PANTAO
International Journal of the Humanities and Social Sciences
ISSN 3028-0877
Volume 4, Issue 2 (2025)

Formulation, analyses, and acceptability of clam powder seasoning

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Abstract: The demand for natural and innovative food products has led researchers to explore alternative sources of flavors and nutrients. To help address over consumption of commercial seasoning powder, this study developed clam powder seasoning using mud clam, hen clam and surf clam. This also aimed to formulate and evaluate the sensory qualities of the powder seasoning, such as appearance, aroma, taste, and texture; determine consumer acceptability; assess differences in sensory attributes; and evaluate the shelf life at room temperatures. The best-performing variant underwent microbial and proximate analyses. The experimental-developmental method of research, using a Completely Randomized Design (CRD) was used. Evaluation samples were coded, and a score card was employed for randomization. The product formulations were completed prior to conducting three sensory testing to assess consumer acceptability. This study included three replications, ten semi-trained panelists, and one hundred consumer respondents. A 9-Point Hedonic Scale was used for evaluation, and data were analyzed using mean and ANOVA. Results showed that Treatment C (surf clam) received the highest ratings across sensory attributes, described as extremely appealing, pleasant, delicious, and smooth. Treatment A (mud clam) followed with very favorable ratings, and Treatment B (hen clam) with good ratings. In consumer acceptability, Treatments C (surf clam) was liked extremely in appearance, aroma, taste and texture followed by the Treatment A (mud clam) and Treatment B (hen clam), which obtained also a high mean score, indicating that consumer was liked extremely the powder seasoning. The appearance, aroma, taste and texture received dissimilar ratings across all treatments, indicating that there was a significant difference in all treatment. Appearance, aroma, taste, and texture was consistently rated liked extremely, with surf clam as the overall preferred variant. While there significant difference observed in appearance, aroma, taste and texture among treatments in sensory evaluation. General acceptability favored Treatment C (surf clam) in all sensory qualities. Finally, the surf clam variant underwent shelf life testing, microbial, and proximate analysis, confirming its potential for extended use and nutritional value.

Keywords: Formulation, Analyses and Acceptability of Clam Powder Seasoning

Date Submitted: May 14, 2025
Date Accepted: May 27, 2025
Date Published: June 3, 2025

INTRODUCTION

Clam consumption can improve skin complexion, that's because clams are rich in Vitamin C and iron, which contribute to collagen synthesis. Collagen is the substance most associated with youthful skin and a radiant complexion and clam consumption helps ward off Rheumatoid Arthritis by obtaining higher levels of selenium.

Clams have many health benefits, including being a good source of protein, vitamins, and minerals. Vitamin B12, helps produce red blood cells, boosts energy and mood, and may slow aging. Zinc, that helps with wound healing, immunity, and bone and muscle growth. Iron, that prevent iron deficiency and boost energy levels. Vitamin C, contributes to collagen synthesis, which helps with skin complexion. Omega-3 fatty acids, helps lower blood pressure, reduce

inflammation, and lower triglyceride levels and balance cholesterol levels and reduce the risk of heart disease and support thyroid health. Clams are abundant in protein, which includes a variety of amino acids. Clams can be eaten raw, steamed, boiled, baked or fried. They can also be made into clam chowder, clams casino, clam cakes, or stuffies, or they can be cooked. It has a tangy texture when it is overcooked and it can substitute to crabs and oyster. Clam products are traded in different forms such as with shell or unshelled, when it is already formulated it can be powdered form or variety mixture. It is a good source of income for the farmers, laborer, housewife, and to every individual for economic gross.

Mud clam is a shellfish that has a thick shelled found eight to ten centimeters beneath the surface of mud flats near mangrove swamps at low tide. Hen clam is used as a diet supplement. It leaves a few centimeters below the sand and collected at low tide by barrio inhabitants. Surf clam is a marine clam found in the sandy beaches area two to four centimeter below the surface. The average length of surf clam is five to six centimeter and they vary in color yellow-cream to orange-brown. Surf clam are harvested at low tide with either a rakee, which ties to the operators waist and pulled back and forth along a section of beach, or by twisting ones` feet back and forth in the sand.

Like other seafood, there's plenty of clean protein. Any seafood dish, provided it comes from a fresh source, and will give you some of the best protein without having to eat too many calories. This is one of the best ways for pregnant women or immune-compromised individuals to safely obtain more protein. Flavor is defined as sensations arising from the integration of signal produced as consequence of smell and taste. The hydrolysate produced from hydrolytic enzymes can enhance the flavor of the protein hydrolysate because it increases the amount of amino acids and low molecular weight peptides that possess unique taste properties including sweet, sour and bitter tastes.

