CHARACTERISTICS OF FISH SAUSAGES FROM MACKEREL TUNA WITH THE ADDITION OF DIFFERENT TAPIOCA FLOUR

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ABSTRACT

Sausage is a ground processed product that has a chewy texture and cylindrical shape which is wrapped in a special wrapper. (casing). Generally, the sausages you often find are made from beef/chicken, but sausages can also be made from fish. The type of fish that is often used to make sausages is mackerel, but basically almost all types of fish can be processed into sausages. Such as tuna, tilapia, tuna, and others. High quality fish sausage can be obtained from good handling of raw materials. Various methods and variations in taste in fish processing encourage increased fish consumption. Fish sausage is made from the main raw material of fish with the addition of other spices and tapioca flour as a texture maker. The aim of this research was to determine the organoleptic characteristics of fish sausages with the addition of different tapioca flour. The main raw material used is tuna. The treatment used was the addition of a tapioca flour concentration of 20%, 25%, 30%. The method used was descriptive analysis of the organoleptics of fish sausages. The results obtained in this research were that the addition of tapioca flour produced a less brilliant appearance of the sausage. The addition of a 20% concentration of tapioca flour produces a dense, compact, quite elastic texture, a strong aroma specific to the type, and a strong flavor specific to the product.

Keyword : *Tuna Fish, Organoleptic, Processing, Fish Sausage, Tapioca Flour*

1. INTRODUCTION

Fish is a food source that contains lots of protein, minerals, vitamins A and D. The nutritional content contained in fish is really needed by humans. However, fish have characteristics *perishable* or easily damaged, so it needs to be processed, so that the fish can be utilized optimally [1]. Mackarel tuna *(Euthynnus affinis)* In international trade it is known as little tuna or kawakawa and belongs to the Scombridae family which consists of 50 species and is the third largest product in the international seafood trade. Tuna is a type of medium-sized tuna and is a type of migratory fish whose distribution is widespread in tropical and subtropical waters in the Indo-Pacific region. More than 16% of the world's tuna, tuna and skipjack tuna production comes from Indonesian supplies and Indonesia is the third largest producing country after China and Peru in terms of marine fish catch production, including tuna [2].

Tuna fish is a fish that is easy to find at any time, but people only process it as a side dish to be eaten with rice by frying it, cooking it with keueng acid, making it into wooden fish, steaming it and processing it into shredded meat. In fact, this fish can be processed into various other food preparations, both as the main ingredient and as an additional ingredient that can improve the taste of a food, for example fish sausages [3]. Sausage is a food made from ground meat, mixed with spices, then added fat and stirred until evenly mixed and placed in a casing. Tuna fish in sausage products can increase the nutritional value of the product, because tuna has a nutritional composition that is no less important than common raw materials for making sausages such as chicken or beef [4].

Fish has a softer texture so the resulting sausage is a bit soft. The characteristics of fish sausage that must be met are that it has a chewy texture, properties *juiciness* (the presence of a lot of water/juice) is good, and the slicing power is good, and has a taste that is acceptable to consumers. Fillers are needed that can improve the properties of the fish sausage produced. The chewy texture is liked by all groups, both children and adults. Sausages on the market are generally made from beef and chicken which have a relatively high fat content, and it is still rare to find sausages made from fish [5]. Thus, tuna fish sausage has become an increasingly important part of Indonesia's culinary variety and also shows potential to penetrate the international market as an innovative product with high nutritional value and delicious taste.

According to the Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 72 of 2016, fish processing is a series of activities or treatments carried out by economic actors who process fish from raw materials to finished products for human consumption. The quality fish processing process is using fish processing guidelines and procedures that meet the requirements for quality assurance and safety of fishery products. Fishery product safety is an effort to prevent fishery products and products from potential biological, chemical and other substance contamination that can damage, harm or endanger human health, as well as ensuring that fishery products and products do not endanger consumer health [1].

Sausage is one of the products resulting from diversification from fisheries. Sausages are made from meat that is ground and mixed with herbs and spices, then put into a wrapper or casing. The chewy texture of the sausage is liked by various groups, both children and adults. On the market, sausages are generally made from beef and chicken which contain relatively high fat, while sausages made from fish are still rarely found. Basically, almost all types of fish can be used to make sausages, such as tuna, mackerel sardinella, tuna mackerel, tilapia and other types of fish [6]. Therefore, this research was carried out with the aim of determining the effect of adding different concentrations of tapioca flour on the organoleptic characteristics of the fish sausages produced.

2. MATERIALS AND METHODS

Research on making sausages by adding different amounts of tapioca flour was carried out from June to July 2024. The research was carried out at the Tropical Marine Fisheries Laboratory at the PSDKU UNPAD Pangandaran Campus. The treatment in this research consisted of using different concentrations of tapioca flour. The concentration of tapioca flour used is 20%, 25%, 30% (w/w) of the weight of fish meat. The ingredients used in making fish sausage are divided into 3, namely raw materials, binders and flavoring ingredients. The raw material is tilapia fish meat. The binding ingredient is tapioca flour. The flavoring ingredients are garlic, shallots, ground pepper, sugar, seasonings and salt. The ingredients in making tuna fish sausage consist of the main ingredients in the form of tuna and tapioca flour with different concentrations, as well as other additional ingredients as seasonings for making fish sausage, such as ground pepper, shallots, garlic, oil, sugar, flavorings, and ice. The procedure for making tuna fish sausages is the process of skinless fish filets, grinding, adding tapioca flour with different concentrations, adding spices, molding with casings, boiling, calculating the yield and organoleptic testing. Fish sausages are stored in the freezer. The characteristic tests carried out in this research were organoleptic tests and yield tests. Testing was carried out at the Tropical Marine Fisheries Laboratory.

