



## The Impact of Using Salt on Drying Rate of Fish

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### Abstrak

Pengeringan ikan dengan menggunakan tambahan garam sebagai pengawet dan untuk menambah rasa dari ikan. Penelitian ini bertujuan untuk mengetahui pengaruh berbagai dosis garam terhadap kualitas ikan nila, motan, serai asin kering dan perbedaan yang tidak menggunakan garam terhadap kualitas ikan. Jenis penelitian ini adalah penelitian kuantitatif dengan metode eksperimen. Variabel bebas dalam penelitian ini adalah konsentrasi garam NaCl sebagai perlakuan yaitu 10%, 20%, 30% dari berat ikan total. Variabel terkontrol dari penelitian ini adalah jenis ikan, kondisi cuaca dan bahan yang digunakan. Proses penelitian diawali dengan perlakuan penyiangian ikan motan, nila dan ikan serai, yaitu pertama-tama ikan motan, nila dan ikan serai ditimbang sebanyak 100 gr. Kemudian ikan disiangi dengan air mengalir dan dibuang semua isi perut ikan dan ditiriskan hingga ikan tidak terlalu banyak mengandung air. Kemudian penambahan garam pada ikan motan, nila dan ikan serai yang telah diberikan yaitu ; 27%,34%, dan 41%. Lama perendaman atau penggaraman yang dilakukan yaitu 24 jam. Setelah waktu penggaraman telah selesai dilanjutkan dengan proses pengeringan ikan. Ikan selanjutnya di keringkan di sinar matahari dengan suhu 30C sampai 35C dengan lam pengeringan 2 sampai dengan 3 hari hingga didapatkan ciri-ciri ikan asin yang diinginkan. Pengumpulan data dilakukan dengan menguji kadar garam pada ikan dengan konsentrasi yang berbeda-beda. Hasil penelitian menunjukkan terdapat perbedaan antara ikan yang diberi garam dengan ikan yang tidak diberi garam. Ikan yang diberi garam mempunyai tekstur yang lebih keras, mempunyai rasa yang lebih enak dan mempunyai ketahanan yang lebih lama.

**Keywords:** Pengeringan Ikan, Tambahan Garam, Ikan

### Abstract

Fish drying by using additional salt as a preservative and adding flavor to the fish. This study aims to determine the effect of various doses of salt on the quality of tilapia, motan, dried salted lemongrass and the difference that does not use salt on the quality of fish. This type of research is quantitative research with experimental methods. The independent variable in this study was the concentration of NaCl salt as a treatment, namely 10%, 20%, 30% of the total fish weight. The controlled variables of this study were the type of fish, weather conditions, and materials used. The research process begins with weeding motan, tilapia, and lemongrass fish, namely motan fish, tilapia, and lemongrass fish, weighing 100 grams. Then the fish are weeded with running water, removed all the contents of the fish's stomach, and drained until the fish does not contain too much water. Then the addition of salt to the motan fish, tilapia, and lemongrass fish has been given, namely, 27%, 34%, and 41%. The duration of soaking or salting is 24 hours. After the salting time has been completed, the fish drying process is continued. The fish dried at a temperature of 30C to 35C for 2 to 3 days to obtain the desired characteristics of salted fish. Data was collected by testing the salt content in fish with different concentrations. The results showed a difference between salted fish and unsalted fish. Salted fish has a harder texture, taste better, and have a longer shelf life.

**Keywords:** Drying fish, Adding Salt, Fish

## 1. INTRODUCTION

Indonesia is known as one of the countries with a very wide sea. Thus, when viewed from the state of the vast marine waters of Indonesia, Indonesia has a rich potential for fishery products (Zebua, Wildani, Lasefa, & Rahmad, 2017). Dried fish is one form of processed food that is in great demand by the people of Indonesia because dried fish is very easy to obtain both in villages and cities. The need for fish consumption is increasing every year. Fish plays an important role as a source of nutrition because fish is an excellent source

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of protein, fat, and minerals (Asikin & Kusumaningrum, 2018; E & Dharmayanti, 2014). Fish contains nutrients and fatty acids that are good for health (Firlianty, E, Hardoko, & H., 2014; Nurilmala, Safithri, Pradita, & Pertiwi, 2020; Sari, Jamaluddin, & Widodo, 2019). But fish is also a food that is easily damaged due to the high water and nutrient content, especially fatty acids and protein. The high water content makes it easier for microorganisms to grow and multiply, causing oxidation which produces a rancid odor. In fact, according to data on the potential of marine fisheries resources in Indonesia, it produces about 65 million tons per year. The great potential must be balanced with the ability of the community to utilize and process these marine products (Hayati & Nugroho, 2018; Kurniawan, Kurniawan, & Fakhurrozi, 2019). Various ways of preserving fish traditionally have been done until now, namely the drying method. Drying salted fish with salt is preserving or drying fish using salt dried in sunlight.