Spices and herbs have been in use for centuries both for culinary and medicinal purposes. Spices not only enhance the flavor, aroma, and color of food and beverages, but they can also protect from acute and chronic diseases. Seasoning refers to the process of enhancing the flavor of food by adding ingredients like salt, herbs, spices, or other flavor enhancers. It can also be used to describe the specific ingredients themselves. Seasoning is often used near the end of the cooking process to bring out or intensify the natural flavor of the food.

In today's time the consumers prefer to live a healthier lifestyle but failed to do because they find it hard to give up their old ways of living, especially in their food intake. they find it hard to give up because one of the reasons is being fan in using commercial seasonings. The commercial seasoning is rampant and widely circulating in the market with an affordable price although it is unhealthy to the body. Nowadays, consumer growing fonder of using commercial seasoning powder and getting less familiar with the natural and safe powder seasoning, that is why the researcher conducted this study that will help the public grow fonder and aware of a healthy seasoning that can be use to prepare a of healthy soup. With that, the researcher caught the interest to proposed "Formulation, Analyses and Acceptability of Clam Powder Seasoning" as alternative in other seasoning powder when preparing soup.

The researcher's main motivation for this study is the interest of abundant mollusk like clams that can be used uncommonly by the public. In this study, "Formulation, Analyses and Acceptability of Clam Powder Seasoning" was made to enhance the flavor and taste of soup and provide a healthy seasoning in making soup. This research study aims to raise the awareness of clams and its contribution to the society in terms of powder seasoning. Not only they are spices and flavor enhancer, but it is also nutritional and healthy powder seasoning. The goal of this

study is to provide the public another alternative powder seasoning to better increase the consumption of clam by turning it into the best powder seasoning.

Problem Statement

This study introduced the formulation analysis and acceptability of clam powder seasoning with three treatments. Specifically, it sought to:

1. determine the sensory qualities of clam powder seasoning in terms of appearance, aroma, taste and texture.
2. determine the sensory qualities of clam powder seasoning which applied to soup in terms of appearance, aroma, taste and texture.
3. find out if there are significant differences in the in the sensory qualities of clam powder seasoning among three treatments.
4. find out if there are significant differences in the general acceptability of clam powder seasoning among three treatments.
5. determine the shelf life of clam powder seasoning.
6. determine the microbial and proximate analysis of most accepted clam powder seasoning.

Theoretical framework

Clams have many health benefits, including being a good source of protein, vitamins, and minerals. Vitamin B12, helps produce red blood cells, boosts energy and mood, and may slow aging. Zinc, that helps with wound healing, immunity, and bone and muscle growth. Iron, that prevent iron deficiency and boost energy levels. Vitamin C, contributes to collagen synthesis, which helps with skin complexion. Omega-3 fatty acids. helps lower blood pressure, reduce inflammation, and lower triglyceride levels and balance cholesterol levels and reduce the risk of heart disease and support thyroid health. Clams are abundant in protein, which includes a variety of amino acids. Clams can be eaten raw, steamed, boiled, baked or fried. They can also be made into clam chowder, clams casino, clam cakes, or stuffies, or they can be cooked. It has a tangy texture when it is overcooked and it can substitute to crabs and oyster. Clam products are traded in different forms such as with shell or unshelled, when it is already formulated it can be powdered form or variety mixture. It is a good source of income for the farmers, laborer, housewife, and to every individual for economic gross.

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Spices and herbs have been in use for centuries both for culinary and medicinal purposes. Spices not only enhance the flavor, aroma, and color of food and beverages, but they can also protect from acute and chronic diseases.

Seasoning refers to the process of enhancing the flavor of food by adding ingredients like salt, herbs, spices, or other flavor enhancers. It can also be used to describe the specific

ingredients themselves. Seasoning is often used near the end of the cooking process to bring out or intensify the natural flavor of the food.

A plate of steamed clams not only tastes amazing, it packs a punch in terms of nutritional value as well, loaded with B12, iron, vitamin C, potassium, and magnesium, which is vital for muscle function, nerve function, and metabolism. Clams contain no sugar, saturated fats, or carbs yet they have plenty of protein to keep you going. As one of the most nutritious foods in the world, clams offer a wide range of nutrients, including, Vitamin B12.

