Utilization of Squid Ink into Squid Ink Paste

Abstract

The process of making seasoning paste by utilizing squid ink as an alternative food ingredient and evaluating the product's final characteristics. The method used in this study was qualitative using a pre-experimental approach, which utilized primary and secondary data sources. Data collection was conducted through interviews, and a pre-experimental design to analyse various preparation techniques including squid ink utilization and seasoning paste manufacturing, and to determine the ideal recipe and formulation in seasoning paste manufacturing. This study identified that the utilization of squid ink in seasoning paste is an innovation that demonstrates potential new variations in the seasoning category that act as a flavor enhancer and a natural colorant. Squid ink paste has black and dark color characteristics that match the color of the main ingredient, squid ink as a natural colorant. The flavor characteristics produced by squid ink paste in the application of fried rice produce a different taste from fried rice in general where the taste of squid ink arises when consumed after chewing (*aftertaste*).

Keywords; *squid ink, pasta seasoning, culinary innovation*

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Introduction

Squid is an abundant marine product in Indonesia and is highly sought after by seafood lovers. One characteristic of squid is its ink sac. Squid ink is one of the black liquids from the inside of the squid; so far, many people consider it useless because it has a thick black color and produces a fishy taste. If processing squid, the shell and ink bag are discarded and become waste. Squid ink liquid generally contains melanin pigment, which is naturally found in the form of melanoprotein with a melanin content of 90%, protein of 5.8%, and carbohydrates of 0.8% (Mimmura, *et al*., 1982). Squid ink has many properties in the world of health. Squid ink liquid, which is alkaloid, is indicated to contain benefits in medicine (Nitsae, et al., 2018), such as anticancer, anti-tumors, and anti-bacterial. (Hutriani, et al., 2019). In the food service industry, such as in Italy, squid ink has been used as a seasoning for pasta dishes, and in Japan, squid ink is used as a flavor enhancer and has health properties (Sasaki, *et al.,* 1997).

Squid ink has excellent potential for economic improvement, especially in the culinary world; squid ink has been used as a food additive, including *arroz negro* (black rice), *triphones en su ink* (baby squid in ink sauce), *ikasumi jiru* (ink soup with pork and squid) and *cavianne* (imitation caviar), squid ink is also used as a food coloring (Derby, *et al*., 2013). Squid ink is still limited and susceptible to spoilage, so preservation technology is needed to extend the product's shelf life (Kristiningsih, *et al.,* 2023). One exciting innovation is the manufacture of seasoning paste, which is made by utilizing squid ink to make a practical and efficient seasoning paste that will be used to manufacture food products to provide a black color and a unique taste.

The seasoning paste is part of one of the instant seasonings. Instant seasoning is a mixture of several spices with a predetermined composition and can be directly used as a seasoning in certain foods. Instant seasoning comes in two forms: instant seasoning paste, which has a liquid and wet texture without going through the drying process. Meanwhile, instant seasoning powder is a wet seasoning that is dried and powdered. We often encounter dry instant seasonings of fish sauce, tempeh sauce, chicken sauce, and others, as well as wet instant seasonings of *rendang*, curry, and many others. The processing of instant seasoning is not only for preservation but also for practical use. (Hambali, et al 2005).

In this research, seasoning paste is one of the unique innovations in the culinary world; in making this seasoning, squid ink is used as a flavor enhancer and provides natural color. Besides, the process of making this seasoning is related to the taste characteristics produced by adding aromatic ingredients and various flavorings. The flavoring in making this seasoning is not just MSG but from the main ingredient, squid ink. It is known that squid ink contains glutamic acid, which gives it a savory taste known as an umami taste. Not only squid ink but some seafood is also a source of umami flavor, such as sardines, shrimp, scallops, mackerel, oysters, mussels, and so on. The taste created by umami is a taste that is difficult to identify its existence until finally, research conducted by a professor from Japan, Kikunae Ikeda (1864-1983), made this umami a commercial flavor. Umami is the fifth flavor from seven primary flavors (sour, sweet, salty, bitter, astringent, pungent, and harsh) to four primary flavors (sour, sweet, salty, and bitter). Umami became the fifth flavor to form and is believed by the Chinese and Japanese, who have a long-standing tradition that a specific identifiable flavor is associated with exceptionally delicious food. This flavor was named umami, a Japanese word that combines the ideas of *"umami"* meaning "delicious" and *"mi"* meaning "essence, essential nature, taste, and flavor" (Ole G, Klavs, 2014).