Traditional fishers widely use drying salted fish because it is easy to make and does not cost money. Processing and preservation by drying is an effort to improve the quality of storage (Nuruzzakiah, Rahmatan, & Syafrianti, 2016). The purpose of processing and preserving fish in principle is an effort to overcome the production and at the same time to maintain the quality of the fish before being marketed or consumed, to increase the selling value of fish as a food diversification ingredient, and to extend the shelf life of fish. The most important factor in processed salted fish food is product quality. The quality of the product in question is in the form of water and protein content. Based on SNI 01-2721-1992, the water content of dried fish is 20%-30%, and the protein content is 24.12%. The protein content of each fish is different. It is influenced by the drying process carried out.

Drying removes water from the material and uses heat to produce dry products. Drying has long been known as a method of preserving agricultural products. The drying process is to reduce the water content in the fish. The fish body contains 56%-80% water. Drying is a method for removing or removing some of the water from the material by evaporating the water using heat energy so that the material becomes more durable, its volume becomes smaller, making it easier and saving transportation space (Hanafi, Siregar, & Nurba, 2017; Yasar, Agustina, Mustaqimah, & Nurba, 2020). It is necessary to control the temperature and relative humidity of the air in which fish are stored to prevent bacteria and enzymes from working in fish and reduce the water content in fish. Some important variables in the fish drying process are relative humidity, drying time (Erni, Kadirman, & Fadilah, 2018; Yuliati et al., 2020), parabolic material, number of drying racks, drying rack height, and rotating speed. The good water content of dried fish is below 25%. It aims to reduce the activity of bacteria and enzymes. In principle, drying is a way of preserving fish by reducing the water content in the fish's body as much as possible so that bacterial activity is inhibited and, if possible, kills the bacteria. Fish drying is one of the easiest, cheapest, and oldest preservation methods. In terms of energy use, drying using sunlight does not cost anything. Drying with sunlight is also known as natural drying, or drying by using natural materials such as wind and sunlight. Drying is drying using direct energy from sunlight. Sun drying is effective, with temperatures around 35°C to 45°C (Riansyah, Supriadi, & Nopianti, 2013). The use of the sunlight is sometimes less favorable due to changing weather conditions.

Another factor that affects the preservation of fish is the use of salt (Retno, Lahming, & Amirah, 2019; Tumbelaka, Naiu, & Dal, 2013). Salt is a product that gives a salty taste. The salt produced from seawater is commonly known as NaCl. Salt has many functions in the drying process, namely as a preservative, and affects the product's taste (Murti, Sumardianto, & Purnamayati, 2021). Almost 70% of fishery products are preserved by adding salt. Drying will be better and faster if previously salted fish with sufficient salt to stop spoilage and add flavor to the fish. Although drying fish will change the nature of the meat, the nutritional

value is relatively constant. Salt is one of the ingredients used to give salted fish a taste. The concentration of salt immersion greatly affects the taste of the salted fish. Salting fish is a traditional preservation process that the community has carried out for a long time because the process is simple and easy. With the use of fish salt, fish become durable because salt is hygroscopic, so it can draw water out of the fish body so that the work of spoiling microorganisms in fish will be hampered (Awdayah, 2016; Usmany & Liline, 2018). The findings of previous studies showed that the addition of salt with different concentrations in the drying process of fish affected the water content, protein, amino acids, and TPC of fish (Bahmid, Lekahena, & Titaheluw, 2019; Puspitasari, Siti Aisyah, Wilianti, & Albarah, 2021). The water content of salted fish tends to decrease with increasing salting time (Retno et al., 2019). The longer the fish meat is soaked in the salt solution, the more water will come out of the material. This study aims to determine the effect of various doses of salt on the quality of tilapia, motan, dried salted lemongrass and the difference that does not use salt on the quality of fish.