In fact, clams offer one of the best dietary sources of vitamin B12, giving you 824% of the recommended daily intake (RDI) per 100 grams. Clams give more B12 than beef. This vitamin is essential in producing red blood cells, forming and maintaining DNA, and aiding in protein synthesis. Omega-3, shellfish contain this essential fatty acid too. A 6-oz serving of clams gives you 337 mg of omega-3, about 2/3 of which is EPA and DHA - two of the most bioavailable omega-3 forms. The human body can use these forms much more efficiently than they can from nuts and seeds. A high intake of omega-3 fatty acids can help to lower inflammation levels. Iron is the second-most concentrated micronutrient in clams, second only to vitamin B12. In a six-ounce serving, you get 23.8 mg of iron, or 132 percent of the RDI. Iron assists in many metabolic processes, playing an essential role in oxygen transport, and it also helps to prevent anemia – an increasing global problem. In the United States, more than three million people suffer from anemia, the most common blood disorder. Protein, A great lean source of protein, clams provide 12.8 grams of protein per 100 grams. While not as much when compared with meat, consider the fact that 100 grams of clams will only cost you 74 calories. This means clams provide exceptional protein density (Terry, 2025).

Clams are live in both saltwater and freshwater. They feed by filtering water and extracting nutrients and microorganisms for food similar to mussels, oysters and scallops. Clams as seafood provide important amounts of non-heme iron. They are low in fat and cholesterol and have a moderately low caloric value. Compared to other mollusks, clams are reportedly low in contaminants, although consumption of raw clams can cause food poisoning. Clam meat is a great brain food to combat mental fatigue and brain fog, provides anti-inflammatory benefits and elevated energy levels. (Marius Lixandru, 2017).

Seasoning is a mixture of legal food ingredients that is applied as needed to accomplish the goal for which it is intended (for example, to enhance the flavour, eating quality, and/or functioning of a product). One or more herbs, spices, and other flavour-enhancing substances are often found in seasoning for a better taste of food (Tahmaz, et al. 2022).

Seasoning is a food enhancer made with natural spices and ingredients, this can assure the aromatic scent, rich flavor, and nutritious food enhancer compared to manufactured flavoring and could be substitute to the wide use of Monosodium Glutamate in the Philippines (Jimenez, 2024). Natural seasonings like dried herbs alternatives are more valued than chemical preservatives and it also enable the combination of intriguing nutrients (Lomillo, et al., 2017). The combination of herbs, spices, and seafood was used to develop so that it can be used as replacement for commercially produced supplements (Badejo, 2015). Enhancement of nutrients using blends of natural herbs and spices is a preferred approach to reduce salt as it results in a clean and more nutritious product, avoiding inclusion and declaration of chemical compounds (Ghawi et al., 2014).

METHODOLOGY

Research design

In this study,theexperimental methodology was a Completely Randomized methodology (CRD) to collect data (Anderson and McLean, 2018), the treatments are assigned completely at random in order that the experimental unit has the same chance of receiving any one treatment. Evaluation samples were coded, and a score card was employed for randomization. The product formulations were completed prior to conducting three sensory testing to assess consumer acceptability.

Respondents of the study

A total of 110 evaluators, composed of 10 semi-trained panelists and 100 consumers, evaluated the product.

Data Gathering Instruments

This study used the experimental-developmental method of research, which is primarily concerned with manipulating or controlling variables to examine their effects on a particular outcome. The experimental method focused on predicting future outcomes, specifically by observing how changes in certain variables lead to alterations in the study's results. The developmental aspect emphasized the systematic development of new products or processes, often involving iterative testing and refinement (Creswell, 2014). The experimental research follows strict controls of the researcher. This type of research design is popular in scientific experiments, social sciences, medical science, etc. This is more likely field research rather than theoretical. This article will give the reader a short guide to experimental research design and process (Zubair et al., 2023).

Developmental research is the systematic study of designing, developing, and evaluating instructional program processes and products that must satisfy the criteria of information consistency and efficacy (Agramon et al., 2018).

In the developmental research, the product developed was the powder seasoning from clam, composed of 3 treatments, which every treatment varied in the types of flavors used, such as mud clam, hen clam and surf clam.

Data Gathering Procedure

The instrument used in this study was an evaluation sheet. It dealt with the quality attributes of the product, as evaluated by experts in sensory qualities of the clam powder seasoning (mud clam, hen clam, surf clam) in terms of appearance, aroma, taste, and texture, while the general acceptability of clam powder seasoning, considering the different treatments, was evaluated by the consumers.

A total of 110 evaluators, composed of 10 semi-trained panelists and 100 consumers, evaluated the product. The evaluation sheets were distributed to the evaluators, who were randomly selected, to ensure the reliability of the data. The evaluators were oriented on how to evaluate the product in the said variables. The evaluation sheets were given to the participants, experts, teachers, students, and random consumers with their honest opinions solicited.