The process of making seasonings in this study requires the correct technique or method to create delicious flavors, not only umami flavors but authentic flavors; one of the cooking methods used in this study is the slow cooking method. This method uses temperature (around 80-90° C) and requires a long cooking time (6-8 hours). In the process, the tool used is a pressure or slow cooker that uses steam and is under high pressure. This method is used to cook various ingredients in the processing of this research, including aromatic ingredients and other complementary ingredients. One of the goals of the slow cooking method is that the cooked ingredients can release a distinctive aroma and flavor; the aroma released by some ingredients is referred to as "essential oil." Essential oils are aromas of certain plants or foodstuffs that provide a fragrant aromatic flavor. From the description above, it can be seen that this research is a new thing that researchers will develop, becoming one of the valuable innovations and having value in the manufacturing process. Therefore, researchers are interested in making seasoning paste as an innovative product by utilizing squid ink as the research focus. To study the focus of this research, researchers first reviewed several journals related to the focus of research that is almost the same as the research to be carried out. The first journal, Agusandi et al., in 2013, discusses the effect of Squid Ink Addition (*Loligo sp)* on the Nutritional Quality and Sensory Acceptance of Wet Noodles. This journal discusses the making of wet noodles with the addition of squid ink by testing the nutritional quality and sensory acceptance and makes the focus of the study. The second journal, written by Syahida Tiara et al. in 2023, discusses the Utilization of Squid Ink (*Loligo sp*) as a Natural Colorant in Burger Making. This journal discusses making burger patties by utilizing squid ink as a natural dye and making the focus of the research. With this, the topic of discussion in the recipe theme is alternative ingredients, related to the theme chosen in processing food and used as an addition to the seasoning processing. In this case, the research that will be conducted will make seasoning paste the object of the research.

Methodology

This article is based on the results of this study. The research approach is the primary way researchers achieve goals and determine solutions to problems. In this study, researchers used qualitative research, which is research used to examine the conditions of natural objects, where the researcher is the key instrument. Qualitative research intends to holistically understand the phenomenon experienced by the research subject, for example, behavior, perception, motivation, action, etc., and use descriptions in the form of language words in a particular context by utilizing various natural methods. This research is used to investigate, find, describe, and explain the quality or features of social influences that cannot be explained, measured, or described through quantitative approaches (Sugiyono, 2005; Moleong, 2005; Nasution, 2023). The research uses qualitative research because qualitative research can describe phenomena thoroughly and in-depth related to the focus of research, including product development, to be able to find out more deeply the characteristics produced by *seasoning paste* products from the use of squid ink.

In this research, there are two problems. The first problem refers to pre-experimental research, which aims to determine and find the right recipe for making the seasoning paste, and the second problem refers to qualitative research, which aims to assess the characteristics of squid ink paste made based on the ideal recipe. Therefore, the research stage is divided into two parts. In the first part of the research problem, there are several stages in the process of making squid ink paste, such as the pre-production stage, by preparing materials and tools that will be used in the research process; the second stage, namely, the production stage, this stage is a production stage that uses all tools and materials to achieve the final result of making the squid ink paste product made. The third stage is post-production, which is the final stage where the assessment of the final result through the characteristics of squid ink paste has been made through the pre-experimental method conducted by the researcher. In the

second part of the research problem, the ideal recipe is the result of the researcher's assessment, which is applied through interviews. At this stage, the researcher conducts interviews by asking selected informants questions. Data analysis is a method of processing data into information. Analysis activities in a study are carried out by examining all data from research instruments, such as notes, documents, test results, recordings, and others. This activity is carried out so that the data is easier to understand and a conclusion is obtained. The data analysis technique is carried out in two ways. The first is sensory evaluation, a term used to indicate the assessment/evaluation of an object using the senses. Sensory evaluation is a process in which specific product attributes are identified, assessed, or measured; then, the data is analyse and interpreted. These attributes can be observed through the five senses: eyes, smell, taste, touch, and hearing (Rahayu & Nurosiyah, 2012). The second is in the form of Qualitative Descriptive Analysis, an analysis of data obtained in the form of words, images, or behavior, and not poured in the form of numbers or statistical figures but by providing exposure or description of the situation or condition studied in the form of narrative descriptions. The explanation must be done objectively to avoid the researcher's subjectivity in making interpretations (Arikunto, 2010).