2. RESULTS AND DISCUSSION

Fish sausage is a processed fishery product made from fish paste mixed with additional spices, which is then molded into sausage casings. Fish sausages can be made from raw water fish or freshwater fish, but sausages can be made from non-economic types of fish [7]. Sausage is defined as one of the diversified processed food products that is popular with the public, this is because fish sausage is a ready-to-eat food with high nutrition so it is the right choice for consumption. Processed foods such as sausages are often found using preservatives and artificial coloring ingredients to increase sales power [8]. The results of research on the characteristics of fish sausages with the addition of different concentrations of tapioca flour can be seen in Table 1.

Table 1. Characteristics of Fish Sausages with the Addition of Different Tapioca Starch Concentrations

Characteristics	**20%**	**25%**	**30%**
Appearance	Less brilliant	Less brilliant	Less brilliant
Texture	Dense, compact, quite elastic	Quite dense and compact	Quite dense and compact
Aroma	Type specific strength	Type specific strength	Not strong enough for specific types
Feel	Strong product specificity	Strong product specificity	Lack of product specific strength

Based on the research results, it shows that the organoleptic characteristics of fish sausages with the addition of different concentrations of tapioca flour produce different physical characteristics. The results of the appearance, texture, aroma and taste characteristics of each treatment were different. The higher the concentration of tapioca flour used, the less visible the appearance, texture, aroma and taste will be compared to other concentrations. The addition of tapioca flour concentration in all treatments affected the appearance of the fish sausage, resulting in a less brilliant appearance. The concentration of adding 20% tapioca flour produces a dense, compact and quite elastic texture, a type-specific aroma and a strong, product-specific taste. Meanwhile, in the treatment of adding a 30% concentration of tapioca flour, the taste characteristics of the fish sausage were less product specific. This is thought to be due to the addition of different concentrations of tapioca flour which affects the appearance and texture of the fish sausage. According to [9] changing the amount of fish meat in the sausage will affect the elasticity of the sausage, the more meat used the better the elasticity and texture of the sausage produced. However, more additional ingredients will affect the texture of the sausage and can even leave the sausage's distinctive properties.

Adding and mixing ingredients containing carbohydrates such as tapioca flour can form a dense sausage texture. Other ingredients such as garlic and shallots, ground pepper, sugar, ice, flavorings, cooking oil, and casings. Garlic and shallots function as aroma enhancers and to improve the taste of the resulting product. Pepper plays a role in dehydration so it can function as an inhibitor of microbial growth in food and as a flavor enhancer. Sugar will affect the taste, namely increasing sweetness, deliciousness, can affect the aroma, texture of meat and is able to neutralize excessive salt and increase energy. The casing functions to form a dense sausage, as a container for forming the sausage, determining the desired shape and size of the sausage and minimizing the weight loss of the sausage when cooked [10].

When processing fish, fileting is done, separating the meat from the head, skin, bones and spines which will become waste. Waste and filet meat will be calculated comparing the initial weight of the fish with waste and filet meat. According to [11] Yield is the percentage of product obtained from comparing the initial weight of raw materials with the final weight. In fillet processing, weight changes occur during the process. Yield calculations are carried out to find out how much fish meat can be used [12]. According to [13], calculations and observations of the yield were carried out at three process stages, namely the fileting stage, bone removal and the trimming stage (the trimming yield was combined with the skin removal yield). Grinding causes the breakdown of muscle fibers in meat

so that as much actin and myosin can be taken as possible so that the resulting sausage has a smooth and compact texture. The level of fineness of the meat greatly influences the appearance of the slices and the texture of the sausage, namely smooth and compact. Grinding is carried out at temperatures below 22^{O}C by adding ice flakes. This is to prevent denaturation of proteins which are very important as emulsifiers [14].

According to [9] states that in general white fleshed fish have better elasticity than red fleshed fish. In processing, the ability to form elasticity in fish flesh is influenced by myofibrillar proteins. Meanwhile, according to [15] Susanti (2021), myofibrillar proteins include 66 – 77% of total fish meat containing myosin. Myosin plays an important role in clotting and gel formation when fish meat is processed. The texture of the fish sausage can be seen from being elastic, springy, and when broken it does not break, meaning that all these aspects affect the quality of the fish sausage. In a study, texture is whether or not a slice is smooth when touched with a finger or the panelist's sense of taste. The aspects assessed in the texture criteria are roughness, smoothness and tenderness of the sausage produced [16].

The characteristics of fish sausage, such as aroma, elasticity and taste, will be greatly influenced by the type of fish and the ingredients used in the manufacturing process. The aroma of fish sausage will be greatly influenced by the type of fish, so use a type of fish that doesn't smell too fishy. Toughness or elasticity is influenced by the water content contained in the fish meat and the percentage of tapioca flour added to the dough, so the measurements used when making sausages must be paid attention to. Then the taste of fish sausage will be greatly influenced by the flavorings added and the type of fish used as well [17].

4. CONCLUSIONS

Making fish sausages by adding different concentrations of tapioca flour produces different organoleptic characteristics. The appearance of fish sausages in the treatment of all concentrations was less bright in color and produced a dense, compact and quite elastic texture. A concentration of 20% produces a dense, compact and quite elastic texture, a strong aroma that is specific to the type, and a strong taste that is specific to the product, while the fish sausage taste is less strong when treated with a 30% concentration of tapioca flour.

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