The evaluators were instructed to evaluate the product using a 9-Point Hedonic Scale as to appearance, aroma, taste, and texture. The 100 consumer respondents, comprised of 20 Technology and Livelihood Education (TLE) teachers, 20 cookery students in Grade 9 and 10 cookery students in Grade 10 at Feliciano Yusay Consing National High School, President Roxas, Capiz, and 50 potential random consumers with background in food technology, evaluated the acceptability of the product prepared in three treatments. After the evaluation of the finished products, the evaluation sheets were gathered.

Data Analysis Procedure

The data were subjected to the Statistical Package for Social Sciences (SPSS). Arithmetic Mean and Analysis of Variance (ANOVA) were the statistical tools used in analyzing and interpreting the data. The mean was used to determine the sensory qualities and general acceptability of mud clam in making seasoning and flavoring powder in terms of the four (4) factors used. Analysis of Variance (ANOVA) was used to analyze the differences among the three (3) treatments. The Tukey HSD post-hoc test was used to analyze where the differences lie in the general acceptability of the three (3) treatments. The alpha level was set at the 0.01 level of significance.

DISCUSSION OF FINDINGS

Sensory Qualities of Clam Powder Seasoning

The sensory evaluation of the three types of clam powder seasoning—mud clam, hen clam, and surf clam—across varying gram levels (50g, 75g, 100g) reveals consistent trends in terms of appearance, aroma, taste, and texture, as assessed by ten semi-trained panelists.

For the mud clam powder seasoning, the formulation with 100 grams consistently achieved the highest sensory ratings: it was described as “Extremely appealing” in appearance (mean 8.70), “Extremely pleasant” in aroma (mean 8.60), “Extremely delicious” in taste (mean 8.20), and “Extremely smooth” in texture (mean 8.30). Meanwhile, the 50g and 75g variants, although still rated positively, showed relatively lower scores, ranking behind the 100g formulation in all categories. Notably, appearance ranked highest for the 100g sample, followed by aroma, texture, and taste, while for the 50g formulation, appearance and taste took precedence, and for the 75g sample, texture was the standout factor.

Similarly, the hen clam powder seasoning with 100 grams emerged as the most favored, earning “Extremely appealing” in appearance (mean 8.50), “Extremely pleasant” in aroma (mean 8.30), “Extremely delicious” in taste (mean 8.40), and “Extremely smooth” in texture (mean 8.30). In contrast, the 50g and 75g variants were rated lower, with the 50g sample’s strength lying in texture, and the 75g sample’s strength also centered on texture. Generally, for the 100g hen clam seasoning, appearance was the top attribute, followed by taste, aroma, and texture.

For the surf clam powder seasoning, the 100-gram formulation again led in all sensory aspects, achieving “Extremely appealing” appearance (mean 8.70), “Extremely pleasant” aroma (mean 8.50), “Extremely delicious” taste (mean 8.80), and “Extremely smooth” texture (mean 8.60). Among the 50g and 75g variants, the 50g sample excelled in appearance, while the 75g sample shared its highest rankings between appearance and texture. Importantly, taste emerged as the strongest factor in the 100g surf clam seasoning, highlighting its superiority over lower gram samples.

Overall, across all three clam types, the 100-gram formulations consistently ranked number one across all sensory attributes: appearance, aroma, taste, and texture. The lower gram variants,

although rated as “very” appealing, pleasant, delicious, or smooth, were consistently outperformed by the 100g samples, marking the latter as the most preferred and well-balanced in terms of sensory quality. This suggests that higher clam content enhances the sensory appeal of the powder seasoning, making the 100g formulation the optimal choice among the evaluated treatments.

General acceptability of ClamPowder Seasoning

The findings of the sensory evaluation results reveals that Treatment C, featuring surf clam, stands out as the most preferred option across all assessed attributes. It achieved exceptionally high mean scores: 8.97 for appearance, 8.91 for aroma, 8.95 for taste, and 8.90 for texture. These consistently high ratings positioned Treatment C under the “Like Extremely” category for all sensory qualities, reflecting a strong level of general acceptability and clear consumer preference.

In comparison, Treatment A, which used mud clam, also received highly favorable evaluations, though slightly lower than surf clam. Notably, its taste scored a mean of 8.41, while its appearance, aroma, and texture also reached the “Like Extremely” classification. The overall general acceptability score of 8.37 confirms that mud clam seasoning was positively received and ranks as a highly favored option among consumers.