Results

Before conducting paste seasoning research, researchers conducted research related to paste seasoning, such as recipes, manufacturing methods, quality, and others. This paste seasoning is an instant seasoning made from various aromatic ingredients such as garlic, onions, dried chilies, lemongrass, bay leaves, ginger, galangal, etc. This paste seasoning has generally been widely produced commercially through factory processing. However, in this study, this paste seasoning can be made at home using various techniques and methods used in the manufacturing procedures, such as pressure cooking techniques, the correct freezing and filtering process, and mixing ingredients and flavors. This study demonstrated that squid ink, often considered waste, can be utilized as an innovative product ingredient; squid ink paste is one of the variations in the processing of food products. Research for the first problem formulation occurred twice at the Practical Kitchen Laboratory, Culinary Arts Study Program, Makassar Tourism Polytechnic. A review of the research process will be presented as follows: making broth seasoning with the treatment of sautéing ingredients before pressure cooking, not using ingredients such as spring onions and salted dried squid, and no sautéing process for tomato paste. When the experiment was conducted, it certainly made a difference to the processed fried rice, starting in color and taste. The fried rice produced did not have a strong squid ink flavor, while the color produced in fried rice did not have a deep black color; this happened because of the stir-frying of the ingredients at the beginning and the absence of a stir-frying treatment for tomato paste. The second experiment was in the form of making seasoning broth with the addition of spring onions, salted, dried squid, and the presence of *sautéing* treatment of tomato paste; at the time of experiment II, making seasoning broth with the addition of spring onions and salted, dried squid gave a different influence on squid ink paste. The influence is in the form of different aromas and flavors. The aroma produced by *squid ink paste* gives the impression of seafood, where the aroma is formed from squid ink, which collaborates with salted, dried squid to give a rich and fragrant aroma of squid ink. It is also unique because mixing spring onions and sautéing tomato paste gives a balanced taste between one ingredient and another and reduces the sourness in the previous experiment. The two experiments above certainly produced products with different characteristics, especially in taste and aroma. The difference in characteristics is due to using different ingredients when manufacturing squid ink paste.

Assessment of squid ink paste against researchers:

In the first experiment, the resulting paste did not have a strong aroma of squid ink due to the lack of addition of ingredients such as leeks and salted, dried squid. This first preparation had a robust sour aroma produced by tomato paste, so it had an unbalanced taste compared to other ingredients. In the second experiment, there was sautéing of tomato paste. Sautéing was done to reduce the sour taste produced as in the previous experiment, and adding spring onions and dried squid produced a more umami flavor to squid ink paste. Storage of this product was carried out at two different temperatures, namely at room temperature and refrigeration room temperature; with the difference in storage, this product did not have significant changes in characteristics in terms of taste, texture, aroma, and color. It can be concluded that between the first and second experiments, the ideal formulation and standard recipe for making squid ink paste was found in the second experiment, which was declared victorious in making squid ink paste because when applied to fried rice, squid ink paste can bring out the desired flavor and has characteristics that are by the expectations of the researcher.

Characteristics of *Squid Ink Paste* in the Application of Fried Rice Products towards Informants' Assessment:

In this study, the assessment of informants was carried out by collecting data through interview techniques by asking questions about the assessment of the required characteristics such as taste (tasting), color (observation), and aroma (smell). As described in Chapter III, Research Methods. Informants who assess this research are divided into two categories. Expert Informants have understanding and skills in the culinary arts field and understand standard and alternative ingredients, manufacturing processes, and characteristics of seasoning paste. Moreover, general informants have an understanding of and skills in the culinary arts field and can provide additional information to complement the analysis.