## **2. METHOD**

This type of research is quantitative research with experimental methods. The independent variable in this study was the concentration of NaCl salt as a treatment, namely 10%, 20%, 30% of the total fish weight. The controlled variables of this study were the type of fish, weather conditions, and materials used. The research process begins with weeding motan, tilapia and lemongrass fish, namely motan fish, tilapia, and lemongrass fish, weighing 100 grams. Then the fish are weeded with running water, removed all the contents of the fish's stomach, and drained until the fish does not contain too much water. Then the addition of salt to the motan fish, tilapia, and lemongrass fish that have been given, namely, 27%, 34%, and 41%—mixed evenly on the fish that has been cleaned. Motan fish, tilapia, and lemongrass fish have been given salt according to the desired salt concentration. The duration of soaking or salting is 24 hours. After the salting time has been completed, the fish drying process is continued. Fish that have been given salt and soaked must first be rinsed with running water so that the salt crystals that are still attached to the fish are lost. Salted fish that has been given a long treatment salt concentration as desired. The fish dried at a temperature of 30C to 35C for 2 to 3 days to obtain the desired characteristics of salted fish. Data was collected by testing the salt content in fish with different concentrations.

## **3. RESULT AND DISCUSSION**

### **Result**

At this stage, the researcher will conduct research on fish that have been given salt and what effect it has on the taste and quality of the fish during the drying process. Salted fish is preserved by giving salt, then dried in the sun until the fish is dry. However, we distinguish these fish into two types; salted and unsalted. The research began with the practicum of drying salted fish. The activity can be seen in Figure 1 about the flow of the practice. The results of the practicum of drying fish with salt can be seen in Table 1, the results of drying fish without giving salt can be seen in Table 2, and the combination of salt concentration and drying time is in Table 3.



**Figure 1. Fish drying steps**

**Table 1. With the addition of salt**

NO	Type of fish	Drying Time	Add salt	Texture	Quality
1	Tilapia	Three days	2 tbsp	Dry	No fishy smell and long-lasting.
2	Motan Fish	Two days	1 tbsp	Dry	No fishy smell and durable
3	Lemongrass Fish	Two days	1 tbsp	Hard	No fishy smell and long-lasting.

Addition of salt to fish in tilapia, motan, and lemongrass. The dose of salt is different; if tilapia is two tablespoons salt, for motan fish and lemongrass fish, salt is one tablespoon. The drying time of the fish depends on the hot sun; if the weather is cloudy, then the drying time of the fish is long. Each time the drying or drying of fish varies depending on the sunny weather and the thickness of the fish or the weight of the fish; tilapia takes three days to dry or dry because tilapia has thick meat, drying time takes a long time. As well, as its dry and not wet texture adds to its deliciousness that is attractive to the eye and does not rot easily, the quality of the fish is durable and odorless so that if it is traded, it will satisfy the buyer. Motan fish has a dry texture, making it crunchy and delicious and adding taste when eating it. The quality of the fish does not smell fishy, so it does not invite flies/caterpillars and lasts for

weeks. It remains intact. Lemongrass has a dry texture that is not moist, making a crunchy, savory, delicious aroma, which invites the appetite to consume it. The quality of fish does not smell fishy/rotten. It lasts a long time so that it can be traded to stalls, markets, and imports between foreign countries to improve the progress of our country and change the poor economy because the way to produce quality dried fish and salted fish does not cost a lot of money especially when it is made using sunlight. After being tested for research on fish that was given salt, the quality of the fish was more durable than fish that was not given salt. And even in terms of taste, fish that uses salt is more feasible or delicious for consumption. Because even without seasoning or other flavorings when cooking, the salted fish already has a distinctive taste. In contrast to fish that are not salted, the taste will be bland. Salted fish made for drying with the help of sunlight is an alternative drying process and the oldest drying that has existed since ancient times. However, this drying is still often done today.

**Table 2. Without the addition of salt**

NO	type of fish	Drying Time	Without added salt	Texture	Quality
1	Ikan Nila	Four days	-	A little damp	Smells fishy and easy for flies
2	Ikan Motan	Three days	-	Dry	Smells fishy.
3	Ikan Serai	Two days	-	Hard	It smells fishy and a bit damp.

After researching that dried fish without added salt is different from salted fish because fish without added salt has a different smell, which is slightly fishy. Fish without salt has a moist texture because when drying, the fish are often attacked by flies and insects, so the fish are easier to use. to rot and have an unpleasant odor. Fish without salt is also often made by riverside communities because there is a distinctive smell from the fish. Fish without salt smells fishy after the fish is dry because there is no preservative. Drying without adding salt will quickly rot if the sunlight temperature is not high. However, if the sun's temperature is high, the fish without salt will not rot easily and smell bad. It's just that the taste will be very different from the salted fish. However, the nutritional content of fish preserved without salt through a drying process makes the price of fish more expensive. When processed, the fish is crispier and has a natural savory taste compared to salt.