Meanwhile, Treatment B, featuring hen clam, while still appreciated, garnered slightly lower mean scores across all sensory parameters relative to the other treatments. Despite this, consumers still indicated a strong liking for its appearance, aroma, taste, and texture, with ratings falling under the “Like Very Much” category. The general acceptability score for hen clam was calculated at 7.72, signaling a notable level of approval but placing it slightly behind Treatments A and C.

Overall, the results highlight the substantial consumer appeal of clam powder seasonings, with surf clam emerging as the top preference, followed by mud clam and then hen clam. These findings offer meaningful insights for product development, emphasizing the importance of optimizing sensory qualities to enhance market acceptance and consumer satisfaction with clam-based seasoning products.

Differences in the Sensory Qualities of Clam Powder Seasoning amongThree (3) Treatments

Surprisingly, the research finds significant relationship in sensory qualities across the three treatments, indicating that the various clams did significantly alter the clam powder seasoning overall sensory experience. Consumer thought all treatments of clam powder seasoning has different amount of appearance, aroma, taste and texture.

The results have several significant implications for consumers and food industry. They recommended that the producers free to try out various clam powder seasoning that can accommodate the different preferences of consumers tastes, this creates potential for product innovation and the creation of distinct flavor profile. Furthermore, a degree of consistency and quality control in the manufacturing process is shown by the constant sensory experience throughout treatments, which is essential for preserving consumers pleasure and confidence.

The results highlighted the potential applications of clam powder seasoning as delicious powder seasoning for choice of consumers. Consumers may anticipate consistent sensory experience regardless of the exact clam utilized, which makes it simpler and based on their unique taste preferences. Overall, the results of shown that the surf clam as clam powder seasoning can satisfy the consumer demands for consistency in appearance, aroma, taste and texture. The food producers may continue to develop and improve their goods to satisfy the

changing taste of health-conscious costumers by using insights and consumers can take advantage in creating viands and menus using clam powder seasoning as an alternative.

Differences in the General Acceptability of Clam Powder Seasoning

The analysis of the differences in the acceptability of clam powder seasonings—specifically mud clam, hen clam, and surf clam—revealed statistically significant variations across all sensory attributes. For appearance, the results yielded an F-value of 173.789 with a p-value of .000, indicating that the visual characteristics of the different clam powders varied notably, likely due to the distinct clam species used. Similarly, for aroma, the F-value of 140.713 and p-value of .000 confirmed significant differences in smell among the treatments, again attributed to the unique nature and variant of each clam type.

In terms of taste, the F-value of 145.612 with a p-value of .000 showed that the seasonings differed significantly in flavor, reflecting that each clam brings its own distinct and recognizable taste profile. While the text mentions some comparability in qualities, the statistical result emphasizes that these taste variations are meaningful and detectable across treatments. Finally, texture also showed a significant difference, with an F-value of 128.562 and p-value of .000, implying that the mouthfeel and smoothness differ notably among the clam types, possibly due to differences in the clams' inherent softness and structural qualities.

Overall, the outcomes rejected the null hypothesis across all attributes—appearance, aroma, taste, and texture—highlighting that the species and physical characteristics of the clams play a crucial role in shaping the sensory qualities of the powder seasoning. These findings underscore the importance of clam selection in product formulation, as each variant contributes uniquely to the seasoning's sensory profile and ultimately to its consumer appeal.

Shelf-life of Clam Powder Seasoning at Room Temperature

The shelf-life evaluation of the clam powder seasonings—mud clam, hen clam, and surf clam—under room temperature storage, protected from water and sunlight, revealed distinct patterns of product stability. All three types were observed daily over a three-week period to monitor any changes in quality. The mud clam powder seasoning showed a notably shorter shelf life, lasting only fourteen days (two weeks) before exhibiting signs of deterioration. In contrast, the hen clam and surf clam powder seasonings remained stable with no observable changes during the first two weeks. However, by the 21st day, all three products—mud clam, hen clam, and surf clam—showed visible signs of spoilage, including mold formation, staleness, and unpleasant odors.

These findings highlight that while the clam powder seasonings initially maintain good quality, their shelf life is limited to approximately two weeks under ambient storage conditions without specialized packaging. Notably, the deterioration rate of the mud clam product appears to be influenced by factors such as temperature, which plays a critical role in microbial growth and spoilage. As emphasized by Balange et al. (2023), the integration of appropriate packaging materials can significantly extend the shelf life of clam-based products, helping maintain their quality and marketability over longer storage periods.

