shells powder on the quality of crab meatballs in in three treatments: The study focused on three distinct formulations of crab meatballs, denoted as T1 (30 grams of crab shell powder), T2 (60 grams), and T3 (90 grams). The researchers examined the impact of these varying amounts of crab shell powder on the color, flavor, odor, and texture of the meatballs. Additionally, the study aimed to identify any significant differences in the respondents' preferences and liking for the different formulations. The researcher utilized an experimental design and collected data through a questionnaire to conduct the study. The gathered data were then tabulated using weighted mean and analysis of variance (ANOVA) to identify any significant differences in the respondents' level of liking for the three treatments. The study involved seventy-five (75) participants, including Food Technology students, instructors, and professional chefs. According to the research findings, Treatment 2, which consisted of 60 grams of crab shell powder, emerged as the most favorable formulation with an average weighted mean of 7.69, signifying a "like very much" response from the participants. This outcome suggests that crab meatballs hold significant potential as a preferred food option, suitable for serving on various occasions and as a promising venture for income generation.

Keywords: crab shells powder, crab, meatballs

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INTRODUCTION

Meatballs are a popular dish frequently served in hotels, resorts, and restaurants during different events. The overall quality of meatballs largely relies on the ingredients used in their preparation. To improve the flavor and nutritional value of the meatballs, the concept of incorporating both crab meat and crab shell powder was introduced. Due to the high cost of crab meat, only a small quantity is used, while a larger portion consists of crab shell powder, which is more affordable and readily available in abundance.

Crabs are readily accessible in the local area as they naturally thrive in the wild, inhabiting places like mangroves and riverbanks with a mix of fresh brackish and salty waters. Additionally, they are cultivated in ponds to achieve a substantial production volume, making them a commonly found seafood in the market.

Crabs offer a multitude of preparation options, but regardless of the method used, only the crab meat is typically utilized, leading to the disposal of the shells. Unfortunately, crab shells are often overlooked and considered of little value in hotels and restaurants where crabs are served. Consequently, these shells are treated as waste, and improper disposal may contribute to additional environmental concerns.

In light of these circumstances, the researcher faced a compelling challenge to incorporate crab shells as an additional ingredient in meatball production. The decision stemmed from the easy availability of crab shells in the market, originating from various sources apart from hotels and restaurants. The shells primarily come from the blue swimming crab species (*Portunus pelagicus*), locally known as Lambay. This particular crab species is abundant and widely served by numerous hospitality service providers. Furthermore, Bennet (2015) highlighted that the shell of the blue swimming crab possesses a

thinner and softer texture compared to other species, making it easily pulverizable for use.

Hence, the researcher contemplated the prospect of utilizing crab shells as an additional component in crafting crab meatballs and subsequently assess the impact of crab shell powder on the meatballs' overall quality.

OBJECTIVE

The primary objective of this study was to incorporate the readily available crab shell powder into crab meatballs. The research aimed to examine how the addition of crab shell powder influenced the quality of the crab meatballs in three distinct treatments, considering aspects such as color, flavor, odor, and texture. The study's secondary goal was to identify any noteworthy variations in the respondents' preferences for the different formulations. The research was carried out at Bohol Island State University-Main Campus, Tagbilaran City, during the Academic Year 2017-2018.

METHODOLOGY

The research employed an experimental research design alongside a descriptive research method. The choice of an experimental design was made because the researcher manipulated the experimental variables, specifically the crab shell powder, and incorporated it with other ingredients to achieve meatballs with enhanced flavor and quality. In addition to the experimental research design, the study also employed the descriptive research method. This approach was crucial for determining the impact of crab shell powder on the quality of crab meatballs through descriptive and preference tests, focusing on aspects such as color, flavor, odor, and texture. The shelf life of the crab meatballs was assessed at both room temperature and chilled conditions.