From the above review, the assessment of fried rice will be presented by researchers who have obtained data after conducting an interview process with informants. The interview was conducted with expert informants first; in this assessment, the expert informants consisted of 5 people. The results of the interview are as follows;

1. Assessment by Expert Informants

Assessment of flavor characteristics based on the sense of taste of the product shows different understanding. Three expert informants considered the flavoring given to squid ink fried rice to be lacking; the assessment was formed because they compared it with the taste of fried rice in general, while the two inform-ants considered that the flavoring used in this fried rice could be said to be quite pronounced and can be enjoyed. Furthermore, the five expert informants assessed that this fried rice has a squid ink flavor and does not cause a fishy taste when applied with squid ink paste. However, the five informants suggested adding squid ink paste to give a more robust flavor to the fried rice; the assessment was formed when the informants took the first bite of squid ink fried rice. Assessment of color characteristics Based on observation, all five informants assessed that this fried rice has a dark black color that matches the result of the application of squid ink paste. The assessment was formed because the five informants generally understood the ink color produced by squid. As for the assessment of aroma characteristics based on the sense of smell, the three informants assessed that squid ink fried rice has an aroma like fried rice because they compared it with fried rice that was usually consumed before. The assessment of the two informants, one of whom assessed that the aroma generated was a smoky aroma that gave a distinctive smoked and charred aroma, was formed because the researcher performed the wok cooking technique applied to fried rice. In contrast, the other informant assessed that the aroma generated was the aroma of squid ink, which was under the application of squid ink paste to fried rice. Based on the assessment of all ex-pert informants, squid ink fried rice's taste, color, and aroma can be assessed if the squid ink paste is successfully applied to making squid ink fried rice.

2. Assessment by ordinary informants

Assessment of taste characteristics based on the sense of taste of the product shows different understanding. One of the five ordinary informants assessed that the flavoring given to squid ink fried rice was considered lacking; the assessment was formed because it compared with the taste of fried rice in general, while the four ordinary informants assessed that the flavoring used in this fried rice could be said to be quite pronounced and can be enjoyed. Furthermore, the five expert informants assessed that this fried rice has a squid ink flavor produced by applying squid ink paste, where the flavor arises after chewing (after-taste).

As for assessing aroma characteristics based on smell, the five informants usually assess that this squid ink fried rice has an aroma like fried rice because they compared it with fried rice that was usually consumed before. However, the five informants thought that this squid ink fried rice was different from fried rice in general because of the color characteristics produced by this squid ink fried rice. Assessment of color characteristics Based on observation, the five informants usually assessed that this fried rice has a dark black color that matches the application of squid ink paste. The assessment was formed because the five informants generally understood the ink color produced by squid.

Based on the assessment of all regular informants, the taste, color, and aroma characteristics of squid ink fried rice indicate that squid ink paste was successfully applied to make squid ink fried rice.

Identifying Stage

In the implementation of this study, researchers found some significant differences in the main ingredients with

Defining Stage

Understanding the alternative materials in the making of this research took the form of two experiments, namely;

1. The seasoning broth should be made by sautéing ingredients before pressure cooking, not using ingredients such as spring onions and salted dried squid, and no sautéing process for tomato paste.
2. Preparation of seasoning broth with spring onions, salted, dried squid, and a *sautéing* treatment for tomato paste.

Development Stage

This chapter contains a review of the results and discussions of the research; the review in question is divided into namely about;

1. Materials and utensils or equipment
2. Stages and process of making squid ink paste
3. Researchers' assessment of squid ink paste in the application of squid ink fried rice

The review focuses on assessing the characteristics of squid ink paste applied to squid ink fried rice products by experts and casual informants. Detailed reviews on each section are contained in the successive subchapters. The review focuses on assessing the characteristics of the sauce applied to the squid ink fried rice product by experts and casual informants. The respective subchapters contain detailed reviews of each. Several stages are applied to making this seasoning paste: removing squid ink, making stock, and making squid ink paste. The description of each stage is as follows;

a. Removing Squid Ink

Fig.1. Material that has been weighed
(Source: Results of research data processing, 2024)

Removing Squid Ink involves separating the ink from the squid and freezing it for one night. This treatment is one of the initial stages before the researcher makes the seasoning paste.

b. Making Stock

Fig.2. Basic ingredients of broth (*Stock*)
(Source: Results of research data processing, 2024)