Microbial analysis of Clam Powder Seasoning

The microbiological assessment of the clam powder seasoning, using six packs at 48 grams each, was conducted following standardized methods: Aerobic Plate Count with 3M Petrifilm™ (AOAC Certificate No. 121403), Total Coliform and E. coli using 3M Petrifilm E. coli/Coliform Plate Count (OMA No. 991.14), Yeast and Mold using 3M Petrifilm (AOAC Certification No. 121301), and Salmonella detection using Compact Dry Media.

The results revealed that the Aerobic Plate Count was below 250 CFU/g, well within the Bureau of Food and Drugs (BFAD) reference criteria, where "M" represents the rejection level and "m" the acceptance level. For yeast and mold counts, the seasoning showed less than 10 CFU/g, also within acceptable limits. Importantly, total coliforms were not detected in the samples. The report emphasizes that these findings reflect the product's microbiological state at the time of testing and apply only to the specific samples submitted.

Referencing the Food and Drug Administration (FDA) Circular No. 2022-012, general microbial safety standards were considered. For most food products, the acceptable aerobic plate count is typically below 10^5 CFU/g, while coliform bacteria, often used as indicators of sanitation and potential pathogen presence, should generally be below 10 CFU/g. E. coli counts are expected to be undetectable (<10 CFU/g), as its presence suggests fecal contamination and potential foodborne illness. Additionally, though not listed in the provided data, the FDA mandates that food products must be free of Salmonella and Listeria monocytogenes, particularly in ready-to-eat products, to ensure safety.

Overall, the tested clam powder seasoning samples met the established microbial safety standards, falling within acceptable limits for aerobic bacteria, molds, yeast, and coliforms, with no detectable E. coli. These results affirm the product's microbiological safety at the time of testing, underscoring the importance of continuous compliance with food safety regulations to maintain public health and product integrity.

Proximate Analysis of ClamPowder Seasoning

The manufacture date (MFD) was April 7, 2024. The data showed the result for fats 6.89g/48gfoolowed by carbohydrates with 7.55g/48g, followed by moisture of 6.80 g/100g, followed by protein 21.65g//48g and total calories of 86g/48g.

The results given in this report are those obtained at the time of examination and refer only to the sample submitted. Furthermore, the results of proximate analysis suggest that clam powder seasoning contains macronutrients and micronutrients essential for human health.

CONCLUSION

Based on the study's findings and objectives, several key conclusions were drawn. First, clams—specifically mud clam, hen clam, and surf clam—can effectively serve as main ingredients in creating powder seasoning. Each type of clam contributed distinct sensory characteristics, enhancing the product's overall appeal: mud clam imparted a fresh, slightly bitter mangrove scent, hen clam delivered a pungent aroma with a pronounced delicious flavor, and surf clam offered a sea-breeze fresh aroma paired with a notably favorable taste. Across all treatments, the clam powder seasonings maintained a desirable powdered appearance and smooth texture, enriched by the inclusion of additional ingredients that boosted their visual and sensory appeal.

The general acceptability assessment showed that all three clam powder variants were positively received by the panelists, although individual preferences varied based on personal taste. Notably, among the treatments, Treatment C (surf clam) stood out as the best-performing

product, consistently earning the highest ratings for appearance, aroma, taste, and texture. Statistical analysis confirmed that significant differences existed in the sensory qualities across the three treatments, underscoring that each variant offered a unique sensory experience. Despite these differences, all treatments were deemed acceptable for consumption and suitable for culinary use, such as in soups.

Regarding shelf life, the powdered clam products demonstrated better longevity compared to their raw counterparts, remaining of acceptable quality for up to fourteen days at room temperature without developing bacterial or mold contamination. While extended storage beyond this period was not covered due to time constraints, the study emphasized the importance of future microbial testing and proximate analysis to ensure the product's safety and nutritional value over longer durations. To this end, the best-performing product—surf clam seasoning—was selected for advanced microbial testing. The results from the Negros Prawn Producers Cooperative Analytical and Diagnostic Laboratory confirmed that the product passed all minimum microbial safety standards, indicating it was safe for consumer use.

Overall, the study affirms that clam-based powder seasonings are not only sensory-pleasing and well-accepted by consumers but also meet key safety standards, paving the way for their potential in commercial culinary applications.

RECOMMENDATIONS

Based on the conclusions drawn from the sensory evaluation, general acceptability assessment, and shelf-life determination of clam powder seasoning (mud clam, hen clam surf clam). The recommendations were constructed as follows:

It is suggested that more experiment with different formulations and concentrations of clam to optimize flavor balance while maintaining product integrity and consider incorporating additional spices to offer a wider variety of flavor options and cater to diverse consumer preferences then explore alternative cooking methods or ingredient combinations to enhance the overall sensory experience of the powder seasoning.