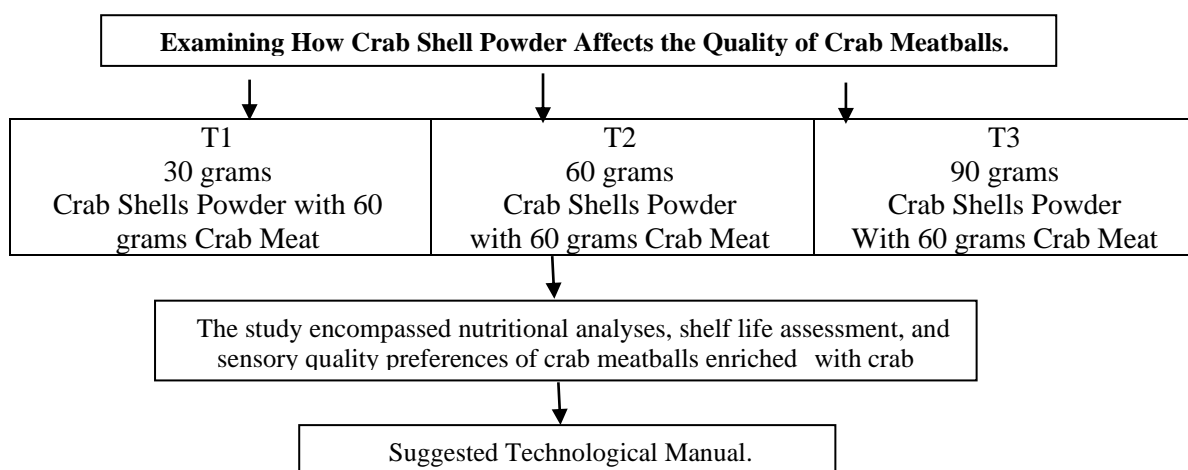


Figure 1. Theoretical and Conceptual Framework

Table 1: Sensory Attributes of Crab Meatballs Enhanced with Crab Shell Powder.

Sensory Attributes	Treatment 1		Treatment 2		Treatment 3	
	AVM	Description	AVM	Description	AVM	Description
Color	3.37	Brown	3.11	Brown	2.43	Dull Brown
Flavor	2.51	Slightly salty	3.23	Slightly Salty	2.47	Salty
Odor	2.27	Slightly Pleasant	3.04	Moderately Pleasant	4.05	Very Much Pleasant
Texture	4.09	Tender	4.07	Tender	2.45	Delicate

Table 1 illustrates the participants' perceptions of meatballs enriched with crab shell powder concerning their sensory attributes such as color, flavor, odor, and texture. The findings suggest that as more crab shell powder is incorporated into the crab meatballs, the color tends to become duller. Additionally, an increase in crab shell powder results in a saltier flavor, attributed to the larger amount of powder used. Hence, the quantity of crab shell powder significantly influences the taste profile in each treatment.

Regarding the odor, the data reveals that a higher quantity of crab shell powder added to the crab meatballs leads to a more pleasant aroma.

Consequently, the amount of crab shell powder utilized strongly influences the product's odor.

Regarding texture, treatments 1 and 2 were perceived by the respondents as "tender," while Treatment 3 was described as "delicate" due to the higher amount of crab shell powder utilized. It appears that the quantity of crab shell powder doesn't significantly impact the texture of the three treatments. However, overall, the varying amounts of crab shell powder employed in each treatment substantially influence the sensory attributes, encompassing color, flavor, odor, and texture.

Table 2: Degree of Preference for Meatballs with Crab Shell Powder.

Sensory Attributes	Treatment 1		Treatment 2		Treatment 3	
	AVM	Description	AVM	Description	AVM	Description
Color	6.47	Like Moderately	7.49	Like Moderately	6.58	Like moderately
Flavor	6.8	Like Slightly	7.45	Like very much	6.01	Like Slightly
Odor	6.56	Like Moderately	7.37	Like Moderately	5.76	Like Slightly
Texture	6.53	Like Moderately	7.73	Like Very Much	6.08	Like Slightly
Average Weighted Mean	6.59	Like Slightly	7.69	Like Very Much	5.86	Like Slightly
Rank		Rank 2		Rank 1		Rank 3

Table 2 illustrates the respondents' preferences for the three treatments of meatballs with crab shell powder. Treatment 2 obtained the highest average weighted mean of 7.69, indicating a "like very much" response. It secured the top rank among the three formulations, primarily attributed to the adequate quantity of crab shell powder used. As a result, Treatment 2 was the most preferred and favored by the participants in terms of color, flavor, odor, and texture.

Nonetheless, Treatment 1 received an average weighted mean of 5.59, and Treatment 3 scored 5.86, both described as "like slightly."

They were ranked third in the overall ranking due to the higher quantity of crab shell powder used. As a result, the respondents exhibited a moderate liking towards the color, flavor, odor, and texture of these treatments.

Table 3: Disparity in the Level of Preference for Meatballs with Crab Shell Powder.

Sensory Attributes	Computed F-Value	Tabular T-Value	Interpretation	Description
	At 5% level of significance			
Color	1.50667	3.036524	Insignificant	Accept Hypothesis
Flavor	2.83423	3.036524	Insignificant	Accept Hypothesis
Odor	31.66342	3.036524	Significant	Reject Null Hypothesis
Texture	51.53166	3.036524	Significant	Reject Null Hypothesis

Moreover, the study's results revealed a notable disparity among the three treatments concerning odor and texture, as indicated by the computed F-values exceeding the tabular F-value of 51.53166

at a significance level of 5%. However, to pinpoint the specific sources of these differences, further investigation utilizing Scheffe's Test is necessary.