**Table 3. Combination of salt concentration and drying time**

Treatment	Salting concentration	Drying time
A	35%	Four days
B	30%	Three days
C	28%	Two days

The addition of the first fish contained 35% of the salt that was smeared on the part of the fish. There was a 30% addition of salt in the second fish treatment, and it took three days for the fish to dry. And treatment C added salt as much as 28% to the fish and required time for two days to dry the fish. The salt concentration was different for each fish treatment because the types of fish we studied differed in size and type, so the percentage (%) of salt for each fish differed. Then the drying time of the fish is also different because the type of fish we studied was not the same size as the fish.

## Discussion

The processing and preservation of fish by drying is an effort to improve the quality of storage (Nuruzzakiah et al., 2016; Yuwana, Zulliansyah, Susanti, & Efendi, 2019). Fish processing and preservation are an important part of the fishery industry chain. Without these two processes, increasing fish production will be difficult. Drying is a method for removing or removing some water from the material by evaporating the water using heat energy. The material becomes more durable, its volume becomes smaller, making it easier and saving transportation space (Hanafi et al., 2017; Yasar et al., 2020). Fish drying is usually done by spreading the fish on a net and with direct sunlight as a heat source. However, this method has weaknesses. It is very dependent on the weather, requires a large drying area, is easily contaminated by the environment, such as dust and other animal disturbances, to reduce its quality (Yasar et al., 2020). Several factors influence the fish drying process, namely relative humidity or temperature drying time. Several factors influence the drying process of fish, namely relative humidity or temperature, drying time (Erni et al., 2018; Yuliati et al., 2020), number of drying racks, drying rack height, and usage (salt concentration).

Salting or salting in preserving fish is the most commonly used method. Salting is a traditional way of processing fish with the product in salted fish (Azka, Ratrinia, Hasibuan, & Harahap, 2019). The processing of salted fish is a way of preserving fish that has been ancient even until now. It is still a staple of the needs of people's lives. Salted fish is a food ingredient made from wet fish that is preserved by giving sufficient salt (using salt in the form of crystals) then drying in the sun (2-3 days). At the time of drying, the fish is occasionally turned over so that it dries quickly and changes color to brown (Bahmid et al., 2019; Muhammad, Dewi, & Kurniasih, 2019). The salting process is carried out in several ways, namely 1) dry salting, dry salting is used for both large and small fish. Salting uses crystalline salt. The fish to be processed is sprinkled with salt and then arranged in layers. Each layer of fish is interspersed with a layer of salt. Furthermore, a layer of salt will absorb the fluids in the fish's body. 2) Wet salting uses a salt solution as a medium for fish. The salt solution will suck the fish's body fluids (so the concentration decreases), and the salt ions will immediately enter the fish's body (Nahrudin, 2014).

The purpose of giving salt in the fish drying process is to absorb the water content in the fish meat so that the activity of microorganisms can be stopped. In addition, the salt solution can also cause osmosis in microorganism cells which causes a lack of water content in bacterial cells (Puspitasari et al., 2021; Tumbelaka et al., 2013). The results showed a difference between salted fish and unsalted fish. Salted fish has a harder texture, taste better, and has a longer shelf life. Then at the time of drying, fish given salt are not much infested by flies because it tastes salty. However, fish that are not given salt does not have a prominent taste, and when drying, the fish are infested by flies so that it is easy for the fish to rot (Puspita, Agustini, & Purnamayati, 2019). Fish that have been given salt will have a very good quality level. Fish will last longer than fish that do not use salt (Patang & Yunarti, 2014). The results of this study are following previous studies which showed that salt concentration and salting time had a significant effect on the characteristics of salted fish, which included salt content, water content and total microbes, a salt concentration of 15% with a salting time of 24 hours was the best treatment for salted fish products (Akwardiansyah, Desniar, & Uju, 2018). The addition of salt with different concentrations in the drying process of fish affects the water content, protein, amino acids, and fish TPC (Bahmid et al., 2019; Puspitasari et al., 2021). With this preservation method, fish meat usually rots in a short time. Making salted fish is done with the aim that students know how to make salted fish and the quality of fish from different salt solutions. It is hoped that fish preservation by drying method using salt can be continuously improved with new, more

modern discoveries so that there is an increase in the processing of fishery products, which will impact the welfare of fishers.

#### 4. CONCLUSION

Based on the research results that have been done, it can be concluded that salted fish is fish that is preserved by giving salt then dried in the sun until the fish is dry. Salted fish has a better taste, a harder texture, and a more durable quality. The process of drying fish here using sunlight.

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