Implement strict quality control measures throughout the production process to ensure consistency in product appearance, aroma, texture, and flavor. Then conduct regular sensory evaluations and consumer feedback surveys to monitor product performance and identify areas for improvement.

Moreover, invest in quality packaging materials that preserve product freshness and extend shelf life while minimizing environmental impact. Highlight the natural and healthy attributes of the product, emphasizing the use of clam in the powder seasoning formulations.

Leveraging unique flavor profiles of each clam treatment to differentiate the product in the market and attract consumers seeking innovative powder seasoning options and collaborate with nutritionists or health experts to communicate the nutritional benefits of clam powder seasoning to health-conscious consumers. Provide detailed information on the health benefits and culinary uses of the clam used in the powder seasoning formulations to educate consumers and enhance product appeal and offer recipe ideas or serving suggestions that showcase the versatility of clam powder seasoning, encouraging consumers to incorporate them into their daily meals or viand preferences.

The source of clam and other ingredients from sustainable and ethical suppliers to promote environmental stewardship and social responsibility and explore eco-friendly packaging solutions, such as compostable or recyclable materials, to minimize the environmental footprint of the product and foster a culture of innovation and continuous improvement within the product

development team, encouraging experimentation with new flavors, ingredients, and production techniques and stay informed about emerging trends and consumer preferences in the food industry to adapt product offerings and stay competitive in the market.

REFERENCES

Badejo, A., (2015). Nutrient Composition and Antioxidative Potential of Seasonings Formulated from Herbs, Spices, and Seafood, Journal of Culinary Science and Technology, 14(3), 222-233

Balasubramanian, H.A., Risikat, A.N &Sururah, A.R. (2016). Food: Its preservatives, additives and applications, Journal of Chemical and Biochemical Sciences, 36-47

Balekundri, A.; Mannur, V. Quality control of the traditional herbs and herbal products: A review. Future J. Pharm. Sci. 2020, 6.

Chanrachkij, I., 2013. Undulated surfclam *(Paphia spp.)* Dredge ofThailand 1-Overview-.pdf.Cited 12 Jan 2018.

Dolorosa RG, Galon FG. 2014. Population dynamics of the mangrove clam *Polymesodaerosa (Bivalvia: Corbiculidae)* in Iwahig, Palawan, Philippines. InternationalJournal of Fauna and Biological Studies. 1, 11-15.

Ekawati, E.R.and S.N.H.Yusmiati, 2018. Detection of Salmonella, sp., Vibrio, sp and total plate count bacteria on blood cockle (Anadaragranosa). IOP Conference Series: Earth and Environmental Science 102: 1-5

Elvira, Marlon. (2018). Species abundance distribution of Mud Clam (Polymesodaerosa) in selected mangrove wetlands of Butuan Bay, Philippines.García-Casal, M.; Peña-Rosas, J.P.; Malavé, H.G. Sauces, Spices, and Condiments: Definitions, Potential Benefits, CONSUMPTION Patterns, and Global Markets. Ann. N. Y. Acad. Sci. 2016, 1379, 3–16.

Guidelines for Assessing the Microbiological Safety of Ready-to-Eat Foods Placed on the Market (2014)

Ismail, M., 2015. Sensory characteristics of mud clam (Polymesodaerosa) hydrolysate (Ciri–ciri, Deria Hidrolisat Lokan (Polymesodaerosa)). Malaysian Journal of Analytical Sciences, 20(4): 812 – 819.

Jwa, Min-Seok, and Chang-Yu Hong. 2022. "Investigating the Link between Microalgal Nutrition and the Environment in Hen Clam (Mactra chinensis) Larvae Growth and Survival" Applied Sciences 12, no. 3: 1367.https://doi.org/10.3390/app12031367

Jwa, M.-S., & Hong, C.-Y. (2022). Investigating the Link between Microalgal Nutrition and the Environment in Hen Clam (Mactra chinensis) Larvae Growth and Survival. Applied Sciences, 12(3), 1367. https://doi.org/10.3390/app12031367

Jwa, M.-S.; Hong, C.-Y. Investigating the Link between Microalgal Nutrition and the Environment in Hen Clam (Mactra chinensis) Larvae Growth and Survival. Appl. Sci. 2022, 12, 1367. https://doi.org/10.3390/app12031367

Kadarsah, A., Krisdianto. &Susilawati, I. O. (2018). Study of Mud Clam Polymesoda Erosa (Bivalvia) Conservation Strategy Based on Landscape Character and Anthropogenic Activity. JurnalBiodjati, 3(2), 99-109.