Table 4: Discrepancy in the Mean Levels of Preference for Crab (*Portunus pelagicus*) on the Quality of Crab Meatballs.

Sensory Attributes	F'		(K-1) (F.05) 2(3.09)	Description
Odor	T ₁ vs. T ₂	8.17	6.18	Significant
	T ₁ vs. T ₃	0.33		Insignificant
	T ₂ vs. T ₃	5.23		Insignificant
Texture	T ₂ vs. T ₃	2.89	6.18	Insignificant
	T ₁ vs. T ₃	2.56		Insignificant
	T ₁ vs. T ₂	10.91		Significant

Table 4 presents the outcomes of the Scheffe's Test. The table highlights the disparities in the average preference test results for meatballs with crab shell powder in the three treatments.

Regarding the odor, a significant difference is observed between T1 and T2, as evidenced by the computed F-value of 8.17 surpassing the critical F-value of 6.18. This indicates that the varying quantities of crab shell powder used in these two treatments significantly impact the flavor of the product.

Concerning the texture, a significant difference is observed between T1 and T2, as indicated by the computed F-value of 10.91 exceeding the critical F-value of 6.18. This suggests that even a slight variation in the quantity of crab shell powder can greatly influence the texture of the product.

This indicates that the key significant difference can be attributed to treatment 2, which contains 30g of crab shell powder. As treatment 2 received the highest preference from the respondents in terms of odor and texture, it demonstrates that a well-blended mixture of ingredients has a considerable impact on the respondents' preferences.

RESULTS AND DISCUSSION

The shelf life of steamed crab meatballs enriched with crab shell powder was found to be three days when stored in chilled conditions and two days at room temperature, both of which were deemed safe for human consumption. Treatment 2 exhibited a longer shelf life compared to treatments 1 and 3, indicating a lower likelihood of harboring microorganisms that could lead to food spoilage. The study suggests that the quantity of crab shell powder added significantly influences the shelf life due to its impact on odor. The impact of crab shell powder on the quality of Crab *Portunus pelagicus* Meatballs was assessed in terms of color, flavor, odor, and texture across the three treatments. According to the average weighted mean, the meatballs exhibited a brown color, a slightly salty flavor, a moderately pleasant odor, and a tender texture. Overall, the results indicate that the color, flavor, odor, and

texture of the meatballs were classified as of good quality.

The level of preference for Crab Meatballs with crab shell powder in terms of color, flavor, odor, and texture was assessed among the three treatments. The findings indicated that all treatments were highly liked by the respondents, with a "like very much" rating. However, Treatment 2 emerged as the most preferred and favored choice among the participants, exhibiting higher levels of liking for its color, flavor, odor, and texture.

CONCLUSION

According to the study's results, the Crab Meatballs with the addition of crab shell powder, in terms of color, flavor, odor, and texture, were well-received by the respondents. The findings indicated that all three treatments were deemed acceptable. Moreover, the study revealed no significant difference among the treatments. This suggests that the Meatballs enriched with crab shell powder offer a nutrient-packed and healthy meal option suitable for everyone. With the positive response from the respondents, there is potential for high demand, making it a viable option for a profitable business venture.

REFERENCES

- Balch, P. (2010). Prescription of nutrition healing. Retrieved August 24, 2013 from
- <http://www.livestrong.com/article/457082>.
- Bansal, S. (2011). Waste management. Retrieved August 25, 2013 from <http://www.waste management. com> Ben Coxworth, (2012). <http://newatlas.com/chin-cheaper-antiviral-drugs/21457>
- Dary, O. (2011). The importance and limitations of food fortification for the management of nutritional Anemias. Retrieved from: www.a2zproject.org
- Gokoolu, N. (2013, April 4). [.Http://doi.org/10.1016/s0308-881646\(02\)00318-7](http://doi.org/10.1016/s0308-881646(02)00318-7)
- Gonzales, G. (2012). Fundamentals of professional cooking Anvil Publishing, Inc.

7. Jones,D. & Morgan,G.(2012).A field Guide to Crustaceans of Austrilian Waters.
8. Kiamco,H.(2003). Crab Neptunus Pelagicus Cream Processed at CSCSt-College Merly,J. (2012, March). [https://doi .org/10.1016/002-0981\(82\)90113-7](https://doi.org/10.1016/002-0981(82)90113-7)