This second stage is to make broth, which acts as a liquid in the next stage; this stage will produce broth water that has been filtered for one night; the process of making this broth water is carried out using the slow cook method, using a pressure cooker, this manufacturing process is carried out to remove the essence of the ingredients which will enrich the umami flavor. The following process is that this material is blended to produce a smooth texture and not rough; this treatment is done to make it easier to separate the broth and the juice of the ingredients. After this seasoning process is blended, the following process is the freezing process, where this seasoning is stored in a container and then put in the freezer for one night. After freezing, the following process is filtering, which separates the juice and broth. This filtering process is carried out for one day and is stored in the chiller. This process uses several aids, such as a filtering cloth and bowl, to become a container for filtered broth water. Later, the broth water produced by this filtering will be used in the next stage of manufacture.

c. Making Squid Ink Paste

Fig.3. Making Squid Ink Paste

(Source: Results of research data processing, 2024)

This process uses ingredients such as tomato paste, broth water, baking soda, dry squid, and squid ink; this stage uses pressure cooking for 15 minutes on low heat; this pressure cooking method is done so that the essence contained in the ingredients can come out and provide a rich umami flavor when processing this seasoning. After cooking, let it stand and cool for 45 minutes so that the gas pressure or steam in the pressure cooker does not come out at high pressure. After cooling, the squid ink paste is filtered to produce a smooth texture. This paste is given complementary ingredients and flavors, put into a jar, and then pasteurized for 15 minutes in boiling water to kill germs and bacteria in food products.

From the explanation above, researchers have conducted trials and research on the manufacturing process through book media and journal references. In this case, researchers have determined the process as a standard procedure for making squid ink paste. This manufacturing process can be said to take three days and go through several stages, as follows.

Delivery Stage

Before conducting seasoning paste research, researchers researched seasoning paste, such as recipes, how to make it, quality, and others. The seasoning paste is an instant seasoning made from various aromatic ingredients such as garlic, onions, dried chilies, lemongrass, bay leaves, ginger, galangal, etc. Seasoning paste has generally been widely produced commercially through factory processing. However, in this study, seasoning paste can be made at home using various techniques and manufacturing procedures, such as slow cooking techniques, the correct freezing and filtering process, and mixing ingredients and flavors. Several stages are applied to making this seasoning paste: removing squid ink, making stock, and making squid ink paste. Researchers have conducted trials and research related to the manufacturing process through book media and journal references; in this case, the process is determined by researchers as a standard procedure in making squid ink paste.

Discussion

In the first experiment, the resulting paste did not have a strong aroma of squid ink due to the lack of addition of ingredients such as leeks and salted, dried squid. This first preparation had a robust sour aroma produced by tomato paste, so it had an unbalanced taste compared to other ingredients. In the second experiment, there was sautéing of tomato paste; sautéing was done to reduce the sour taste produced as in the previous experiment. Adding spring onions and dried squid produced more umami flavor than squid ink paste. Storage of this product was carried out at two different temperatures, namely at room temperature and refrigeration room temperature; with the difference in storage, this product did not have significant changes in characteristics in terms of taste, texture, aroma, and color. It can be concluded that between the first and second experiments, the ideal formulation and standard recipe for making squid ink paste was found in the second experiment, which was declared victorious in making squid ink paste because when applied to fried rice, squid ink paste was able to bring out the desired flavor and had characteristics that were following the expectations of the researcher.

Conclusion

From the results of the research conducted, the making of squid ink paste has black and dark color characteristics that match the color of the main ingredient, namely squid ink as a natural dye. And the characteristics of the taste produced by squid ink paste in the application of fried rice produce a different taste from fried rice in general where the taste of squid ink arises when consumed after chewing (aftertaste), then in terms of the characteristics of the aroma of the application of squid ink to fried rice does not cause a fishy taste, but the aroma of squid ink fried rice is made. In making squid ink paste, what needs to be considered is that the ingredients used must be quality so that the resulting product also has maximum results. The cooking techniques and methods applied in this research are not just ordinary techniques, but there are special technical treatments in the manufacturing process such as filtering which is done using a filtering cloth and then stored in the refrigerator for one night. The utilization of squid ink applied to the manufacture of seasoning paste can be said to be successful by researchers because the products produced by this research can become an innovation in the culinary world.

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