Karam, M.C., Zimmera, J.P.D., Elie Baudelaire Djantou, E.B., (2016). Effects of drying and grinding in production of fruit and vegetable powders.Kloss, L.; Meyer, J.D.; Graeve, L.; Vetter, W. Sodium intake and its reduction by food reformulation in the European Union—A review. NFS J. 2015, 1, 9–19

Lea May S. Araneta; Denille G. Manalang; Christine O. Cruz (2018), Development of nutritional powdered seasoning using selected philippine vegetable. Antorcha Vol. 5 Nos. 1-2Leja, K.B.; Czaczyk, K. The industrial potential of herbs and spices—A mini review. Acta Sci. Pol. Technol. Aliment. 2016, 15, 353–365.

Marlon V. Elvira , Joycelyn C. Jumawan,. (2017). Species abundance distribution of Mud clam (Polymesodaerosa) in selected Mangrove wetlands of Butuan Bay, Philippines. Journal of Biodiversity and Environmental Sciences (JBES) ISSN: 2220-6663 (Print) 2222-3045 (Online) Vol. 11, No. 3, p. 1-6.Martínez-Graciá, C.; González-Bermúdez, C.A.; Cabellero-Valcárcel, A.M.; Santaella- Pascual, M.;Frontela-Saseta, C. Use of herbs and spices for food preservation: Advantages and limitations. Curr. Opin. Food Sci. 2015, 6, 38–43.

Mathot, A.G.; Postollec, F.; Leguerinel, I. Bacterial spores in spices and dried herbs: The risks for processed food. Compr. Rev. Food Sci. Food Saf. 2021, 20, 840–862.

Natta, L., Orrapun, S. and Orapin, K. (2014). Seafood-like flavour obtained from the enzymatic hydrolysis of the protein by-products of seaweed (Gracilaria sp.). Food Chemistry, 158: 162 – 170.

Ngo Thi Thu Thao, Danh Nhiet, Tran Ngoc Hai and Nguyen Xuan Niem. 2018. Effects of chemicals and induced methods on reproduction efficiency of mud clam Geloina

Minh Thuong, Kien Giang. Vietnam J. Agri. Sci., 16(3): 250-256. (in Vietnamese with English Abstract).

Nguyen Van Trai, 2015. Integration of mud clam (Geloinacoaxans) in a black tiger shrimp pond. Proceedings of Scientific Symposium for Young Scientists in Aquaculture, Nong Lam University-Ho Chi Minh City: 137-143.

Reunova, A.; Lutaenko, K.; Vekhova, E.; Zhang, J.L.; Zakharov, E.; Sharina, S.; Alexandrova, Y.; Adrianov, A. In the Asia-Pacific region, the COI DNA test revealed the divergence of the bivalve mollusk Mactra chinensis into three species; can these species be distinguished using shell coloration and sperm structure. Helgol. Mar Res. 2021, 75, 7.

Reunova, Y.; Akhmadieva, A.; Adrianov, A. In the Asia-Pacific region, the COI DNA test revealed the divergence of the bivalve mollusk Mactra chinensis into three species; can these species be distinguished using shell coloration and spermstructure. Helgol. Mar Res. 2021, 75, 7.

Saleh, N., Fady, R., &Toutou, M. (2015). Evaluation of garlic and onion powder as phyto additives in the dict of sea bass (Dicentrarcuslabrax), 41(2), 211-217

Sanders, E.R., (2015). Aseptic Laboratory Techniques: Plating Methods. Journal of Visualized Experiments. 6 (1), 20-25.

Śmiechowska, M.; Kaczmarczyk, A. Seasoning mixes—A hidden source of salt. Probl.Hig. Epidemiol. 2014, 95, 128–130.

Śmiechowska, M.; Newerli-Guz, J.; Skotnicka, M. Spices and Seasoning Mixes in European Union—Innovations and Ensuring Safety. Foods 2021, 10, 2289.

Sorio, Jerson. (2021). Microbiological quality of undulated surf clam (*Paphia undulata*) in selected areas in Samar, Philippines. 213-220.

Wu, Jiulin, Xiaoban Guo, Hui Liu, and Li Chen. 2019. "Isolation and Comparative Study on the Characterization of Guanidine Hydrochloride Soluble Collagen and Pepsin Soluble Collagen from the Body of Surf Clam Shell (*Coelomactraantiquata)"* Foods 8, no. 1: 11.https://doi.org/10.3390/foods8010011

Zubair, Ahsanul. (2023). Experimental Research Design-types & process. Academia Open.